Retail Execution & Image Recognition:
The Elusive Competitive Edge for Consumer Goods Manufacturers

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Along with the typical trials of ensuring optimized product availability, visibility, and distribution in retailer stores, Consumer Packaged Goods companies now face new challenges caused by the digital disruption of the retail industry. On one hand, pure players completely redefine the way to approach shoppers as well as the experience behind acquiring fast moving goods with online shopping. For instance, Amazon used their acquisition of Whole Foods to force a new dynamic in grocery and perishables shopping. Shoppers can now get their products delivered to the location of their choice in a timely fashion and only travel to the supermarket to purchase specific items. Likewise, the emergence of micro-retail where shoppers visit smaller stores more frequently to buy the products that they need at a given time is growing.

On the other hand, CG manufacturers must continuously fight to increase profitability and revenue per available space in the stores. They must leverage the scarce visits shoppers make to hypermarkets and the frequent ones they make to convenient stores. As a result, CG companies focus more efforts on impulse products and cross-merchandising activities to maximize the purchases made during visits to physical stores. For example, they reinforce promotion and trade marketing tactics such as flash sales to encourage consumers to test new products and flavors or to introduce new packaging. Taking these challenges in and balancing offerings across channels to win over shoppers' hearts and minds and drive growth has become the new way of doing business in retail. But, it takes agility and innovation to make this turn, a process which is sometimes difficult to undertake rapidly. Indeed, Business Insider warns that 12,000 stores could close in 2018 in the US alone - over 30% more than in 2017, and that 25 major retailers could file for bankruptcy due to this turmoil. For

CPG organizations, that means less space to occupy on the shelves and fiercer competition to appear on the ones that are left, which adds another challenge to their growth ambition. A shelf can only contain so many products, so they must find additional ways to reach their objectives of cost optimization and revenue growth.

The main battlefield is the store, so leveraging new technologies and innovations to improve execution at the point of sale is a must. Following a Retail Activity Optimization (RAO) strategy to ensure that the most promising visits are executed and that the right actions are implemented while at the store is crucial to achieving better results. Forward-thinking companies continuously look for new ways to optimize retail execution activities. They search for best business practices to empower their sales reps as they address planogram compliance issues and negotiate with stores. Whether their company objective is to reduce costs or increase sales, CPG firms must seek to capitalize on the time their sales reps spend in stores to make visits as profitable and effective as possible. Hence, one of the pillars of an RAO strategy is to identify those in-store tasks that are more time-consuming and to find ways to add more value to the outcomes of such activities - especially where it matters the most (at the store).

To do so, combining cutting-edge technologies for Retail Execution and Image Recognition into an all-in-one solution can help FMCG companies address the modern challenges of the retail business. In this document, we will discuss how a joint solution of Retail Execution and Image Recognition (RE/IR) can provide the elusive competitive edge they have longed for.

PART 1:
Debunking the myth of Image Recognition in Retail

Looking Under the Hood
the technology behind the scenes

Before understanding the benefits of a fully integrated RE/IR solution, it is necessary to take a closer look at the technology behind Image Recognition to demystify its use and address common misconceptions. Artificial Intelligence (AI), and specifically deep learning, one of the most robust AI methods used to perform Image Recognition in retail, is at its core. But, contrary to widespread belief, deep learning does not mimic the human brain. While scientists were aiming at emulating the decision-making ability of the human brain when they started building expert systems[1], they realized that they could solve complex problems such as recognizing objects and produce results comparable to - and in some cases superior to - human experts without copying the way the brain processes information. Deep learning, whose most modern models are based on what we call artificial neural networks, was developed in this context. While neural networks are vaguely inspired by information processing and communication patterns in biological nervous systems (they are composed of neurons that transmit a signal to other neurons in the same system), they present various differences from the structural and functional properties of biological brains, which make them incompatible with neuroscience evidences.

Neural networks «learn» to perform tasks by considering examples, generally without being programmed with any task-specific rules. For instance, in Image Recognition, they might learn to identify images that contain apples by analyzing example images manually labeled as «apple» or «no apple». They do this without any prior knowledge about apples, in other words without any rules. In a deep learning model, the accuracy of the results is directly correlated to the amount of example images, each new example image being an opportunity for the system to learn and to improve its capacity to perform the task. The level of accuracy grows over time because the more the system receives different images of the same product, the more it enriches its identification parameters with different angles, shades, perspectives, etc., increasing the recognition performance. It is also how the system can discern and identify shelves, categories, products, texts, and so on; it extracts and compares their characteristics against the different pictures it receives. In other words, the more images, the better the recognition. This is why deep learning is particularly adapted to Image Recognition in the retail environment. With sales reps, crowdsourcers, shelf cams, and now even drones and robots being able to provide pictures of the shelves, data collection through picture-taking is a handy process.

[1] The first versions of systems using artificial intelligence.

But, for Image Recognition to succeed in the retail environment, the technology must embrace the rules of retail within its algorithm. This means that the programmer must have an acute knowledge of the industry for which he or she builds the system. Their expertise must help adjust it to adapt the system's capabilities to the reality of the store environment to find products in specific locations and various dispositions. Once the algorithm is modeled, the system automatically determines which parameters are necessary to recognize individual items from the set of images it is fed. During this learning phase, each neuron within the network tunes its parameters to optimize the recognition of each product. The technology enables the continuous improvement of the recognition as more photos are introduced to the system. In addition, the system will learn from feedback given by users; for every picture sent, users indeed have the opportunity to correct the results provided, thereby enhancing the product identification capabilities.

Concretely, there are two major rules CPG companies should be mindful of for successful Image Recognition in retail:

1. Companies must provide their technology vendor with at least one standard image of their products, preferably an image that matches the way the product appears on the shelve (e.g., finalized packaging, real products) rather than stock images. Provisioning a large product image database with updated photos helps the system learn about the products' characteristics as it builds its recognition capabilities.

2. Picture quality also plays a role in the identification process. CPG companies do not need expert photographers or the most advanced devices to capture images. However, photos that are too dark or too blurry may have an impact on product recognition. A simple rule of thumb to follow is to be able to discern the products in an image clearly. If the human eye can recognize them, so can the computer.

Image Recognition provides CG manufacturers with a means to efficiently collect shelf data digitally, as opposed to doing so manually, and then transferring the results into a Retail Execution solution. But, as simple as this sounds, Image Recognition requires a degree of customization to help CPG firms tackle their own retail challenges. In this context, FMCG businesses must ask themselves a series of fundamental questions as they seek to implement Image Recognition to optimize their retail execution processes. More specifically:

a. The definition of a facing: What do I mean by "facing"? Is it the front of one product or do I include product stacks as one facing? Do I consider a product side a facing, as well?

b. KPI collection: What KPI do I want to monitor? Do I want to exclude certain competitors from my analysis? What about unknown products?

c. Promotion tracking: Do I want to identify cross-merchandising activities along with the count of the items on the shelf?

d. Seasonal activities: Do I want to include KPIs to monitor seasonal packaging variations?

The answers to these questions are crucial for an Image Recognition project to succeed because they focus on the use and benefits the technology can provide to enhance retail execution practices.

From theory to practice:
the benefits of Image Recognition

Thanks to four key levers that enhance in-store execution capacities, Image Recognition allows CG companies to engage in some of their objectives to cut down retail execution costs and obtain some relevant uplift in store sales.

Speed

According to a recent study published by Microsoft, over 60% of store checks involve manual measurements (2017). We know from experience that sales representatives can take up to several hours to perform manual checks in a single store, especially if their categories are numerous or complex. This lengthy process can leave sales reps with little time to dedicate to their clients and lead to productivity issues. Reducing the time spent performing store checks by replacing manual measurements with digital measurements is one of the four weapons that the technology provides CPG firms to support their company objectives. For example, a leading player in the soft-drinks industry using this technology reports their sales reps now obtain the shelf data they need to collect within two minutes after sending photos to be analyzed. As a result, not only do they reduce the store check time by 80%, but they are also able to implement corrective actions immediately at the point of sale.

Breadth

With Image Recognition, sales reps can also seek to increase their store coverage to maximize sales opportunities. According to Bain & Company, nearly 40% of CPG executives view channel strategies as the top lever to enhance sales force effectiveness. In the channel strategy approach, CPG businesses optimize their turnover by exclusively allocating their field rep resources to stores with the highest business potential. But while such methods are robust, they are also limited. They tend to cluster sales opportunities to preferred stores, resulting in lost opportunities in the ones that are not visited. Image Recognition helps CPG firms overcome this limitation by reducing the time of compliance checks, which can allow field forces to cover more stores in the same time frame.

In addition, it can provide FMCG businesses with exhaustive visibility over store shelves without requiring more work from their sales reps. Lengthy manual measurements deprive CPG firms of that benefit; they often ask field reps to focus on star SKUs to maximize the number of high potential stores visited in a day.

With Image Recognition, FMCG companies can produce all the KPIs they need from a single photo and monitor their competition's activity. As a result, they can fine-tune their analyses and significantly grow their understanding of the shopper and the category by processing and cross-referencing shelf data with other sources of data (e.g., epos, display, pricing data, etc.). These capabilities help CPG firms make more relevant recommendations to their clients.

Accuracy

Best-in-class Image Recognition solutions achieve 98%+ accuracy rates. By experience, manual store checks hold between 15% and 40% errors. That means that for every 10 facings, one to four have invalid measurements. Scholars make similar observations, as well. In a study published by Stanford University in 2016, Chong, Bustan, and Wee report that alternatives to manual store checks mixing photos and manual labor have been proposed in an attempt to improve accuracy. However, they reveal that even when photos are taken in store and later manually compared to benchmark planograms for analysis, "error rates [can still reach] up to 20%.»

There are three reasons which can explain low accuracy levels recorded with manual measurements: self-interest, store hazards, and cognitive biases. Most CPG companies incentivize their sales reps based on the results they obtain from their store checks, so altering the reality in stores to reach individual objectives can be tempting. At times, field forces may also choose to adapt to the operational hazards of the store (e.g., a delay in order delivery) and change some KPIs slightly considering that the shelf situation at that moment does not describe the reality of the store. But beyond making conscious modifications, field reps are subject to cognitive biases[2]. In the retail environment where they must recognize hundreds of facings per store, the 180+ cognitive biases the human brain is subject to are a natural limitation to reliable measurements. Therefore, the accuracy rates recorded for full or partial manual measurements are too weak for CPG companies to base their business decisions on. That is why Image Recognition is particularly adapted to the challenges FMCG companies are facing.

Consistency

The robustness of an Image Recognition solution in retail lies in its capacity to deliver objective, standardized, and repeatable measurements to CPG firms. Transferring the production of shelf data to the technology allows CPG businesses to suppress any manual intervention this process requires. Thus, they can rely on the accuracy rate provided by the best Image Recognition solutions on the market to establish objectivity for every store check. In an article published in TIME Magazine, Lance Whitney explains that «Computers don't suffer from important limitations that plague human beings. They're not restricted by biology, they don't get tired, they can crunch numbers for long hours, and they're exceptionally smart while doing repetitive mathematical tasks» (2017). So, on top of delivering impartial shelf data, the product recognition techniques embedded in an Image Recognition solution for retail can be repeated countless times without impacting results' reliability.

As FMCG businesses distribute their products all around the world, their ability to standardize store checks to retrieve the same quality of data from every market is crucial. Without this process in place, their business decisions may be misled, which can hurt their global sales and market position. The way Image Recognition is designed solves that challenge. No matter the market, shelf photos are processed and analyzed in the same fashion by deep learning's algorithm, preventing any inconsistencies from occurring.

[2] A cognitive bias is a type of error caused by an attempt of the brain to simplify the complex information it receives from the world (2018). Cognitive biases help human beings select, process, and interpret information faster to reach decisions at a relative speed. But while the brain selects information, it also losses some of it.

PART 2:
The value of an all-in-one Retail Execution/Image Recognition solution

Although CG firms can experience the benefits of Image Recognition in a standalone application, they can also use it to complement the top-class business processes they manage in advanced Retail Execution solutions. As they strive to keep up with today's retail landscape, FMCG companies often resort to different applications to optimize their field forces capacities and ultimately influence costs and sales. However, this practice can easily result in them having to manage a handful of siloed applications, losing valuable time and insights in the process. Equally, relying on one solution to provide all the different services they need is not optimal. No one solution can be the best at covering every aspect of retail, not to mention the technical risks depending on one tool to manage all retail execution activities implies. From an IT perspective, deploying, implementing, and upgrading a solution which already embarks other applications through integrated APIs is a relief. Not only does it mitigate the risks of technical failure, but grouping these phases also generates considerable time gain. Thus, the best option for CPG firms is to integrate the most robust solutions in the market together to get a holistic view of their activities and make business decisions that drive growth.

Merging Image Recognition with the single front-end application provided by Retail Execution solutions can generate a high return for CG organizations as well as bring efficiencies in Total Cost of Ownership. For instance, reports indicate that this type of advanced solution can save CPG firms nearly 240 employee hours per year[3].

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While time savings is one of the benefits of a powerful RE/IR solution, it is not the only one. An all-in-one application helps them improve shelf insights and sales force productivity in various ways to optimize field execution and reach company objectives. The joint solution accompanies field forces throughout their daily activities, from visit planning to sales and reporting. As a result, they can:

1. **Determine which Store to Visit Based on Business Opportunities:** From their application, reps can leverage Image Recognition to know which stores to visit in priority. How? By relying on past photos and planogram compliance reports to assess which points of purchase are more likely to hold the highest business potential. After selecting the stores to visit, they can create their schedule and ask the SFA tool to advise them on the best routes to take to optimize their time.

2. **Assess POS Opportunities in Real Time to Maximize Sales:** Studies report that the overall compliance rate for points of purchase and displays typically is less than 30%[4]. An RE/IR solution helps CPG companies reverse this trend. While in stores, field forces can collect shelf data digitally using the photo capture component of Image Recognition embedded in their SFA tool. Building on Image Recognition's four key levers, sales reps can access KPI reports instantly to correct planogram compliance issues and increase sales during their visit. They can also use the store' sales data readily available in the application to reinforce their arguments. For example, if a product is missing from the shelf, field reps can combine IR and RE data to quantify the revenue loss impact of a specific Out Of Stock situation to the store. This capacity to collect real-time POS data can help FMCG companies increase sales by 10%[5]. A joint RE/IR solution enables them to take the execution process even further. By integrating order placement options directly into the application, CG firms break down the barriers to purchase that their client can experience to support their field forces' efforts fully.

[3] Based on Planorama and AFS Technologies' clients before and after implementation comparisons
[4] Research commissioned by Promotion Optimization Institute, Gartner, and Microsoft
[5] Based on Planorama and AFS Technologies' clients before and after implementation comparisons

A joint RE/IR solution impacts every stage of the Retail Execution process

1.
Define/Refine

RE/IR solution

2.
Execute

3.
Measure
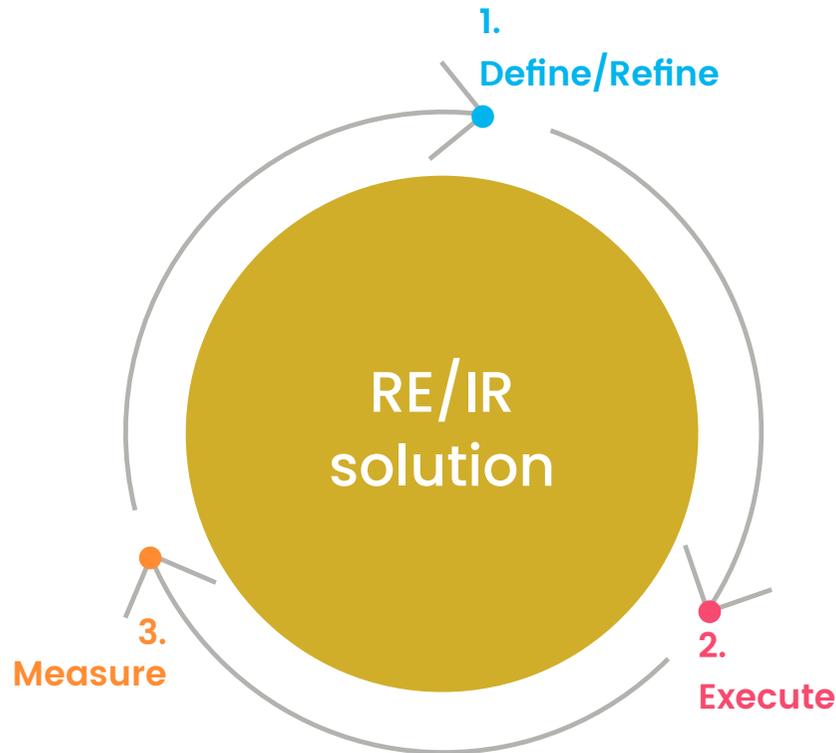
3. **Drive Business Decisions by Compiling Data from Different Sources:** A RE/IR solution can serve as a central retail execution platform between CPG companies' operational teams and headquarters. The capability of the system to compile data from different sources into compelling reports and dashboards can help field and merchandising teams optimize shelf analyses, identify potential issues and perform corrective action during their daily retail activities. Meanwhile, headquarters have full visibility over their operations to evaluate overall planogram compliance and measure the success of their perfect store initiatives. Thus, a joint RE/IR solution enables CPG firms to monitor and control all the elements of the retail execution process in a single application. With Image Recognition, they can collect more shelf KPIs in a consistent, accurate, and granular way, and automatically enrich their RE reports to generate actionable insights and reach proactive business decisions.

This is why Planorama and AFS Technologies, two leading organizations in their respective fields of Image Recognition, Retail Execution and Sales Force Automation, have come together to provide FMCG companies with a solution that will help them bring retail execution to the next level. With a single handshake, CG firms can benefit from the implementation of a vast number of features and functions to freely design their business processes in retail execution and direct store delivery. The seamless integration of the two solutions allows them to quickly get measurable results in sales increases and cost savings, making it the best value for their technology investment. At Planorama and AFS Technologies, we know that actions speak louder than words, which is why we have chosen to illustrate the benefits obtained from our joint solution by sharing some real-life examples!

Saving Retail Execution Costs by Improving Sales Force Productivity in Store

Among the benefits of an integrated RE/IR solution, improving sales force productivity to reduce costs at the point of purchase is one of the first that comes to CPG organizations' minds. Thanks to the accuracy and consistency provided by Image Recognition, one of our clients improved product identification across 50 different store formats in Latin America. They were able to leverage the speed provided by our joint solution to perform faster store visits, reducing the time spent by sales reps on store checks by 45%.

In addition, CPG companies can use the time that they gain back from faster KPI measurements and order taking to make more efficient, and shorter store visits resulting in reduced resources they mobilize for store checks. Another of our clients, a leading player in the FMCG industry, achieved a reduction of nearly 1/3 of their retail execution costs by doing so.

Regaining Independence from Third-Parties

Thanks to the 98%+ accuracy rate provided by best-in-class Image Recognition solutions, CG firms no longer need to resort to 3rd party auditors to verify the accuracy of their sales reps' measurements. Likewise, the shelf data collected by the field forces in stores can turn buying sample data from third parties into an obsolete expense. Either way, manufacturers can benefit from significant cost savings with Image Recognition.

In one customer example, a leading brand in the market of households, health, and personal care products managed to reduce their auditing costs by nearly 50% with Image Recognition. This was the result of greater accuracy and consistency eliminating the need to hire auditors to conduct more reliable store checks. As they substituted auditors with Image Recognition, they were able to rely on their field reps to perform this task. Not only did it decrease their costs, it also enabled them to gain more qualitative data and access more KPIs which they were directly able to analyze and interpret using their customized dashboards.
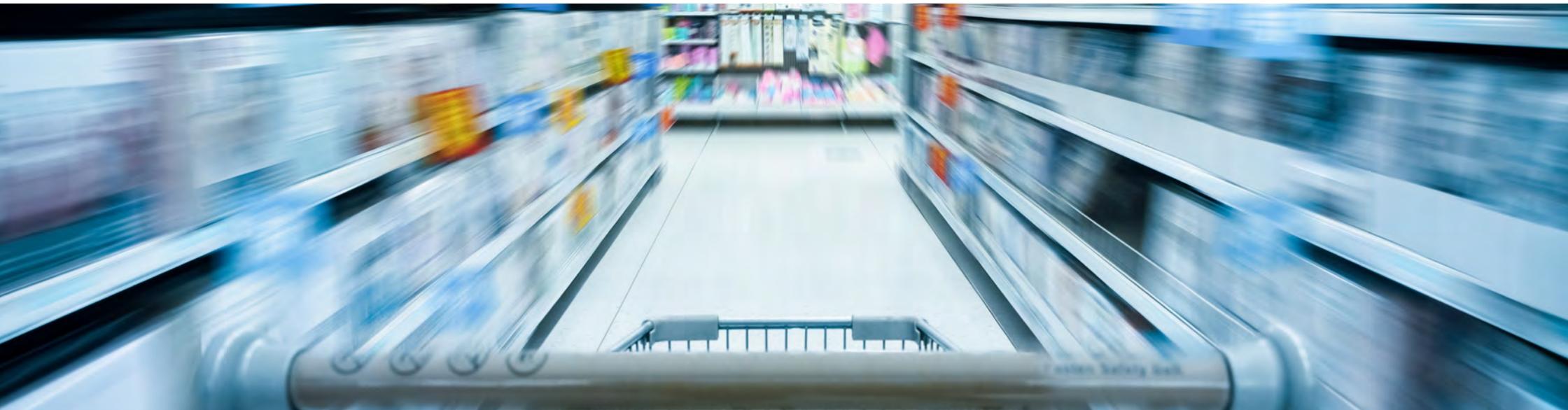
Reallocating Resources to Increase Revenue

CPG firms also use our solution to reallocate resources to drive sales growth. Some of our clients choose to reinvest the time that they gain from faster planogram compliance checks or optimized store visits directly back into sales efforts. Indeed, field forces can exploit the compliance checks results which they instantly receive in their application to implement corrective actions while they are still at the store.

One of our clients, a global leading CPG company, found a direct benefit in leveraging the time gained with our all-in-one app to grow their revenue. They knew that the less time their sales reps spent measuring planogram compliance, the more they could focus on selling to stores. In the retail world, field forces need to rely on the results derived from compliance checks to refine their sales pitch at the store level, but they also need to discover what their client's main challenges are to adapt their arguments to the store context. This discovery phase is critical to the final sale and invariably occurs after compliance checks. That means CPG firms need to ensure their sales rep have enough time to discuss with stores to sell better. That is exactly what our client achieved in one of their key markets. They chose to reallocate their resources to leverage their sales teams' expertise to the fullest, a technique which is recognized by McKinsey to result in higher than average category growth and improvements in selling costs. Within a year after implementing our solution, the client reported that they had managed to save their field forces 14,000 hours on store checks, which is equivalent to $300,000 in salary wages. They were able to reinvest their sales reps' time back in retail execution activities to increase revenue. This process resulted in immediate sales increases; the year after implementing our joint solution was recorded as the best year ever, with a growth of nearly $4 million.

Confirming National Agreement Compliance

The value of a joint RE/IR solution lies in its capacity to deliver to FMCG companies a tool which can support and facilitate their sales reps' daily activities to maximize the ROI of retail execution operations.

Building on the granularity and consistency of the data provided by Image Recognition as well as the retail analytics produced in their SFA, CPG firms have the tools to conduct fact-based, frank discussions with their retailer partners on planogram compliance mishaps.

Thanks to photos of store shelves, a client of ours was able to prove the commercial agreements they had in place with 900 independent stores were not respected regarding Share of Shelf and was able to assess its impact on revenue loss. As a result of their follow-up discussions with these stores, Share of Shelf increased in the non-compliant stores, resulting in an estimated sales uplift of $5 million.

In another client example, one of the leading brewery groups in the world managed to increase their annual sales by approximately $3 million using our joint solution to determine whether the SOS metrics they observed in their coolers were up to agreed upon compliance standards.

Digital disruption, and the technologies underpinning it, is creating unprecedented opportunities for growth and innovation. As a result, FMCGs that embrace these new technologies to drive more efficient and effective execution at point of sale have a distinct advantage. The combination of market leading Image Recognition and Retail Execution solutions from Planorama and AFS amplify the responsiveness, efficiency and accuracy of in-store processes – eliminating the latency of post mortem analysis by driving opportunistic and corrective actions while the rep, merchandiser, or delivery person is still in the store. In this model, store conditions are captured, analyzed, scored and the appropriate response tasks assigned with the execution transparently monitored to assure best practices area followed.

As we have seen in the real-world customer examples above, the results can be quite compelling. Efficiency, accuracy, identifying and correcting any discovered performance gaps with the right focus on the highest value activities can deliver tangible value through reduced costs, increased market share, increased revenue.

With recent advances in computing and Artificial Intelligence/Machine Learning technologies driving new capabilities in both the Image Recognition and retail execution domains, there has never been a better time to get started to capture the elusive competitive edge and leverage it to your strategic advantage. We encourage you to think about where your organization could benefit from our joint solution.

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At AFS, our focus is providing technology and service solutions to all areas of the CPG value chain. In the retail execution solution space, we have over 15 years of experience delivering sales, merchandising, and delivery solutions to hundreds of organizations around the world. These range from small regional deployments with a single sales teams, to some of the largest multinationals with hundreds of sales teams with thousands of field reps distributed across many different geographies, regions and languages. We have a legacy of investment in the retail execution space increase our functional depth, global reach and local expertise to the benefit of our customers. Today our retail execution solutions are deployed in 50 countries in 25 different languages with approximately 160,000 active users executing nearly 52 million visits per month.

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Established in 2009, Planorama digitalizes retail execution and merchandising for manufacturers and retailers by leveraging the power of Artificial Intelligence. Based on shelf pictures from any source, their image recognition solutions can instantly analyze and recognize millions of product items and deliver immediate actionable retail insights for their clients and their teams.

Headquartered in Paris, Planorama powers multinational companies such as Unilever, Mondelez and Coca Cola, operates in more than 60 countries, and analyzes millions of photos each year for more than 10,000 users.

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