



Food & Beverage White Paper



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Sowing the Seeds of Success:

Leveraging Traceability to Achieve a Competitive Advantage in the Produce Industry

ABSTRACT

Traceability requirements up and down the produce industry supply chain are substantial and here to stay, but there are significant benefits to be gained beyond greater tracking, visibility, and compliance with regulatory, industry, and vendor mandates. Over the last five years, leaders in the produce industry have leveraged elements of traceability requirements to increase their competitive advantage; however, more recent innovations in today's technology, including those related to mobility, are making opportunities from these gains ever more significant as they enable a greater, stronger, and more cohesive connection among growers, distributors, processors, retailers, and consumers.

Along with increasingly flexible and extensible enterprise resource solutions, the convergence of mobile technologies and the rapid adoption of smartphones and tablets by both the business and consumer

communities is enabling produce companies to leverage information in new and profitable ways. This paper provides the basic context within which these changes are taking place for the produce industry, followed by a discussion of the innovations themselves, how they are emerging in today's marketplace, and future applications of this disruptive technology that will create new opportunities for produce executives to differentiate themselves from their competitors.

INTRODUCTION

In a landscape characterized by fierce competition, razor thin margins, and stringent food safety and traceability requirements, leaders in the produce industry are increasingly seeking means to improve efficiency, reduce costs, maximize profit, and improve brand loyalty. Addressing challenges that range from near-immediate inventory turn times for highly perishable products to increasing expectations of safer and healthier products from consumers, virtually every stakeholder in the produce supply chain is faced with critical decisions around inventory management, customer demands, traceability, and how to improve the bottom line along the way.

While some organizations view rising traceability requirements merely as burdensome overhead, others are successfully leveraging the improved efficiencies and transparency that come with greater traceability to gain and maintain a distinct competitive advantage. Against this dynamic backdrop, this white paper is intended to provide produce industry executives insight into the role enterprise-wide visibility, automation, and mobile communications play in addressing produce-specific traceability requirements, industry standards, and changing consumer demands.



The discussion begins with a brief introduction of the players in the produce supply chain, followed by a high-level snapshot of the produce marketplace today, including recent market trends that may provide further opportunities for gains from savvy competitors who are able to effectively maximize use of available technology solutions.

This examination is followed by an outline of the drivers behind and specifics around increased traceability requirements, both voluntary and regulatory, and the areas in which produce industry organizations may be able to gain a competitive advantage as they meet and exceed these standards. The paper then focuses on specific opportunities for produce companies to outperform the competition based on the benefits rapidly-emerging mobile technologies bring to the game. Finally, the paper closes with a look at opportunities on the horizon as new mobile technologies emerge and mature.

STAKEHOLDERS IN THE PRODUCE SUPPLY CHAIN

While not an exhaustive list, the following players comprise the bulk of stakeholders in the produce supply chain:

- **Grower/Shippers.** Grower/shippers typically include small, medium, and large farmers that pick, sort, and pack product that then goes to processors and packers. Growers deal with pressures around managing field and labor resources, while also ensuring that the traceability data created at the start of the chain is accurate and compliant.
- **Processors and Packers.** Processors and packers generally include

larger regional or national companies that procure product from a variety of growers that then sort, wash, and pack product for retail consumption. Many of these companies have moved to a strategy of building brand recognition among consumers, especially in the health and organic space. These companies are concerned with product quality, production efficiency, supply chain efficiency, compliance with food safety laws, and brand protection.

- **Wholesalers, Distributors, and Distribution Centers.** Wholesalers, distributors, and distribution centers are the middlemen of the produce industry and typically not brand owners. Positioned between processors/packers and retailers, they play a critical role in the flow of product and information. Key concerns for these companies include warehousing efficiency, supply chain optimization, and value chain visibility.
- **Food Services Processors, Brokerages, and Distributors.** Food services organizations process and distribute food products to entities such as restaurants, cafeterias, industrial caterers, and hospitals, often serving as the sales and distribution arm for smaller food manufacturers. Like wholesalers, distributors, and distribution centers, food services organizations also play a critical role in the produce supply chain. Keys to success for these companies include warehousing efficiency, supply chain optimization, and supply chain visibility.
- **Retailers.** Retailers sell packaged/finished goods directly to consumers and are on the front lines of customer interaction. Key concerns for retailers include brand protection, customer loyalty programs,



optimization of shelf space, and optimization of inventory turn. Flowing customer information back and through the supply chain is also an important function of retailers.

PRODUCE INDUSTRY MARKET SNAPSHOT

According to data from the United Fresh Foundation, the third quarter (Q3) of 2011 mirrored trends in Q1 and Q2, bringing with it higher prices for fresh produce than were seen over the same time periods in 2010; however, those higher prices were generally accompanied by predictable price sensitivity and associated decreases in purchase volume. Specifically, in commodity-based produce, the 5.7 percent increase in Q3 dollar sales driven by a 9 percent overall increase in retail price also came with an associated 3 percent decline in overall purchase volume, with fruit purchase volume affected more than that of vegetables.¹

Bucking the trend were “value-added” and organic produce categories, both of which boasted higher prices alongside higher purchase volume, suggesting consumer purchases in these specialty categories are powerfully driven by factors other than price. Value-added produce includes both fruits sold as fresh cut, in jars and cups, or with overwrap, and vegetables sold as side dishes, in trays (or party platters), for snacking, or for use in meal preparation. Q3 of 2011 revealed year-over-year dollar increases of 8.3 percent, coupled with volume increases of 5.3 percent. Value-added vegetables behaved similarly, with the Q3 2011 versus Q3 2010 comparison showing increases in weekly dollar sales of 6.8 percent alongside volume increases of 7.1 percent.²

Organic produce performed best of all categories, yielding double-digit growth in dollar purchases in Q3 2011 over the same period of 2010. Organic Produce Gains in Weekly Dollar Sales (Q3 2011, Year over Year Increases) The volume of organic vegetables purchased in Q3 2011 grew 8.9 percent over the same period the previous year, with pricing remaining relatively steady, showing increases under 2 percent. Organic fruit saw an 11.3 percent increase in year-over-year pricing in Q3, accompanied by little change in purchase volume.³

This micro-vertical industry snapshot is useful when examining consumer purchasing behavior, and the ways in which industry trends may be married with existing and future technologies to yield optimal results for members of the produce community seeking success in the marketplace with means other than a “price-to-price” comparison with the competition. For example, as consumers increasingly seek out organics and locally-grown produce, adoption of technologies that provide them with easy access to thorough and accurate details around how and where their produce was grown, handled, and transported could mean the ability to move from a commodity pricing model to one that commands both higher margins and greater brand loyalty. The ability of some of today’s technology to provide the produce industry not only with traceability, but also with true revenue-generating opportunities will be discussed throughout this paper.



PRODUCE AND PUBLIC HEALTH SAFETY: AN ONGOING NEED FOR TRACEABILITY

At the most basic level, the produce industry is subject to traceability standards and requirements that originated with concern over potential harm to humans and animals arising from tainted/contaminated or mislabeled food. While many domestic production methods have increased in sophistication over the decades, the need for such protections has not been eliminated. Consider the following recent adverse events in the produce supply chain:

- In September 2011, a listeria outbreak originating from cantaloupes grown in Colorado resulted in 72 illnesses and 16 deaths in 18 states.^{4,5}
- In October 2011, listeria contamination prompted the voluntary recall of 2,500 cartons of romaine lettuce grown in California. The recall covered product in 19 states and Canada, and included 90 cartons that went to retail sales and 2,410 cartons sent to restaurants and cafeterias.⁶
- In March 2012, potential salmonella contamination prompted three separate recalls of fresh jalapeno peppers grown in South Florida. The recalls covered peppers with distributors in North Carolina; Florida; New Jersey; Washington, DC; and Canada.^{7,8}

In addition, the Centers for Disease Control (CDC) announced in March 2012 that imported food outbreaks are on the rise since the late 1990s, with almost half (17 of 39) of the outbreaks between 2005 and 2010 occurring in 2009 and 2010.⁹

With health and safety drivers of traceability front and center, the produce community is all too aware of the profound long-term damage that can engulf an entire industry or its segments when elements of contamination cannot be accurately traced and addressed – overall loss to the produce industry attributed to lack of adequate traceability has at times been estimated at up to 50 percent.

Perhaps most graphically illustrating this point was a 2008 salmonella outbreak attributed to contaminated tomatoes that sickened 1,300 people, required hospitalization of 250, and cost the tomato industry \$250 million in lost revenue over a one-year period. Subsequent research determined the contamination actually originated from serrano peppers coming out of Mexico that had been mixed with the tomatoes in salsa – but lack of adequate traceability prompted broad warnings around tomatoes that erred on the side of safety. By the time the truth was discovered, the collateral damage to the tomato industry was irreversible.¹⁰ Trust was lost, and at that point in time, few if any technology tools existed that were capable of quickly restoring customer and consumer confidence.

Within this unforgiving landscape, produce industry leaders are now looking to mobile-enabled technology solutions that provide not only traceability of their products throughout the supply chain, but also provision of critical data all the way to the consumer, enabling greater consumer confidence, establishing stronger brand loyalty, and significantly impacting revenue potential. Some of the market opportunities these new technologies are affording the produce industry will be discussed later in the paper.



TRACEABILITY DRIVERS

Over the last decade, scores of highly publicized recalls have forced the produce industry and regulators alike to rethink traceability requirements. On one hand, the industry has sought to regulate itself in an effort to stave off additional compliance pressures; on the other hand, regulators have had to respond to public outcry from consumers and lawmakers. The end result has been the creation of produce-specific industry standards that, while voluntary, have been necessary to operate in such a highly complex and restrictive industry. In addition to the industry standards, produce companies have also had to contend with the unique demands of many of their customers, including big box retailers that have imposed increasingly stringent traceability and quality standards.

VOLUNTARY

Within the realm of “voluntary” traceability, the produce industry is affected by both industry pressure and by requirements put in place by retailers and “further processors” of produce. Interestingly, voluntary measures in this scenario are often stricter than regulatory measures, perhaps indicating a preference among members of the produce supply chain to be self-regulating rather than ruled by external government entities perhaps less familiar with the intricacies of their businesses.

Industry | Produce Traceability Initiative

The produce industry is notable in that it has led the way among its food counterparts in both consumer demand for “farm-to-fork” traceability and

in industry adoption of this vision, driven by the recognition that the risks faced by consumers, individual companies, and the industry as a whole have been profound and costly. To address these concerns and make the “farm-to-fork” vision a reality, the produce industry began its own traceability charge with the creation of the Produce Traceability Initiative (PTI) in 2007. PTI is an industry consortium comprised of growers, food processors, retailers, industry trade groups, and technology partners with a vision for “supply chain-wide adoption of electronic traceability for every case of produce by the year 2012.”¹¹ PTI has also been used as a model for traceability initiatives in other industries, including dairy, meat, seafood, and packaged foods.

Vendor Initiatives

Soon after its creation, prominent produce retailers, including Wal-Mart®, Safeway®, Kroger®, and Food Lion®, quickly went on record endorsing the goals of PTI.¹² While PTI sought to establish a broader standard and platform for traceability in the produce industry, retailers and further processors of produce intently focused on risk mitigation, reputation management, and brand protection continue to push for even more rigid guidelines regarding quality, safety, and freshness – particularly when produce is used in private label/store brand products. These non-regulatory “vendor” requirements are generally considered to have as much if not more impact on produce processors than many current government requirements, as failure to meet vendor traceability standards in even a single mock recall can mean immediate termination by the vendor without additional warning or notice. With their extreme focus on brand protection, retailers often make periodic mock recalls part



of their relationship with suppliers, sometimes even moving outside the organization to an auditing agency to ensure the results of food safety audits are independent verified.

The power of “voluntary” vendor requirements in promoting adherence to traceability standards and goals cannot be overstated. Says a barcoding industry executive specializing in mega-retailers, “The real mandate for them [produce suppliers] isn’t the government guidelines so much as mandates from retailers. When retailers set the expectation that traceability is a condition of doing business, then growers will fully adopt the standard.”¹³

REGULATORY | FOOD SAFETY AND MODERNIZATION ACT

While PTI is technically a voluntary initiative within the produce industry, it also helped to develop much of the seminal work that was later incorporated into the Food and Drug Administration (FDA) Food Safety and Modernization Act (FSMA) of 2010, signed into law January 4, 2011 as the most sweeping reform of U.S. food safety laws in more than 70 years. The act aims to ensure the U.S. food supply is safe by shifting the focus from responding to contamination to preventing it.¹⁴ Primary provisions of the law include:

- FDA authority to enact mandatory recalls (rather than simply recommending that a company recall a product found to be potentially unsafe)
- Directives that the FDA enact a risk-based rather than blanket approach

to regulation, with requirements that it reevaluate and provide industry guidance around the most critical contaminants every two years

- Mandatory inspections at least once every three years of facilities determined by the Department of Health and Human Services (HHS) to be at highest risk for contamination
- FDA authority to access all relevant records when suspicion exists over potentially contaminated food
- Greater control over imported foods, to include mandatory verification by foreign suppliers that food entering the U.S. meets appropriate standards
- Requirements around preventive measures to avoid food contamination, including identification of potential contamination points and implementation of steps to prevent contamination¹⁵

While yet to be fully implemented, the FSMA has provisions directing the FDA to “establish a system that will enhance its ability to track and trace both domestic and imported foods. In addition, FDA is directed to establish pilot projects to explore and evaluate methods to rapidly and effectively identify recipients of food to prevent or control a food-borne illness outbreak.”¹⁶

From a produce perspective, these pilot projects will cover packaged foods as well as fruits and vegetables that are raw agricultural commodities. Within 18 months of enactment of the law (i.e., July 2012), the FDA is



required to report findings from the pilot projects to Congress, along with recommendations for improving the tracking and tracing of food. At that time, FDA is authorized to “establish within the Agency a product tracing system to receive information that improves the capacity to effectively and rapidly track and trace food that is in the United States or offered for import into the United States.” Additional requirements cover foods determined to be “high risk” by statute.¹⁷

While full implementation will take place over a period of three years from enactment, new regulatory requirements brought to segments of the produce supply chain by the FSMA include:

- Growers/Shippers: Development of mandatory produce safety standards
- Fresh-Cut Processors, Wholesalers, Distributors: Registration of facilities every two years; requirement for food facilities to develop and implement preventive control standards; creation of risk-based inspection frequency programs for food facilities; ensuring FDA has access to records associated with a food that may be part of an outbreak investigation or any other article of food that is likely to be affected in a similar manner; FDA authority to suspend registration of any facility where there is reasonable probability that food from the facility could cause serious adverse health consequences to humans or animals
- Importers: Requirement to perform risk-based foreign supplier verification to confirm that imported food is produced in compliance

with applicable U.S. laws and not adulterated or misbranded, requirement for FDA to establish a voluntary qualified importer program, authorization for FDA to require imported food to have a certification of compliance with applicable requirements

- Retailers and Food Service: Requirement for additional information to be submitted to the reportable food registry that impacts retailers
- Food Transporters: Requirement for FDA to develop new regulations for the safe transport of food
- General: Authorization for FDA to require a mandatory recall of any product for which there is a reasonable probability that the product is adulterated or misbranded and will cause a serious adverse health consequence or death; requirement for FDA to pilot tracing systems, consider establishing a product tracing program, and expand record keeping requirements for high-risk foods; requirement for FDA to develop guidance and regulation to protect against intentional contamination¹⁸

The new law also requires produce shipments to have barcode or QR code labels to the case level that identify producer, production location, and “unique lot number and content description.”¹⁹

TRACEABILITY AND TECHNOLOGY

Against this backdrop, the proverbial writing has been on the wall for some time for stakeholders in the produce supply chain: industry and



regulatory standards for traceability cannot effectively be met with cumbersome and time-consuming paper-based records, or even with rudimentary technology tools.

To address these challenges, produce companies often look to technologies like enterprise resource planning (ERP) systems as their operational system of record for traceability. While many ERP systems offer some level of transparency and access to information on merchandise source, production and line operations, inventory, and customer shipments, most ERP systems are not ideally suited to provide the full functionality required to effectively support mock or actual recall scenarios.

Historically, this capability gap has forced many produce companies to either heavily invest in disruptive ERP customizations or to rely on manual spreadsheets and workflows to augment missing functionality. This reality underscores the need for leading produce companies to select a vertical-specific ERP solution able to both accommodate complex track and trace reporting for compliance as well as support bi-directional customer and consumer safety communications to ensure brand loyalty and trust.

TRACEABILITY AS A COMPETITIVE ADVANTAGE

For growers/shippers, pickers, and packers of produce, back-office technology platforms have traditionally been viewed as disconnected, inflexible information systems used simply to warehouse basic data in categories like contract versus yield price, trade promotions

efficacy, inventory availability, sales orders, and delivery status – or information necessary to comply with industry and government mandates. Although point of origin information, including country, planting region, farm name, date and time of harvest, field team, and other elements, is considered a “must have” to meet regulatory requirements, this treasure of uniquely relevant, available data has rarely been leveraged to its potential as a toolset to achieve myriad tangible business benefits, including:

- Greater Consumer Confidence and Brand Loyalty
- Faster Response Times in Recall Scenarios
- Automated, On-Demand “Push” Notifications to Consumers
- Real-Time Access to Product Information
- Accommodation of Field-Pack, Shed-Pack, or Line-Pack with Automatic Tracking of Lot Comingling
- Ease of Use and High Degree of Configurability
- Additional Real-Time Product Information for B2B Processors
- Real-Time Traceability Despite the Complexity of the Supply Chain

At the most basic level, traceability tools integrated into an ERP system of record enable produce stakeholders to deliver the right product faster,



in the right quantities, to the right place, at the right time. At a higher level, some solutions now allow consumers to access a comprehensive dashboard of product information, not only to view recall inquiries but also receive value-added product information and promotions.

From a business process perspective, today's technology allows quality assurance staff to automate any number of daily functions, and in the event of a significant food safety event, easily place relevant "holds" on production and fulfillment processing, depending on the additional ERP-centric functionality currently in play.

Technology also offers produce companies quick access to recall; freshness; country of origin and grower/lot/processing facility information; nutrition and allergen information; and recipe options. These same consumers can sign up for "active push" notification so that they are proactively made aware if a recall is executed, helping to avoid potentially dangerous food and, in so doing, dramatically affecting consumer confidence.

Particularly with growing consumer demand for organic, locally-grown, regionally-grown, and/or sustainable produce, extending available information all the way back to those consumers builds brand loyalty. Technology enables stakeholders both to communicate critical information that may include where a particular item was grown, chain of custody, and recall information, as well as to differentiate their products for consumers – for example, organic products or "locally grown" or "identity preserved" produce targeted to specific markets.^{20,21}

From a cost reduction and inventory control perspective, producers who lack accurate data on what they have in the warehouse tend to produce too much, resulting in loss due to spoilage. Today's technology enables real-time visibility into accurate inventory of products in the warehouse and information on what is being loaded during shipping. With better inventory information, shipping can take place immediately and production scheduling can be optimized to better meet demand. Some vendors also offer technology designed to work for both branded and private label products, regardless of the complexity of the distribution channel.

Some technology solutions can also operate in a variety of delivery models, depending on the user's needs. Solutions that can be delivered either on premise (with software installed on a produce company's own servers) or on demand (accessible via the internet) ensure processors and retailers are able to maximize the technology's functionality in the way that best suits their individual business requirements.

Some of the most advanced technology in this space enables produce companies to truly distinguish themselves from competitors, allowing them to push highly-targeted coupons, buy-one-get-one (BOGO), and other trade promotions to consumers while also maximizing feedback capture capabilities to encourage repeat purchases and drive revenue. These highly-configurable solutions allow produce companies to respond rapidly to changes in consumer behavior, enabling them to quickly change messaging and campaign branding by company, product line, label, and retail trademark. These capabilities are a game changer with real potential to build brand recognition, loyalty, and customer preference.



TRACEABILITY GOES MOBILE

Advancements in mobile technology, the rapid adoption of smartphones and tablets by businesses and consumers, and increasingly flexible and extensible business applications have converged, enabling produce companies to harness information like never before. Forward-thinking produce companies are leveraging this convergence to extend highly detailed product information all the way to the consumer's fingertips, providing further safeguards from recalls while simultaneously improving customer/brand loyalty.

For the first time, this comprehensive customer connection is allowing grower/shippers, processors, distributors, and retailers to use mobile technology tools to markedly strengthen customer preference and drive repeat purchases and greater revenue opportunities, while also providing consumers with greater peace of mind.

For these companies, coding, tracking, and tracing produce items starts at the field level, processing facility, or packing plant where unique coded labels are applied to cases or individual items, with product information linked to a specific grower, manufacturer, or processing facility. This valuable information is passed down the supply chain:

- Produce processors are able to determine the quality and viability of items being delivered by suppliers before pallets or containers are even taken off the delivery truck.

- Retailers are able to verify the alert and recall status of merchandise before they stock store shelves or make it available online.
- Consumers are able to determine with certainty that the produce they select is safe and access a host of other relevant information designed to drive confidence and trust, including nutrition details, allergen notices, product information, organic certification, grower profiles, recipes, and produce "active-push" alerts.
- Grower/shippers, packers, processors, and retailers can engage promotions and offer coupons at the shopping cart level to encourage additional purchases and help build brand loyalty.

Underscoring the value this type of technology might bring to the produce industry the BBC News reports, "consumers are 12 percent more likely to buy a product that can be traced."²² Interestingly, this phenomenon has the potential to hold true even if the produce in question is offered at a premium price point.

Though only anecdotal, a leading produce industry publication notes consumers in a Salinas, California market study were willing to pay up to 30 percent more for Valencia oranges that contained smartphone-scanable barcodes that provided them with regional grower information before they reached the checkout register.²³



Similarly, for organizations paying a premium to carry “home grown or prepared” specialty produce items to better meet consumer demand, instantly being able to validate grower and harvest information can have a substantial impact at the cash register.

A 2011 study from Cornell University revealed that consumers were willing to pay 9 to 50 percent more for local produce that had a label or marketing materials containing harvest information and a “farm identity.” General food products with organic traceability yielded even higher results, with shoppers demonstrating willingness to pay up to 82 percent more for these products than for their undocumented counterparts.²⁴

LOOKING FORWARD: NOT YOUR FATHER’S TRACEABILITY

Forward-thinking produce companies have been leveraging traceability requirements imposed by regulators, retailers, and industry trade groups to improve other aspects of their business for some time, and are now beginning to capitalize on the next wave of advances in technology to improve margins, strengthen brand/customer loyalty, and ultimately create a competitive advantage.

Existing functionality in today’s technology enables consumers to scan a barcode, QR code, or metatag to determine whether a product has been recalled or to receive an alert via email; the next step will be to push instant notifications or SMS text messages to a consumer’s smartphone when a recall has occurred. Imagine looking down to a smartphone to see a text reading, “The bag of spinach you purchased on May 5 has been recalled.”

Envision further the possibilities of integrating this type of technology with shopper loyalty cards. Advances in ERP functionality are well on their way to linking merchandise detail information with smartphones and shopper loyalty programs, and storing the information in a single database. This repository would then be searchable by the manufacturer or retailer in the event of a critical merchandise update or recall scenario. Notifications could be segmented in real time based on purchase activity, expiration date, allergen information, or any set of criteria dictated at the ERP management-level and directly pushed to the consumer.

Potential for significant revenue enhancement also exists from a marketing and promotions perspective. By linking ERP data with couponing programs, retailers can cost effectively drive relevant, targeted offers based on buyer history and current preferences. Coupon delivery can be automated to push alternative offers to a shopper’s mobile device, even prior to that consumer leaving the retail store, website, or the e-commerce portal. This ability to dynamically update offer information has significant potential to influence buyer behavior and drive customers to higher profit merchandise that closely matches their up-to-the-minute interests.

The bottom line is that business opportunities can now be maximized using vertical-specific ERP platforms and software synced with the latest in mobile communications, allowing produce companies to efficiently and cost effectively comply with government, industry, and vendor requirements while also enhancing trust and brand loyalty. Bridging the chasm between the farm/plant/distribution site and the point of sale, regardless of how business is transacted, enables all members of the



produce supply chain to deliver a positive purchasing experience, and one for which all parties are willing to pay a premium.

While the market potential for these new technologies in the produce arena seems limitless, the scenarios described are far from wild theorizing of “Jetsons-like” capability – technologies like these are entering production with the help of vertically-focused solutions providers and are beginning to be leveraged by both regional and global leaders in the produce industry.

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Junction Solutions provides vertical-specific on-premise, hosted and cloud-based software and services for the Produce industry. Junction Solutions' portfolio includes enterprise resource planning (ERP), supply chain management (SCM—demand, warehouse, yard and transportation management), production and scheduling optimization, grower accounting, trade promotions management, direct store delivery management, merchandising, order entry and mobile/web-enabled product sourcing and traceability. For more information, please visit www.junctionsolutions.com.