EVRYTHNG ™

The Internet of Things and the Smart Supply Chain:

The New Competitive Battleground for Global Consumer Goods Companies

EVRYTHNG ™

Introduction: Disruption and Reinvention

Global consumer goods companies are being disrupted by a perfect storm of stringent new regulations, agile competitors, emerging technologies and fast-changing consumer behaviors. All of this has a profound impact on the operations and workflows behind how consumer products are manufactured, distributed and purchased.

To weather this storm one thing is clear; companies must very quickly make their supply chains smarter, more adaptive and driven by real-time data intelligence, or they will be left behind.

A smart supply chain reduces costs and improves consumer satisfaction. It can eliminate catastrophic product recalls by providing end-to-end traceability; a case study highlighted later in this paper reveals how product traceability has become 40 times faster. Declining consumer trust can be restored by making serialized product provenance information available in real-time to shoppers via product packaging. And, a smart supply chain delivers new levels of visibility by identifying and locating excess or slow-moving inventory to fulfill sudden spikes in demand.

> " **$1.9 trillion** - total value created by IoT associated with supply chain. "

Underpinning this supply chain transformation is the Internet of Things (IoT). The IoT enables physical assets and goods, wherever they are in the world or in their lifecycle, to become identifiable, trackable and interactive. This gives rise to innovative new supply chain applications and insights, changing the competitive landscape in the process.

Moreover, the value of smart, connected supply chains is not limited to consumer goods companies, but part of a far larger strategic shift that is rapidly transforming the supply chain and logistics function across businesses of all types. Cisco estimates that the IoT will deliver $8 trillion dollars in value over the next decade. Of this total, $1.9 trillion, or almost 25% of the total value created by the Internet of Things, will be associated with supply chain and logistics enhancements. Gartner meanwhile predict that by 2018, the deployment of end-to-end supply chain visibility solutions will increase by up to 50%.

> " By 2018, the deployment of end-to-end supply chain visibility solutions will increase by up to 50%. "

With a focus on Food, Beverages and Apparel manufacturers, this white paper explores the urgency for adoption of the smart supply chain, its essential characteristics and its business benefit. It will come as welcome news to CSCOs that such a transformation does not require multi-year, multi-million dollar programmes but can be realized through the adoption of a cloud-based platform to digitally augment existing systems.

Smarter products come with **EVRYTHNG**

EVRYTHNG ™

Understanding the competitive urgency: 7 reasons your supply chain needs to get smarter

1

The rising cost and frequency of product recalls

Over the past decade, the annual number of food product recalls has more than doubled in the United States. In the first 8 months of 2016, there were 82 recalls alone[1]. The out-of-pocket costs of a product recall for each firm frequently exceed $50 million[2], while the long-term damage of a major recall to the reputation of a brand can be devastating.

New regulations make global traceability essential[3]

2

The FDA's 'Nutrition Facts'[4] and the EU 'Food information to consumers' legislation[5] place an increasing burden on manufacturers to provide full traceability of ingredients and products, and make this information available via product packaging. Similar legislation exists for pharma and medicines such as the EU's FMD (Falsified Medicine Directive) which mandates item level traceability from 2017.

Significant decreases in consumer trust and brand value

3

$13 billion in sales shifted from large to small CPG manufacturers between 2009 and 2014[6]. During this same period, the combined market shares of the largest 25 food and beverage companies declined from 49.4% to 45.1%[7]. Industry studies[8] and participants attribute this shift to shrinking consumer trust. Ethical sourcing and sustainability are now more important to consumers, meaning they will soon demand complete transparency of product origins in exchange for their loyalty.

New competitors

4

In recent years, billions of dollars in sales have been lost to higher margin, niche brands[9]; competition from lower priced store-brands[10] and new Direct-to-Consumer (DTC) offerings from the likes of Amazon Dash or Dollar Shave Club (recently acquired by Unilever, who recognized the value of this model, for $1 billion).

The mounting cost of fraud

5

As well as damage to brand reputation, CPG companies lose an estimated 5.7% of revenues[11] each year from fraud. Counterfeit product, parallel trading and gray market activity are all symptoms of a fragmented and vulnerable supply chain.

Smarter products
come with **EVRYTHNG**

EVRYTHNG™

Improving systems with transparency

6

Global supply chains involve a disparate and complex web of suppliers, wholesalers, carriers, systems and processes. Supply chain staff are often flying blind unable to optimize what they cannot see, or act swiftly to minimize the impact of negative events that occur outside their visibility. Those that solve this problem gain a powerful and valuable competitive advantage.

Increasing complexity leading to higher costs and declining service quality

7

CPG companies have launched a broader range of products in recent years. Coupled with an increasing number of new retail outlets this has resulted in greater complexity in inventory management According to the Boston Consulting Group (BCG) in a recent study: "CPG companies on-time delivery rates had declined precipitously," with "more than 60% of companies failing to meet their delivery targets," as inventory levels increased[12].

Figure 1: Challenges with the traditional supply chain network.

Smarter products
come with **EVRYTHNG**

How does the IoT make supply chains smart?

The IoT is more than internet-connected devices and sensors. Fundamentally, it is about giving every physical thing a digital identity so that it can be identified communicated with and tracked. It becomes in effect an object on the web which can generate data and participate in software applications. In short, have its own digital life, like people do.

Digital identities can be given to individual products, to collections of items in cases, containers and pallets, and also to individual ingredients and components which are assembled to make other products. This allows the complex physical relationships in the real world to be mapped and made instantly available (to those given permissions to see them) via the web.

When an asset is digitized it solves a long-standing problem in supply chain management: full transparency of a product throughout the lifecycle, as it passes through a company's often-fragmented network of logistics activities, whether owned or outsourced.

Visibility

Location: The whereabouts of every single item, case or pallet, as well as each object's history and destination can be captured in real-time and aggregated in a central cloud platform. The data can be 1) collected automatically from sensors on products and containers, 2) captured manually through scanning smart labels and 1D/2D barcodes or 3) ingested from different supply chain systems.

State: On-product sensors can record temperature and humidity (e.g. for perishable food supplies) or the status of packaging (such as damage in transit), and send this data in real-time to the cloud where customizable rules automatically register analytics and trigger alerts and business workflows.

Traceability

Detailed history of unique items: Companies can track the specific raw materials or components that are combined to become part of finished products, and allow pinpoint accuracy in tracing where faulty or suspect elements have ended up.

A digital passport: All data recorded about each product, including its origin, journey and constituent parts, are recorded in an item's digital passport. This data can be added to, and accessed, by different stakeholders throughout the entire product lifecycle because each item's profile exists in the cloud, outside the traditional boundaries of the enterprise IT estate.

Smarter products
come with **EVRYTHNG**

EVRYTHNG™

Predictability

Demand-driven: In the 'closed loop' world of ERP systems, there is often detailed transparency within the 4 walls of the manufacturing plant, but visibility deteriorates beyond the factory gates. But, a smart supply chain takes data from multiple sources; including retailers' point of sale scans, consumers interacting with products pre- and post-purchase and recycling companies processing discarded products. This all creates a real-time, 360° view of an item's life from cradle to grave (or ideally, cradle to cradle as it's recycled), allowing operational teams to better understand consumption patterns and tailor the supply of goods accordingly.

ALERTS

HIERACHIES

QUANTITIES

INTEGRITY

SCANS

LOCATIONS

SHARES

INTERACTIONS

CONDITION

HISTORY

Figure 2: When a physical object is given an Active Digital Identity™ in the cloud, it becomes a data-generating asset.

Smarter products
come with **EVRYTHNG**

How to implement the smart supply chain

A complete end-to-end solution from a single vendor is neither practical nor achievable in today's global supply chain. Rather, today's reality is about using enabling cloud technology to link together your company's distribution partners and processes by connecting the data that flows between their systems.

Start with a common digital identity

At the heart of a smart IoT-enabled supply chain there must be a single platform to manage your product's unique digital identities, and all the data generated by, and about, these physical objects throughout their lifecycle. This is more than a database of unique product identifies; it's a dynamic cloud-based solution connecting all systems and partners in the chain, continually collating real-time data about every unique, serialized item.

Figure 3: A physical product with its digital half.

Use IoT as a 'pace layer'

In Gartner's pace layer model[13], the typical enterprise IT estate has foundational elements such as ERP, SCM, CRM (from SAP, Oracle etc.) described as 'systems of record'. The complexity of these deployments makes it difficult for companies to adapt quickly to new technologies, processes or business needs. 'Systems of innovation' are the agile application layers, overlaid on top, which give the business the ability to react fast. Adding an IoT cloud software layer to augment and synchronize with these systems gives CPG brands easier access to new, continuously evolving technology, making it easier to keep pace with change.

Smarter products
come with **EVRYTHNG**

Combine existing technologies

There are many identification and communication technologies involved, from 1D and 2D barcodes, RFID, NFC, sensors, GPS or other smart packaging. Often this results in multiple 'point solutions', incompatible with each other, deployed at different stages of the supply chain. A cloud-based IoT platform can track and monitor goods and assets regardless of their physical characteristics or connectivity: the primary currency is the digital identity of the physical product itself and the data associated with it, rather than the means by which it is scanned or communicates.
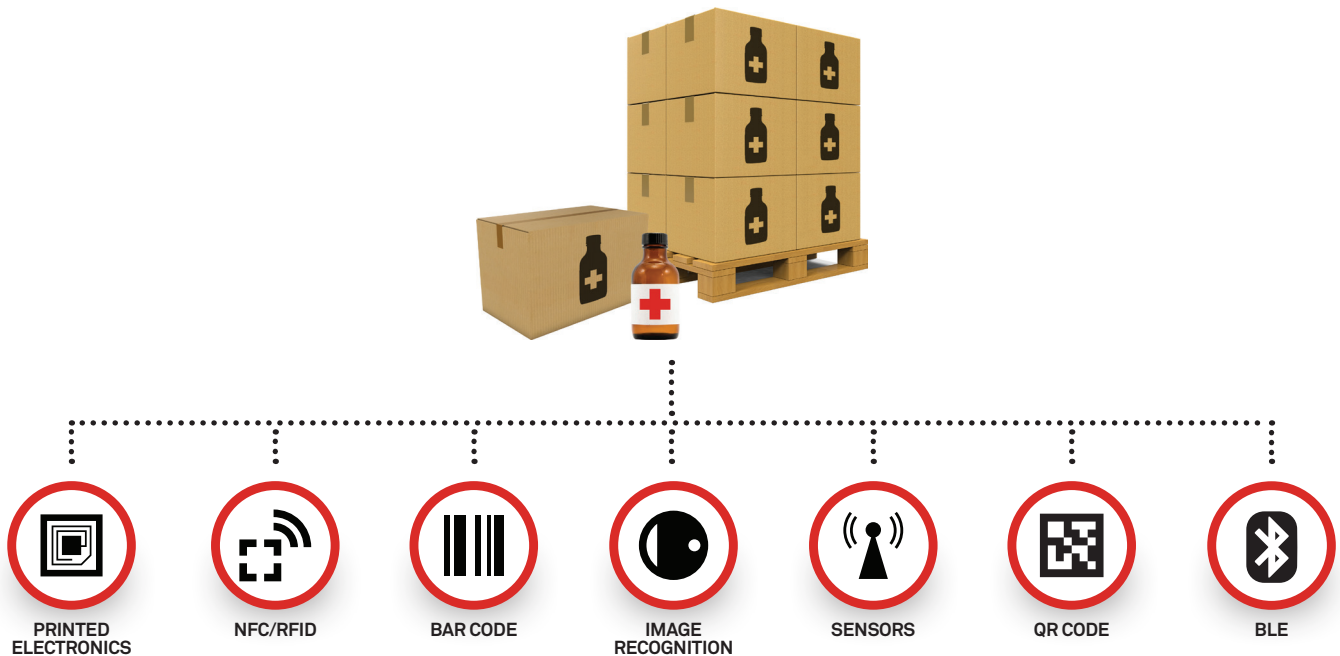

| PRINTED ELECTRONICS | NFC/RFID | BAR CODE | IMAGE RECOGNITION | SENSORS | QR CODE | BLE |

Figure 4: Any on-pack identifiers or connectivity can can be used, at item, case and pallet level

Provide single 'source of truth' for analytics

The value of digitizing every asset you process or manufacture is in the data this generates. But this value can only realized if it is easily, instantly accessible and provides actionable insights. A smart supply chain will take information from heterogeneous sources and present web-based data visualizations to key stakeholders across the ecosystem.

E V R Y T H N G ™

The Many Benefits of Smart Supply Chains

Smart supply chains create benefits for CPG companies in three broad areas: Increased consumer demand, reduced risk of high cost product recalls, and cost savings through enhanced logistics optimization.

1. The Smart Supply Chain as a Lever for Building Consumer Demand

Build Brand Trust

A Nielsen study found that 66% of consumers were willing to pay more for brands with a demonstrated commitment to sustainability, and that consumer trust was the most significant factor associated with these purchases[14]. With IoT enabled supply chains, CPG companies can provide consumers with transparency. For example, data on full manufacturing history and origin of ingredients is collated in the cloud through the product's lifecycle and can be displayed to consumers scanning product labels with their smartphones.
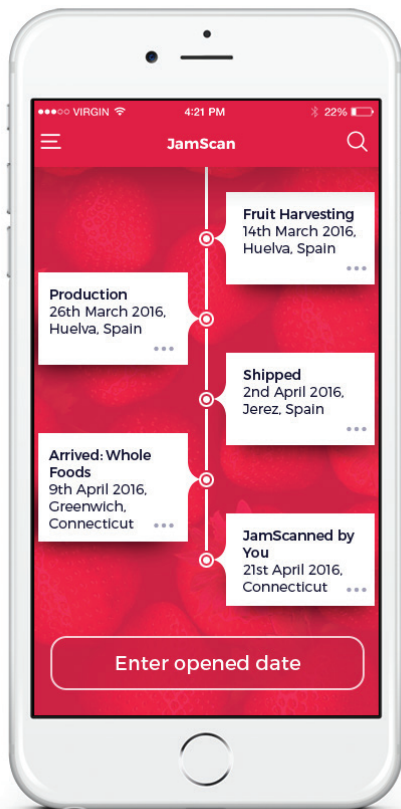
Solving the product label real-estate challenge

Linked to this, Food and Beverages brands need to provide more and more nutritional and origin information via product labels and packaging, while Apparel brands face similar challenges with care labels. Storing this data in the cloud and presenting it to consumers scanning on-product codes with a smartphone solves this. More importantly, software rules can detect the geolocation of the scan to dynamically provide different information to meet regional regulatory requirements – for example, in Connecticut, USA where new GMO (genetically modified organism) labeling laws have been introduced.

Prove Product Integrity

Using smart tags and labels on clothes or food and beverage packaging, brand protection staff and consumers can validate a product's authenticity, or even check whether a product has been tampered with prior to purchase.

Avoid Stockouts

Finally, IoT enabled supply chains provide CPG companies with greater flexibility to manage uncertainty or spikiness in inventory demand. When a new product or campaign is building demand, inventory volatility often rises accordingly. With a real-time ability to view, and modify, stock location and demand in distribution centers and retail, companies can avoid stock-outs which impact sales and hurt word-of-mouth market momentum.

Figure 5: Food provenance data can be provided via consumer apps

2. The Smart Supply Chain Mitigates Product Recalls

Minimizing risk and cost

Once the faulty ingredient, packaging or batch is isolated, companies can identify all the affected stock and its location. This pinpoint accuracy enables manufacturers to make recalls faster, minimize the scale and out-of-pocket costs of the recall, and consequently limit the longer-term, devasting damage to brand reputation. Stores can remove specific product from shelves and consumers can even scan products themselves and view up-to-date online product safety information, triggered in real-time by programmable rules in the IoT cloud platform.

3. Optimizing What You Can See, Monitor, and Measure

Measure Logistics Service Provider (LSP) performance

Misplacements, delays, theft and damage inevitably occur; in 2015, for example, U.S. cargo theft of food and drinks amounted to $8.4 billion[16]. Having a single view of all inventory at each step of the supply chain journey lets you track the real-world performance of partners to better identify and eradicate these issues.

Efficient demand management

Real-time visibility of stock levels at DC's and retail outlets enables cost reduction and control through optimized inventory carry, better demand and supply planning as well as shipment planning and transportation scheduling. Stock can also be re-routed to meet higher demand in some locations, or to prevent the build-up of excess inventory at other locations. At the same time, supplier and carrier invoice reconciliation becomes faster and more accurate, based on aggregated data, of who shipped what, where and when.

Reduce waste

With real-time cold chain management, instant alerts can be sent if temperature thresholds are exceeded so that cargo spoilage and disposal charges may be prevented.

Quickly spot fraud

Product which ends up in the wrong markets can be spotted using geolocation software rules which can notify staff in real-time via dashboard alerts and SMS.

EVRYTHNG™

Conclusion: Welcome to the Age of Smart Supply Chains

In recent years, global CPG companies have, to a large extent, been an industry under assault. New competitive dynamics, changing consumer tastes and shifting regulatory regimes have ramped up the pressure on these businesses to reinvent themselves.

This is part of a wider digital transformation imperative for all companies in all industries. Digital technology is re-shaping the environment in which businesses operate and driving a fundamental change in how brands connect with their customers, employees, partners and supply chains. As a consequence, it also creates a board-level mandate to 'adapt or die'. According to Gartner[17], by 2017, 20% of all market leaders will lose their number one position to a company founded after the year 2000, because of a lack of digital business advantage.

> " 20% of all market leaders will lose their number one position to a company founded after the year 2000, because of a lack of digital business advantage. "

Crucial to this requirement for reinvention and digital transformation is the intelligent, interconnected supply chain. By layering onto existing systems a capability to manage the digital identity of products and the IoT data they generate, supply chains can be become more automated, more transparent, more responsive and make better decisions, faster, based on real-time data and actionable insights.

The rewards for companies that act on this opportunity will be substantial. The competitive risks for those that hesitate will be just as great.

Appendix – how EVRYTHNG makes supply chains smart

The EVRYTHNG IoT Smart Products Platform is an enterprise-grade, high scale cloud platform that helps global product manufacturers transform their product operations and supply chains.

It provides item-level digital identity and data management throughout the full product lifecycle, and provides rich insights on product lines, inventory status, distribution partner as well as information on consumer purchasing locations and preferences.

The EVRYTHNG cloud platform acts as a complementary software layer to collate and manage data about a manufacturer's products to create a digital ecosystem of products, partners, processes and customers. It gathers data by:

1. Connecting to systems like SAP, Salesforce, and Oracle.

2. Receiving real-time data captured at every step from supplier to factory to shop to home, using any on-product identifier, sensor or tag, such as RFID, NFC or 1D/2D barcodes.
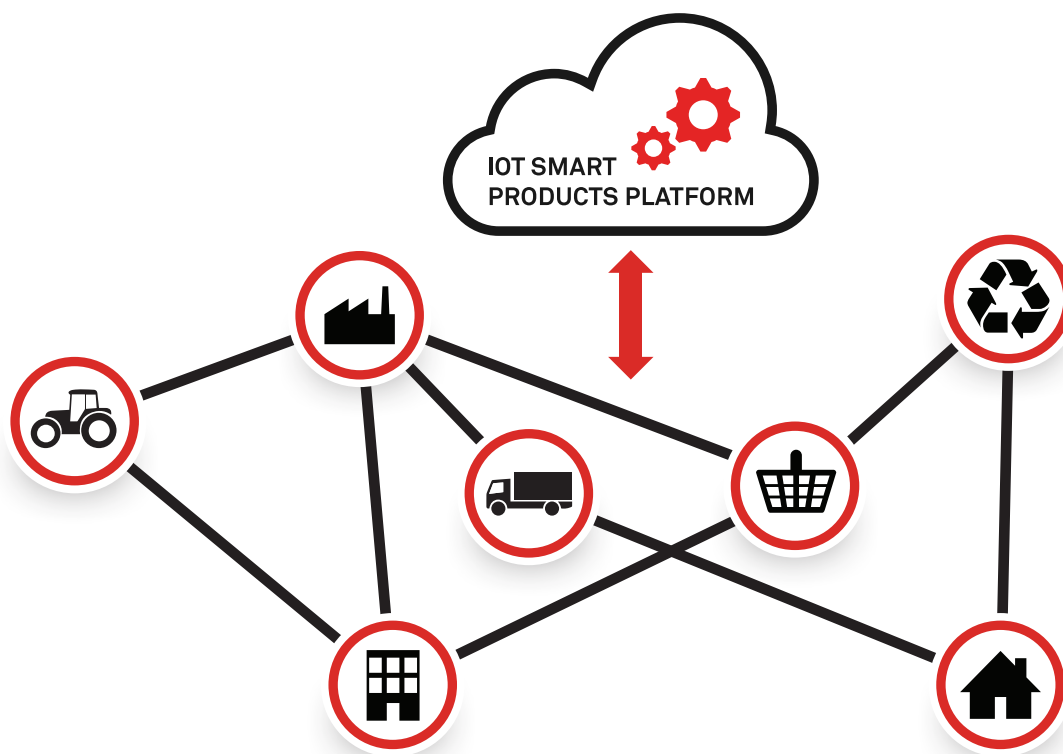

Figure 6: EVRYTHNG platform for real-time end-to-end transparency

Smarter products
come with **EVRYTHNG**

EVRYTHNG™

Spotlight on Traceability

One critical smart supply chain application enabled by the EVRTYTHNG platform is Traceability.

The complex, interlinked hierarchy of component parts, ingredients, finished product, batches, cases and pallets can be identified and mapped to each other using our flexible data model. The platform ingests disparate data from supply chain systems, structures it and makes it instantly available via a customizable web-based console. CPG brands get an unparalleled view of every item they produce, including their realtime location, manufacturing history and journey through the distribution network. Actionable insights include:

1. If a faulty batch, ingredient or component part is identified supply chain staff can immediately pinpoint where all affected product(s) are in the world, and contact third parties to recall these products in a controlled, rapid initiative.

2. If products end up in the wrong distribution center, or go missing during the supply chain, they are automatically detected and alerts or notific tions sent.

3. The performance of regional warehouses and carriers in the extended supply chain can be better understood.
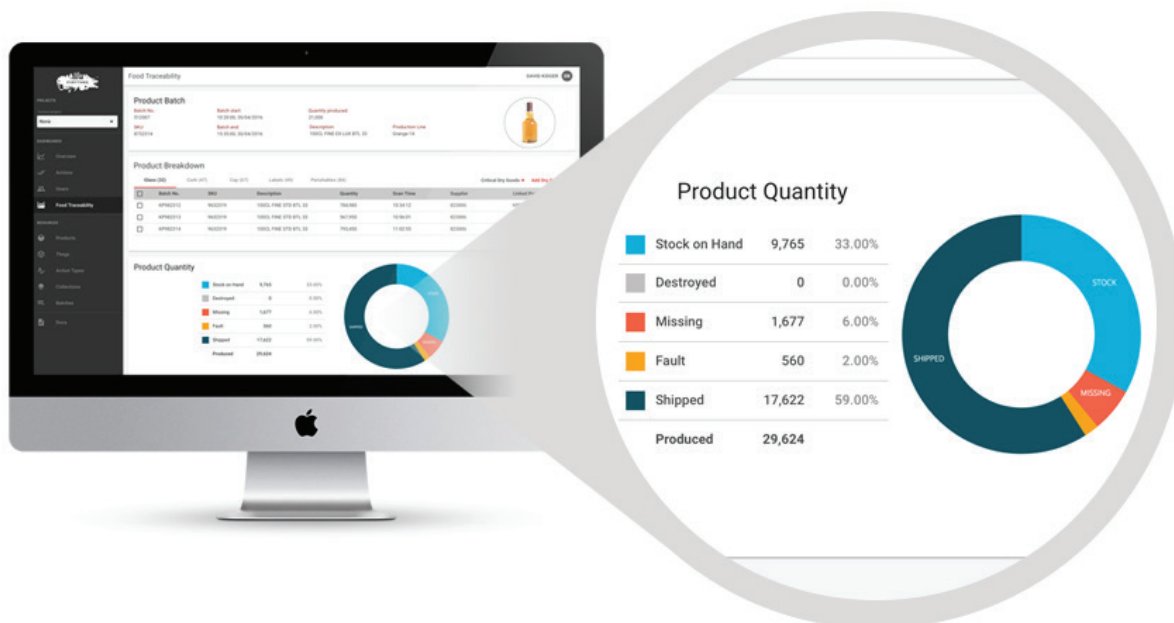
> " End-to-end traceability and supply chain analysis is 40 times faster thanks to EVRYTHNG "

Jerome Grevin
QSE Compliance Director
The Glenmorangie Company

Figure 7: Customizable Traceability dashboard.

Smarter products
come with **EVRYTHNG**

EVRYTHNG™

Key Attributes of an IoT digital identity and data management platform

	REQUIREMENT	EVRYTHNG
Products	Customizable for any type of product and hierarchies	✔
	Supports any type of tags, sensors and identifiers	✔
	Serialized item-level	✔
Software intelligence	Custom rules for automatic decision making	✔
	Alerts and notification (SMS, email, web)	✔
Connections	Connectors for common systems (SAP, Oracle etc.)	✔
	Open APIs	✔
Analytics	Real-time and historical reporting	✔
	Graphical data visualizations	✔
	Connects to BI systems	✔
Tools	Enterprise-wide permissions and tiered access	✔
	Baked-in security and privacy policies	✔
Cloud Platform	Agile methodology, continuous s/w cycle	✔
	End to end security	✔
	Accessed from anywhere	✔
	Auto scales	✔
	Scales to billions of 'things'	✔

Learn More

Find out how EVRYTHNG's award wining IoT cloud platform can make your supply chain smarter.

Visit our website at evrythng.com, or email us at smarter@evrythng.com.

Smarter products
come with **EVRYTHNG**

1. http://www.fsis.usda.gov/wps/portal/fsis/topics/recalls-and-public-health-alerts/current-recalls-and-alerts

2. America's food industry has a $55.5 billion safety problem, Fortune (Mya 6, 2016) http://fortune.com/food-contamination/

3. Ibid. See also Parliamentary Questions, European Parliament.

4. http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/LabelingNutrition/ucm385663.htm

5. http://ec.europa.eu/food/safety/labelling_nutrition/labelling_legislation/index_en.htm

6. Time to Shift Gears: Top Trends in the CPG Supply Chain, October 2015, Study conducted by the Boston Consulting Group with the Grocery Manufacturers Association. http://www.gmaonline.org/file-manager/GMA-BCG_Time_To_Shift_Gears-Top_Trends_in_the_CPG_Supply_Chain.pdf

7. Advertising Age, Big Food's Big Problem: Consumers Don't Trust Brands (May, 2015) http://adage.com/article/cmo-strategy/big-food-falters-marketers-responding/298747/

8. The bigger the food company, the less consumers trust it, new research reveals, FoodNavigator-USA (Nov. 2015), http://www.foodnavigator-usa.com/Manufacturers/Why-don-t-consumers-trust-big-food-asks-Center-for-Food-Integrity

9. Time to Shift Gears: Top Trends in the CPG Supply Chain, October 2015, Study conducted by the Boston Consulting Group with the Grocery Manufacturers Association. http://www.gmaonline.org/file-manager/GMA-BCG_Time_To_Shift_Gears-Top_Trends_in_the_CPG_Supply_Chain.pdf

10. Invasion of the Bottle Snatchers, The Economist (July 2016) http://www.economist.com/news/business/21701798-smaller-rivals-are-assaulting-worlds-biggest-brands-invasion-bottle-snatchers?cid1=cust/ednew/n/bl/n/2016077n/owned/n/n/nwl/n/n/NA/n

11. http://www.pkf.com/media/31640/PKF-The-financial-cost-of-fraud-2015.pdf

12. Time to Shift Gears: Top Trends in the CPG Supply Chain, October 2015, Study conducted by the Boston Consulting Group with the Grocery Manufacturers Association. http://www.gmaonline.org/file-manager/GMA-BCG_Time_To_Shift_Gears-Top_Trends_in_the_CPG_Supply_Chain.pdf

13. https://www.gartner.com/doc/1890915/accelerating-innovation-adopting-pacelayered-application

14. The Sustainability Imperative, Neilsen (Oct. 2015). Pages 1, 5. http://www.nielsen.com/content/dam/nielsenglobal/dk/docs/global-sustainability-report-oct-2015.pdf

15. http://smartlabel.org/

16. http://info.plslogistics.com/blog/shocking-statistics-about-cargo-theft

17. https://www.gartner.com/doc/2636049/predicts--seizing-digital-business

Smarter products
come with **EVRYTHNG**