CS Whitepaper1: Tunnel for your DC

Case Study: CS Smart Connected Device Delivers Operational Transparency:

High Speed RFID Tunnel in high volume, high value merchandise distribution center

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Executive Summary

The Challenge was to provide a custom solution enabling both real-time operational information, and global, enterprise-level data analytics. The Customer was a successful high volume, high value merchandise distribution center in the consumer product wholesale business who wanted to expand within its existing facility to enhance its overall production. A secondary goal of the project was to improve the DC's overall productivity, and efficiency through improved business intelligence of the operation.

The Solution was to design an integrated system with phased implementation. Key elements have already been operating for over a year at a beta-site, including monitoring with traditional Commercial off the Shelf handheld RFID Tag readers, and a custom Internet-accessible high speed RFID scan tunnel. All of the data can be viewed in real-time locally or globally via the web. The solution is fully integrated with CS /Microsoft-Cloud-based Data Analytics Tools.

The Result is that even though only a fraction of the items are being tagged at the factory, the Tunnel has been providing a sample of the shipments passing through enabling the verification of a significant fraction of the shipments. Using manual intervention, the system has demonstrated that incorrectly packed cartons can be intercepted from being shipped to retailers. Operating for over 5 Quarters to date, the tunnel has detected numerous incorrect shipments, including incorrect packing plans, and unexpected errors from the suppliers. Overall, it has provided Operational Transparency -- a real-time-accessible view of continuing operations in the facility.

Operational Transparency:

- A Cloud-Based System enables seamless tracking of individual items, and shipments, from the factory, through the Distribution Center, to the Retail shelf.
- Applying Data Analytics Tools to the real-time data stream and various data aggregations enhances Enterprise-level Business Intelligence.

Challenge: Transformation and Expansion:

• A successful high volume, high value merchandise distribution center in the consumer product wholesale business wanted to expand within its existing facility to enhance its overall production.

• A secondary goal of the project is to improve the DC's overall productivity and efficiency through improved business intelligence of the operation.

Background:

Off the rack / shelf garments, the industry segment is in the process of transitioning from traditional clipboard and pencil means of production monitoring. Today, most of the monitoring is via laser bar codes printed on paper tags attached to the individual items, and also printed on paper labels attached to the shipping cartons. The use of the laser bar codes results in a degree of opaqueness when one or more individual items are packed for shipment. As a result the industry for the past few years has begun to introduce tags RFID Tags operating at paper-penetrating radio frequencies.

The process of the Distribution Center involves packing and shipping to the retail stores, cartons containing one or more individual items ordered by the retailer. Volume shipments of diverse lines of garments and other consumer products arrive at the Distribution Center from factories located around the world [primarily East Asia]. The incoming shipments are unpacked, and individual items [typically as garments on a hanger] are placed into overhead rail-based temporary classified storage [aka the Warehouse], by hand and with information entered by hand.

Customers' orders are received and processed, and paper "Packing Lists" are generated by a mainframe-based system. Human Pickers, using the paper lists, search the Warehouse for the requisite items and assemble on a "Trolley" [short section of rail, hanging from rollers riding on the overhead rails], a "Kit" ready for packing. Each of the one or more individual Kits, on a given trolley, are verified by hand scanning their Laser Barcodes, and then assigned and conveyed by hand to one of several Packing Stations. Packers take the Kit off the trolley, one item at a time, and place the specified items in a shipping carton. The carton is closed and a packing list, and an exterior bar coded shipping label is attached. A complete shipment may include multiple cartons, possibly packed at several stations. The resultant shipment is placed by hand onto the master conveyor belt which carries the cartons to the shipping area.

The stream of cartons aggregating the production of several packing locations passes through a laser bar code reader, which is used to control the dispatch of the individual cartons to various side branches of the conveyor using timing. An automated scale provides some detection of errors through comparing weights of the shipments. After arrival at the end of each branch line, the cartons are aggregated into pallet loads for shipment to an individual retailer. Pallet loads are eventually loaded into trucks through shipping docks to transport them to the retail stores.

Mistakes are quite commonplace and include:

- Errors in the incoming shipment;
- Placing an item into the wrong section of the Warehouse;
- Picking the wrong item[s] when assembling the Kit;
- Pack Plan Errors
- Packing Errors:
 - Missing an item from the kit;
 - Including an extra item in the Kit [adding an item from the next Kit on the same trolley];
- Sending the shipment to the wrong loading dock for inclusion in the wrong pallet load

Most errors are only detected when the shipment is unpacked for sale by the retailer. The cost to the distribution center is substantial, as a make-up shipment, has to be assembled, packed and shipped. The retailer then experiences a delay in stocking and potentially unavailable items for their customers, while the make-up shipment is in transit. In a worst-case scenario, a popular missing item might be back-ordered all the way through the supply chain to the factory in East Asia, and the delay in delivery to the retailer, might miss the important selling season.

Clearly, the entire supply chain would benefit from the ability to track an individual item from the factory through the Distribution Center to the display shelf in the retailer. DC shipment errors would be drastically reduced and the retailer would receive the appropriate quantities of each of the various SKU's which they had requisitioned. Overall costs would be lowered and so profitability would increase.

Approach:

CS designed an integrated system-based solution to be phased in to meet at the customer's newest Distribution facility. CS has already implemented key elements at this beta-site. The solution incorporates both traditional, commercial off the Shelf handheld RFID Tag readers, and a custom Internet-accessible, high speed RFID scan tunnel all integrated with CS /Microsoft-Cloud-based Data Analytics Tools.

Technology:

Smart Connected Devices:

In *How Smart, Connected Products Are Transforming Competition,* published in the November 2014 Harvard Business Review, Michael E. Porter, James E. Heppelmann, provide a definition of the Smart Connected Device as,

"Smart, connected products have three core elements: physical components, "smart" components, and connectivity components. Smart components amplify the capabilities and value of the physical components, while connectivity amplifies the capabilities and value of the smart components and enables some of them to exist outside the physical product itself."

High Speed Conveyor RFID Tunnel

The principle Smart Connected Device for the DC transparency solution is a High Speed Conveyor RFID Tunnel optimized for identifying objects moving on a conveyor, or similar device. The Tunnel through its physical components [i.e. its unique geometry and materials, key mechanical elements, and method of construction], optimizes the "reading" of the information stored in the multiple RFID Tags, located in fast moving cartons. The Smart Component [i.e. the Tunnel's Commercial off the Shelf RFID Reader] connects to a Cloud Accessible Database, using its Connectivity Components [i.e. a local embedded webserver locally networked over a wireless, wired or fiber, Ethernet].

As the carton enters the tunnel, the Reader interrogates the RFID tags attached to each item within the carton. As the carton exits the Tunnel, this information is transmitted by the Reader to the Cloud-based master database. The Cloud-based logic compares the individual sku's in the carton to the master packing list [retrieved from the master database] and in turn based on the laser bar code printed on the shipping label attached to exterior of the carton at the time of packing. A match is recorded, while a miss is both recorded, and can be used by the conveyor system's master controller, to divert the carton to a remediation station. At the remediation station the carton can be reread using hand-held scanners, and if necessary opened and the appropriate corrections made.

Ideally, with this approach no errors, detectable with the RFID technology, should exit the distribution facility. At the minimum, the tunnel provides a real-time sample of the stream of cartons passing through the distribution facility's conveyor.

Microsoft/ComponentSoft Cloud-Based Data Analytics

ItemSight[®], CS's System Analysis Tools are founded on the industry standard data base, and traditional Business Intelligence Tools deployed on the scalable storage and processing Cloud-based platform. At the detail level, Real-time Streaming Data from the Tunnel can be viewed locally or globally through the web portal, carton, by carton or even sku, by sku. This data can be aggregated over any time period to see evolving trends or diagnose events. Tunnel Data owners can use the framework to create their own custom Business Intelligence Logic to monitor and analyze operations. Finally, using the Big Data Analytic Tools, Enterprise-wide, the owner of the Tunnel Data can review it in the aggregate, with the capability to a drill back down to the individual retail shipment, carton or even sku.

Beta Test RFID Tunnel as Installed on Distribution Center Conveyor:

with a typical carton entering the tunnel



Sample Data & Analysis:

At the beta test site for the Tunnel, the conveyor travels at more than three feet per second, taking less than 2 seconds to traverse the Tunnel. At that operating speed, the Tunnel can handle over 1000 cartons per hour or more than 10,000 cartons on a busy day. Since the Tunnel was placed in service in late 2013, more than one half million cartons have passed through the Tunnel with nearly 40% containing RFID- tagged items.

Snapshot of Logfile & discussion

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IftH 4 0.177 30343631(526729287466442 SKu=00087922419307 Serial= 11000000078 ITEH 5 0.314 B0343631(5267292874664652 SKu=00887922419307 Serial= 11000000078 unrepc:tag:sgin-96:1.0867922.041930.11000000078 ITEH 6 0.327 30343631(526728295464652 SKu=00887922419307 Serial= 11000000078 unrepc:tag:sgin-96:1.0867922.041930.11000000078 ITEH 7 0.737 30343631(526728287464525 SKu=00887922419307 Serial= 11000000078 unrepc:tag:sgin-96:1.0867922.041930.11000000078 ITEH 8 0.752 30343631(526728287464525 SKu=00887922419307 Serial= 11000000014 unrepc:tag:sgin-96:1.0867922.041930.110000000141 ITEH 9 0.658 30443631(526728287464627 SKu=00887922419307 Serial= 11000000017 unrepc:tag:sgin-96:1.0867922.041930.11000000017 ITEH 1 1.022 30343631(526728287464627 SKu=00887922419307 Serial= 110000000039 unrepc:tag:sgin-96:1.0867922.041930.11000000017 ITEH 1 1.022 30343631(526728287464627 SKu=00887922419307 Serial= 110000000039 unrepc:tag:sgin-96:1.0867922.041930.11000000017 ITEH 1 1.022 30343631(526728287464627	11EH 3 0.053 303436310826F2828F4664866 5KU=00887922419307 Serial= 110000000134 urn:epc:tag:sg1	96:1.0887922.041930.11000000134	
TREM S 0.314 03434501CSCF 2027FAABLED SNU=00057922419307 Serial= 110000000159 ITEH 6 0.337 30343561CSCF 2025FAABLED SNU=00057922419307 Serial= 11000000056 unrepcttag:sgtin=561.0887922.041930.11000000058 ITEH 7 0.737 30343561CS2F2625FA6BLED SNU=00887922419307 Serial= 11000000056 unrepcttag:sgtin=561.0887922.041930.11000000059 ITEH 8 0.752 303435631CS2F2625FA6BLED SNU=00887922419307 Serial= 11000000058 unrepcttag:sgtin=561.0887922.041930.11000000014 ITEH 8 0.752 303435631CS2F2625FA6BLED SNU=00887922419307 Serial= 11000000017 unrepcttag:sgtin=561.0887922.041930.11000000017 ITEH 1 1.022 30343631CS2F2625FA6BLED SNU=00887922419307 Serial= 11000000039 unrepcttag:sgtin=561.0887922.041930.11000000017 ITEH 1 1.022 30343631CS2F2625FA6BLED SNU=00887922419307 Serial= 11000000039 unrepcttag:sgtin=561.0887922.041930.11000000018 ITEH 1 1.123 30343631CS2F2625FA6BLE7 SNU=00887922419307 Serial= 11000000007 unrepcttag:sgtin=561.0887922.041930.11000000016 <td>11ER 4 0.17/ 303450310820F2828FA0AE4E SK0=00067922419307 Serial= 1000000078 Urn:epc:taj:sgt</td> <th>96:1.055/922.041930.11000000075</th>	11ER 4 0.17/ 303450310820F2828FA0AE4E SK0=00067922419307 Serial= 1000000078 Urn:epc:taj:sgt	96:1.055/922.041930.11000000075	
Ifth 6 0.327 30343551102672420FA6AE22 SMi=00067922415307 Serial= 110000000076 ITEH 7 0.737 30343551102672420FA6AE25 SKi=00867922415307 Serial= 11000000076 ITEH 8 0.752 3034353110287202FA6AE05 SKi=00867922415307 Serial= 11000000076 ITEH 8 0.752 3034353110287202FA6AE05 SKi=00887922415307 Serial= 110000000141 urn:epc:tag:sgtin-951.0867922.041930.110000000127 ITEH 9 0.658 30343531102872628FA6AE77 SKi=00887922415307 Serial= 11000000017 urn:epc:tag:sgtin-951.0867922.041930.110000000127 ITEH 10 1.022 3034353110287628FA6AE77 SKi=00887922419307 Serial= 11000000007 urn:epc:tag:sgtin-951.0867922.041930.110000000127 ITEH 11 1.123 3034353110287628FA6AE77 SKi=00887922419307 Serial= 11000000007 urn:epc:tag:sgtin-951.0867922.041930.11000000007 ITEH 12 1.127 3034353110287628FA6AE75 SKi=00887922419307 Serial= 11000000016 urn:epc:tag:sgtin-951.0867922.041930.11000000007 ITEH 13 1.141 3043453106287628FA6AE75 SKi=00887922419307 Serial= 11000000016 urn:epc:tag:sgtin-951.0867922.041930.11000000018 ITEH 14 1.277 3034353106287628FA6AE74 SKi=00	11th 5 0.314 303436311826F2828F48486E8B SkU=00867922419307 Serial= 11000000139 Unitepcitagisgti	95:1.006/922.041930.11000000139	
ITEM 7 0.757 30343651105072024766620 SKU=00067922413307 Serial= 1100000000341 ITEM 9 0.658 303436511052720276646620 SKU=00867922413307 Serial= 110000000141 unriepc:tag:sgtin-96:1.0867922.041930.11000000147 ITEM 9 0.658 30343651105272027646627 SKU=00867922413307 Serial= 110000000147 unriepc:tag:sgtin-96:1.0867922.041930.11000000017 ITEM 10 1.022 303436511052720257646427 SKU=00867922413307 Serial= 110000000039 unriepc:tag:sgtin-96:1.0867922.041930.11000000039 ITEM 11 1.123 303436511052720257646427 SKU=00867922413307 Serial= 110000000107 unriepc:tag:sgtin-96:1.0867922.041930.11000000039 ITEM 11 1.123 30343651105287282587646427 SKU=00887922413307 Serial= 110000000108 unriepc:tag:sgtin-96:1.0867922.041930.11000000007 ITEM 12 1.127 3034365105287282587646425 SKU=00887922419307 Serial= 11000000016 unriepc:tag:sgtin-96:1.0867922.041930.11000000016 ITEM 13 1.141 3034365105287282587646425 SKU=00887922419307 Serial= 11000000016 unriepc:tag:sgtin-96:1.0867922.041930.11000000016 ITEM 14 1.227 3034365105287282587646425 SKU=00887922419307 Serial= 110000000016 unriepc:tag:sgtin-96:1.	116H 6 0.52/ 303435310826728287464662 5K0=00066/92241930/ Serial= 11000000098 urn:epctag:sgl	95:1.088/922.041930.1100000098	
ITEM 8 0.762 30343531C56722047866E00 SxW=00067922413307 Serial= 110000000127 umrepc:tag:sgtin-961.0867922.041330.11000000127 ITEM 10 1.022 30343531C5267262678664E07 SXW=00087922413307 Serial= 110000000127 umrepc:tag:sgtin-961.0867922.041930.110000000127 ITEM 10 1.022 30343631C5267262678646E07 SXW=00887922419307 Serial= 110000000139 umrepc:tag:sgtin-961.0867922.041930.110000000137 ITEM 11 1.123 30343631C526726287646E05 SXW=00887922419307 Serial= 11000000017 umrepc:tag:sgtin-961.0867922.041930.110000000037 ITEM 12 1.127 30343631C526726287646E05 SXW=00867922419307 Serial= 11000000016 umrepc:tag:sgtin-961.0867922.041930.11000000016 ITEM 13 1.141 30343631C526726287646E25 SXW=00867922419307 Serial= 11000000037 umrepc:tag:sgtin-961.0867922.041930.11000000016 ITEM 13 1.141 30343631C526726287646E425 SXW=00867922419307 Serial= 11000000037 umrepc:tag:sgtin-961.0867922.041930.11000000016 ITEM 14 1.237 30343631C526728287646E425 SXW=00867922419307 Serial= 11000000016 umrepc:tag:sgtin-961.0867922.041930.11000000016 ITEM 14 1.237 30343631C526728287646E425 SXW=00867922419307 Serial=	116H 7 0.757 303436316826728284664650 Stu=008867922419307 Serial= 110000000935 urn:epctagisgt	96:1.086/922.041930.1100000095	
ITEM 9 0.856 505436310526722054768677 SKU=00067922419307 Serial= 110000000127 Umrepcrtag:sgfin-9611.0867922.041930.11000000127 ITEM 10 1.022 303436310526728287666427 SKU=00087922419307 Serial= 110000000087 umrepcrtag:sgfin-9611.0867922.041930.11000000039 ITEM 11 1.123 303436310526728287664627 SKU=00887922419307 Serial= 11000000087 umrepcrtag:sgfin-9611.0867922.041930.11000000007 ITEM 12 1.127 303436310526728287666425 SKU=00887922419307 Serial= 11000000087 umrepcrtag:sgfin-961.0867922.041930.11000000007 ITEM 13 1.141 303436310526728287666425 SKU=00887922419307 Serial= 11000000087 umrepcrtag:sgfin-961.0867922.041930.11000000018 ITEM 14 1.237 303436310526728287666425 SKU=00887922419307 Serial= 11000000017 umrepcrtag:sgfin-961.0867922.041930.11000000018 ITEM 14 1.237 303436310526728786766475 SKU=00867922419307 Serial= 11000000016 umrepcrtag:sgfin-961.0867922.041930.11000000016 ITEM 14 1.237 30343631052672878786464675 SKU=00867922419307 Serial= 11000000016 umrepcrtag:sgfin-961.0867922.041930.11000000016 ITEM 14 1.237 30343631052672878786464675 SKU=00867922419307 Serial= 1	11EM 8 0.782 30345031682672826F486480 5KU=000867922419307 Serial= 110000002141 urn:epc:tagisgt	95:1.055/922.041930.11000000141	
Ift N 10 1.022 3034363105267202FA6Hc27 SNM=00007922413307 Serial= 1100000000037 unriept:tag:sglin=561.0867922.041330.11000000007 ITEN 11 1.123 3034363105267202FA6Hc27 SKM=00087922413307 Serial= 110000000007 unriept:tag:sglin=561.0867922.041330.11000000007 ITEN 12 1.127 3034363105267202FA6Hc25 SKM=00087922413307 Serial= 110000000087 unriept:tag:sglin=561.0867922.041930.11000000018 ITEN 13 1.141 3034363105267202FA6Hc25 SKM=00087922413307 Serial= 110000000037 unriept:tag:sglin=561.0867922.041930.11000000018 ITEN 14 1.237 3034363105267202FA6Hc72 SKM=00087922413307 Serial= 11000000168 unriept:tag:sglin=561.0867922.041930.11000000016 ITEN 14 1.237 3034363105267202FA6Hc72 SKM=00087922413307 Serial= 11000000016 unriept:tag:sglin=561.0867922.041930.11000000016 ITEN 14 1.237 303436310526720787078Fa6Hc72 SKM=00087922413307 Serial= 11000000116 unriept:tag:sglin=561.0867922.041930.110000000116	1100 9 0.656 3034353106267266846877 500-000672243507 Serial= 11000000127 Urn:epctagisgi	90:1.000/922.041930.1100000012/	
ITER II I.125 30343501050722097 Nohet V SN#=00067922419307 Serial= 11000000000V Umripp:tiag:sgin-951.0867922.041930.1100000000V ITER II 1.121 1.27 3034350105267220876A64E25 SKW=00867922419307 Serial= 110000000007 umripp:tiag:sgin-951.0867922.041930.11000000018 ITER II 1.141 3034363105267282876A64E25 SKW=00867922419307 Serial= 11000000016 umripp:tiag:sgin-951.0867922.041930.11000000018 ITER II 1.237 3034363105267282876A64F25 SKW=00867922419307 Serial= 11000000016 umripp:tiag:sgin-951.0867922.041930.11000000016 ITER II 1.237 3034363106287282876A64F25 SKW=00887922419307 Serial= 11000000016 umripp:tiag:sgin-951.0867922.041930.11000000016 ITER II 1.237 3034363106287282876A64F25 SKW=00887922419307 Serial= 11000000016 umripp:tiag:sgin-951.0867922.041930.11000000016	1100 10 1.022 303450310620726207406427 3x0-200007922413507 Serial= 1100000000359 urn:epctagisgi	50:1,000/922.041930.110000000039	
ITEM 12 1.127 30343631650722267464604 SKU=00067922419307 Serial= 11000000008 Unrepc:tag:sgtin-961.10867922.041930.110000000106 ITEM 13 1.141 303436316528F2828FA64E25 SKU=008679224919307 Serial= 110000000037 Urn:epc:tag:sgtin-961.0867922.041930.11000000037 ITEM 14 1.237 303436316528F2828FA64E74 SKU=00887922419307 Serial= 11000000016 Urn:epc:tag:sgtin-961.0887922.041930.11000000037 ITEM 15 1.243 303436316528F2828FA64E74 SKU=00887922419307 Serial= 11000000016 Urn:epc:tag:sgtin-961.0887922.041930.11000000016	1100 11 1.125 303430310820728207804007 3x0=0006792241507 Serial= 1000000000 urn:epctag:sgl	90:1.000/922.041930.1100000000/	
ITER 15 1.141 2023-0501L0.007.02007.0001.22 5XU-00007.52.2415307 Serial= 1100000000057 UMREPCITAgE:gEIN-9611.0008/922.041930.110000000057 UMREPCITAgE:gEIN-9611.0008/922.041930.110000000016 TTER 14 1.237 30343631C628F2828FA6E74 SKU=0008722011307 Serial= 11000000016 UmrepcitagE:gEIN-961.0887922.041930.11000000016 TTER 15 1.243 30343631C628F2828FA6E74 SKU=0008722011307 Serial= 110000000057 UmrepcitagE:gEIN-961.0887922.041930.11000000016 TTER 15 1.243 30343631C628F2828FA6E74 SKU=0008722011307 Serial= 110000000056 UmrepcitagE:gEIN-961.0887922.041930.11000000016 TTER 15 1.243 30343631C628F2828FA6E74 SKU=00087220211307 Serial= 11000000016 UmrepcitagE:gEIN-961.0887922.041930.11000000016 SKU=000000000000000000000000000000000000	11ER 12 1.127 30345031602072020FR0AC5L SVE-0086792241930/ Serial= 11000000108 Urn:epc:tag:sgt1	90:1.000/922.041930.11000000100	
1FTT 14 1.237 30243501L0.007.02.007.00.07.04 5NU=0000752.4135307 SET1a1= 1.100000000110 UTHEPCT18g:5gT1n-501.08679/22.041330.110000000110 TTFH 15 1.243 30243531K2057202545345 5 (SHL00804722413307 SET1a1= 1.100000000106 UTHEPCT18g:5gT1n-561.087972.041330.11000000010	1107 13 1.141 30345051020760267604025 3X0=4086/92241330/ Serial= 1100000003/ Unrepcitagisgi	90:1.000/922.041930.1100000003/	
1 FER 15 1 1.795 1 1039 S0 113 0707 20 / 05 00 0 0 0 7 2 7 0 19 50 / SET 0 1 0 1 0 10 0 0 0 1 0 1 0 0 1 0 1 0 1	1166 14 1.237 3024303162072860F04674 3502000005792419307 Serial= 1000000116 Umrepctagisgt	30:1,000/322.041330.11000000110	
TEN 15 4 15 20010201(0)00000000000000000000000000000	ITER 15 1.445 3004001060072620FR0445 340F006/92/241330 36F161= 1100000005 0/71:60C16815811	05.1 0667022.041030.11000000000 05.1 0667000 041020 11000000000	

Shown above is a sample of the continuously available Log File of the ItemSight[®] program. Color-coding [red indicates an error as detected by the RFID Tunnel] allows rapid classification of the status of a carton on the conveyor.

Sample of Big Data Analytical Portal View & discussion



Shown above is a sample of the types of analytical outputs which are available through the portal. The graph shows the number of total number cartons processed on a given operating day [in grey] vs RFID-tagged cartons [orange] and cartons with a detected error [blue].

Results:

Despite lack of complete adoption of factory RFID tagging of individual garments, the Tunnel provides a sample of the shipments passing through enabling the verification of a significant fraction of the shipments. Using manual intervention, the system has demonstrated that incorrectly packed cartons can be intercepted from being shipped to retailers.

Operating for over 5 Quarters to date, the tunnel has detected numerous incorrect shipments, including incorrect packing plans, and unexpected errors from the suppliers. Overall, it has provided Operational Transparency -- a real-time-accessible view of continuing operations in the facility.

Technical Resources:

CS Smart Connected Devices, Cloud-based Big-Data Analytics:

Background to the Internet of Things Background to The Microsoft Cloud...... Background to Big Data Analytics..... CS solutions based on Microsoft view on the Internet of Things & Cloud...... RFID Readers & Data CS High Speed RFID Tunnel – patent

CS and your Big Data -- item-level data challenge

The goal is to deliver a Cloud-Based System enabling seamless tracking of individual items and aggregated shipments from the factory, frequently offshore to the retail shelf. Enabling the tools of Data Analytics.