RAIN in Healthcare
Is it worth it?

Paul M Elizondo – IntelliGuard
VP Engineering and R&D
Tommy Hilfiger
Unmentionables
Airline Baggage Tracking

- Year 2000 – First international baggage tracking trial
- Sponsor – US FAA
- Airline Participants – Alaska Airlines, Singapore Airlines
- RFID Technology – 125KHZ, 13.56MHz, 2.45Ghz (Proprietary protocols)
- Objective – Positive Passenger Baggage Matching

- Year 2002 – Delta Air Lines
- Baggage Loss Problem – $US 100Million / Year
6 Ton Paper Roll Tracking

• Year 2001 – International Paper / Little Rock, Arkansas
• Paper Roll Loss Problem – $US 1 Million / Week
Oncology Medication Dispensing

- Year 2002 – MD Anderson / Houston, Texas
- RFID Technology – 2.45GHz (Proprietary protocol)
- Product – 2.3 CF Lab Refrigerator with Access Control

- Oncology Theft – US$ 6 Million over two years
- MD Anderson Annual Pharmacy Budget - > 1.2 US$ Billion
- Monetary Loss – 0.25 % of Annual Budget

- Real Loss - Thousands of oncology patients received medication transfusions with 0% efficacy!!!
Worldwide Pharmaceutical Market

Source - IFPMA
Worldwide Medication Counterfeiting

• World Health Organization – US$ 200 Billion
  • 10% to 30% of drugs in developing nations are counterfeit
  • Internet sales of counterfeit drugs account for US$ 75 Billion

• Anti-counterfeiting packaging market will grow from $US 105.9 Billion in 2018 to $US 215.7 Billion in 2027
Among healthcare providers, it is estimated that 15% of pharmacists, 10% of nurses, and 8% of physicians are challenged with alcohol and/or drug dependency. There are 287,420 pharmacists in the United States. This means that over 43,000 of these medical professionals could be substance abusers.

Mayo Clinic (2000): sending at least one anesthesia worker a year into treatment for fentanyl addiction, one of the drugs to which that specialty has easy access.

In a 2017 study of 45 different incidents, the total amount lost to the organizations and payors was $301.1M. This included the loss in medications, prescription fraud, and fines imposed.
Every Hospital has this problem.

**Cost to the Hospital:**

- Disruption
- Employee impact
- Reportable event requiring agency involvement (FDA, DEA, etc.)
- Fines
- Jail Time
- Damaged Reputation
- Loss of licenses
- Time to establish prevention programs
Avery Dennison Advertisement

Because It’s Not Just a Sweater

You want to know that the person you hoped made your sweater... actually made your sweater.
That the cotton was picked and harvested in the right way, whether mechanically or by hand.
You want to know that it’s organic if it claims to be organic.
You want to know that your sweater started out from where it should, whether the Great Plains of Texas or anywhere from Costa Rica to Burkina Faso.
You want to know that it was woven, stitched, dyed and packaged in an ethical and sustainable manner.
Transported as it should (most ideally, at 21°C).
In fact, you want to know everything about it.
Because it’s not just a sweater... but a sweater with global cause-and-effect.
Yes, you want to know that everything you’re led to believe, you can believe.
Beyond doubt.

Made Possible
by Avery Dennison
## Retail is “WINNING”
### Cumulative Sales - 2018

<table>
<thead>
<tr>
<th>Application</th>
<th>Number (millions)</th>
<th>Biggest markets by number of tags</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical / Healthcare</td>
<td>1481</td>
<td>1 – mostly RAIN</td>
</tr>
<tr>
<td>Retail apparel</td>
<td>26350</td>
<td></td>
</tr>
<tr>
<td>Retail consumer goods</td>
<td>740</td>
<td></td>
</tr>
<tr>
<td>Books</td>
<td>2095</td>
<td>7 – mostly HF/NFC</td>
</tr>
<tr>
<td>Assets, Parts, Post</td>
<td>4726</td>
<td>4 – mostly RAIN</td>
</tr>
<tr>
<td>Smartcards / Payment key fobs</td>
<td>20897</td>
<td>2 – mostly HF/NFC</td>
</tr>
<tr>
<td>Smart tickets</td>
<td>5890</td>
<td>3 – mostly HF/NFC</td>
</tr>
<tr>
<td>Air baggage</td>
<td>796</td>
<td></td>
</tr>
<tr>
<td>Conveyances / Pallets / Cases / Rollcages</td>
<td>4045</td>
<td>5 – mostly RAIN</td>
</tr>
<tr>
<td>Animals (Livestock and Pets)</td>
<td>2946</td>
<td>6 – mostly LF</td>
</tr>
<tr>
<td>People (excludes other sectors)</td>
<td>207.9</td>
<td></td>
</tr>
<tr>
<td>Vehicles (incl. car clickers)</td>
<td>1530</td>
<td>8 – LF and RAIN</td>
</tr>
<tr>
<td>Passports / Secure documents</td>
<td>1034</td>
<td></td>
</tr>
<tr>
<td>Leisure</td>
<td>466</td>
<td></td>
</tr>
<tr>
<td>Other NFC applications</td>
<td>1100</td>
<td></td>
</tr>
<tr>
<td>Other tag applications</td>
<td>1725</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>76,644</strong></td>
<td></td>
</tr>
</tbody>
</table>

- **ALL FREQUENCIES** shown, passive and active, labels, fobs and cards
- RFID is used in very diverse, unrelated applications, addressing different problems
- Room for different technologies
- Total of ~16.7 Billion tags sold in 2017

Source – ID TechEx
<table>
<thead>
<tr>
<th>7&amp;i Holdings</th>
<th>C&amp;A</th>
<th>Gardeur</th>
<th>Liverpool</th>
<th>Sears</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acne Studios</td>
<td>Calcedonia</td>
<td>Gerry Weber</td>
<td>lululemon</td>
<td>Seidensticker</td>
</tr>
<tr>
<td>Adidas</td>
<td>Carrefour</td>
<td>Gottfried Schmidt</td>
<td>Macy's</td>
<td>Suit Supply</td>
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<tr>
<td>Adler</td>
<td>celio</td>
<td>H&amp;M</td>
<td>Marc O'Polo</td>
<td>Target</td>
</tr>
<tr>
<td>AEON</td>
<td>Chicos</td>
<td>Hailan</td>
<td>Marks &amp; Spencer</td>
<td>TESCO</td>
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<tr>
<td>American Apparel</td>
<td>Club21</td>
<td>Hudson Bay</td>
<td>Max Mara</td>
<td>TK Maxx</td>
</tr>
<tr>
<td>American Eagle</td>
<td>Dazzle</td>
<td>Hugo Boss</td>
<td>Mood of Norway</td>
<td>Tommy Hilfiger</td>
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<tr>
<td>AZ Modell</td>
<td>Decathlon</td>
<td>Intersport</td>
<td>Mersmann Design</td>
<td>Under Armour</td>
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<tr>
<td>Beams</td>
<td>Decks</td>
<td>JBC</td>
<td>Nespresso</td>
<td>UNIQLO</td>
</tr>
<tr>
<td>Beaumanoir</td>
<td>Dilliards</td>
<td>JC Penney</td>
<td>Old Navy</td>
<td>Urban Outfitters</td>
</tr>
<tr>
<td>Bed Bath Beyond</td>
<td>Dior</td>
<td>Kohl's</td>
<td>Oxylane</td>
<td>VandeVelde</td>
</tr>
<tr>
<td>Bel &amp; Bo</td>
<td>Elie Tahari</td>
<td>Komono</td>
<td>Pepe Jeans</td>
<td>Veritas</td>
</tr>
<tr>
<td>Boboli</td>
<td>Etam</td>
<td>L'Oreal</td>
<td>Ralph Lauren</td>
<td>VF</td>
</tr>
<tr>
<td>Bon-Ton Stores</td>
<td>Fast Retailing</td>
<td>Lacoste</td>
<td>Rebecca Minkoff</td>
<td>Vivienne Westwood</td>
</tr>
<tr>
<td>Brascol</td>
<td>G-Star</td>
<td>Levis</td>
<td>River Island</td>
<td>Zara</td>
</tr>
</tbody>
</table>

Source – ID Tech Ex
Benefits of RAIN in Retail

• 2 to 20% sales boost without increasing stock levels
• Reduction in out of stocks
• 96% improvement in labor productivity
• Over 98% inventory accuracy results

• Global ongoing roll-out for tagging apparel due to proven benefits
• Expanded from apparel to items including luxury goods, jewellery, furnishings and other high value, high complexity mix items
• Anti counterfeiting and anti theft are also driving adoption of RFID in retail
• Many are focusing on increasing sales through better customer service/engagement

Source – ID Tech Ex
Healthcare/Pharma is “WHINING”

- We are nothing like the Retail Apparel market
- Modifying existing medication labels is costly and time consuming
- No industry agreement on numbering
- Disparate vendor solutions prevent end-to-end supply chain usage
- Resistance to RAIN – Improved Inventory Management and Visibility Leads to:
  - Elimination of expired meds – loss of sales
  - Elimination of safety inventory – loss of sales
  - Direct sales of medication from pharmaceutical manufacturer to acute care facility – IDN Direct Purchase Power
  - Greater visibility of narcotic supply chain – Opioid Crisis (FDA)
DSCSA Goals

1. Implement an interoperable, electronic tracing of products at the package level by 2023 that will:
   - Enable secure tracing of product at the package level
   - Use product identifiers to verify product at the package level
   - Enable prompt response to suspect and illegitimate products when found
   - Improve efficiency of recalls

2. Establish national standards for licensure for wholesale distributors and third-party logistics providers

www.fda.gov
Key Requirements*

Authorized Trading Partners
Verification
Product Tracing
Product Identification (Serialization)

*The requirements under section 582 of the FD&C Act apply to manufacturers, repackers, wholesale distributors, and dispensers (pharmacies).
Product Identifier Requirement

Product Identifier
- National Drug Code (NDC)
- Serial Number
- Lot Number
- Expiration Date

- Human and machine readable formats
- 2D data matrix barcode for packages
- Linear or 2D data matrix barcode for homogenous cases

Manufacturers/Repackagers
- Encode product identifiers on prescription drug packages (November 2018)
- Determine smallest individual saleable unit

Verification requirements change once products are serialized with product identifier

NDC: XXXX-XXXX-XX
SERIAL: XXXXXXXXXXXX
LOT: XXXXXXXX
EXP: YYYY-MM-DD

www.fda.gov
GS1 SGTIN - 96

EPC SGTIN-96 Binary

- Header
- Partition Value
- Item Reference
- Filter Value
- Company Prefix
- Serial Number
GS1 Digital Thread

GS1 enables healthcare’s digital thread

Processes
- Physical flow
- Supply chain
- Product recall
- Patient data
- Transactional data
- Reimbursement

Strategies
- Current business
- Patient/provider
- Disruptive

GS1 standards legend:
- GTIN: Global Trade Item Number
- SSCC: Serial Shipping Container Code
- GLN: Global Location Number
- GSIN: Global Service Information Number
2019 Installed Healthcare Base -- RAIN RFID -- just the statistics...

RFID Refrigerators for Pharmaceuticals
More than 3,000 RAIN RFID enabled refrigerators deployed in hospitals, pharmacies, and doctors offices since 2017
2,000,000 unique drugs tracked in 2019
RAIN installations in USA, Europe, and Japan

Hospital Sterilization Process
Tracking medical trays through hospital to ensure sterilization processes followed
70 units deployed in 2019, tracking thousands of reusable surgical medical trays

Pharma Cold Chain Tracking
Tracking medical transport of cold storage pharmaceuticals to ensure drugs maintain optimal temperature
Deployed initial pilots in 2019 at 2 locations. 100 additional locations scheduled for 2020-2021
DeRoyal

- Medical Device Tracking – Class I, II, and III
- Customers Using RAIN – 115
- Number of RAIN TAGS Deployed - > 1Million
- Benefits
  - Visibility of Devices Stored on Shelves
  - Tracking to specific patient
  - Time savings for healthcare professionals
  - Reduced costs / Increased Revenues
INTELLIGUARD ENTERPRISE PLATFORM
Supply Chain – Controlled Substance - Advanced Data Analytics

Pharmacy
RFID-Enabled Kit and Tray Processing

Anesthesia
RFID-Facilitated Remote Clinical Access Stations

Smart Cabinets
RFID-Equipped Controlled Temperature Cabinets

IntelliGuard Insights
Data aggregation platform with predictive analytics
Rady Children’s Hospital
San Diego, CA

Hospital Overview
• Largest pediatric facility in California
• Provide 91% of pediatric care in San Diego
• Level 1 trauma center

IntelliGuard Implementation
• First IntelliGuard Anesthesia Customer
• Existing pharmacy customer
• Adopted anesthesia stations across OR’s, procedural areas, and outpatient locations
  • 28 units placed
RFID: The Future of Healthcare

Compelling statistics from other industries

- 20% improvement in managing inventory levels
- 96% improvement in labor productivity
- 98% improvement in inventory accuracy
- 70% improvement in shrinkage and write-offs
- 52% improvement in workflow efficiency with a less than 1% error rate
- Elimination of 15,000 annual hours recording inventory

Proven Results that translate to Healthcare

- Automation of manual processes
- Reduces labor
- Improves accuracy
- Improves compliance
- Improves safety
- Provides reliable actionable data
- Allows for predictive analytics
- Reduced time managing supply chain elements
RAIN in Healthcare/Pharma

• Is It worth it?? YES!!!!

• RAIN will revolutionize the world’s medication supply chain!!!!
  • Authentication
  • Reducing counterfeiting
  • Reducing diversion
  • Cold chain pedigree
  • Reduce medication errors
  • RAIN frees Healthcare professionals to practice at the top of their license
RAIN in Healthcare/Pharma

• What can we do to accelerate the tagging of medication with RAIN at the source?
  • RAIN Alliance
    • Support GS1 Standards and Interoperability
    • Support the GS1 US Healthcare Initiative
    • Engage with the FDA to promote RAIN
    • Engage with the Pharmaceutical Industry
    • Demonstrate the power of RAIN through pilots
    • Work with stakeholders across the pharmaceutical enterprise to explain and demonstrate the benefit to all parties!
Future RAIN Tag Advertisement

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• You want to know:
  • Where the ingredients were sourced
  • Who made your medication
  • That it has efficacy
  • That it is authentic
  • When it expires
  • Whether it came from Canada or India
  • That it was maintained at the proper temperature during shipment

• A patient is the destination of every medication in the supply chain
Eloise Nicole !!!
LET IT RAIN AND FOLLOW US

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Twitter: RAINrfid

LinkedIn: RAIN RFID Alliance