Learnings from developing a RAIN RFID based NEW RETAIL solution

Stora Enso Intelligent Packaging
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Agenda

- Stora Enso
- New Retail
- Learnings
  - Business Case
  - Solution Design
  - Intelligent Fridge
  - Application Performance
- Technology Comparison
- Conclusions
Stora Enso
In brief

• A leading global provider of sustainable solutions in packaging and retail space
• 26 000 employees in 35 countries
• Sales in 2017: EUR 10 billion
• Listed in Nasdaq OMX, HQ in Helsinki, Finland
• RAIN RFID end-user (pulp bales, paper rolls, biocomposites, packaging pallets, consumables)

Stora Enso Intelligent Packaging
− Digitalization of packaging and product flows using RAIN RFID technology
− Geographical focus Europe, Asia and the US
− Product and solution offering provided in three focus areas

Intelligent Packaging RAIN RFID Verticals

<table>
<thead>
<tr>
<th>Vertical</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECO tag products</td>
<td>Digitalization of packaging and product flows</td>
</tr>
<tr>
<td>New Retail solutions</td>
<td>Using RAIN RFID technology</td>
</tr>
<tr>
<td>Industrial solutions</td>
<td>Geographical focus Europe, Asia and the US</td>
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</tbody>
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New Retail

• “New retail” term by Jack Ma (Alibaba) in 2016

• “Pure e-commerce will be reduced to a traditional business and replaced by the concept of New Retail—the integration of online, offline, logistics and data across a single value chain.”

• Impacting the whole marketing mix, enabled by modern technologies
  • Mobile devices & apps => payment, authentication, data
  • Cloud computing => analytics, optimization
  • RAIN RFID => unmanned operations, logistics

• Consumer centric, increased availability & customization

• Video: New Retail by Stora Enso
It isn’t just the intelligent fridge

Complete solution for New Retail

ECO™ Tags
- Sustainable, performant and reliable RFID tags

Twin
- Tag integration & encoding
- Creation of digital twin

Switch
- Sorting station for distribution

Installation
- Assembly and start-up services, with partners

Intelligent Cabinet
- Unmanned store

Consumer engagement services
- Partner network

ReFill
- Replenishment and inventory management

SLA
- Maintenance and services

Bridge™ cloud platform throughout the solution

Main Software partner Microsoft
Learnings – Business Case

- **Driver** is *increased revenue* – maximize it (location, outlook, payment solution, offering)

- **Advertising** is one revenue stream – display & software to support this

- Very different customers – internet giants and corner stores – choose your target customers & biz model

- Include entire customer journey from product catalogue management to product tagging and encoding, replenishment, payment, sales reporting, pricing updates

- **Payment solution** selection is critical

- **Remote provisioning and management** as each visit to cabinet is expensive

- **Replenishment** cost important – existing staff or own last mile service
Learnings - Solution Design

- **Design for scalability**: efficient pre-integration, cabinet test mode for automated diagnostics for isolation and factory acceptance.

- **Design for customisations**: centralised services (payments, products and pricing, advertisements).

- **Optimise data usage** between Cloud and Cabinets, to match with limited mobile data subscriptions.

- **Test automation** software helps during development.

- **Challenge to find truly global payment service fitting to cabinet payment use case.** Create **easy integration to local payment solutions.**

- **Modular software and hardware architecture** to support changing requirements.
Learnings – Intelligent Fridge

• Cost of fridge plays major part in ROI calculation – components and supply chain must be **cost down engineered**

• Fridge inner surfaces may need to be engineered – non-metallic inner walls and shelves

• If shelf antennas are used, make sure shelf complies with load bearing and food grade requirements

• Performance and reliability of industrial PC module

• **Competition is with alternative technologies** (camera, scale)
# Intelligent Cabinet – Technology comparison

<table>
<thead>
<tr>
<th>Area</th>
<th>RAIN RFID</th>
<th>Camera</th>
<th>Scale</th>
<th>Dummy</th>
<th>Mechanical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer experience</td>
<td>Fast, easy to take multiple items</td>
<td>Fast, easy to take multiple items. Camera recognition still unreliable*</td>
<td>Fast, easy to take multiple items</td>
<td>Fast, easy to take multiple items</td>
<td>Slow, one-by-one</td>
</tr>
<tr>
<td>Support for variety of products</td>
<td>Works for all kinds of items</td>
<td>Difficult to segregate SKU’s with similar or changing looks</td>
<td>Problem with objects with varying weight (fruit, sandwich etc.)</td>
<td>Works for all kinds of items</td>
<td>Lot of restrictions due to mechanical function</td>
</tr>
<tr>
<td>Replenishment</td>
<td>Requires tagging &amp; encoding. RFID can be utilized in sorting, packing, shipping.</td>
<td>Easy replenishment</td>
<td>Inventory information unreliable</td>
<td>Easy but slow process</td>
<td></td>
</tr>
<tr>
<td>Expiry date management</td>
<td>Item level identification (good for high margin items like fresh food, milk etc)</td>
<td>SKU level identification</td>
<td>SKU level identification</td>
<td>SKU level identification</td>
<td>SKU level identification</td>
</tr>
<tr>
<td>Adding new SKU’s</td>
<td>Easy to add new SKU’s</td>
<td>Slow, thousands of images per SKU</td>
<td>Easy to add new SKU’s</td>
<td>Easy to add new SKU’s</td>
<td>Easy to add new SKU’s</td>
</tr>
<tr>
<td>Cabinet cost</td>
<td>RFID HW, isolation required</td>
<td>Simple cabinet structure but powerful PC and cameras needed</td>
<td>Large amount of scales &amp; wiring needed</td>
<td>Simple cabinet</td>
<td>Expensive mechanics</td>
</tr>
<tr>
<td>Per item cost</td>
<td>Requires tagging &amp; encoding</td>
<td>No per item costs</td>
<td>No per item costs</td>
<td>No per item costs</td>
<td>No per item costs</td>
</tr>
<tr>
<td>Basket size</td>
<td>High, easy to take multiple items, all kinds of items in one cabinet</td>
<td>High, easy to take multiple items, all kinds of items in one cabinet</td>
<td>High, easy to take multiple items, all kinds of items in one cabinet</td>
<td>High, easy to take multiple items, all kinds of items in one cabinet</td>
<td>Small, slow process, limited product offering</td>
</tr>
</tbody>
</table>

Subjective views of the presenter, situation also depends on exact business case, location and offering. Sometimes camera+scale is combined to improve reliability. RFID functions on its own.

*Camera detection impacted by: lens covered by anything, lens dirty, lens foggy, lighting conditions, product covered by other product, SKU size small, too similar SKU’s,
Learnings – Application Performance

• Intelligent Cabinet is a **demanding application**
  - Hundreds of items to be inventoried within few sec
  - Challenging products and packaging (metals, liquid)
  - Confided isolated space with reflections and nulls
  - Orientation, stacking difficult to control
  - High humidity

• **Consumer facing** application
  - System needs to resist misuse
  - All steps need to happen very fast
  - Errors immediately destroy customer experience

• **Tailored solutions are needed**
  - Reader antennas, middleware
  - Anti-tamper tags fit for metal, liquid packages
  - EMI Shielding
Conclusions

• New retail is a whole new business model and business case success depends on multiple factors like consumers’ payment habits in selected region, capabilities in cabinet replenishment and so on.

• Customer’s need a full solution which covers the entire customer journey.

• From RFID perspective it is a demanding application but if implemented well it can outperform alternative technologies.
Thank you!

Any questions?

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