Item-level RFID Tagging: Lessons Learnt and Future Challenges

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Overview

- MyGrocer project
- Developments since then
  - Standardisation of RFID for supply-chains
  - Item-level deployments
- Benefits of item-level tagging
- Trust and privacy issues
- Open questions
  - Technical
  - Sustainability
- Near term predictions
RFID in Retail

• What applications are feasible
  – Which are needed/wanted by consumers
  – Which applications can be supported by a business case

• Open vs. closed supply chains
  – Standardisation
  – Information sharing

• Dealing with consumer generated data streams
• Fast Moving Consumer Goods
• Extend SC to the supermarket floor and the home
• JIT stock keeping
• Three scenarios
  – On the floor
  – On the move
  – At home
• First two scenarios implemented in MyGrocer
MyGrocer Studies

- Scenario development in multidisciplinary development team
- Focus on consumer value
- Exploratory research using qualitative methodologies and storyboarding
- Quantitative analysis of two-week trials in supermarket with loyalty club members
- Re-analysis of qualitative data with focus on privacy, security and trust
System features

- Track cart content
- Track price
- Display product info
- Compare products
- Update preset shopping list
- Display offers and promotions
- Display locations of products in shopping list and navigation info
IST project: MyGrocer
MyGrocer Trials
## Evaluation - Functionality

<table>
<thead>
<tr>
<th>System Functionality</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring of the products in the shopping cart</td>
<td>4.72</td>
</tr>
<tr>
<td>Weekly / Regular Shopping List Reminder</td>
<td>4.60</td>
</tr>
<tr>
<td>Personalized Product Promotions</td>
<td>4.33</td>
</tr>
<tr>
<td>Appearance of Promotional Messages</td>
<td>4.30</td>
</tr>
<tr>
<td>Additional Product Information</td>
<td>4.47</td>
</tr>
<tr>
<td>Usability of “scanning” the products yourself</td>
<td>4.55</td>
</tr>
<tr>
<td>Continuous monitoring of the shopping cart’s total value</td>
<td>4.9</td>
</tr>
<tr>
<td>Ability of automated payment during check-out</td>
<td>4.93</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>4.60</strong></td>
</tr>
</tbody>
</table>
# Evaluation - Acceptance

<table>
<thead>
<tr>
<th>System Acceptance</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Usefulness</td>
<td>4.50</td>
</tr>
<tr>
<td>Perceived Ease Of Use</td>
<td>4.80</td>
</tr>
<tr>
<td>Aesthetics of menus</td>
<td>4.40</td>
</tr>
<tr>
<td>Perceived Trust</td>
<td>4.52</td>
</tr>
<tr>
<td>Intention Of Use</td>
<td>4.74</td>
</tr>
<tr>
<td>Intention Of Service Loyalty</td>
<td>3.92</td>
</tr>
<tr>
<td>Overall Service Quality</td>
<td>4.69</td>
</tr>
<tr>
<td>Average</td>
<td>4.51</td>
</tr>
</tbody>
</table>
Positives

• Ubiquitous retail has considerable value:
  – Reduced stress levels associated with shopping
  – Cognitive and navigational support while shopping
  – Reduction is POS queuing
  – Continuous price tracking (cost control)
  – Offers and promotions
  – Detailed product information and price display
  – Ability to compare different similar products

• “Fun” element
  – Long term studies are required to overcome the possible effect of the novelty factor
Privacy

- Very strong objections to home scenario
- Consumption monitoring seen as invasive
- Commercial communications seen as undesirable
- Personalisation via profiling and data mining seen as intrusive
- Data mining potentially can be used to infer individual situation
- Balance between data collection and functionality
- Willing to discuss tradeoffs between value and personal data
System security

• Low confidence on system integrity
• Low confidence in electronic payment
• Non-electronic mechanisms to guarantee security of transactions
• Provision for transaction traceability
• No single interaction point is confusing
• From no-one knows your name on the Internet to everyone knows your location
Trust

- **Consumer control over the system is critical**
- Means of control should be visible and its results verifiable
- Data once collected can be reused outside the scope of the system
- Option to use the system anonymously
- Relationship with service is personal
  - The role of branding
Transparent operation

- Notify when the product contains an RFID tag
- Option to remove or destroy tags when product is purchased
- No penalty for opting out of RFID use
  - Price discrimination
- Access to information and mechanisms for modification of erroneous information
- Notification of RFID monitored areas

CASPIAN Guidelines
• DHL automated warehouse for high end garments (fashion expo)
Item-level stock-keeping applications – M&S

- High value items, primarily suits
- Closed supply chain
- 64-bit UHF tags
- Stock keeping at the end of day to replenish sizes/colours
- Rolled out across all stores
Retail – Mitsukoshi department stores

- Service improvement
- Increased to 3 from 1.7 trials
- HF tags with EPC codes
The next 3 years, part 1

• RFID use in the supply chain will (slowly) become common at the SKU level
• Item level use of RFID will remain restricted to high value products
• RFID-based supply chains will put considerable stress to the back end infrastructure due to increased data requirements
  – The RFID stack
• Personalised consumer services will be using sensor data to improve their accuracy
  – RFID is just one of the sensors used to develop services
  – Cameras can potentially be more important
The next 3 years, part 2

- UHF will be the winner for item-level tagging
- EPC does not offer a clear competitive advantage
- Reward mechanisms for commercial use of private data will be introduced
  - Ownership will remain open for debate
  - Different views will proliferate
- The learnt behaviour of shopping will change and we will need to be educated in new practices
- Consumer activism will increase