กรณีศึกษาด้านเทคโนโลยีการตรวจสอบย้อนกลับ
Case Study: Traceability Technology Center

March 2011
สถาบันส่งเสริมความเป็นเลิศทางเทคโนโลยีอาร์เอฟไอดีแห่งประเทศไทย (RFID Institute of Thailand)
Introduction to RFID

• What is RFID?
• Components of RFID Systems
• Benefits of RFID
• Complementary use of Barcode and RFID
What is RFID?

“Radio Frequency Identification”, Electronic data storage system, with additional computing capacity and security, powered by magnetic or electromagnetic fields instead of physical contacts...
Types of RFID Tags

Passive Tags:

Passive RFID tags have no internal power supply. It relies entirely on the energy of the interrogator (reader) signal to power up and transmit a response. Most of UHF passive tags signal by backscattering the carrier wave.

- Power comes from the field of reader
- Low cost & very durable
Types of RFID Tags

Active Tags:

Active RFID tags have their own internal power source, which is used to power up and to transmit a response signal to the reader. Active RFID tags provides greater communication range and more reliable than passive RFID tags.

- Incorporate a battery
- Applications: long range tagging and road tolling

Properties of Wavetrend
Battery Assisted Passive (BAP):

Also known as Semi-Passive Tags or Semi-Active Tags, it is similar to active tags in that they have their own power source to maintain volatile memory and powers the microchip, but the battery does not power the broadcasting of a signal back to the reader. The tag communicates back to the reader by reflecting and modulating the reader signal, just like passive tag.
RFID Readers

- Automation solution with stationary devices
- Fast, Easy and Convenient
- Reliable and Durable
- Various Form Factor (Panel, Tunnel, Portable, Handheld)
How RFID System works

Tag/Transponder
- Tagged along with items to identify and/or monitor
- Contains unique number
- Read-only or read/write memory
- Active, passive, battery-assisted passive
- can be designed/encapsulated to work in harsh environment
- Built-in sensor(s) as option

Reader/Interrogator
- Provides power supply to passive tags
- Reads/writes data wirelessly with tag, no line of sight required
- May interface with motion sensor(s) and signal light(s)

Middleware
- Monitors and manages RFID Interrogator(s)
- Links the interrogator to application, e.g., ERP
- Tag filtering
- Provides interoperability in distributed architectures
- Stores and evaluates basic information to business event

Enterprise Software
- Interpret and process basic information/business event to business decision

RFID Institute of Thailand, www.RFID.or.th
Benefits of RFID

- Automation
- Robust and reliable
- Speed and accuracy
- Provides real-time information
- Integrated IT Solution
- Enhance active decision making
- Change business process, business mind etc.

- Enhance “Supply-Chain Visibility”
Barcode Technology

Information and pictures from “Motorola”

• Barcode 1 dimension

• Barcode 2 dimension
# RFID vs Barcode

<table>
<thead>
<tr>
<th></th>
<th>RFID</th>
<th>Barcode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Storage</td>
<td>Sufficient</td>
<td>Limited</td>
</tr>
<tr>
<td>Line of sight</td>
<td>No need</td>
<td>Required</td>
</tr>
<tr>
<td>Cost</td>
<td>Higher but dropping</td>
<td>Low</td>
</tr>
<tr>
<td>Widespread</td>
<td>Less</td>
<td>Yes</td>
</tr>
<tr>
<td>Robustness</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Others</td>
<td>• Tags are reusable</td>
<td>• Human readable</td>
</tr>
<tr>
<td></td>
<td>• Multiple reading ability</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Authentication and encryption available</td>
<td></td>
</tr>
</tbody>
</table>
Complementary use of Barcode and RFID

Picture from www.epcglobalinc.org
Global Situation in Food Industry

- Rise in Demand
- Losses in Processes of human-managed food chain
- Food Safety & Food Traceability Concern
Global Situation in Food Industry: Rise in Demand

"Technology's Role in the 21st Century: Food Economics and Consumer Choice"
Jeff Simmons, Elanco Animal Health 2009
Global Situation in Food Industry: Losses in Processes of human-managed food chain

“Over half of the food produced today is either lost, wasted or discarded as a result of inefficiency in the human-managed food chain”

Concepcion Calpe, senior FAO economist (December 2008)
Global Situation in Food Industry: Food Safety & Food Traceability Concern

Consumer Concerns Regarding Food Safety

<table>
<thead>
<tr>
<th>Issue</th>
<th>% of Consumers Citing This Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disease/Contamination</td>
<td>50</td>
</tr>
<tr>
<td>Handling/Preparation</td>
<td>29</td>
</tr>
<tr>
<td>Food Sources</td>
<td>13</td>
</tr>
<tr>
<td>Agricultural Production</td>
<td>7</td>
</tr>
<tr>
<td>Biotechnology</td>
<td>1</td>
</tr>
</tbody>
</table>

Though research shows most consumers aren’t overly concerned about food safety, when asked to share potential worries, 50 percent cite disease and contamination. In contrast, only 1 percent cite biotechnology as a food safety concern.
Why Traceability is so important?

- **Laws**
  - EU Food Laws
  - Japanese Sanitary Laws
  - US Bioterrorism Act 2002

- **EU Regulation (EC) No. 178/2003**
  - The ability to trace and follow a food, feed, food-producing animal or substance through all stages of production and distribution

- **ISO 22000 7.5.3 Traceability**
  - The organization shall establish a Traceability system, which enables the identification of product lots and their relation with batches of raw materials, processing and distribution records.
  - Traceability records shall be maintained for a defined period sufficient for recall purposes, in accordance with customer and regulatory requirements and shall be based on the product shelf life.
Importance of Traceability System

• Get the current location and status of products in the cold distribution chain
• Prevent our products from Recall, Contamination, Bioterrorism, or even Counterfeit
• Some of Information that Traceability System can tell:
  • Where did ingredients come from?
  • What about the ingredients in ingredients?
  • What line, batch #, date, time was it made on?
  • What is the shelf life left of the product?
  • Is the food safe when we eat it?
• It became Laws!
Internal Traceability

• Food business operators would save costs in term of times of a withdrawal and in avoiding unnecessary wider disruption.
• Without prejudice in more detail rules, the Regulation does not compel operator to establish a link (so called internal traceability) between incoming and outgoing products.
• In summary, food business operators should be encouraged to develop systems of internal traceability designed in nature of their activities (food, processing, storage, distribution, etc.).
• Food crises in the past have shown that tracing the commercial flow of a product (by invoices at the level of a company) was not sufficient to follow the physical flow of the products.