

RFID for the Pharmaceutical Industry

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Published: May 2, 2006

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There has been much attention given to the RFID (radio frequency identification) device, or a small radio transmitter appearing in everything from credit cards to pet tags. To date, much of this attention has focused on the use of RFID to replace bar code technology.

This article will expand that definition of RFID by looking at the RFID device as the cookie for the brick-and-mortar world, much like the cookie used to analyze Web site activity. This aspect of RFID technology will have a tremendous impact on pharmaceutical manufacturers, retailers and service providers. It will also illustrate how many pharmaceutical organizations are currently utilizing RFID devices.

When analyzing Web traffic, the signature of the person visiting a Web site is captured in a continuous stream of entries intermingled with other visitors to the site. Software such as [WebTrends](#) and other products take the continuous stream of data and organize it from a grouping of Web servers into sessions so that Web traffic and patterns can be analyzed. The cookie, which is a file stored on the Web client, is a place where identity information is stored and used to enrich the Web log during its population. Just like Web traffic, the signature from an RFID device is transmitted to RFID receptors, which are collected for real-time activity or grouped into sessions for further analysis.

In most cases, the RFID device has available memory for storage of additional information. This information is transmitted continuously (unlike Web traffic) for receipt by RFID receptors. The information stream from an RFID device needs to be enriched with master reference data in order to achieve valuable results that can be utilized in a variety of business operations.

The RFID industry is in its infancy. As a result, there are a variety of incompatible RFID technologies that have not yet been standardized. We can expect that information sharing across trading partners will be limited for the next several years until information exchange standards can be formulated. This lack of standards, however, does not preclude companies from taking the initial plunge and formulating their RFID strategy, which includes organizing the necessary data so that RFID signals can be enriched for use in business operations.

The Use of RFID Devices

The earliest uses of RFID devices have been direct electronic replacements for bar coding. RFID devices have been costing approximately 25 cents per applied device, which is far more expensive than bar coding. Recent advances have brought pricing to less than 8 cents per applied device, but that is still far more expensive than the cost of bar coding. Clearly, mere replacement of bar coding will not justify the investment in implementing RFID technology.

RFID devices continually send an electronic product code (EPC). This EPC is essentially a signature for an individual RFID device that can be tracked if, and only if, the reference data needed to resolve the product, consumer or other application information is available to make use of the movement of the electronic signature. Initial RFID implementations integrated into business operations are being adopted, but this is still at the innovation stage.

Some of the more interesting implementations of RFID in the pharmaceutical industry are listed in Table 1.

RFID Application	Reference Data Required	Why
Eliminate the traffic of contraband pharmaceuticals	Product Number Lot Number Container Number Doses per Container	It is the container of a number of doses that will be tracked.
Medication bands worn by patients in hospitals	Patient ID Room / Bed Number Primary Physician Product ID Unit of Measure Units per Dose Adverse Reactions	The purpose of the RFID device in hospital situations is to reduce the possibility of over- and/or mis-medication of patients.

	Treatment Schedules	
Avoid out of stock conditions at distributors and hospital dispensaries	Stock Location Product Number Vendor Number Unit of Measure Blanket Purchase Order Container Number Expiration Date Doses per Container	The purpose of the RFID device is to avoid running out of compounds which can be potentially filled by a competitor's product.

Table 1: RFID Implementations in the Pharmaceutical Industry

The Need for Data Standardization

In order to fully exploit RFID technology, it is imperative that the product and customer data available from the generated EPC signals be collaborated so that intelligent supply chain and other applications utilizing the EPC signal can be coordinated between participants in the supply chain (see Figure 1). From a pharmaceutical perspective, service providers can be armed with just the right amount of inventory in compounds and, by participating in the available information from the RFID devices, can mitigate their risk of over-medicating or mis-medicating patients.



Figure 1: The Stairway to Electronic Collaboration

RFID devices are already available to house positive patient identification, which assists in reduced medical errors, and HIPAA-compliant wristbands have been developed to ensure up-to-date secure patient data exchange. This is just the beginning.

The Data Volumetrics

There was an order of magnitude more information needed to exploit the business opportunities presented by Web logs and the "Web cookie," and it can be conservatively estimated that there will be at least an order of magnitude more information collected from RFID devices.

There are some subtle differences between the Web transaction and the RFID transaction that must be discussed. In the Web transaction, all the information about a Web visitor is collected in either a cookie or some data enrichment scheme such as Hitbox or Gomez. In the RFID scenario, there are a variety of signals being provided, some originating from the product you know about and some originating elsewhere. These RFID signals can be coming from:

- A frequent buyer free-on-board shipment you issued to the consumer, which has demographic information about the consumer and other information that has been written to the imbedded RFID device that you stored.

- An RFID enabled credit card, which will continuously transmit generic information about the consumer (there are privacy issues that need to be resolved).
- The products that the consumer has with them either for purchase or on them (RFID devices sewn into labels will start to become prevalent in the next year or so).

Revenue enhancing and risk mitigation opportunities will result from taking the information available from RFID devices sensed by RFID receptors, integrating the information and acting on potential opportunities. These can be:

- Highlighting an over-the-counter (OTC) product that fits within a consumer's buying pattern.
- Alerting a register that the OTC compound about to be purchased has a high incidence of reactions with other medications the consumer is taking.
- Alerting care givers of OTC and prescribed products on premises that interfere with the therapeutic benefits of treatments.
- Issuing a targeted coupon or mailing to a consumer about new compounds based on information stored in their frequent buyer FOB or their credit card.

Many of these examples require near real-time access to the EPC signals received by RFID receptors, enriched with the necessary reference data and potential business scenarios that can be presented to either the consumer, care giver or cashier. And, of course, the enrichment and determination of a potential business opportunity is being made against an order of magnitude increase in data.

First Steps

It is expected that the RFID device will be the preferred means of information exchange within the next three to five years. It is currently being used by several credit card companies as an alternative to swiping credit cards. In the pharmaceutical space, smart band technology has already been developed for read/write electronic storage of patient and treatment status, medications, allergic reactions, surgery schedules and other information.

The RFID and its EPC signature cannot be exploited without first having impeccable data quality in reference data used to enrich RFID signatures. The master data required to enrich RFID signatures and the program necessary to cleanse the identified master data should be implemented now.

The tools available for analysis of data were initially designed for small amounts of data fed in batch for analysis on demand. They are ill equipped to deal with the volume of data anticipated from RFID technology. To accommodate this anticipated increase in data volume and frequency and achieve near real-time processing, companies must begin to address the limitations of their architectures now.

Finally, the development of innovative ways to exploit the RFID technology cannot be done in a vacuum. Technology savvy individuals will come up with interesting uses of the new technology, but not necessarily those that will yield either revenue gains or cost savings to the organization. The identification of ways to exploit RFID technology over the next three to five years should also be initiated now.

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