

## Win in the flat world

# Simplify . . .

### Leveraging RFID & Other Pervasive Technologies to Achieve Transaction Efficiency in Consumer Retailing

– Devon C Ferreira, Girish A Ramachandra

If staying open on a Sunday gave you the edge in 1950's retailing, and having a supply chain that hummed made you a winner in the nineties, it's clear that in the next five years the battle for customers will be waged on the edge of consumer interactions. The retailers who get to keep Joe Customer's dollars will be those who can provide the best consumer experience with the most efficient supporting retail operations. This paper explores how technology is transforming consumer behavior, and examines the way in which RFID and other pervasive technologies can be effectively employed to optimize retail operations to enable a superior consumer experience.



## Technology is transforming the shopping experience...

In his book, *The World is Flat*<sup>2</sup>, Thomas Friedman identifies the combined forces of Digital, Mobile, Personal and Virtual (DMPV) as primary drivers of the changing global economy. He refers to them as “the Steroids” because of the manner in which they have accelerated and magnified the impact of other globalizing forces. In much the same way, DMPV forces are flattening the consumer retail landscape. They allow large retailers to connect with consumers at mom-and-pop levels of customer intimacy, causing a convergence of channels and broadening the shopping universe for modern consumers. The proliferation of technologies such as mobile & wireless and the internet have nurtured a highly-informed customer base, enabling many consumers to research purchases and investigate alternate sources before ever visiting a store. As a result, the manner in which consumers shop is evolving, as are their expectations of the retailer with regards to service and product availability.

As part of this evolution, the notion of a disconnected, multi-channel retail strategy is being replaced by a channel agnostic paradigm. One may think of this model of Connected Retailing as “multi-channel retailing on steroids”. From a customer’s perspective, a purchase made online for delivery or store pick-up should be indistinguishable from one made in the store...or over the phone...or on the phone/PDA. The expectation in each case is of a personalized experience, perfect service, 100% availability, and complete compatibility across channels. What this means is that retailers require a robust technical architecture to support multi-channel integration and provide sufficient computing power at the edge i.e., at the point of consumer interactions.

## So what does Connected Retailing look like?

Consider the following scenario: Julia is at the subway station, heading back home after a long day at work. At the station, she notices an ad on the wall for the latest computer game. Touching the poster with her Near Field Communication (NFC) cell phone, she initiates a dialog on her phone and gets more information about the game, including pricing, locations and promotions. She knows her son would love this, and adds it to her electronic shopping list with the touch of a button. Later, at her neighborhood retailer, she picks up an Smart Shopping Assistant (SSA) and mounts it on the shopping cart. The SSA recognizes

### Top 2 Areas for Retail IT Focus in 2006<sup>1</sup>

- Experience-based Differentiation
- Services Oriented Architecture Retailers are looking for leaner, more agile technology platforms that enable them to better service customers across all channels, both on and offline

### Digital, Mobile, Personal & Virtual (DMPV) – It’s Everywhere...

- The increasingly pervasive nature of technology in the day-to-day lives of modern consumers is flattening the retail landscape, resulting in more choice, instant access and increased competition (both external and cross - channel).

### Connected Retailing is characterized by:

- Personalization
- Customer-dictated Experience
- Context Awareness
- Location Awareness
- Ubiquitous Access
- Intelligent Interfaces
- Self-reporting Systems

<sup>1</sup> Forrester Research, Trends 2006: Retail IT, March 1, 2006, by Nikki Baird

<sup>2</sup> Thomas Friedman, *The World is Flat*, Farrar, Straus and Giroux (2005)

Julia from her RFID-enabled loyalty card, recalls her shopping list, and helps her navigate around the store, all the while adding her purchases to the electronic cart for easy check-out.

The SSA is context and location aware and presents timely and relevant information as well as personalized promotions. Working with store systems and personnel, the application backbone also ensures that the desired products on her list are available in stock when she shows up at those shelves. Business rules embedded in the store systems reward Julia's status as frequent customer with a discounted cross-sell offer to purchase a gaming wheel to complement her selection. Julia adds both to her cart, which instantly updates her item list in the perpetual check-out application managing the transaction. Having completed her shopping, Julia is able to check-out immediately using her payment-enabled NFC<sup>3</sup> phone, or by tapping her new contactless payment credit<sup>4</sup> card without having to wait in line.

These concepts of the convergence of online and in-store shopping, context and location awareness, personalization, ubiquitous access and intelligent interfaces are already here. A clear example of this is the proliferation of NFC phones in Japan, which indicates the speed with which these concepts are being assimilated and adopted.

### **Connected Retailing Solution Concepts include...**

- Smart Print Media (SPM)
- In-store Self Service Kiosks
- Smart Shelves
- Line-Busting
- Perpetual Check-out
- Shopping Assistants
- Clienteling Solutions
- Remote Inventory for Mobile
- Mobile Inventorying

In less than a year after the launch of NTT DoCoMo's FeliCa NFC service in July 2004, over 3.3 million FeliCa handsets had been sold, and over 20,000 FeliCa terminals deployed around Japan in shops, airports, railway stations, cinemas and theatres.

## **Connecting with customers requires an agile platform**

In order to adequately address the demands and opportunities inherent to Connected Retailing, it's necessary to evolve the way we think about technology. Scenarios like those described above demand a shift in dealing with data collection and analysis, as well as its translation to timely, actionable events that create business value. Traditional approaches to business intelligence solutions rely on data aggregation and information mining through reporting. This fundamental premise implies latency – something that enterprises can ill-afford when they are competing for customer attention. Compare this with a model where you have intelligent agents sniffing for business events and communicating them to an edge processing layer which can implement application proxies for real time decision making. These agents take the form of software, sensors, or a combination of both. In the case of software, they are lightweight and have a small footprint with multi-platform capability. In this model, information mining occurs in real time as a non-intrusive extension to current transactional and decision support systems. More importantly, they enable real time decision making (via process automation or informational alerts) during the moment of truth that can make or break a conversion or change in total basket value. Using such

<sup>3</sup> Near Field Communication Technology holds the promise of bringing true mobility to consumer electronics in an intuitive and psychologically comfortable way since the devices can hand-shake only when brought literally into touching distance. (Wikipedia.org)

<sup>4</sup> The major payment service providers all have RFID-enabled credit cards deployed today. Increased transaction security is a major driver of this technology and usage is expected to increase significantly in the next 2-3 years. See MasterCard Paypass, Visa Contactless and American Express ExpressPay

a combination of sensors and software, enterprises can shift from a reactive mode to one that is interactive and in some cases proactive<sup>5</sup>.

## Tuning into radio WIFM... what's in it for me?

In the basic retail equation, maximizing sales means gaining access to the largest possible population of *potential* buyers, converting as many as possible to *actual* buyers. It also maximizes the amount of product, in dollar terms, that each of these buyers is purchasing. Top line lifts are available through technologies that allow:

- More customers (traffic) with ubiquitous access to product information
- Enabling cross and up-sells (conversion) that will drive additional sales (average sale).

### Retail Revenue Equation

- Total Retail Revenue =  
Sum of Channel Traffic x  
Shopper Conversion  
Rate x  
Average Sale Value

On the cost side of this equation, it is necessary to address basic supply chain challenges. These include minimizing stock-outs, improving distribution process accuracy and optimizing procurement. It is becoming increasingly important in a flattening world to source merchandise where it is least expensive and sell where most profitable, further complicating procurement processes and supply chain management. Here too, pervasive technologies are proving to be most useful in addressing these challenges.

Connected Retailing, underpinned by a platform of pervasive technologies can positively influence retail sales. The convergence of channels draws more traffic, ubiquitous access and personalization convert more customers, and clienteling applications drive cross and up-sell to increasing average ticket totals. The gains are not infinite, and as with many other strategies, there is a point of diminishing returns. This occurs as the extent to which technology pervades the retail environment begins to disrupt the natural buying cycle and impacts the consumer experience negatively. An effective strategy for the future of retail experience and operations needs to balance enough technology to delight the customer and optimize operations, but not so much as to negatively impact the retail experience. In this equilibrium, technology is pervasive but not apparent.

For Julia, the promise of pervasive technologies, Connected Retailing and applications - smart print media, perpetual check-out, SSA's - lies in shopping convenience, instant access to product information, improved product availability and better use of her time. For the retailer and consumer goods companies, customer interactions such as those described in the scenario above provide invaluable insights into consumer demand.

### Anonymous Customer Loyalty... an oxymoron worth thinking about

- Current loyalty programs generally require that consumers divulge personal data, something they are not happy to do in many cases.
- Pervasive technologies and Connected Retailing allow consumers to be identified with a temporary unique number, as opposed to personal data. This enables a personalized experience to provide personalization, but not at the expense of privacy.

<sup>5</sup> David Tennenhouse [http://www.intel.com/research/spotlights/one\\_on\\_one\\_david.htm](http://www.intel.com/research/spotlights/one_on_one_david.htm)

Applications such as the SSA that have both context and location awareness and can reward more profitable transactions with personalized promotions that are generated in-situ, and delivered at the right time. Customers like Julia can benefit from immediate rewards based on shopping behavior, while the retailer can leverage the interaction data to enhance promotional campaign efficiencies. Closer interactions and increased customer intimacy create tangible benefits for both Julia and the retailer. This encourages Julia to share shopping or wish lists and other preferences to maximize her value from her shopping experience. This can also be implemented the form of an anonymous customer loyalty program to alleviate consumer privacy concerns. Armed with this information prior to Julia's arrival, the retailer can proactively iterate through her shopping list to identify shelf level stock-outs and alert store associates on their mobile devices to enable timely replenishment from the back room. Location awareness also enables information on new products presented at the right moment. This also works to entice a customer to a brand switch.

## Where does RFID fit into the pervasive technology picture?

Radio Frequency Identification (RFID) is increasingly gaining prominence as a pervasive technology with significant potential to deliver business benefits. RFID has demonstrated its efficiency in providing automated data capture and serialized identification capabilities. Early adopters have demonstrated that RFID can deliver significant results in consumer experience and retail operations. This includes stock availability improvements of >50% and a reduction of in-store labor requirements of up to 20%.<sup>6</sup> These obvious benefits apart, convergent technology solutions leveraging DMPV can further extend the value of RFID and also provide competitive advantage. Such solutions can help retailers empower warehouse and store personnel through timely information delivered on handheld devices, mobile phones and other intelligent interfaces. Combined with real-time decision making capabilities at the edge, process automation benefits can increase multi-fold.

## Is there a shortcut to Connected Retailing?

If the value in moving towards a technology-enabled environment that delivers focused attention to individual consumers is obvious, the magic that makes this all possible is not. To have an enterprise enabled by pervasive technologies at the edge of consumer interactions, a technology platform that supports such a strategy is necessary.

Infosys' Pervasive Infrastructure for eXtended Information Exchange (PIXIE) is a key enabler of the pervasive enterprise and provides the technology platform for enterprise agility. Its innovative architecture makes it possible to abstract the complexity of new devices and sensors from current

### RFID's role in a pervasive enterprise

Combined with the Electronic Product Code (EPC), RFID is a key enabler of the Simplified retail environment. RFID/EPC can:

#### *Serialize*

Personalization requires the ability to uniquely identify items and individuals, and store enough information about them to provide a value-add service

#### *Automate Data Capture*

Incidental data collection enables real-time decision making

#### *Provide Self Reporting Systems*

High read rates and decent range create an environment that "tells you about itself"

<sup>6</sup> Targeted RFID Merchandise Tagging: A New Approach to Item-level Tracking AMR Research, 2005

IT infrastructure. It enables the extension of legacy applications into the new world of anytime anywhere computing. With a programming model that supports implementation of software agents as empowered proxies of enterprise applications, handling situations that demand real time decision making is a breeze. Designed specifically for low horsepower computing environments, small footprint agents can extend legacy applications with edge processing capabilities. They also provide an opportunity to sense and communicate events of business value on a real time basis. PIXIE has out of the box support for a variety of such devices and sensors and support for industry standard interfaces for enterprise integration. This enables you to get more from your current IT infrastructure in a pervasive world.

## Closing Comments

Technology is not only transforming consumer behavior and expectations. It is also changing the way in which retailers conduct business and engage customers across all dimensions of the in-store experience. Infosys has built many of the solutions described in this paper and can be seen today in our solutions centers. If the concepts presented here seem relevant and appealing to your business, and you would like to learn more, please contact the authors. We are ready to help you understand how you can Simplify... your retail operations and experience.

This is the first in a series of papers from Infosys under the Simplify... theme exploring the business and technology concepts of the modern pervasive enterprise.

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