

Raising the Bar on Bar Codes

a report by

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From the Past...

Since its inception in 1973, the Universal Product Code (UPC) – commonly known as ‘the bar code’ – has revolutionised the merchandising of products worldwide. The UPC provides an accurate, efficient and economical means of controlling the flow of goods through the use of an all-numeric system. This system identifies uniquely the thousands of different suppliers and millions of different items that are warehoused, sold, delivered and billed through retail and commercial distribution channels. Several emerging technologies also spurred early adoption of bar coding: development of laser technology, improved computer processing power and creation of scanners, for example. Surprisingly, though, full adoption of the UPC has only been within the last 10 years. However, the UPC has fulfilled its promise as few technologies have – supporting global standardisation and, in turn, helping businesses reduce costs, increase efficiency and drive innovation for the benefit of consumers, employees and shareholders alike. At the developmental phase of the UPC, a committee of scientists at the Massachusetts Institute of Technology (MIT) in Cambridge, Massachusetts, was asked to assess how many years might pass before the technology would need an upgrade. Their answer: 25 years.

In the Present...

During the boom of the dotcom economy, many start-ups saw the bar code as the key to digital commerce. Companies such as AirClic and Digital:Convergence – who rolled out the ‘CueCat’ – used the bar code as a hyperlink to the Internet. Their focus was on consumer convenience and making it easier to connect consumers with manufacturer and retailer websites.

For the leaders of the Uniform Code Council (UCC), however, the question remained: “After 25 years, what next?” The issue was whether a technology that has demonstrated its benefits clearly could be improved upon, as recommended by the MIT scientists back in 1975. According to an article in *Consumer Goods Technology*, that same committee

had estimated in 1975 that bar coding would save the American food industry US\$1.43 billion. However, the actual results have been nearly 50 times greater in the US food industry alone. So, it was established firmly that the technology could indeed be improved upon. In October 1999 – with the support of the UCC and several major manufacturers – the Auto-ID Center was established to build the future of global automatic identification (auto-ID) technology.

With a staff of 30 scientists, engineers and graduate students – and more than 40 of the world's leading manufacturers, retailers and technology developers – the Auto-ID Center is one of the more unique research projects in academia. With additional research laboratories in England, Australia, Japan, China and Brazil, the Auto-ID Center combines research and development (R&D) simultaneously, joining global business leaders with the world's leading scientists and professors. This synergy enables the Auto-ID Center to succeed on two levels: first, the ability to attract the brightest graduate students and PhD candidates across multiple disciplines; and, second, the ability to offer sponsors involvement during the R&D phase of a revolutionary standard that will shape how products are manufactured, shipped, sold and consumed. Two of the most important contributors are the UCC and European Article Numbering (EAN).

The Auto-ID Center will take bar coding to the next generation by building a system that merges the centuries-old ‘network of atoms’ – the production, distribution, sales, use and disposal of products – with the ‘network of bits’ – the Internet. Merging these two platforms is the essence of the work of the Auto-ID Center and involves four fundamental components:

- Electronic Product Code™ (ePC™) – a unique ID code that is designed in such a way that one can be assigned to practically every atom on earth;
- ID system (tag and reader) – draws the unique ID from an object and passes that ID to a network of computers;
- object name service (ONS) – deciphers each ePC as a Web or server address (URL); and



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- Physical Markup Language (PML) – describes the physical object associated with each ePC, allowing multiple computers and software packages to communicate.

On 1 October 2001, the Auto-ID Center successfully raised the bar on bar coding. On that day, with the system in place within a real supply chain, scientists from MIT were able to track – in realtime – pallets from a manufacturer's distribution centre to the back storeroom of a major retailer. While it is difficult to speculate on the potential benefits, this system could combat lost or stolen goods, which, according to retail specialists, cost retailers 2% to 3% of their sales. Also, manufacturers and retailers could potentially see as much as a 6% increase in sales if they were able to keep products in stock. According to an article in *Business 2.0*, about a trillion dollars worth of goods are stuck in the supply chain at any given time because manufacturers and retailers are not sure how to match supply and demand optimally. This system provides the ability to 'produce to demand' and manage inventory accurately, which will forever change the way goods are made and stored.

To the Future...

If we look at the entire supply chain, one of the

greatest benefits of this technology is simplifying waste management. The ePC code would allow different types of materials to distinguish themselves from one another and guide the sorting and recycling process automatically. However, the optimal design of the next generation of auto-ID systems or the 'ultimate' bar code will depend on a number of evolving technologies and trends, for example:

- new sensing technologies that are cost-efficient – radio frequency and electrostatic tags, magnetic imaging and holograms;
- greater acceptance for information exchanges on the Internet and growth in wireless telecoms usage; and
- the emergence of new business paradigms, in particular e-commerce and interactive marketing.

Two of the most important factors for the success of the next-generation bar code lie in the need for establishing global operating standards and performance protocols. Without such standards – as history has demonstrated repeatedly – we get fragmented technologies, slower rates of adoption and higher costs. In contrast, standardisation creates a common ground on which progress and creativity can be harnessed. ■

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