

Watching Your Every Move - A Cautionary Technological Tale

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Larger than a dust mote (but not by much); inexpensive to manufacture and distribute and deploy; millions, and later billions and trillions of them -- virtually everywhere. They will be sowed as if by the four winds, lodging into clothing, tennis balls, tools, passports, car keys, car VIN plates, books, banknotes, pamphlets, and letters. They will become pervasive. And wherever one is, someone will know. (Or at least will have the potential to know.) This is not a futuristic discussion of nanobots or other bleeding-edge technologies; this is instead the likely results for the lineage of already commercially deployed "Radio Frequency Identification Tags" (RFID Tags) which seem poised to replace today's retail "UPC Bar Codes."

Today

Today's bar codes identify one SKU (Sales Keeping Unit) of a product (one particular UPC bar code may identify a 12-ounce can of a particular vendor's cola drink.) Every such can of cola is marked by the same bar code. When the bar code is waved in front of the store's optical scanner (which is why most grocery carts must be unloaded for checkout), the bar code does not identify that unique can of cola; it only identifies that this is "a" 12-ounce can of cola from that manufacturer; the store's computer then looks up its price and adds it to your bill.

Once you've purchased that can of cola and left the store, regardless of how many times it might later be scanned (difficult except at a checkout counter because the bar code on the can must be read optically), no one could know if that was the particular can of cola that you purchased from a specific store -- only that it is one of millions of such 12-ounce cans of cola from that manufacturer.

Enter The Wireless Tag

But once RFID tags replace UPC bar codes, things will be more than a little different. Because each and every RFID tag will likely carry the same information as a UPC bar code, plus an additional globally unique serial number! That means that if you buy a specific 12-ounce can of this cola from your grocery store, where you've identified yourself either by swiping your "loyalty card" for a discount or by paying with a credit or debit card (or even if you pay by cash, as we'll see later), the store's computer knows that you bought that very specific physical can of cola, and no other can of cola.

You didn't even have to unload your grocery cart, because the "Radio Frequency" part of the RFID tag's name means that it's designed to be read at a distance. It means that you might just be able to wheel your full grocery cart straight out the door, and the door sensor will automatically total up your order and charge it to your payment account. Now, depending on how the store's computer is networked, the grocery chain's computer will also know exactly which can of cola you purchased, when, and from which store. Very convenient for all concerned, actually.

The Dark Side...

But consider where this technology could, easily, lead, as an infrastructure of these RFID tag sensors/readers becomes widespread throughout society:

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As you continue down the street, either drinking the cola or carrying it in your shopping bag, the sensors at the doorways to each store you enter or pass, which are always querying for any tags that get within range, could also be receiving a tiny identification response from your can of cola! But since this store's computer system knows that it didn't have a 12-ounce can of cola with that tag's unique serial number, it ignores it and doesn't try to charge you. Nevertheless, that store's computer did know that that specific can of cola passed its way. And it may well record such trivia as a matter of course. And forward it on to its chain's master computer...

In fact this could occur wherever you walked, leaving invisible crumbs of information about where your can of cola passed. In excruciating detail.

But isn't this trivial? After all, who cares if every can of cola can be tracked? The issue is that these many sensors wouldn't only note that your can of cola passed by -- they would also note the passing of your car key's unique ID; the unique ID of your driver's license, and even the unique ID of each and every dollar bill in your wallet. Toss that empty can of cola into a trash can and the next store you stroll by would still be collecting all the unique numbers of the other things you're carrying, and the things you're wearing. And if all the chains' main computers and those of smaller stores made this mass of random information available to say, a Marketing firm, or to other stores along your path (for a fee, of course), or to a government organization upon demand, then a very detailed picture of "You" -- your travel habits, your spending habits (remember those individually tagged dollar bills?), almost everything about you, could be mixed and matched and dissected in ways that you might, or might not, agree with. This might be the ultimate "data mining" warehouse.

...And The Bright Side!

Those and related privacy issues are significant, so why would we pursue implementing such technologies? The answer, as is so often the case, is "money," because along with the dangers, such active tags offer great benefits and economic rewards.

Such ubiquitous RFID tags (or any technological cousins) could dramatically improve all facets of the supply chain; every individual item could be uniquely tracked throughout the entire manufacturing and distribution and retail channels. It would be very difficult for items to "go missing" when their absence could be noted almost immediately by wireless sensors, and their location tracked. It would be trivial to identify, say, packages of meat that had reached their "Sell By" date, or every recalled child's toy on a store shelf or anywhere within the supply chain. Pallets or shipping containers loaded with many items could expose their exact contents to a reader. And far more, as such efficiencies allow manufacturing and retail costs to be lowered, leading to higher profits and/or retail price relief.

And note that the benefits of RFID tags are not limited to the supply chain. On the home front we could see refrigerators and pantries that always know exactly what was in them, and even warn of expired items. Tie that in with an Internet-connected home computer network and you could go to your favorite food Web site and ask it for a selection of recipes that you can make tonight with the ingredients you already have on-hand! And you might never again lose your car keys. Or your remote... Or a wandering child...

For Good And For Ill, It's Really Already A 'Done Deal'

Clearly, such technology offers both benefits and risks, so one might wish to "slow down" and explore all of these issues prior to implementation. But the problem with that technique is "Moore's Law," which for over 35 years has accurately predicted that, in-effect, the number of transistors on

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a chip, and hence its the chip's computing power, will double every 18 months, while the cost remains stable.

Because of this incredible and compounding exponential rate of innovation, technology moves far faster than the societal discussions and plans and rules and laws that might control its offspring. We seem to always be playing a game of catch-up as we integrate such devices into society. Yet the economics are such that "slowing down" really isn't an option.

For example, the widespread adoption of RFID chips, for all of the supply chain benefits we've been discussing, is already a "done deal." Both Wal-Mart and the US Department of Defense have now required that every supplier add an RFID-tag to every crate or pallet of items (although not yet to the individual items themselves) that they deliver. With these two giants of commerce demanding RFID tags, a huge number of manufacturers across all industry segments are now gearing up to meet the deadlines, or face losing what might be their largest customers.

And once manufacturers are successfully RFID-tagging every case or pallet and the cost of producing the RFID tags falls, how far of a stretch would it be for manufacturers, distributors, and retailers to later demand tagging every individual item to bring supply chain visibility to its ultimate conclusion?

The Cautionary Side

As is so often the case these days, it seems that this technology is coming; in fact is already here at the crate and pallet level. And because of its benefits, it seems likely that tagging technology will, eventually, make that final leap to uniquely defining just about everything. But the dark side is there as well, demanding very careful, thoughtful, study. As we implement these technologies, we should take care to implement them in a way that will preserve, or at least knowingly and deliberately give up a minimum of the "privacy" that we have always taken for granted. We don't want to allow such potentially far-reaching changes to happen invisibly, "by accident," as a result of technological innovation.

"Educated" Tradeoffs

Broadening the RFID tag example used above to technologies in general, some privacy tradeoffs may be worthwhile; others may not. But "change" is certain. It's only by educating ourselves, and by thinking things through in-advance, that we will be in a position to rationally control the results.

We do have the opportunity to realize many of technologies' benefits while keeping their dark sides at bay. It behooves each of us to determine the acceptable results earlier, rather than latter.

Let's make sure that we create a world that each of us, quite literally, is willing to live in. Because we will. And our kids will...

This essay is original and was specifically prepared for publication at Future Brief. A brief biography of Jeff Harrow can be found at our main [Commentary](#) page. Other essays written by Jeff Harrow can be found at his [web site](#). Jeff receives e-mail at jeff@theharrowgroup.com.