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Consortium Standards Bulletin

A ConsortiumInfo.org publication

JANUARY 2007

Vol VI, No. 1

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‡ ‡ ‡ **January 31, 2007**

#45 Product Evolution and “Standards Swarms”

Three recent news clips highlight the disorderly, but ultimately productive, way in which products and standards evolve in tandem during times of disruptive innovation.

The first clip is a press release announcing the completion of a new [USB connector](#) design standard. A really *small* connector design. How small? That large object to the left of the connector in [this picture](#) looks like a flat camera battery to me. The reason for creating the new standard is because mobile devices are getting smaller at the same time that more and more features (camera, video, music, wireless, etc.) are being crammed inside a single mobile device. As a result, the space available to accommodate a connector is rapidly diminishing.

The second article provides an update on a delayed [wireless USB](#) standard that would eliminate the need for a physical connector at all. And the third announces the completion of a new WiFi-compatible standard to make [mobile security](#) as easy to set up as the push of a button – whether you are accessing data wirelessly or physically. As the standard is extended, other wireless standards (like Near Field Communications – a very short range standard) will be supported as well.

You can expect that the devices you buy in the next year or two will use one, two or even all three of these standards. Or you might see completely different connection and data-transfer standards in use, all chosen from what might be called a “swarm” of overlapping standards that are continuously being developed around mobile devices. Logically, you might wonder whether this is a good thing, or simply yet another case of too many standards being created to do the same job.

In this case, I think it's the former rather than the latter. Let's see if evolution in the physical world provides an example of why this would be so.

In a mature natural ecosystem, it's difficult for a new species to get a foothold, because every niche is already filled with one or more other creatures or plants, each of whose development has been optimized to maximally exploit that niche. The same tends to be true in a mature commercial system as well, where launching a disruptive technology requires great coordination among competitors in order to displace an incumbent, as I pointed out in a recent blog entry, titled [Standards and Disruptive Technologies](#).

But - in nature, this stable appletart is regularly and frequently (in geologic time, that is) upset by a variety of causes, such as dramatic climactic changes, the formation of land bridges that allow previously separated species to intermix, and massive meteorite strikes, among other events and catastrophes. On several occasions, these disasters have been sufficiently massive to result in unimaginable waves of extinction, wiping out 60% or more of all species on earth.

When this happens, speciation has a clean slate to work with, and evolution runs rampant. Countless new species evolve in weird and wonderful ways as they compete to share in the sudden wealth of opportunities. Most of these species die out over time, as the best-adapted win, and a new period of relative stasis sets in.

The same sort of process is occurring with increasing frequency in the modern world of technology, and the advent of wireless technology provides an excellent example. Once cell phones became ubiquitous,

people became used to carrying a device around wherever they went. More recently, WiFi has conditioned us to want the Internet everywhere, all the time. Concurrently, multiple technological advances have been made, including the ability to dramatically miniaturize all sorts of devices and features.

As a result of these convergences, a metaphorical meteorite has indeed struck the telecommunications industry, and the race has been on to exploit the new commercial niches enabled by these advances. The result? First, music players, PDAs and cell phones with enough features to require a 200 page manual, and then the increasing consolidation of all these capabilities (camera, video, computing, phone, games, music, and so on) into a single mobile device.

In this type of explosively developing environment, there's no time for everyone to agree on a single standard for every purpose – if they did, product development would grind to a halt. Nor would the best standard necessarily be agreed upon in each case. By pushing the envelope simultaneously on the technological, product and standards development fronts, more creative options are developed and tried (just as in the post-catastrophe real world), and a richer set of features and options becomes available for both vendors and customers to sample. Some of these standards and technologies will go even farther than their original proponents hoped or expected, while others will fall short. Ultimately, some will make the grade, and most of the others will die.

Another example can be found in the world of open source, where the same winnowing will doubtless occur in the not too distant future among the many Linux distributions that have dropped a bomb on proprietary operating systems. Some will find and flourish in discrete niches, while others will wither away.

This is the context in which I view the connectivity standards I noted above. Each one, as well as others that may be announced in today's and tomorrow's news, is part of just one of the rapidly evolving standard swarms that are evolving today. In the case of data transfer, device vendors can pick and choose among multiple options and select the best solution for their particular product. And at the same time, fierce competition will continue between the developer groups of competing standards, each of which will try to push the envelope or their contender as far and as fast as possible – something that would not happen in the absence of competition.

This rapid, albeit redundant, innovation is a good thing, and indicative of a healthy and competitive commercial ecosystem. The key, of course, is to know the difference between a stable system, where developing multiple standards to do the same job may sometimes create inefficiency and inconvenience, and a dynamically developing system. The former situation usually leads standards developers to work on incremental improvements to existing standards, but the latter presents a classic chicken and egg paradox: standards will be needed when the products are done, but standards developers can't yet know exactly what vendors and users will want to use those standards for, or exactly what those standards should be capable of doing.

The solution? If we launch enough initiatives, it will probably all turn out all right.

Or, to paraphrase a former first lady, in times of rapid innovation, it takes a swarm of standards to raise a new technology.

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