Why Doesn't Technology For Blind People Cost Less And What Can We Do About It?,

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Note: This speech was given in the late 1990s

Thank you, President Maurer, Dr. Jernigan, and the National Federation of the Blind for the invitation to be here.

The theme for this conference is "Technology for the Blind as we approach the Twenty-First Century." Many sub-themes could fit under that broad heading. As I prepared my remarks for this conference, it was not easy to choose an appropriate theme from among many I could see.

The challenge for all of us who are developers and suppliers of products and services is how we can best advance the interests and needs of our blind clients. But it's essential that be done in an affordable way—affordable for the blind consumer, when that is possible and appropriate, or at least affordable for an appropriate agency or organization whose charter includes dispensing government funds for rehabilitation, education, public access, or similar purposes.

Why is stuff for blind people so gosh-darned expensive and often not really affordable? I'd like to answer that question and then tell you what I think might be done about it, although unfortunately with no absolute assurance of success.

Let's start with some examples. Why does a stand-alone reading machine, such as Telesensory's new Domino product, or Xerox's Reading Edge, or Arkenstone's Open Book product, cost $5,000 or more? How can people charge $500 to $1,000 for software for blind people when lots of equally complicated software sells for less than $100, and entire suites of software, with many applications in them, can be had for a street price of $200 to $300, or sometimes even less than $100, if you're trading in a competitive suite?

The problem is that there aren't really a lot of blind people. Put another way, there aren't enough blind people to permit economies of scale to come into play, to permit mass-market production, and to permit product development costs shared over a very large population.

In our field the development and tooling costs for new technologies and products must always be amortized over a relatively small number of units. Let me give you some examples. Consider a TV set or VCR for mass markets: development is spread over many millions of units. There is hardly a consumer electronic appliance around for which the product development costs cannot be spread over hundreds of thousands of units. And once the development is complete, the tooling necessary to allow each individual product to be built at the lowest possible cost can also be amortized over a large number of production units.

By comparison, one of the most popular electronic devices in our field, Telesensory's Aladdin video magnifier for people with low vision, involved about a million dollars in product development cost and nearly another million dollars in what we call "hard tooling," to permit the individual products to be made at the lowest possible cost. We wanted to set a new, lower price point in the market with a high quality product, and we did so. The basic Aladdin is priced nearly 20 percent under the Voyager, which it replaced, and nearly 30 percent lower than the Telesensory Vantage CCTV reading machine, which it also replaced. It's the lowest price full-featured quality unit on the market, worldwide; and, to give our customers greater comfort, we also added a five-year warranty, which is unheard of in most any industry.

But even so we had to take a considerable risk because, if our startup costs could not be spread over a fairly large number of units, this would have been a losing proposition for Telesensory. Fortunately our market planning was correct, and our unit volume—the number of units we sold—jumped 53 percent in the first year after Aladdin was introduced.

In the area of products for people who are totally blind, especially Braille-related products, it's even tougher. To sell as many as 500 to 600 units a year of a particular product using Braille output is a challenge to most manufacturers in this field, and that's a very small number of products over which development costs and hard tooling can be spread. As a result, Braille products seem very expensive, and they are!

We can imagine what it would be like if 100,000 Braille displays were being produced every year, such as the refreshable Braille line displays of the type made by Telesensory, Alva, Blazie, and a host of European companies. We could expect costs to drop significantly, probably by at least 50 percent, and perhaps even more.

That's likely to remain just a dream, unless someone comes up with a significant advance in Braille-cell technology. And even that is unlikely, because the potential volume is not enough to justify the kind of investment which might produce a low-cost Braille cell. That's what's called a vicious circle, and it's been with us for as long as people have tried to apply technology to meet the needs of blind people more effectively.

So there's a problem I've described: there aren't a lot of blind people, so there isn't a large potential user base over which to amortize the costs of product development and tooling. The result? We don't get substantially lower-cost products, as we'd like to have.

I've always hated describing problems without at least trying to offer some sort of solution, or at least a path to be followed. So I'll do that here as well and describe an approach to product development and to the application of technology to meeting the needs of blind people better, which I think has some reasonable potential for getting around the dilemma I've just described—at least in some cases.

Let me approach this topic by describing two product developments with which most of you will be familiar. Many years ago Telesensory designed and produced what I believe was the world's first talking calculator. It was called "Speech Plus," and many of them are still in use today. It was relatively bulky, had limited battery life, had limited functions, and sold for what seemed like the enormous price of $395. That's probably equivalent to nearly a thousand dollars today.

Telesensory sold around 15,000 of the Speech Plus calculators over a period of a few years. Then what happened? You know the story: our Japanese friends came out with talking calculators for the mass market, initially priced under $100, and I understand you can get some today for prices as low as $29. Perhaps they were not as well-optimized for the needs of blind people as was the Speech Plus calculator, but who was going to complain, with that enormous price difference?

What's going on here? Was Telesensory ripping off its blind consumers? Of course not! Telesensory's direct internal costs were well in excess of a hundred dollars. The profit level made on the product was reasonable, not excessive. But Telesensory did not have the wherewithal or perhaps did not have the means to attempt to develop a talking calculator which could be sold profitably for less than a hundred dollars in large volumes to mass markets. As soon as the Japanese entered the market, Telesensory dropped out. Well that was a success story for Telesensory for a while, but eventually it had to be abandoned.

Let's look at another example. Ray Kurzweil, whose name is familiar to all of you, invented reading machines for blind people. Initially they cost $50,000 or more, well beyond the reach of virtually all blind people, and even unaffordable to public agencies for individual client use.

Many years later Xerox acquired Ray Kurzweil's company. Still, almost no reading machines were sold, despite massive subsidies by the Xerox Foundation to place machines in various libraries. It was still beyond the reach of the ordinary blind consumer or even of most rehabilitation agencies.

What changed this picture? First, ask yourselves the question: why did Xerox buy Ray Kurzweil's company? Do you think it was because they wanted to enter the field of products for blind people? Think again. Their motivation, from a business perspective, was clearly to obtain access to optical character reading technology for general office use. The product for blind people was an incidental by-product, which they continued to produce, but in which they have invested very modest development resources since then. There's not been much new in that field for quite some number of years, except for a Telesensory product which I'm going to talk about before I'm through. In fact, Xerox's adaptive devices division was, according to industry information, on the market to be sold for quite a period of time, although I don't know whether that's the case at present. Xerox wasn't a bad corporation because of this—it just didn't make business sense for such a large corporation to invest money in such a low-volume industry.

Even so, reading machine prices have dropped from $50,000 in Kurzweil's early days to $5,000 or so for stand-alone systems today and $1,000 for the software alone to be used with your own PC and scanner.

Now we begin to see the answer. We begin to see what it is that can make technological wonders available to blind people—and not at a high price, but at reasonable prices which can be afforded by ordinary consumers, or at least by the rehabilitation agencies whose mission is to help blind consumers obtain jobs and lead fuller and more independent lives. The key is the connection between mass-market technology and the unique needs of blind people.

Video magnifiers, so common today, would not have been possible were it not for the growth of the market which uses video cameras for inexpensive high-volume applications, such as security and surveillance in parking lots, office buildings, and residences, as well as countless other applications. There are not enough low-vision people to justify the development and production of low-cost cameras, but by using cameras developed for mass-market applications, a whole new industry was born in the early 70's.

Similarly, Ray Kurzweil's invention could never have been made affordable, as it is today, were it not for the development of personal computers and scanners for mass markets unrelated to the needs of blind people.

"Well, that's great!", you might say. "So we're just supposed to sit around and wait for the technological crumbs to fall off the consumer mass-market table." That would be a dismaying scenario, if that were the only way we could hope for truly significant advances in our field, since we would all be doomed to follow, not lead. In addition, we'd be subject to the problems still being experienced with, for example, Windows 95 access, where the mass-market product, Windows 95, just won't work for blind people without significant adaptation, which remains costly and sometimes inefficient or kludgey.

There is, I think, another approach which developers of products for blind people can take. That involves tying in other needs—needs which aren't directly the needs of blind people—in order to support the kind of product development which will nonetheless benefit significant numbers of blind people. For example, if Telesensory had been able to develop speech technology in such a way that talking calculators became a desirable appliance for everyone, not just blind consumers, the cost of talking calculators might have been reduced at an earlier stage. Unfortunately that didn't happen.

Let me give a more pointed example using some of Telesensory's newer products as an example. Last month, at the Closing the Gap convention in Minneapolis, we conducted private showings of a new device we call Domino. It's the world's first battery-powered, truly portable reading machine for blind people, weighing only fourteen to fifteen pounds and the size of a briefcase. It's lighter, smaller, faster, and easier to use than Xerox's Reading Edge, which had previously been the closest the world had seen to a portable reading machine for blind people and, at twenty-seven pounds or so, not truly portable.

We're putting Domino on the market at less than $5,000, which is a fair price and less than anything which is even remotely comparable to it. But even at that price, it won't be a very profitable product for us, and we need profits to pay for development and tooling costs, so that we can keep on doing good things.
Are we crazy? No, we're not crazy. We're just betting again, as we did with Aladdin, that we've got some ideas which will have applicability in such a way that we can substantially increase the market base for this product. We want to sell Domino—or parts of it, or other products based on some of its unique and patent-pending technology—to people who aren't blind for other applications. If we're successful in doing that—and, remember I said it's a bit of a gamble— then we think we can lower the cost of Domino in the future so that blind people can benefit immensely.

This is an example of what I mean by trying to create crossover applications between what we do that benefits blind people and finding other applications for the same products and technology for people who aren't blind.

Another example of the same concept at work is our recently-introduced Marco (as in "Marco Polo"). This is an audible-signage navigation system for blind people. Here there are two parts to the story. First, it's of equal benefit to people who have low vision. With the much broader audience and market that provides, we've been able to make a commitment to considerably reduced pricing for the Marco products, which will benefit blind people as well. The second major part of this story is that the part of a Marco system which a blind or low vision person would want to buy—the receiver—costs less than $100. We've designed the system so that the greater part of the cost is in the transmitter, or audible sign, and that's the part that someone else (a building owner or transit-system operator) will need to buy and install. This also operates to hold down the ultimate system cost for the blind user.

Finally, there's one other observation I'd like to make. As many of you know, Telesensory decided, with considerable regret, that the time had come to stop producing the Optacon, the world's first electronic reading appliance for blind people. There are many Optacon-lovers who have lobbied for continuation of the Optacon or some sort of new development to provide the same functions. Deane Blazie and others are working to see if that can possibly be done.
I think this effort, while commendable for what it tries to accomplish for blind people, is misguided in the path it takes. The Optacon will never be used by truly large numbers of people. If one believes, as I do, that resources are finite and limited and that development funds spent in one place are therefore unavailable to achieve more in some other place, and that sometimes-difficult choices need to be made, then the consequence is clear: money spent on low-volume technology to try to replace the Optacon is money which cannot be spent on other technological advances which have far greater potential to help blind people. If small amounts of government funding are used as seed money, perhaps the cost is moderate. But it still leaves the problem of commercialization,

which will continue to be a costly process in the very small volumes which are likely to be involved.

In conclusion, let me summarize the situation as I see it, regarding the cost of products for blind people—and much of this probably applies to other disabilities as well. There aren't many blind people. Therefore, there's not much expectation of being able to produce technological advances for them in the high volumes which are characteristic of consumer appliances. As a result, both development costs and tooling costs must be amortized over relatively small unit volumes, which makes the resulting device costs seem to be fairly high.

But despite that picture, there are areas in which the possibility exists of adapting mass-market technology for use by blind people, or of developing devices for blind people which have other uses so that the costs I mentioned can be spread over much higher unit volumes. And Telesensory certainly hopes to lead the way in doing just that: better and better applications of technology to meet the needs of blind and visually impaired people, while driving costs as low as we possibly can.