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assisting

ASSISTIVE
TECHNOLOGY

An expert on assistive technology and disability issues, Suzanne Robitaille is a former reporter for *Business Week Online* and is the founder of abledbody.com, a consumer website focused on disability innovations in the workplace. Profoundly hearing impaired from an early age, Robitaille understands well the challenges of navigating the workplace with a disability and, in her new book, *The Illustrated Guide to Assistive Technology*, provides guidance for people who might benefit from assistive devices at work and at play. *ABILITY Magazine* recently chatted with Robitaille about how her book can benefit employees with disabilities.

ABILITY Magazine: What compelled you to write this book?

Suzanne Robitaille: A publishing company had read some of my *Business Week Online* articles, which were mostly about assistive technology, and asked if I was interested in developing the topic into a book. So I did some research on the subject, and I found that there weren't very many books on the market that approached this material from a purely consumer perspective. Most were medical-sounding books and academic-type books that were difficult to get through. So my goal was to talk about all of this in a much more consumer-friendly way.

ABILITY Magazine: How did you get started as a writer for Business Week?

Robitaille: I graduated from Medill School of Journalism at Northwestern University in 2000 and moved to New York that same year. After I'd worked with *Wall Street Journal Online* and helped them build their online operation, I got a job with *Business Week Online*, who asked me if I'd be interested in writing about assistive technology. A writer named John Williams had been doing a column for them and was leaving to start his own website, so I agreed to step in and contribute. John and I have different writing styles, so my work ended up being a different kind of column.

ABILITY Magazine: What sort of audience did you have in mind when you set out to write this guide?

Robitaille: My target audience is the wide range of people with disabilities who are all over the workplace. In my very first chapter, I write about the fact that employers are required to provide reasonable accommodations for people with disabilities. Essentially, if you as an employee need a particular accommodation to perform your job, or to perform it better, your employer is supposed to provide that resource. So, if you look through my book, chances are you'll see things that might help you in your job, and you can then ask your employer about those resources. There are other ways to get these accommodations—you can pay for it out of pocket, you can get reimbursed by insurance—but by far, the best way is to acquire them through your company.

The truth is, a lot of assistive technology companies don't have the resources to promote what they do, so I think people who read the book will be pleasantly surprised at how much is already out there for them. So many companies are working to make life better for people with disabilities. There are even some iPhone applications designed to help people with disabilities, which many people don't know about. One application called Proloquo 2 Go is great for people who can't talk. It sort of allows them to simulate speech in a pinch. That's on page 157 of my book.

ABILITY Magazine: Are there plans to convert your book into other formats?

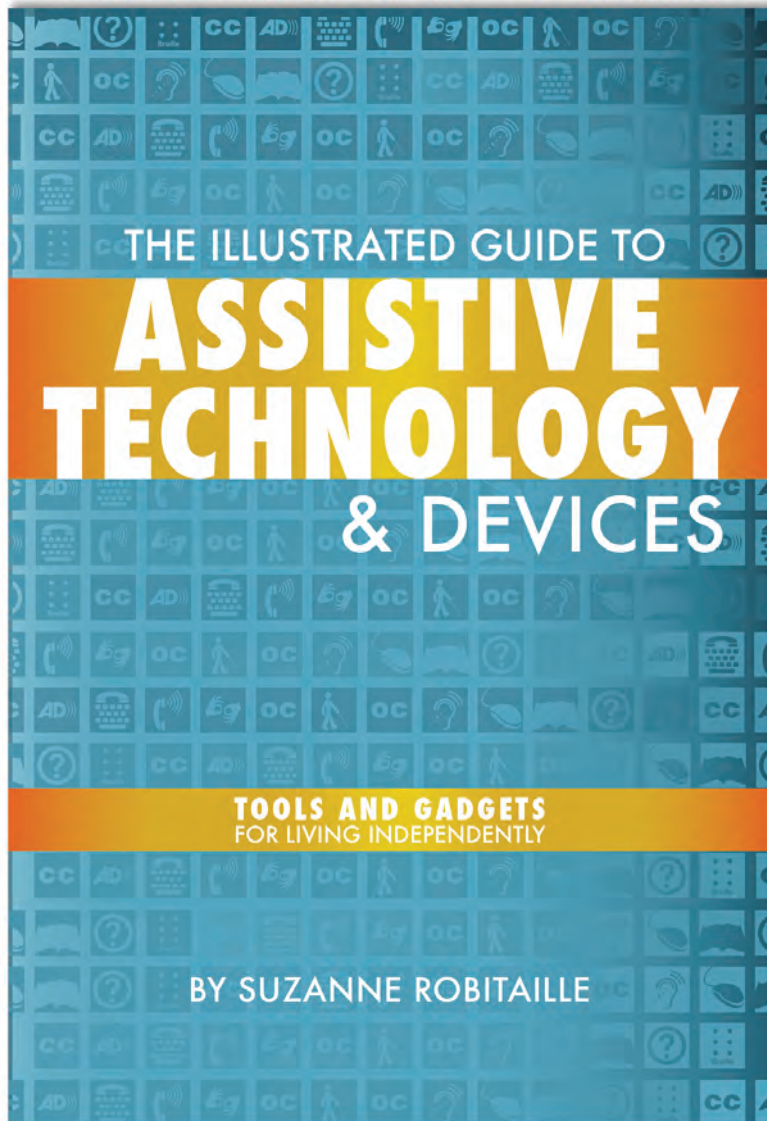
Robitaille: Yeah, a company called ReadHowYouWant is making the book available in audio, Braille, and large print.

ABILITY Magazine: Frances West, the director of the Worldwide Accessibility Center for IBM, had some nice things to say about the book.

Robitaille: Yeah, it's gotten a lot of great feedback from people at IBM, the Assistive Technology Industry Association, Microsoft, the National Multiple Sclerosis Society, and the Business Leadership Network. But the publisher could only put so many good quotes on the back of the book. ■

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EXCERPTS FROM



Chapter 1 WHAT IS ASSISTIVE TECHNOLOGY?

Self-preservation is the first law of nature.
-Samuel Butler

Having a disability isn't easy. Believe me, I know. I have had a hearing disability since I was four years old. Growing up profoundly deaf impacted my education, my lifestyle, and eventually my employment. Indirectly, it affected my parents, my sister, my teachers, my friends, and my bosses.

But being deaf was also a blessing. It helped me build character; it gave me insight into a more realistic world than the one in which my peers lived; and it brought for me a love of books, and of writing, which my wonderful mother—who, like the rest of my family, was hearing—encouraged me to pursue as a career.

The definition of “disability” is any physical or mental impairment that substantially limits a major life activity. Disabilities include, but are not limited to, learning disabilities, blindness or low vision, hearing loss, speech impairments, and mobility impairments. Assistive technologies have helped many people to circumvent, mitigate, or eliminate the barriers to major life activities.

In my case, I couldn't comprehend language or use the telephone with just my hearing. When I was twenty-seven I got a cochlear implant; the surgery removed my natural hearing forever and replaced it with artificial hearing. Today I can hear on the phone. I have a device implanted inside my head that's attached to a processor I wear behind my ear. I made the choice—and for me it was a good one—to allow assistive technology to play a large role in my life so that I could hear again.

When I tell people I write about assistive technology, I can see their eyes glaze over—that is, until I tell them that this technology helps people with disabilities succeed in the workplace and in life space. Then their faces light up: “Oh my, that's so wonderful,” they exclaim. “My sister has a learning disability” or “Gee, my father is losing his hearing.”

Suddenly, they can relate. That's because disability affects most of us in one way or another. In the United States, 54 million people have a physical or mental disability. That's 20 percent of the population. More than 20 million families

have at least one family member who has been touched by disability. And one can add to that list the 80 million baby boomers, the growing number of children with special needs, and the thousands of soldiers returning from Iraq and Afghanistan who have service-connected disabilities such as limb loss and brain injury.

Today, disability has been threaded into our national discourse. It affects health care, employment, education, and recreation. It has an impact on a person's physical and financial health and well-being, not to mention on the strain on a family trying to provide care and attention.

That's why technology is so important for people with disabilities. Assistive technology devices can help someone improve physical or mental functioning, overcome a disorder or impairment, prevent the worsening of a condition, increase capacity to learn, or even replace a missing limb.



Suzanne Robitaille speaks with technology writer John Williams during a CSUN Conference

TYPES OF ASSISTIVE TECHNOLOGY

Assistive technology comes in many different shapes, sizes, and packages. It can be acquired commercially off the shelf, modified or customized, or designed specifically for one or more disability types. The one thing that all assistive technologies have in common is that they are capability enhancers.

There are ten classes of assistive technology devices, categorized by their main objective. They are:

1. Architectural elements, such as adaptations to the home and other premises
2. Sensory elements, such as aids for communication and hearing
3. Computers, such as software and hardware
4. Controls, including environmental controls
5. Aids for independent living, such as personal care items
6. Prostheses and orthoses
7. Aids for personal mobility, including wheelchairs
8. Modified furniture and furnishings
9. Aids for recreation and sports
10. Services, such as device selection and training

This list of classifications is widely used in the U.S. and around the world. In addition, assistive technology can be “no-tech,” such as Velcro for fastening one’s shirt; “low-tech,” such as a walking cane; or “high-tech,” such as screen-reading software. It can be specially designed equipment for people with disabilities, or standard equipment that has been modified for their use. Here are some more examples:

Hearing aids
 Access ramps
 Wheelchairs
 Speech generators
 Talking books
 Closed-captioned television

In this book I discuss all types of assistive technology, looking at technologies that can aid individuals in their work, home, and lifestyle. These devices include the various types of low-tech and high-tech hardware, software, and gadgets that are available to people with different disabilities. However, I will pay closer attention to products on the higher end of the technology spectrum.

For example, people with limited hand function may use a keyboard with large keys or a special mouse to operate a computer, people who are blind may use software that reads onscreen text in a computer-generated voice, people with low vision may use software that enlarges screen content, people who are deaf may use a text telephone (TTY), and people with speech impairments may use a device that speaks out loud as text is entered via a keyboard.

In many cases, higher-tech assistive technology is more expensive, is harder to find, and has a learning curve, but the results can be extraordinary and life-changing. Without these technologies, someone might not be able to go to school, sustain a job, or communicate with family members.

DEFINING ASSISTIVE TECHNOLOGY

Many people in my field don't like the term "assistive technology." It's medical sounding, doesn't trip off the tongue, and, quite frankly, seems boring. The legal definition of assistive technology was first published in the Technology-Related Assistance for Individuals with Disabilities Act of 1988, known today as the Tech Act. This act was replaced with the Assistive Technology Act of 1998, which established a grant program to provide states with funding for assistive technology products and services. In 2004 the law was amended to mandate, in some instances, that states provide alternative financing and loans for assistive technologies. I talk more about this in chapter 9, "How to Pay for Assistive Technology."

Congress defines assistive technology in Section 3 of the 1998 Tech Act as follows:

Assistive technology is any item, piece of equipment, or product system, whether acquired commercially or off the shelf, modified or customized, that is used to increase, maintain, or improve the functional capabilities of a person with a disability.

People with disabilities might be pleased or even surprised about what the U.S. government has to say on assistive technology and disability. According to the Assistive Technology Act, disability is "a natural part of the human experience and in no way diminishes the right of individuals to live independently, enjoy self-determination and make choices, benefit from an education, pursue meaningful careers, and enjoy full inclusion and integration in the economic, political, social, cultural, and educational mainstream of society in the United States."

Under the Assistive Technology Act, the Department of Education provides grants and funding to increase the "availability [of] and access to assistive technology devices and services" that will "significantly benefit individuals with disabilities of all ages." Keep in mind that this law was passed two years before the proliferation of mobile devices, smartphones, mp3 players, and electronic book readers. It also preceded the Americans with Disabilities Act of 1990—the landmark civil rights legislation for people with disabilities—which I'll talk about later in this book.

On a less formal note, a former *Business Week Online* colleague, John Williams, should get some credit for coining the phrase "assistive technology." John has been writing about disability and assistive technology since 1980—a full decade before the Americans with Disabilities Act was passed into law. He also started the Assistive Technology column, which I took over after he left *Business Week* in 2001 and continued until the end of 2004.

BENEFITS OF ASSISTIVE TECHNOLOGY

The benefits of assistive technology cross categories of age, disability, and health challenges. From young children to seniors, people may face a range of physical and cognitive limitations. Today, there are thousands of assistive technology products on the market to help people with disabilities with all sorts of needs, from the simple to the sophisticated. If you or someone you know has difficulty typing on a keyboard, reading a document, or hearing the TV, there's probably a product that will fit your needs. It's really just a matter of finding the right technology and figuring out how to use it. Sometimes I meet people who are afraid of using assistive technology because they believe it seems like a crutch. Believe me when I say it is not. In all the conversations I've had with people outside of the assistive technology world, they use words such as "cool," "brave," and "inspiring."

This is especially noticeable when the assistive technology is associated



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with helping someone who is already doing something well do it even better. Take, for example, Oscar Pistorius, the Paralympic athlete from South Africa who straps on blade runners (prosthetic legs) to run 100-meter races, or Stephen Hawking, the brilliant astrophysicist with a neuromuscular disability who uses a device that helps him communicate his theories about black holes. Users of assistive technology must acknowledge that the device exists to help them. There is no stigma in using assistive technology as a daily or occasional aid in your life. Quite honestly, self-preservation is a human responsibility; it's a hard world out there, and if you want to thrive, it is wise to do whatever it takes to stay on top of your game.

With assistive technology, the families of people with disabilities benefit too. Instead of a wife having to read the mail of a person who is blind, he can read it himself using scan and speak software. Instead of a child making a phone call for his mother who is deaf, she can do it herself in sign language, over the Internet.

One of the most important things to remember is that, as humans, we're all temporarily abled. At one point or another, it is likely that each of us will use some form of assistive technology. If you have a disability now, you're just starting a little sooner. Assistive technology is a life-changer. It can help individuals with disabilities increase their independence, build their self-confidence and self-esteem, improve their quality of life, and break down barriers to education and employment. The real challenge, of course, is finding the right devices and gadgets, for the right purpose, at the right price.

Chapter 2 HISTORY OF ASSISTIVE TECHNOLOGY

*If necessity is the mother of invention,
then disability is its grandmother.*
-Anonymus

In the beginning, there were bullhorns. That's what hearing-impaired people used as tools to try to hear. In the 1870s, Alexander Graham Bell, whose wife was deaf, tried to develop a device for her to hear and ended up inventing the telephone. Until Louis Braille invented Braille in 1824, blind people couldn't read; it wasn't until the development of "talking" reading machines, including the one invented by Ray Kurzweil in 1975, that many people with vision impairments could have access to printed material.

The history of modern assistive technology doesn't go back very far. In fact, the people who are considered the pioneers of assistive technology are still around and working on next generation technologies. Many consider Gregg Vanderheiden, a professor at the University of Wisconsin-Madison, to be a leader in this field. In the 1970s Vanderheiden developed Auto Corn, one of the first communications devices for people who cannot

speak. Today he is working on making the World Wide Web more accessible for people with disabilities.

One of Vanderheiden's partners in this initiative is Jim Fruchterman, a long-time inventor and assistive technology entrepreneur, who wrote in a 2007 op-ed in the *Sacramento Bee*:

At an affordable price, everybody should have access to communications technology and content to meet their personal, social, educational and employment needs. We need to raise the technology floor so that all of our citizens have at least the basic tools they need to participate in our modern society. – "Everyone deserves access to technology." Online world, *Sacramento Bee*, June 17, 2007.

The first eyeglasses (about AD 1000) took the form of handheld lenses. It was probably an Italian monk, scientist, or craftsman who invented head-worn eyeglasses, in about 1285. When Gutenberg invented the printing press in 1456, which made printed books accessible to more people, the evolution of eyeglasses was fully underway.

We also must recognize those who pioneered mainstream technologies such as the personal computer. Without Bill Gates and Paul Allen and their colleagues at Microsoft, or Steve Jobs and Steve Wozniak and their team at Apple, or Vincent Cerf, the father of the Internet, who committed themselves early on to making their technologies accessible to the widest audiences possible, the disability community wouldn't be as well equipped as it is today.

APPLE'S EARLY START

Speaking at the Assistive Technology Oral History Project, Alan Brightman, former head of the Apple Education Foundation, noted the following:

At Apple we made an interesting discovery after about three years of working to make the Macintosh more accessible for people with disabilities. We thought we were about accessibility, but we realized our real purpose was to fundamentally change the experience of being disabled. When we have this technology, and assuming that we can use it, all of a sudden we have a whole new range of degrees of freedom and we're more independent. We could almost see people sitting up straighter in their wheelchair and almost adding inches to their self-esteem. It was a phenomenal consequence of being given this new gadget; this new technology.
Source: Assistive Technology Oral History Project, with permission.

The rise of assistive technology in the United States can be traced to the pre-computer era, particularly following the Second World War, when the great number of veterans with disabilities posed a dramatic social problem and prompted the U.S. Veterans Administration to launch a prosthetic and sensory aids program, which

was followed by many initiatives that spawned modern research into rehabilitation and assistive technology.

Gradually the idea took shape that a person with a disability should aim not necessarily at bodily normality but at life normality, which inspired the first programs of vocational rehabilitation intended to help people regain access to work and productive life. The Vietnam War also increased awareness about disability civil rights. Veterans who returned home with disabilities in the mid-1970s laid the groundwork for the 1990 Americans with Disabilities Act (ADA), one of the most important pieces of civil rights legislation in American history.

The ADA extends full civil rights and equal opportunities in both the public and private sectors to people with disabilities. Specifically, the law prohibits discrimination in employment, public service, public accommodations, and telecommunications on the basis of a physical or mental disability.

An excellent movie on this topic, *Music Within* (2007), chronicles the activities of Richard Pimentel, a brilliant public speaker who returns from Vietnam severely hearing impaired and finds a new purpose lobbying on behalf of Americans with disabilities. The disability civil rights movement had to overcome not only prejudice but also physical barriers that limited access to employment and inclusion in other aspects of daily life. Activists successfully lobbied for laws that required curb cuts, ramps, and buses with wheelchair lifts.

Crucial to the movement's success was access to information and communication through technologies such as text telephones, voice recognition systems, voice synthesizers, screen readers, and computers.

This access in turn increased the possibility of economic and social mobility. In the 1970s and 1980s, a growing population of consumers with mobility impairments fueled demand for wheelchairs and scooters to match their active lives. At the same time, barrier-free designs brought a new aesthetic to public spaces. Curb cuts are now ubiquitous in cities and towns, but they didn't exist until people with disabilities fought for them.

Advances in computer technologies have provided important stimulation for the development of assistive technology. Today, assistive technology is a specific discipline that brings together thousands of engineers, scientists, and doctors from around the world at various conferences and research centers to pave the way for a better tomorrow.

Are we there yet? No, but the future is bright, and new technologies come out of the laboratories and onto the market every year that advance the field of assistive technology and the lives of people with disabilities. ■ **ABILITY**

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