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## Introduction

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Technology transfer is an attractive concept. As a concept, it suggests that one can realize efficiency and effectiveness by taking technology advances made in one area, and apply them to another area. This re-application assumes that little of the initial research and development effort made in the first area will need to be made in the second area. Thus, technology transfer connotes a potential range of benefits ranging from leveraging prior investments to gaining something for nothing. The reality is, of course, somewhat different from the concept. This issue of Technology and Disability explores the reality of technology transfer, within the field of assistive technology, along with the reality of associated activities.

The growing interest in technology transfer as a concept has not been matched by a corresponding discussion of the details underlying the concept. As such, the term technology transfer is currently used to describe activities as varied as publishing research results, product development, commercialization and even teaching/learning. The articles in this issue touch upon each of these activities, and describe how they relate to the process of technology transfer.

Lane's article provides an overview of the concept of technology transfer, as it is generally understood in the field and as it is particularly applied to the assistive technology marketplace. The article, 'Technology Transfer Terms, Process and Roles', lists the terms associated with technology transfer, including terms describing events

leading to and following from the actual transfer. It also describes the process of technology transfer, and places it within the context of related activities. Lastly, the article presents the roles an intermediary can play to facilitate the technology transfer, at least the roles played by an intermediary supported by the National Institute on Disability and Rehabilitation Research, US Department of Education. These intermediary roles support the seller, buyer, developer and end user of the technology under transfer.

Sheredos and Cupo offer 'The Department of Veterans Affairs Rehabilitation Research and Development Service's Technology Transfer Process'. Although the program's focus is on improving the quality of life for veterans, the work has benefited the broader population of people with disabilities. The author's combined experience of nearly fifty years in product evaluation and commercialization, is reflected in their areas of emphasis. Their process emphasizes the manufacture, clinical testing and market evaluation of pre-commercial products. Involving manufacturers at the outset of product development is seen as key to optimizing the chance for commercial viability. The variety of examples used is evidence of the program's reputation, strength and success.

Newroe and Okarsdottir describe the functions of one technology transfer intermediary, operating independent of any one participant. The Consumer Assistive Technology Transfer Network facilitates information and technology transfer

between three principal groups: State Technology-Related Assistance Programs, Rehabilitation Engineering Research Centers, and members of the Federal Laboratory Consortium. The program helps consumers communicate their unmet needs to device developers, through intermediaries who can translate functional needs into technical specifications. The program helps device developers communicate their technological capabilities to the end users, through intermediaries who can identify the functional value of the technology.

The National Science Foundation's BRAD program funds university engineering design courses which focus on having senior students design devices for people with disabilities. In 'Assistive Technology Transfer and the NSF Bioengineering Research to Aid the Disabled Program', Rice and several fellow project directors describe the program's activity over the past decade. Although the program is not designed to address technology transfer or device commercialization, the authors explore the possibilities. The paper illustrates the distances separating criteria for student projects to assist individuals from criteria for business decisions to address markets. It is difficult for programs to span the needs of academia and industry, although technology transfer intermediaries can perform that role for both.

Much of the technology transfer literature focuses on transferring technology out from a research laboratory, or out from one specific application. 'Technology Transfer — One Manufacturer's Perspective', provides a valuable look from the opposite perspective. Krass describes the complex set of criteria a technology must meet to qualify for transfer in to a company. The examples provide insight into one company, while the underlying principles apply to any firm. By explaining the capabilities and interests of his company, the author illustrates his point that it is important to fully understand the transfer criteria of the target manufacturer.

Technology transfer is viewed as a useful strategy to develop products offering new functional benefits to persons with disabilities. But what if such benefits are built into products for the mass market, so they accommodate all levels of func-

tional limitation whether it results from permanent injury or from trying to hold a struggling toddler while answering the telephone? Tobias' article, 'Universal Design Applied to Business Practice', studies the telecommunication industry's approach to accommodating customer's with disabilities. This qualitative benchmark study reports what the major companies are doing and how they are doing it. The majority of companies accept the principal of universal design for mass market products, while recognizing the need to offer options to make products even more accessible. The telecommunications industry is responding to the increasingly diverse needs of their customers in product development and customer service.

Fetterman's 'My Disability Made Me Do It', takes the reader into one person's experience from a product concept to a successful business. As an inventor, an entrepreneur, and as a person with a disability, the author's perspective encompasses the full range of issues involved in technology transfer. Every successful transfer has a champion, but so does every unsuccessful one. Perhaps the difference is not the technology itself, but the person committed to its success.

After all the concepts are defined and all the models are built, someone has to actually transfer a technology to begin to understand the details and the realities involved. In 'Lessons Learned from a Successful Tech Transfer', Joseph et al. describe the process of implementing a transferred technology for designing prostheses and orthoses. Their experience underscores the importance of involving the eventual users in the development process, the contribution of user trials to improving successive versions of the product, and the value of technical support through the entire implementation phase. The article shows that while opportunities for technology transfer may arise by chance, their success requires commitment and focused effort by all parties involved.

Tam et al. offer another example of implementation. 'Commercialization of New Silicone Ability Switches — The Hong Kong Experience', relates the issues involved in creating and producing an assistive device in low volumes to meet

local demand. Focusing on a small or narrow market does not negate the issues common to all markets. For example, the process requires an optimal product design — possibly from among several options, establishing a relationship with a suitable manufacturer, securing feedback from the customer base, planning for and financing production, pursuing a marketing strategy, and securing the required level of sales.

'Designing Devices that are Acceptable to the Frail Elderly', investigates the interplay of function and appearance on device acceptance and use. Pippin and Fernie interview older persons who use walkers. Although walkers have been in use for decades, the function and features expanded over the past few years, as have the range of colors and styles available. What do the consumers think about recent changes in form and function? What is their impact on the user's self-concept and concerns about stigma? Both the questions and answers are important because they provide a method for accessing consumer input about a category of products. This consumer input can then be integrated with technical and market considerations into future product design and development.

Advanced technology offers new functional gains through assistive devices. There is some question about the willingness of older persons to accept and use assistive devices with advanced technology. This question is especially salient when exploring the use of technology by older persons, to perform simple, manual tasks around the home. Watzke's article, 'Older Adult's Re-

sponse to Remote Gateway', reports the results of having seniors perform a series of tasks manually and perform the same tasks through a remote control device. Although the remote control device performed as expected, older people clearly saw its value for issues of safety rather than for convenience. Such comparison studies by the expected end users generate important information for technology transfer. Knowing a device's potential value to consumers and understanding their expectations, is helpful when assessing whether or not a transferred technology will be perceived as beneficial in the marketplace.

Technology transfer assumes the presence of an innovation which presents a novel opportunity for the marketplace. In a free market economy, an entrepreneur becomes wealthy by bringing useful innovations to market. This belief fuels a substantial amount of invention and product development activity. Gilden's 'Moving from Naive to Knowledge on the Road to Tech Transfer', debunks 13 myths about invention and development. It substitutes realities for the myths and explains how those realities influence the success or failure of technology transfer. The useful guidance is presented in plain language designed to reach the garage inventor and professional researcher alike. It is a fitting summary for an issue on technology transfer — a concept with unlimited potential and a reality with significant constraints.

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