

## RI. Surviving the Darwinian Sea: Evolutionary Adaptations Among the Fittest - Joseph P. Lane

### An Appropriate Metaphor

Our efforts to understand and convey the complexity of the transfer and commercialization process include the use of metaphors. The “Valley of Death” is frequently used to characterize this expansive and perilous environment which must be traversed to survive.

The “Valley of Death” metaphor connotes a barren wasteland, devoid of resources and capabilities. In reality, the low survival rate for entrepreneurial projects more often results from the attributes of individual innovations, rather than from the environment in which they struggle to survive. The environment is actually teeming with opportunities and the resources necessary to pursue them. The fittest survive by capitalizing on these opportunities.

More recently, Branscomb and Auerswald proffered the imagery of a “Darwinian Sea” as a metaphor for charting the entire technology transfer process, from initial conception of the innovation, through prototype iterations of the invention, and on through the final design suitable for mass-production. The “Darwinian Sea” concept represents an evolutionary imperative for survival - the product that arrives at far shore is far different than the technology which first embarked on the journey. More importantly, it shifts responsibility

for survival from environment as a passive barrier to traveler’s ability to identify and apply helpful carriers.



### Geography of the Darwinian Sea

Between the left shore of science & technology (S&T) and the right shore of commercial enterprise (CE), lies a hazardous expanse where safe passage is not even likely -- let alone assured. The S&T shore is the source of innovations in core technologies with inherent capabilities.

The conception of an innovation is the first critical event - the flash of inspiration noted with “AHA!” or with the light bulb symbol. The accompanying excitement results from the feeling of a pioneering achievement, a sense of arriving at the destination, unfettered by the practical aspects of the journey itself. Unfortunately, many entrepreneurial ventures are launched on this perceived value of the concept.

To realize the idea’s potential and reach the CE shore, this initial dream must be transformed into operational steps with defined goals. One must construct a vessel with the attributes necessary to stay afloat, generate propulsion and steer. A captain must map out the intended route and estimate the time involved, plan sufficient provisions to last for the entire journey, and then successfully navigate through the hazards to reach an open port on the far shore. Access to the CE port is not assured as others embarking on a similar voyage may prove more fit.

### Methods of Propulsion

Traversing the Darwinian Sea involves hard work and a significant expenditure of energy. Although the type of work and form of energy may vary:

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- Rowing - This method depends on the ability to coordinate a crew, overcome the power of currents, all while avoiding a mutiny. Rowing is the brute force method of propulsion most closely aligned with the pure supply push approach of inventors and entrepreneurs.



- Sailing - This method involves a more sophisticated craft with a corresponding level of skill in meteorology and aerodynamics. Wind must be present to sail. Wind is equivalent to identifying unmet needs in the marketplace, particularly high priority needs of industry sectors - representing the demand pull model of technology transfer pursued by many SBIR grantees and other industry suppliers.
- Power - A power source requires a supply of fuel on board as well as supply points along the way. Contract R&D represents the power analogy with the contractor supplying the fuel for the entire journey. This approach requires the least internal effort, but one risks being cast adrift if the contract is terminated while en route.

## Charting a Course

Voyagers must plan from the outset to meet the many challenges ahead. The plan also helps to identify opportunities worth seizing. Charting a successful course involves two key activities:

- The Business Plan - The diligence applied to business planning sounds the depths ahead. The excitement of the discovery must be captured in a business framework, whether a start-up venture or a going-concern. The crucial element is articulating what the business will offer and to whom it will be offered. One has to be clear about the product offered, and the target customer.

- Proving the Market - The dictum of “Prove the Concept” is an out-dated notion. New concepts are all too common and devoid of any means of propulsion. They have been surpassed by the higher and more difficult standard to “Prove the Market.” The burden of proving the market size and price now falls to the entrepreneur, who is now competing with a queue of corporate opportunities, most with internal champions.

## Rocky Shoals & Open Water

Despite the best intentions and plans, unseen hazards jeopardize the passage. The most important example involves intermediary agencies which are unintentionally creating serious problems.

- Inaccurate Valuation - The intermediary is less familiar with any particular industry than the principle stakeholders, and their work may miss important issues either for or against the technology in the fog of uncertainty.
- Competing Priorities - The intermediary is awash in invention disclosures from various fields, but cannot predict which hold the most promise.
- Indefinite Delays - Intermediaries necessarily assign values and priorities to all disclosures, but they remain risk averse regarding all disclosures. Opportunities may run aground for all practical purposes.

## Beacons and Bridges

Manufacturing corporations on the CE shore are increasing the visibility of their needs across the sea, and building infrastructure that ensures safe passage to a predetermined destination. The beacons are broad and passive forms of information dissemination, including future product plans, unresolved technological limitations, even public web logs maintained by internal staff.

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The bridges involve more active and deliberate focus, linking back to the islands where entrepreneurs stop for financial capital and market data. Three recent trends in “bridge building” are worth noting here:

- Cooperative business “reef” - Large firms partnering with smaller companies in a network of mutual support, avoids the costs of acquisition and, accrues the benefits of external innovation.
- Swift current of symbiotic R&D sourcing - Companies are establishing their own satellite R&D facilities, co-located with the desired university faculty or Federal lab staff expertise.
- Synchronicity - The hierarchical mindset of “command and control” is being supplanted by “communicate and coordinate.” While R&D remains a core competence, it too is becoming a candidate for concentration and outsourcing.

Corporate efforts to accelerate product development cycles reveal evolutionary strategies for overcoming the hazards of the Darwinian Sea. Change. Adaptation to change. Evolution. The analogy seems even more appropriate when one recalls that Darwin’s theory was developed aboard a ship! ■



## R2. Public Policy Project: Identifying Innovative Technology Transfer Practices - Steve Bauer

Starting with the Technology Innovation Act (1980), the Patents and Trademarks Act (1980), and the Small Business Innovations Development Act (1982), federal legislation has created mechanisms through which federally-funded research can enter the marketplace as commercial products. The Public Policy Project looks at the specific impact of this legislation on assistive technology products and subsequently to people with disabilities using these products.

We can roughly divide technology transfer legislation into “supply-side” legislation and “demand-side” legislation. Supply-side legislation fosters technical innovation and product development. Demand-side legislation creates market incentives by providing money to purchase products or by establishing regulations that require certain types of products to be purchased. The Public Policy Project focuses on the supply-side legislation and the four programs that derive from that

legislation. These programs include the Small Business Innovation Research Program (SBIR), the Small Business Technology Transfer Program (STTR), technology licensing (and other mechanisms) from universities, and technology licensing (and other mechanisms) from federal laboratories. Transfer projects through the T<sup>2</sup>RERC will also be considered.

The first two years, the Public Policy Project focused exclusively on the SBIR and STTR programs offered by the National Institutes of Health, the National Science Foundation, the Department of Education, the Department of Transportation, and the Department of Agriculture. Tracking was facilitated by the public record maintained by each of these agencies of the SBIR and STTR grant awards. Most of these agencies maintain their records in two or more on-line databases. Some 30-

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35,000 award abstracts were reviewed for the period 1996-2005. A great deal of cross-referencing between databases was required in order to develop complete records. Research showed that approximately 85% of these awards were made by the National Institutes of Health, which was by far the largest agency examined in this study.

The US Small Business Innovation Research (SBIR) program provides funding to small businesses (less than 500 employees) for product development and pre-commercialization activities. To be eligible for these grants, the small business must be located in the US, be at least 51% US owned and independently operated; and the principle investigator must be employed by the small business. Contracting portions of the work scope defined in these grants is allowed, however, the small business must do at least 67% of the work. The remaining 33% of the work *may* be done by universities or other non-profit research organization. The SBIR program typically has two funded phases and one unfunded phase. Phase I is typically 6 months at up to \$100K US; while Phase II is typically 2 years at up to \$1M US. A small business cannot apply for a Phase II award unless they have already been awarded a Phase I award.

Ten federal departments and agencies participate in the SBIR program. They are required to set aside 2.5% of their extramural funding to support this program. Approximately 29% of all applicants receive a Phase I award; while about 40% of Phase I award winners, apply for and secure a Phase II award.

The US Small Business Technology Transfer (STTR) program is similar in most respects to the SBIR program, but only about one-tenth of the size. Under the STTR program, the principle investigator *need not* be employed by the small business. At least 40% of STTR research *must* be done by a small business; and at least 30% *must* be done by a university or other non-profit research organization. The STTR program also has two funded phases and one unfunded phase. Phase I is typically 12 months at up to \$100K US; while Phase II is typi-

cally 2 years at up to \$0.75M US. Five federal departments and agencies participate in the STTR program, and set aside 0.3% of their extramural funding to support this program. In fiscal year 2003, federal departments and agencies contributed about \$1.6B to the SBIR and STTR programs.

The SBIR / STTR data collected during the course of this project is being entered into a database for analysis. A quick review of the data revealed about 550 assistive technology related awards. This constitutes 1%-2% of all SBIR / STTR awards made by the five agencies studied over the ten year period under consideration. Following normal trends, there will be roughly 390 Phase I awards and 160 Phase II awards with an average yearly award total of up to \$19.6M. This is a significant figure, rivaling the National Institute on Disability and Rehabilitation Research (NIDRR) yearly budget for the entire Rehabilitation Engineering Research Center (RERC) program. On the other hand, there are many tens of millions of people with disabilities or aging into disability; and with diverse assistive technology needs. In this context, policy makers must decide whether award totals are adequate; and whether types of technologies being funded are appropriate.

The SBIR / STTR award data can provide many insights including funding levels across agencies, types of assistive technologies funded, and the proportion of Phase I awards to applicants and Phase II awards to Phase I awards. Technology "types" include but are not limited to: mobility, vision, hearing, communication, cognition, recreation, and education. A phenomenon throughout the SBIR / STTR programs studied was for a small number of companies to win a disproportionate number of awards. Perhaps reflecting this phenomenon, a US Department of Commerce study suggests that only about 14% of assistive technology companies apply for SBIR / STTR awards. This could place an important bias on the types of assistive technology developed under SBIR / STTR programs.

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In the coming year, the Public Policy Project will focus on technologies transferred from research universities and federal laboratories to the private sector. There are about 250 US research universities with about 50 dominating technology transfer, as measured by number of patents, technology license agreements, and license royalties. Each research university owns all intellectual property produced by its faculty, staff and students. University technology transfer offices (TTO) move this technology to the private sector through “licensing agreements” and other mechanisms. Many universities maintain online databases of technologies that have transferred; or are available for transfer. We will review on-line records; contact technology transfer offices; and identify licensed technologies that have led to commercial assistive technology products.

There are more than 700 federal laboratories; assigned to six national regions. For each region, the Federal Laboratory Consortium (FLC) maintains records of transferred technologies. We will review on-line records; contact the director of each FLC region; and identify transferred technologies that have led to commercialized assistive technology products.

Federal legislation mandates the full inclusion and equal participation of people with disabilities; requires the provision of assistive and accessible products; and finances their purchase. Exploding health care costs are driving a paradigm shift. Under the old paradigm, sick elders are treated and maintained in centralized, specialized and costly health care facilities. Under the proposed new paradigm; environment modification, innovative technologies and caregiver support will allow elders to remain healthy as they “age in place.” Assistive technology products will be needed by people with disabilities and people aging into disability; across all tasks and environments.

Universities and federal laboratories can be important technology sources for product development. SBIR / STTR programs can be important funding mechanisms for private sector technology development and product commercialization. The Public Policy Project can play an important role by evaluating the impact of these programs on commercialized assistive technology and trans-generational products; and inform policy makers as they shape these programs to meet future needs. ■

## R3. Readers Respond to Industry Profile on Visual Impairment - Jennifer Brace

As a part of our mission to transfer new and innovative products into the marketplace, the T<sup>2</sup>RERC publishes Industry Profiles compiling information such as demographics, technologies, funding sources, in a given assistive technology industry. There is a lack of reliable market data in the assistive technology field, our goal in publishing these Profiles is to assist developers in identifying market needs, developing products to meet these needs, and using this information to write grants to support these research and development efforts. A result of many months of primary and secondary market research, these Profiles have

proven to be valuable resources for students, professionals, developers, marketers, and others in fields such as vision, hearing, augmentative communication, and wheeled mobility.

In July 2004, the T<sup>2</sup>RERC released its Industry Profile on Visual Impairment. In the spring of 2005 we conducted a survey to evaluate the organization, usefulness, thoroughness, and clarity of the Profile. A sampling matrix was formulated including stakeholders from various areas of the low vision and

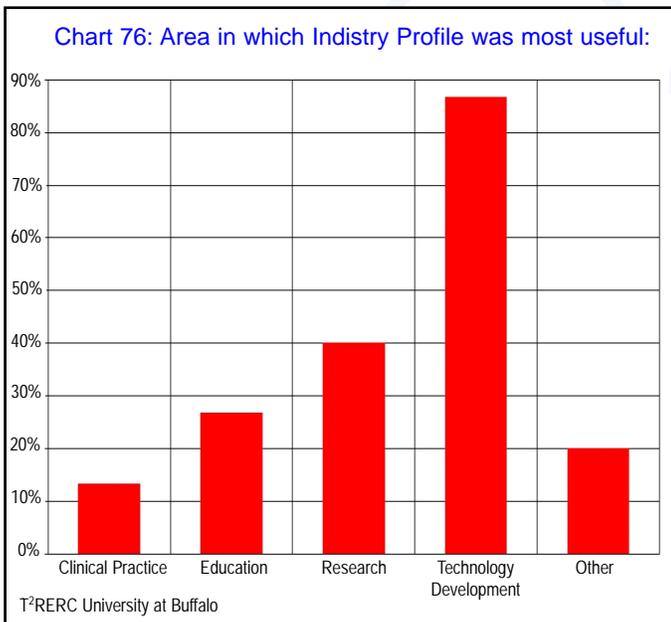
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# R3. Readers Respond to Industry Profile on Visual Impairment

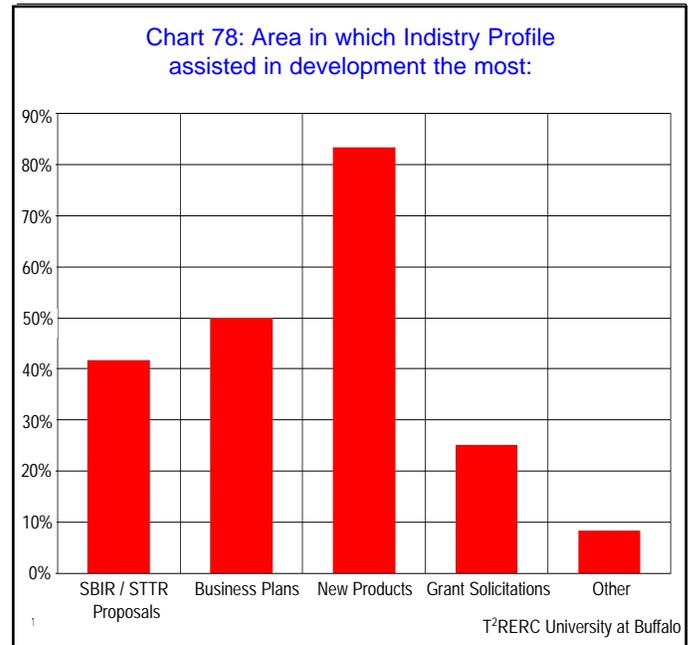
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blindness industries, and email invitations were sent out to participate in a web hosted, fully accessible survey. Overall, between 90 and 100% of all respondents felt that the Industry Profile on Visual Impairment was either “very” or “somewhat” organized, comprehensive, relevant, valuable, clear, and easy to understand.

Respondents who used the Industry Profile found it to be helpful in a wide variety of areas, depending on their field of expertise. 13% of respondents found the IP to be useful in clinical practice, 27% found it to be useful in education, 40% found it to be useful in research, 87% found it to be useful in technology development, and 20% found it to be useful in other areas as well.



42% of respondents found the IP to be useful in the development of SBIR and STTR proposals, 50% found it to be useful in the development of business plans, 83% found it to be useful in the development of new products, 25% found it to be useful in grant solicitations, and 8% found it to be useful in other areas of development as well. As the T<sup>2</sup>RERC mission is to transfer new and innovative technologies, its perceived usefulness in these areas is extremely beneficial to our project goals.



The sections of the Industry Profile pertaining to Technologies and Demographics were the most popular and most useful to respondents to the survey. The section on Eye Care Professionals and Visual Impairments, Causes, and Treatments was the least applicable to respondents.

Perhaps the most intriguing and rewarding responses came from the open ended comments we received. Some reviews were as follows:

“This report was very valuable since it managed to compile effectively the problems and needs facing the assistive technology industry for visual impairment.” “It represented an in-depth analysis of the industry needs, opportunities and challenges which was essential for our technology development efforts.” “It provided us with excellent background information to support our business modeling (e.g. market size, growth, constraints).”

- David Kryzpow, iACTIV Corporation

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“Much information is available from a variety of sources. This document offers quick access to information on many areas related to the topic.” “It is the aim of Tactile Vision Inc. to fill needs which exist and to work with other groups in the service of providing resources. The information included provides easy access to suitable contacts.”

- *Ed and Cecelia Anczurowski, Tactile Vision, Inc.*

“This information is of crucial importance to developers of new assistive tech products, and it is difficult to find usable, non-biased reporting in this area.” “The document is useful in providing good sources for demographic information that is important to writing a convincing grant proposal.”

- *Steven Landau, Touch Graphics, Inc.*

“A job well done! A very useful reference tool, something that I know I will use many times in the near future. Thanks!” “My company is in the business of designing and developing new products. Good to have a reference tool that gives me a broader point of view.”

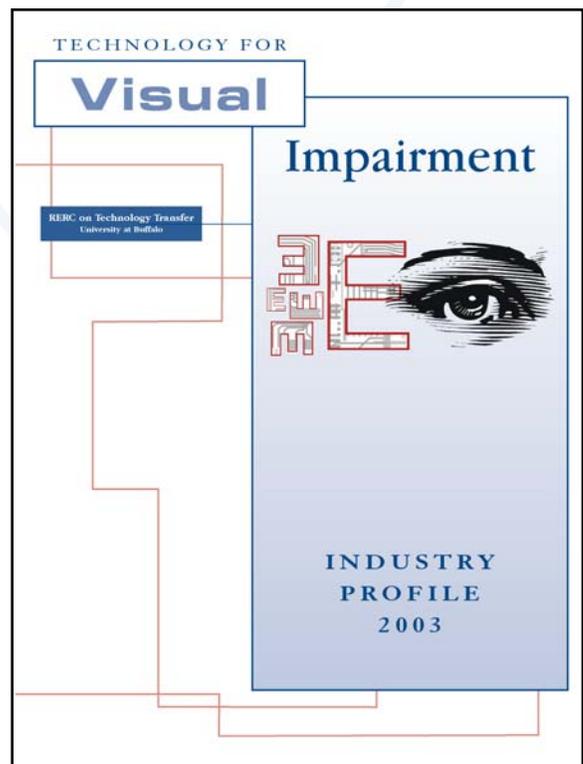
- *Stan Kapinos, Innotech Systems*

“I have spent a good deal of time with the Industry Profile and I think it is a wonderful piece of work. We at the MS State RRTC are teaching a class in access technology to rehab counselors, and I would love to make use of this material for them. Once it is published, I intend to talk to the university

bookstore about securing it as a textbook. It is simply the best compilation of information on this subject which I have seen, in a little over twenty years in the field.”

- *B.T. Kimbrough, RRTC on Blindness and Low Vision, Mississippi State University*

The completed IP on Visual Impairment is available for download on the T<sup>2</sup>RERC website at <http://cosmos.buffalo.edu/t2rerc>. The T<sup>2</sup>RERC staff are currently completing the Industry Profile on Education Technology for People with Learning Disabilities. It will be available in March 2006. ■



# R-4 Efficacy of the T<sup>2</sup>RERC Automatic Jar Opener

## - Doug Usiak and Vathsala Stone

### Introduction

The Efficacy Study presented here was conducted to determine if a product transferred by the T<sup>2</sup>RERC, the Lids-Off™ Jar Opener, is an improvement over its competing alternatives. Operationally, its objective was to verify and document the product's overall quality, its value and consequently, its importance to users with disabilities, as manifested by the consumer's subsequent acceptance and use (or disuse) of the product. What we wanted to find out was (a) how products commercialized through the T<sup>2</sup>RERC's process compare in *quality*, with other products/methods available to consumers with disabilities; and (b) the extent to which end users value the products transferred through the T<sup>2</sup>RERC, compared to alternatives available to them.

The Lids-Off™ is an automatic jar opener manufactured by Black and Decker®, which went through the T<sup>2</sup>RERC's process during the project's last cycle and recently came to the marketplace. It is an innovative mainstream product that also accommodates persons with disabilities, specifically those with limited hand function, including the elderly. Additionally, in light of the product's success in the mainstream market in terms of sales, we were interested to know the extent to which our specific target population (consumers with disabilities) valued the device. In order to determine how the Lids Off™ compared to a competing product, another automatic jar opener equivalent to the Lids Off™ that was popular in the market at the time of transfer was used as a comparative commercial product. It was similar in purpose (useful for persons with limited hand control) and function (motor twists lid off from above). However, unlike the Lids Off™, this jar opener could be mounted under a cabinet.

### Method

Fifty consumers with limited hand functions participated in the study trials. The study began with an onsite (laboratory) trial of Lids-Off™ and the competing product, followed by a six month trial of Lids-Off™ by the participants at home.

**Onsite (Laboratory) Trials:** The trials followed a repeated measures design; each participant used both devices consecutively. Each participant was asked to open five jars that were pre-selected for different combinations by size, material, content and weight of jar and lid. The sequence in which the participants tested the two devices was balanced by random assignment of each participant to each sequence. This was done in order to reduce the bias created by the order of event and carry over of learning from one product to the next. Thus, half of the participants tested the Lids Off™ product before trying out the other product, whereas the other half did it in the opposite sequence. Participants responded to questions on the Consumer Questionnaire systematically after each jar, and then overall.



*Black & Decker's new Lids Off Open-It-All.*

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A trained observer with knowledge of the product, who worked with the users on a one-to-one basis, observed the individual trials. The same observer followed each participant operating on both devices. Each participant was also interviewed at the end of the onsite trial for comparative judgment on the performance of the two devices.

***Home Trials:*** After participating in the onsite evaluation consumers took the Lids-Off™ product home with them to use for the subsequent six months. During the first seven-week period they used the product and kept a log of its use as directed. This weekly feedback on questionnaires included judgments in comparison to other alternatives they used to open jars. During the final period of about three months, they were told to continue to use the product but with no specific request for feedback. Two sets of follow up calls were made to the participants, one at the end of each of these two periods. The first follow up call obtained user feedback on specific indicators of use (frequency of use, degree of usefulness, role fulfillment, etc). We also examined their log records and checked their qualitative comments (about satisfying or frustrating experiences, the ease or difficulty of use, etc) against relevant indicators. We noted and recorded what current device or alternative they use at home, against which they would be judging our product.

At the end of the first two months, the value of the device to the participant was assessed based on their willingness to “buy” the product using the financial compensation received for participating in the study. The participant’s choice of either full monetary compensation or keeping the product and accepting a reduced payment gave us an indication of how valuable they thought the device met their needs. Independent of their response, all participants continued to keep the product for the rest of the study period (four months), as per an original

understanding with them. Final telephone interviews were made at the end of six months when we repeated the offer and compensated them according to their purchase decision. The purpose of the final telephone interview was also to verify the status of use /abandonment of the device during the last four months. The participants had not been required to keep a log but only to use the product as they wished. The interview verified if and how frequently they chose to use the product or if they abandoned it. The use /abandonment response was used to confirm the product’s relevance and overall importance to the user. In cases where the products were not abandoned, we retrieved information on details of use. In cases of abandonment, we also recorded why the device was no longer used. The resulting information determined the comparative level of consumer acceptance between Lids Off™ and other products or methods used at home, in terms of each option’s unique ability to fulfill the consumer’s functional needs. This would evaluate our product against its “critical competitors.”

### Data Collection

The sources of data we collected were consumers (perceptions and judgments), observers (direct observation) and the video tapes (live session recording). Data collected in the study were both quantitative and qualitative. Measures included end user ratings on five point scales in surveys (consumer questionnaires and weekly logs), as well as their open-ended (qualitative) responses on questionnaires and interviews. We used both face to face (onsite trials) and telephone (home trial period) interviews. Our objective measures included direct observation by experts at the onsite trials. Video content in later analyses generated both quantitative and qualitative data.

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### Data analyses

Both descriptive methods and statistical tests of comparison were used as appropriate to analyze the quantitative and qualitative data. As of this report, the needed initial descriptive comparisons have been performed between the two devices, in terms of comparative frequencies and percentages, as well as central tendencies (means and medians) on variables of interest as related to both the devices. These comparisons relate especially to quality indicators, and to the onsite trials, and have been further verified for statistical significance (t tests for independent samples). As of this report, data on judgment of product's value have been tabulated and analyzed by tracking consumer responses on the interviews regarding purchase data and / or purchase intent data, including user decision to use /abandon the product.

### Results and Discussion

This section reports results on key variables covering both evaluative questions. We point out however, that these should be considered preliminary results. Longitudinal (between onsite and home trials) and cross analyses (between instruments within onsite or home trials) to support the conclusions are still under way. Included here are descriptive results on both Product Quality and Product Value. Most of these results are confirmed by statistical tests of significance not reported here. We first describe the sample distribution and present the results including the indicators that emerged and directed the trials.

#### Study Sample Distribution

The main variable of interest for composition of our sample was the inclusion criterion of severity of functional limitation in the upper extremity. Regarding hand control the problems limiting their hand function were various, from weakness to cramping to joint restriction

to other difficulties including extremity deformities or its absence (amputation). The severity also varied among persons; about half the sample was characterized by arthritis (24%), carpal tunnel (14%) and multiple sclerosis (14%). The other half was characterized by Spinal Cord Injury, Cerebral Palsy and related disabilities. The sample distribution by age and gender showed that there were more women than men. Most were middle aged, the youngest was 28 years old and the oldest was 74. The median age was 55.

#### Findings

We measured effectiveness and efficiency of the two devices by averaging the five jar trials by all fifty participants, or 250 trials. The Lids Off™ was more successful (92.9% of the time), opening 86.25% of the time at first attempt (vs. 67% for the other device). It was also found to be effective when used with one hand 15% of the times (vs. 5% for the other device). In terms of efficiency of opening, there was much less spillage or breakage (1.2% vs. 12.7%) and it seemed to require much less effort (signs of discomfort 7.1% of the times vs. 44.2% for the other device). However, the competing product was much more time-efficient taking only 21 seconds per jar (mean) vs. 60 seconds for the Lids Off™. 47 of the 50 participants preferred the Lids Off™ in their homes and 46 of them expressed an interest in buying it. Only four persons preferred the other product and maintained their preference until the end of the study.

Value related results were computed from systematic tracking and longitudinal integration of consumer responses to the three interviews interspersed through the study period which indicates how much they valued each device in relation to the perceived benefits. After testing both devices at the onsite trials each consumer was asked to provide an estimated selling price for the Lids-Off™ and the comparative product.

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The Lids Off™ was assigned more worth (median \$32.50) vs. \$25.00 for the other product. Midway through the study and then again at the end of the study consumers were given the opportunity to purchase the device for \$15. Results reflected consumer's purchase intent midway through the home trials showing a preference toward the Lids-Off™ with 37 consumers choosing it. When we actually offered consumers the opportunity to trade part of their compensation (\$15) to keep for the Lids Off™, the same 37 consumers did purchase it.

Our results also identified that more than 37 of the participants used the Lids Off™ in their home during the last part of the study. This part of the study did not require them to keep logs and we wanted to see their use / abandonment pattern while not being forced to use the Lids-Off™ on a daily basis. We found only four people used the Lids Off™ rarely or very rarely and they gave specific reasons exemplifying their dissatisfaction with the Lids Off™. This number is consistent with the number who had preferred the competing product at the onsite trials.

Summing up the results so far presented, the Lids Off™ was found to be more effective in jar opening than the competing product as per the onsite trials. It was found to be considerably more comfortable, safer, more aesthetically appealing, more intuitive, required less effort, and was less damaging. The noise levels between the two did not differ greatly. The Lids Off™ was less time efficient than the comparative product but it opened more jars than the competitor. Consumers also placed more value on the Lids Off™ at the end of the onsite trials. The purchase decision of 37 to buy the Lids Off™ after the home trial period shows they valued it not only over the competing product but also over other alternatives they had used or were using at home (the real critical competitors of the product).

In closing, we point out that the above conclusions regarding product quality are limited to the data so far analyzed. On the other hand, the purchase decision results are indicative of the value of the Lids Off™ to the consumers and suggest a high probability that the results on quality will be confirmed by findings from the rest of the analyses currently under way. ■

## D1. Supply Push Program: Transferring New, Useful, and Innovative Products to the Marketplace through a Supply Push Approach - Jim Leahy

The Supply Push Model of Technology Transfer utilized in this development project has the T<sup>2</sup>RERC interacting with a wide range of technologies, products, inventors, researchers and companies in our efforts to bring new products into the marketplace. During this past year new products transferred and in the marketplace include our PDA Magnifier / Line Text Isolator through Turning Point Therapy and Technology and the Kelvin Thermostat through Independent

Living Aids Incorporated. Design functions and features of both these products were detailed in our previous newsletters. Our Caller Connect device (off the hook telephone reconnection) received a provisional patent and a utility patent was filed for our Automated Pill Crusher. Both devices were developed by the T<sup>2</sup>RERC and the Automated Pill Crusher is very close to being licensed to a manufacturing entity.

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In addition, technical assistance was provided to nine other Rehabilitation Engineering Research Centers (RERC's), and conference papers and presentations on the project were made at the Rehabilitation Engineering Society of North America (RESNA) and the Assistive Technology Industry Associations' (ATIA) conferences.

However, transfer and licensing of devices, technical assistance to individuals and companies, and dissemination efforts do not tell the entire story of the Supply Push project. The T<sup>2</sup>RERC provides on going assistance to companies licensing devices represented by the T<sup>2</sup>RERC. For example, during this past year, for the Kelvin thermostat, the T<sup>2</sup>RERC performed Beta focus groups for the express purpose of providing to Independent Living Aids a critique on the current version of the thermostat and guidelines on design changes needed for the final commercial product. In addition, the T<sup>2</sup>RERC authored and produced a web based commercial on the Kelvin thermostat for Independent Living Aids' web site.

Independent Living Aids also expressed an interest in providing a version of the Kelvin to the hotel and motel industry. The T<sup>2</sup>RERC was able to provide a high profile corporate partner to evaluate the thermostat and provide feedback to Independent Living Aids on the design and features Kelvin must possess to be considered for incorporation into their hotels. In addition, Kelvin is to be showcased at the large American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) Heating, Ventilation, and Air Conditioning (HVAC) show in January 2006. The T<sup>2</sup>RERC has provided a looped version of the web commercial to Independent Living Aids along with our last newsletter article on the device for use at the show.

Early in year 2 the T<sup>2</sup>RERC was contacted by representatives from Michelin. Michelin had developed a new product called Tweels for auto-

mobiles and had introduced it at an auto show in January 2005. The Michelin representatives were seeking information on the market size of the Wheeled Mobility portion (wheelchairs and scooters) of the Assistive Technology (A/T) industry. Michelin was exploring the possibility of broadening the market for their tires and wheels into the A/T marketplace. If Michelin felt there was a market there, it could justify the creation of a new business unit within Michelin.



The Michelin Tweel™ Assembly is a non-pneumatic tire and wheel assembly designed for wheelchairs. Tweels™ have the ability to deliver performance characteristics similar to pneumatic tires but with greater damage tolerance and the maintenance reduction characteristics of non-pneumatic tires. Tweel™ assemblies are designed to accept more deflection and absorb more energy from shock loads than equivalent size pneumatic and non-pneumatic tires, thus simplifying suspensions by eliminating suspension components. Tweel™ assemblies simplify wheelchair manufacturing and final assembly thus presenting a significant overall cost savings for the manufacturer.

To make a long story short, the T<sup>2</sup>RERC provided industry market information; accepted 4 caster Tweels for internal T<sup>2</sup>RERC evaluation; showcased the Tweels in the T<sup>2</sup>RERC booth at RESNA to potential commercial partners; introduced the Michelin representative to representatives from Sunrise Medical; introduced the Michelin representative to Dr. Rory Cooper of Human Engineering Research Lab (HERL) at the University of Pittsburgh and to the RERC on Wheeled Mobility at Georgia Tech who currently is running consumer focus groups on the Tweels for Michelin.

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## D1. Supply Push Program

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After RESNA, the T<sup>2</sup>RERC arranged a conference call with Sunrise Medical and Michelin to discuss possible joint development activities. As Sunrise has been a willing partner in the past to companies, such as Delphi, an auto industry corporation, who are trying to enter the A/T industry, the T<sup>2</sup>RERC believed Sunrise to be a viable candidate for partnership with Michelin.

In addition, the T<sup>2</sup>RERC began work on a Value Proposition report for the Michelin Tweels. Michelin shared portions of the sixty page technical and marketing sections of Value Proposition with various Wheeled Mobility companies at Medtrade 2005 in October. However, the story doesn't end here and we hope to bring you its successful conclusion in a future newsletter article. ■

## D2. Demand Pull Project on Education Technology - Evaluation of Initial Data - Wendy Strobel

The Demand Pull Project is conducting a study of technology-based needs within the field of Education Technology particularly for students with learning disabilities. We have conducted interviews with expert manufacturers, researchers, and technology developers who provided invaluable insight into the state of technology in American schools, post secondary institutions, and work world. To verify and expand upon the information provided by the expert interviews, the Demand Pull team is conducting consumer focus groups. After this data collection phase is completed, the T<sup>2</sup>RERC will publish problem statements seeking critical technologies to improve hardware and software for students with learning disabilities. Presentations on our initial findings have been shared at the Assistive Technology Industry Association (ATIA) Conference and in a web cast offered by the RRTC on Workplace Supports ([www.worksupport.com](http://www.worksupport.com)).

Due to recent legislation and societal trends, many commercial technology developers are now including features so that a wider range of diverse learners with different abilities, languages and learning styles can successfully use their products for learning. Software features such as changeable displays, text highlighting, keyboard commands, progress monitoring and speech options are now more frequently included in the design of mainstream education technology products. These new

products not only improve the opportunities for children to learn, but also increase the potential market share of small AT companies. When a company designs for all using Universal Design for Learning (UDL) principles, they can also sell to all. This allows them to take advantage of the larger pots of information technology (IT) monies available to American schools.

All technology has the goal of helping individuals complete tasks in ways that are easier, better, and more efficient. The UDL philosophy is blurring the line between what is considered IT and what is considered assistive technologies (AT). Technology can now be used to increase access to a universally designed curriculum. While AT was previously seen as addressing problems with only core functions such as vision, mobility and communication, it also has the potential to enhance academic performance and access to materials for all students. Solutions for students who have a learning disability or other struggling students may include simply being given access to digital text or may entail a more specialized access tool. As students with and without disabilities learn together in the same classrooms, all students have the opportunity to benefit from an expanded inventory of available technologies. ■

## D3. The Fortune 500 Project: Improving the Accessibility of New Mainstream Products - Jim Leahy

Working in close collaboration with Fortune 500 companies in the design of the next generation of consumer products has been an enlightening and exhilarating time for all involved. Enlightenment for the T<sup>2</sup>RERC staff's comes from exposure to the inner workings of major companies and the acquired knowledge of the monumental effort needed to bring a new product to life. And of course, exhilaration for the T<sup>2</sup>RERC's staff comes from seeing the introduction of a new, more usable and accessible consumer product in the marketplace; the fruits of our labor if you would.

Enlightenment for the company comes from their designers and marketers realization that they have to design products that are more usable and accessible for all. Of course, exhilaration for the company comes from the successful introduction and sale of that new product.

When we have completed our intense collaboration with a Fortune 500 company we see that a change has come over that company. Product Designers and Product Managers are now speaking in accessibility terms, using Transgenerational and Universal Design terminology. Those managers and designers are then seeking ways to integrate those design concepts into more of their products. They are quite aware of the aging Baby Boomer population and the positive effect it will have on sales of their new more usable and accessible products. It seems that the T<sup>2</sup>RERC's Fortune 500 Project couldn't have come at a better time. What we have started here and are continuing through the life of the T<sup>2</sup>RERC may just be the beginning of an accessible product revolution in the United States.

The past year for the Fortune 500 Project started with a collaboration with the Eastman Kodak Company. The resultant focus groups for the next generation of a Kodak product line, electronic and bound versions of our final report, and edited DVD copies of our product demonstrations, evaluations and 3 focus groups were all well received

within Kodak. We have also been told by Kodak personnel that specific functions and features identified in our focus groups are being incorporated into the next generation of Kodak products.

The new Black & Decker Lids Off Open It All Jar Opener, Can Opener, Bottle Opener made its tradeshow debut at RESNA in June of this year in the T<sup>2</sup>RERC's booth. Both of these collaborations were reported on in detail in our last newsletter.

During a visit to Benton Harbor, Michigan, in August, negotiations were completed on two different product design collaborations between the T<sup>2</sup>RERC and the Whirlpool Corporation. As a result, Alpha, or Concept Definition focus groups were held in late September and early October for a completely new product. In addition, alpha focus groups were scheduled for December 2005 for the redesign of major kitchen appliance. We hope to provide more details in the near future but as of this time we are bound by a non-disclosure agreement signed between Whirlpool and the T<sup>2</sup>RERC.



*MBA student Liz Lagowski with a Whirlpool Duet Washer.*

*continued on page 15*

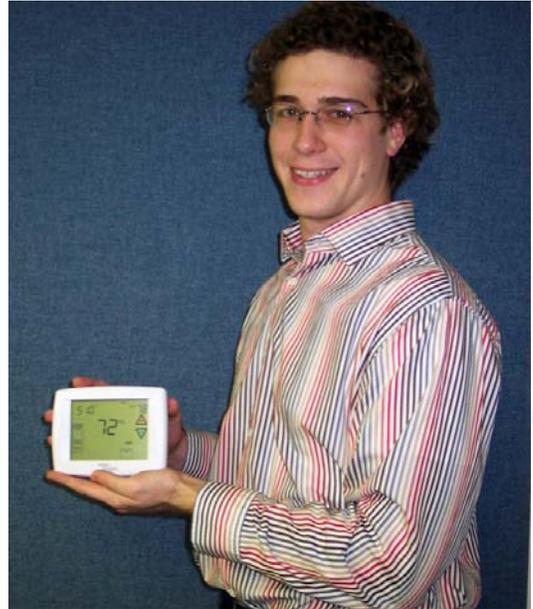
## D3. The Fortune 500 Project

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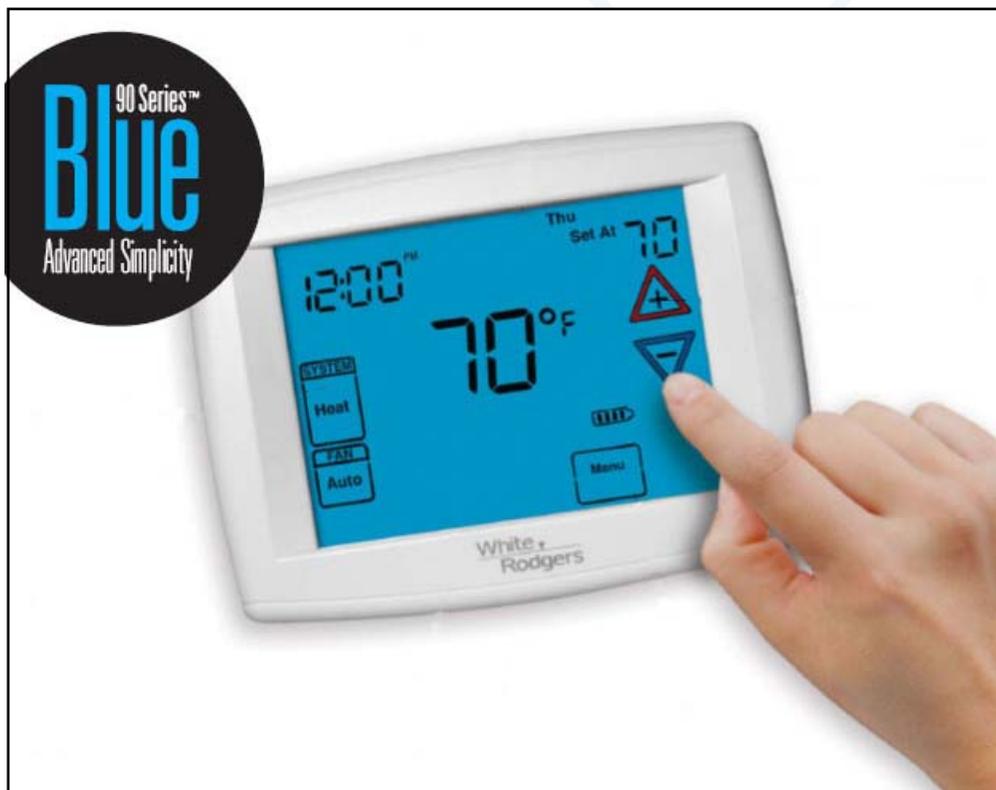
On another front, we have received a production prototype from White Rodgers on a thermostat design we worked on in 2002. We have scheduled Beta focus groups for January 2006 and will be providing design feedback to the company for incorporation into the final production model.

The White Rodgers 90 Series Blue thermostat incorporated a significant number of design and functional features identified in our 4 consumer focus groups. Large and easy to see characters for heat and cool options, large intuitive red/blue temperature keys, a large 12 square inch touch screen display, audio prompting to ensure program change confirmation, menu driven program change, a keypad lockout, a limited temperature range, change furnace filter and humidifier pad alert, ability to copy programming, a 5 year warranty, a backlit display to improve display contrast in low lighting and multiple other features. The T<sup>2</sup>RERC will be displaying the new White Rodgers 90 Series Blue thermostat at RESNA 2006 in Atlanta, GA.

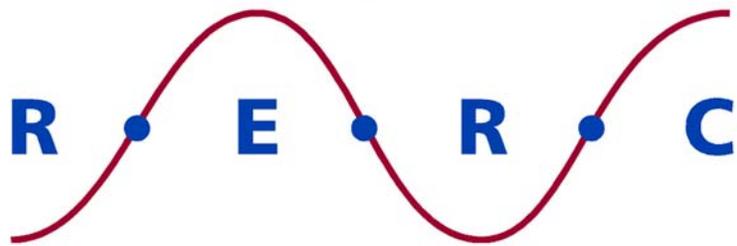
As year 2 for the Fortune 500 Project has come to a close we look forward to year 3 being another exhilarating year for the T<sup>2</sup>RERC and all of our partner companies. ■



*JD/MBA student Jonathan Leahy with the new White Rodgers 90 Series BLUE Touchscreen Thermostat.*



# TECH TRANSFER



# UPDATE

A PUBLICATION OF THE  
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