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Product Design Case Studies

Abstract: These case studies examine the role of Universal Design in the development of several successful product designs.

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Product Design Case Studies

BY THE CENTER FOR UNIVERSAL DESIGN

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Amtrak® Acela Express® Accommodates All

National Railroad Passenger Corporation (Amtrak)
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Washington, DC 20002
www.amtrak.com

December 11, 2000: As thousands of airline passengers along the East Coast became stranded due to fog, Amtrak's new Acela Express whisked from Washington to Boston in six hours and 43 minutes with its first paying passengers. Though 12 minutes late, the passengers didn't complain. "A lot of people hanging out at airport gates would have been happy to be just 12 minutes late," said an FAA spokesman (Phillips, 2000).



The Amtrak Acela in motion. Photo credit: Night Owl City (Flickr)

The northeast corridor between Washington, New York, and Boston is among the most densely populated and highly traveled areas of the United States. In 1995, Amtrak began the development of the high-speed, high-quality Acela Express system to compete more effectively with air and auto travel in this important market. Acela, designed to reduce travel time and increase the amenities of Amtrak's passenger rail system, became operational on December 11, 2000, with the inaugural run from Washington's Union Station to Boston's South Street Station. Unprecedented events in 2001 would also affect the ongoing competition between air and rail travel.

It would be an understatement to say that the horrific airliner tragedies of September 11, 2001, changed the way Americans travel. Among these changes were additional delays in air travel due to heightened security measures, and an increased reliance by Americans on auto and rail travel. These changes coincided with social and legislative changes within the US.

Department of Transportation Initiatives

The US Department of Transportation's (USDOT) Strategic Plan 2000-2005 clearly stated concern for the needs of elder passengers and those with disabilities:

“Accessibility and meeting the physical and service needs for all the population is a challenge that will involve serving multiple generation households, families with children, persons with disabilities, and the retired and elderly.”

For this 5-year period, the DOT's specific plans included:

“Work with public and private sector interests to: identify transportation needs for all segments of America, especially transportation disadvantaged, older and younger people, and people with disabilities, and supplement market mechanisms to assure basic transportation availability, and flexibility of choice for all Americans.”

The DOT's reasoning reflected thinking by census officials and market researchers alike:

“Baby boomers will start reaching the traditional retirement age of 65 in 2010. people who are likely to retire over the next 20 years currently have very high trip rates, rates that may be sustained further into old age.” Because of these and other projected demographic changes, train travel is expected to increase by 40% by 2030. (USDOT, 1998)

The Americans with Disabilities Act

In addition to responding to large numbers of baby boomer and elder travelers, Amtrak's Acela service was required to be accessible to people with disabilities under the 1990 Americans with Disabilities Act (ADA). These requirements were not new to Amtrak's management, who had provided testimony and support during the creation of the ADA, as well as the Rehabilitation Act of 1973. Inspectors from the Federal Railroad Administration (a division of USDOT) pay attention to these requirements, as do Amtrak designers.

In response to the ADA, Amtrak was mandated to be totally compliant in its architecture, products, and graphics by 2010. The bi-level Superliner II cars for long distance service were Amtrak's first newly constructed ADA compliant vehicles, followed by the single level “Viewliner” sleeping cars. Bringing existing single-level trains into compliance became a critical priority, especially for the Northeast Corridor trains. Fortunately, Amtrak's proactive approach to accessibility over the years minimized the burden.

“It's the right thing to do”, said Blair Slaughter. Slaughter, a member of Amtrak's industrial design staff, had lost the lower portion of his leg in an accident in 1985 and had used crutches and a wheelchair during his recovery. This experience gave him an understanding of the work ahead in overcoming architectural and other barriers.

Slaughter, as well as David Nelson, Amtrak's Program Manager of Employment Diversity, who is deaf, were among Amtrak's internal disability advisory group, helping to infuse awareness of diversity into Amtrak's corporate culture.

Cooperation among Design, Management, and Legal Staff

Blair Slaughter saw Amtrak's Industrial Design Department as "the conscience of the organization" and was no stranger to accessibility issues, having completed a cooperative project with Carnegie Mellon University on restroom accessibility. Amtrak management also aggressively pursued improved passenger amenities. Acela's well-integrated accessibility features were the result of this and other previous experience. Amtrak's "Viewliner" accessible sleeping room with roll-in shower had already become recognized as among the most luxurious and desirable to all travelers. "If access is built into the design, then no one notices, and the cost is minimal," said Slaughter.

Amtrak's management was not new to designing for customers with disabilities, having provided testimony to Congress in support of the Rehabilitation Act of 1973. On the other hand, in the transportation industry, passenger space = revenue. Additional space for wheelchair accessibility did carry a cost. Amtrak's legal department advised management that the accessibility requirements of the Americans with Disabilities Act would heavily impact older cars.



The Amtrak Acela Express wheelchair-accessible café. Photo by Kevin H (Flickr).

Management treated the requirement not as a burden, but as an opportunity to improve the interior environment for everyone. Don Knapik, Assistant Vice President of Acela Services, pointed out an example: "Making our café car accessible allowed us to improve the aesthetics and usability of the design for all customers."

User-Centered Design

To address the market opportunities of the highly-competitive northeast corridor, Amtrak sought a new level of speed and quality in rail travel, reflective of European rail and business-class airline travel. Amtrak's internal marketing, market research, mechanical, engineering, customer service, and operations staff teamed with design firms IDEO and OH&CO for the design of Acela Express train cars. The team collected data about the complete rail travel experience from amenities to material colors and textures to travel times from 24,000 Amtrak customers and employees. These included persons with and without disabilities.

Don Knapik believed it was this direct exposure to the diverse user population that stimulated Amtrak management to go beyond the requirements of the ADA. "We wanted to do more than just make our trains accessible. We sought a more 'aspirational' approach," Knapik said. "We want them to be the preferred mode of transportation." People with disabilities remained active participants in the design process, reviewing full-scale mockups along the way. By extending passenger amenities beyond ADA requirements, Amtrak naturally appealed also to people traveling with customers with disabilities.

Combining amenities of European rail and business-class airline travel, each 304-passenger Acela Express train was equipped with larger windows and enclosed overhead storage (larger than in airliners) with grab rails along the edge. Large reclining seats incorporated electrical and audio entertainment outlets, and most were movable to face the direction of travel. Entryways (with automatic doors), aisles, telephones (with TTY), and restrooms were accessible to wheelchair users.

The hotel-size restrooms included back-lit mirrors, high-quality materials, and call buttons for assistance. Seats closest to the restrooms had flip-up armrests so that wheelchair users could transfer more easily into the seat.

Graphics and Station Access

The Acela design project also involved redesign of system-wide graphics and train stations. The McCulley Group, a California design firm, was originally contracted to redesign the architectural graphics system in 1994, with input from disability consultant John DeWitt and Associates. McCulley updated the system-wide graphics manual in 2001. Taking a cue from the architectural signage and Acela Express, the interior signage for Amtrak's other railcars was redesigned by Amtrak's equipment design group. In keeping with Amtrak's proactive stance on accessibility symbols, tactile graphics and Grade 2 Braille were incorporated into the interior signage, well beyond the ADA requirements.

Ellen Taylor, Amtrak's Senior Director of Station Planning, described how accessibility of station design was also carefully considered. A program for station graphics was undertaken by the design firm of Calori & Vanden-Eyden, Ltd. to reinforce the Acela identity throughout the station. "A unified 'bread crumbs' trail was created for the traveler from street to train platform," Taylor said.

Dynamic graphic signs complemented the stations' public address system, and level change options included not only elevators and stairs, but escalators as well. "We consider escalators also important for access by persons both with and without disabilities, especially with an aging population," Taylor said.

The overall design integrated accessibility without calling undue attention to the fact. "The best features are the ones customers don't remember," said Blair Slaughter. "Aesthetics are respected, along with accessibility." Amtrak's web site and trip planner publications provided information about accessibility of equipment and destinations, but there was no overt marketing to elders or people with disabilities.

Building on Success in the Marketplace

From the high-profile introduction of Acela Express in December, 2000, Amtrak received about \$10 million in media coverage, and Amtrak revenues that month were the highest in the company's history. Between December 11, 2000 and June 11, 2001, more than 100,000 Acela riders bought over \$15 million in tickets, enabling Amtrak to top its sales projections. Ellen Taylor pointed out, "It is very difficult to quantify return on investment of our design approach." But it was clear that Taylor and other Amtrak managers embraced the inclusion of people with disabilities among their valued customers, who responded in turn. "Word of mouth is our most powerful sales tool among people with disabilities," said Don Knapik.

Amtrak realized that making all cars accessible provided more product consistency, simplified configuration of trains and reduced the number of different cars in inventory, also simplifying maintenance. Lessons learned from making older cars accessible formed the basis for making the Acela Express accessible from concept to construction. In turn, the lessons of Acela Express were applied to subsequent redesigns of older cars and continued to influence new vehicle accessibility. Amtrak also began providing special accommodations for groups of people with disabilities traveling together by reconfiguring the train to include more accessible cars and occasional special accommodations for groups of travelers with disabilities.

In 2001, both the Acela Express and Acela station signage program received gold Industrial Design Excellence Awards (IDEA) from the Industrial Designers Society of America.

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Gardening for All Ages and Abilities

The Florian Ratchet-Cut Tools

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www.florianratchetcut.com

“I have arthritis of the hands, and this is one product that I can use in my garden and yard that does not hurt my hands.”

Testimonials like this from customers and therapists alike no longer surprised Judy Florian, head of Customer Service for American Standard Company and wife of the President. In fact, statements like this were scattered throughout their catalog of Florian Ratchet-Cut Pruning Tools.

As Nat Florian wrote in the Florian catalog, “Over the years we are pleased to find that our tools are not only widely used by the professional commercial market, but also by the average homeowner bridging all age gaps. Folks with diminished hand and arm strength who had given up pruning and working in their gardens now are able to resume their passion for gardening.”

Background

American Standard Company, maker and seller of Florian Ratchet-Cut pruning tools, was a third-generation, family-owned, tool and die and metal stamping business founded by R. Steuart Florian in 1937. Mr. Florian invented and patented the Ratchet Pruning Shear in the 1960's as a result of watching his wife struggle with conventional garden pruning tools.

Florian's ratchet design worked similarly to a hydraulic automobile jack, which generates its power through short, easy strokes. American Standard claimed that their hand pruners cut through branches up to 3/4" thickness, with less than one fifth of the effort required with conventional pruners. Their customers seemed to agree: “I have apple trees that are twenty-five years old. Normally, it takes two weeks to trim. With your pruners it takes only three days,” read another testimonial in their catalog.



"Ratchet-Cut" Pruners

American Standard Company's sole facility was located in Southington, CT, and had about 53 employees and affiliates, including 13 sales staff, 10 office staff, and a production staff of 20-30. Since 1987, Nat had served as President. Most of Florian's seven children worked in the business, some later moving on to other manufacturing companies. Two of the sons, Nat and Jonathan, re-engineered their father's design, which led to a second patent.

Foreign Competition: Bad Copies are Good Publicity

The popularity of Florian tools spawned cheap imitations which 63-year-old president Nat Florian described as a "mixed blessing": The low-quality imitations focused attention on the quality of the genuine article, while also negatively reflecting on the Ratchet-Cut design if executed poorly.

American Standard's Customer Service Department was established in the 1990's by Judith Florian. The department protected the company's reputation by providing factory service for its products. However, occasionally the department received broken foreign-made imitations of their tools accompanied by customer demands for warranty replacements.

Marketing "by Hand"

The virtues of Florian products were difficult to convey through advertising. The reduced physical effort required of the ratchet action had to be experienced. Customers had to heft the larger tools to appreciate the unexpected lightness of these tools.

Florian products could be found in only several hundred nurseries and other retailers nationwide. Florian products were generally more expensive than competitive products, so retail shoppers might pass them by for less expensive alternatives. In the early 1970's, Florian tools were briefly marketed by Stanley Tools, although this alliance dissolved.

American Standard has determined that its most effective marketing is through personal selling. American Standard's Marketing Manager, Kit White, became interested in Florian garden tools when he saw them demonstrated

at a state fair in 1975, when he was 15 years old. Since then he has traveled extensively to promote the advantages of Florian's products. White and his sales force attend dozens of trade and retail shows every year. They also attend state and regional fairs such as the Eastern State Fair, which attracts about 1.5 million people.

Meeting Customers with Disabilities

At the Northwest Flower and Garden Show, which attracted hundreds of thousands of visitors, White would meet 75-100 wheelchair users each day of the 5-day show. White added that the total number of customers with less visible disabilities than these was impossible to measure.

Wheelchair users found the company's pole pruning system very useful, since pole extensions could be easily added and removed for either high or low pruning. One-armed customers found that the ratchet action of the long-handled Maxi Lopper allowed them to cut limbs up to 2" thick by holding the red handle stationary against their body, while pumping the green handle. With conventional pruners, both handles must be squeezed together.



"Ratchet-Cut" Loppers

Product Improvements through Customer Feedback

Since the establishment of the Customer Service Department in the 1990's, a steadily growing stream of customer letters has developed, much of it from customers with disabilities ranging from heart disease to amputations to cerebral palsy. Both Judy and Nat found these letters heartening, but emphasized that their tools were good for everyone, as many other catalog customers stated: "I have 6 acres crowded with azaleas and all sorts of fruit trees and my lopper thrilled me with the effortless cuts on stuff the size of my wrist."

Field sales representatives had similar experiences with customers with disabilities. Sales Manager Kit White noted that, at garden shows, women attendees outnumbered men and ranged in age from 40 to 90 years of age.

With the exception of the original ratchet-cut patent born through the invention of R. Steuart Florian to address his wife's limitations, Florian products had not been designed to meet the specific needs of customers with disabilities. The advantages cited by these customers simply reinforced the logic of the design, according to Nat Florian.

Regular improvements in design and manufacture were conceived and executed in-house. These improvements focused on improving ease of use and durability for every user. Needs identified by the sales force were brought directly to the attention of the factory staff through Nat Florian.

Teaching Universal Design by Example

Florian's RP 701 Pruner was used in Universal Design seminars at "Designing for the 21st Century" and RESNA conferences in June, 2000. Not surprisingly, participants at these conferences were at first confused by the unique ratchet action of this product. Without instructions in its design, users felt that the tool might be broken. After learning how the design works, however, they were impressed. Several suggested that some description of the Pruner's unique design be printed right on the tool to overcome this initial confusion. This suggestion was passed on to American Standard's president.

Florian's Future

Ethel and Steuart Florian's son and grandson continued to manufacture and market the Florian line of garden tools, as well as a growing number of related gardening products produced by others. The number of home and garden shows attended by Kit White and his sales staff increased each year.

With an estimated 30% sales growth in 1999 and a natural appeal to the growing population of seniors and people with disabilities, American Standard continued to be an excellent example of the business appeal of Universal Design.

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November, 2000

Beyond the “Tupperware Party”: Reaching New Generations of Customers

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Recreating the Classics

It was 1990, and Morison Cousins, Vice President of Design for Tupperware Worldwide, faced a formidable challenge. Tupperware had decided that it needed to update its products to reach a new generation of homemakers. This would mean changing a design that had remained essentially unchanged since the 1950's while increasing in sales for 3 decades. Cousins remembered the 1950's fondly, and Tupperware had been among the more popular and exciting home products during these years. Born in Brooklyn in 1934, Cousins had studied industrial design at Pratt Institute and had later opened his own design office, also in New York, before joining Tupperware in 1990.

Growing up with the Baby Boomers

Unlike so many consumer products, Tupperware containers remained useful for decades after purchase. The same container that kept the baby's food fresh was still used years later to save dinner leftovers for that same child when she came home late from high school cheerleading practice. In the ensuing years, young homemakers who purchased their first Tupperware in the 1940's reached middle age, while their children and their elderly parents used their Tupperware products as well. Though life changed considerably for baby boomers and their families through the next 3 decades, Tupperware design remained essentially the same.

Sealing Out Some Users

For many children, elders, and people with disabilities, the same airtight seal that had been Tupperware's trademark was also a barrier, because the narrow lip was difficult to open. At the same time, many who had been young homemakers in 1945 and among Tupperware's most faithful customers, had begun to experience arthritis and other natural effects of aging that made use of that classic seal difficult for them as well. One of those users was the mother of Morison Cousins, Vice President of Design for Tupperware Worldwide. Like many of her contemporaries, she had found that the narrow lip around the edge of the seal had become difficult to use.

Usability Meets Durability

In 1990, Cousins undertook the redesign of Tupperware products. In developing the new One Touch Seal and the redesign of the classic Wonderlier bowls, Cousins had in mind users like his 87-year-old mother. He replaced the narrow lip seals with larger seal tabs and double-arc handles that were easier to grasp.



Wonderlier Bowls

Strong color contrast between the lids and bowls increased usability for people with limited vision. The very features appreciated by museum curators also had a straightforward usability, even for people limited by age or disability. In 1994, Tupperware added about 100 new products to the line, which included Wonderlier and Sevalier bowls, One Touch containers, Tuppertoys, and Tupperware microwave cookware. Cousins' adherence to simple, elegant forms helped to preserve the utilitarian character that had endeared Tupperware products to homemakers. Cousins' approach also earned Tupperware products a place in design museums around the world. With Cousins' redesign of the classic Tupper seal, Tupperware products became not only capable of enduring through the user's lifespan, but remaining useful throughout that lifespan as well.

Background

In 2000, Tupperware, headquartered in Orlando, Florida, remained one of the world's leading manufacturers and sellers of plastic food serving, storage, and preparation products. Tupperware was one of the most well recognized brand names in the world, its products found in over 90% of American households and widely recognized for designing top-quality, innovative products. Tupperware's core product line included food storage containers to preserve food freshness through the well-known Tupperware seals. The company also had an established line of children's educational toys, serving products and gifts. New product development continued to be an important part of the company's growth strategy, as it strove to generate about 20% of annual sales from new products.

The line of products expanded over the years into kitchen, home storage and organizing uses. This included products such as Modular Mates, Fridge Stackables, OneTouch canisters, the Rock N'Serve line, Meals in Minutes line, Legacy Serving line, and the TupperMagic line, as well as the Expressions line, the Luxuria line, Ultra Plus

and OvenWorks, Salad Spinner, E-Series ergonomic knives, Multi Organizer water filters, mixers, blenders, flower vases, ComfortClean Squeegees, and BagKeepers. The development of Tupperware's new products differed in various markets, due to dissimilarities in cultures, life-styles and needs.

Tupperware positioned its products at the upper end of the market by incorporating innovative designs and higher quality plastics in its products. In general, the company avoided product categories where it felt it could not differentiate itself and command a premium price.

Company History

Tupperware has literally been a household word for generations. But long before Tupperware became an integral part of the classic suburban lifestyle in the 1950's, Earl Tupper was a self-educated engineer working for a Du Pont chemical plant. With the beginning of WWII, industrial materials for home products became scarce, and Tupper began to experiment with a refining process to make use of Du Pont's leftover polyethylene plastic. When refined, this plastic became the basis for Tupper's revolutionary kitchen product. Tupper's very first product was a simple tumbler. But looking at a paint can in a hardware store one day, he conceived of inverting the lid seal and producing it in flexible plastic. So the famous "burp" seal was born.

In 1958, Tupper sold the company to Rexall Drug, which became Dart Industries in 1969. Dart Industries spun off Tupperware in 1986, along with several other divisions, Hobart (commercial kitchen appliances), Ralph Wilson Plastics (plastic laminates for countertops), and West Bend (small appliances), to form Premark International, Inc. Tupperware became a separately traded, publicly owned company in May 1996 through a tax-free spin-off and share distribution from Premark. In 1999, company sales totaled over \$1.0 billion through a sales force of about 1 million spread throughout more than 100 countries worldwide. Tupperware's global reach was reflected in the numbers -- nearly 86% of revenues were generated outside the U.S. Focusing more on updating product designs, management invested in a major public relations campaign in the U.S., which resulted in about 300 impressions per month (in magazines, television shows, etc.) in 1999. Strategic alliances with Whirlpool, Proctor & Gamble, and the International Chef's Forum enabled Tupperware to promote the brand and spark interest in products.

An Innovative Marketing Idea in the 1950's

Until Earl Tupper introduced his Tupper Plastic products in 1945, kitchen containers were either glass jars or ceramic crocks. Many homemakers were familiar with the use of Mason jars for preserving fruits and vegetables. Tupper's airtight seal made polyethylene Tupper containers functionally superior to conventional containers. But plastics had been seen very little outside of industrial applications. As a result, few homeowners knew the advantages of the material or even how to open the Tupper containers, and they sold poorly. Watching his products languish on the shelves of hardware stores, Tupper realized that the product had to be brought directly into the homes of users in order to convince the public.

Tupper's first direct sales person was Brownie Wise, who conceived the idea for the "Tupperware party" to do just that. Tupperware parties brought awareness of these new plastic products into suburban neighborhoods. For decades, Tupperware sales flourished, utilizing "Tupperware party" to conduct sales in a group environment, using the opportunity to demonstrate product features and educate the consumer.

Modern Marketing of Multi-Generational Products

It wasn't until she finally attended her first Tupperware party in 1998 that Pam Parish, a 35-year-old teacher's aide and mother of two children, began filling her kitchen with Tupperware. In order to reach the post-Donna Reed generation of homemakers, including "stranded" customers who had either no access to or no interest in attending a typical party, as well as new customers, the 50+ year old Tupperware began to reinvent its marketing approach in the 1990's with the following initiatives:

- 1 **TV Shopping**-Tupperware hosted six live Tupperware parties on the Home Shopping Network in 1999, with 12 additional one-hour shows planned in 2000. Sales from these shows represented no-cost advertising for products, parties, and careers with Tupperware.
- 2 **Kiosks**-The number of Tupperware kiosks in shopping malls nationwide grew from four in 1998 to over 250 open during the 1999 holiday season. Typically operated by Tupperware distributors, the kiosks provided many leads for parties and sales force recruits.
- 3 **E-commerce**-Tupperware began selling products online on August 9, 1999. Looking primarily for top-line growth, management also hoped to spark recruitment efforts and modernize the Tupperware image.
- 4 **Direct Mail**-Tupperware's work on creating a database for direct-mail marketing was designed to allow management to follow up on leads from kiosks, Internet, and party hostesses and attendees.



Rock N' Serve Container

The Next Generation of Tupperware Products

In 2000, Morison Cousins noted several design trends at Tupperware, including the success of more durable, upscale products such as "Rock and Serve". This product line incorporated a conventional Tupperware polypropylene seal with a more durable, transparent polycarbonate canister, which resisted high-temperature pitting that sometimes occurred in microwavable containers.

NOTE

In 1999, Cousins' mother passed away at age 91. Up to that time, she had lived in her own home, driven her own car, and cared for herself. Among the possessions passed down was her collection of much-used Tupperware products.

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October, 2000

Fiskars Develops Its “Softouch”

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Background

The use of scissors predates written history, but the design is believed to have originated during the Bronze Age, which began about 3000 B.C. In the 18th century, steel replaced bronze and iron blades. Despite subsequent technological advances, scissors design has remained relatively unchanged for centuries, while scissors-users have not.

In 1989, a Fiskars’ vice president received a one-page study from the Arthritis Foundation citing arthritis as a major concern of aging baby-boomers. Struck by the size of this population and by their own personal experiences with aging family members, Fiskars’ designers began to consider how well their products were designed for this market.

Beginning in 1989, Fiskars began to develop new products based on sensitivity to the aging consumer market, particularly those with arthritis that interfered with their ability to grasp and manipulate hand tools.

Development of the “Softouch” Concept

Eighteen months after its vice president had first read about the effects of arthritis on the baby boomer generation, Fiskars had developed a prototype called the “Golden Age Scissors”, based on consideration for users with arthritis.

The lightweight design accommodated both right- and left-handers equally well and offered a larger, softer grip to distribute pressure more evenly across the palm of the hand. The scissors also incorporated a lock closure and a spring assist to open the scissors, eliminating one of the tasks of cutting.

No market surveys among older or disabled customers were conducted to justify the design. It just seemed like “common sense”, in the words of the designers, Jim Boda and Doug Birkholz.

As it became obvious to Fiskars designers that the product had features useful to anyone, Fiskars changed the name to reflect a less age-related focus, and the “Golden Age Scissors” became known as the “Softouch” scissors and went into production in 1991.



"Softouch" Scissors

Positive Customer Feedback

Elder Fiskars customers responded that until Softouch went on the market, they had given up sewing. Children found that Softouch gave them much greater cutting ability. Businesses began to use them in production jobs to minimize the risk of repetitive motion and cumulative trauma disorders. Softouch Scissors won awards from the American Society on Aging and the Industrial Designers Society of America in 1993 and the Arthritis Foundation in 1995.

Softouch scissors were sold through a wide variety of outlets, from kitchen supply retailers to New York's Museum of Modern Art Design Store. Fiskars Softouch Scissors were even selected by the Center for Universal Design for its posters and presentations illustrating the 7 Principles of Universal Design.

Fiskars' History

Fiskars is one of the oldest companies in the western world, with deep roots in iron- and steel-working. In 1649, a Dutch merchant and owner of an ironworks was chartered to establish a blast furnace and forging operation in Fiskars, a small village in western Finland. The country was under Swedish rule at the time, and much of the nails, wire, knives, and hoes produced by the operation were sent on company ships to Stockholm.

Over the next 160 years, industrial and economic development accelerated in Europe. During this time, Fiskars developed its skills and reputation as one of the finest copper and ironworks in northern Europe. In the 1830's, the company expanded into the manufacture of forks and scissors, originally in heavy, forged steel. In 1837, Fiskars established the first machine shop in Finland and manufactured the first Finnish steamship engine the following year. Fiskars continued to develop its reputation as a premier steel and ironworks company, extending its production into architectural, industrial, agricultural, and home products.

Throughout its history, Fiskars has strived toward five principles:

- ~ A sense of its identity and direction
- ~ Commitment to quality
- ~ Attention to details
- ~ Understanding of each of its marketplaces
- ~ Strong relationships with its customers

The Fiskars company is still controlled by descendants of the founder. The family is considered the largest land-owner in Finland and a dominant force in Finland's construction, electronics, forestry, shipping, and telecommunications industries.

Fiskars in the U.S. Marketplace

Fiskars, Inc. produces nearly half the scissors sold in the US. The quality of their scissors is among the top three manufacturers in the world, including Henckels and Gingher, whose products are more expensive.

By far the largest unit, the Consumer Products Group, accounts for 94% of sales and is headquartered in Madison, Wisconsin. This Group manages the manufacture, sale, and worldwide distribution of three product families: scissors and other housewares products, outdoor recreation products, and lawn and garden products. With more than 60% of its sales in the US, the Consumer Products Group maintain offices in North America and Europe, as well as offices and manufacturing facilities in Fiskars, Finland. Their products are marketed under the Fiskars name as well as under the labels of some of its customers.



Rotary Cutter

Spin-offs and Competition

Focus groups of 40-70 year old customers with limited hand function were conducted in the development of other Fiskars' products, IDSA award-winning Rotary Cutters and Rotary Paper Trimmer. These products were conceived in reaction to competitive rolling-cutter products from Olo and Dritz. Fiskars' advantage over these lay in superior ergonomics. In citing the design for a 1994 Industrial Design Excellence Award, jurors noted that the handle contours made it "comfortable for any size hand, allowing the user to distribute downward pressure across the hand while maintaining neutral arm position."

New Market Concept, Not Market Niche

Jim Boda and Doug Birkholz felt that the "universal design" approach had required a "paradigm shift" at Fiskars toward a broader definition of their market to include people with manual limitations, whether due to age or disability.

They noted that Fiskars Research and Development staff integrated this shift readily, but other departments, such as Lawn & Garden Products, were more conservative and resistant to redefining fundamental marketing strategy. Nevertheless, the concept took hold, and customers with limited hand function were eventually considered also in the design of garden tools such as Softouch Floral Shears, Power Lever Pro, and Softgrip Multi-Snip gardening tools. The approach was also integrated into designs for ax and shovel handles marketed by Fiskars in Europe.

Applying the Universal Design Concept

Fiskars designers agreed that introducing a new product such as Softouch or Rotary Cutter was somewhat easier than “displacing” an existing product, whether the company’s own or a competitor’s. They believed that market “space” was already available and waiting for a product that meets a significant need. This suggested that products reflecting Universal Design as a new paradigm were more likely to be successful than existing products facelifted or subtly altered to reflect this approach. For Fiskars, the key was to avoid designing for a specific market segment, e.g. “Golden Age Scissors” in favor of integrating features that addressed the needs of these populations with those of the general market. This, in a nutshell, is the concept of Universal Design.

Extending the Softouch Concept

Though Fiskars’ Softouch products continued to sell well in 2000, the company received feedback from some customers who felt that the large grip of Softouch also brought some loss of control. So Fiskars developed a more conventionally-shaped scissors with soft inserts on the gripping surfaces.

Fiskars submitted their Softgrip Pinking Shears and Softgrip Bent Scissors to the 2000 ASA “Design for Mature Markets” competition. These designs were essentially identical in shape to their popular “orange-handle” products, but with a softer skin over the handles to reduce reduce fatigue with prolonged use.



Softgrip Fabric Shears

ASA judges were surprised at the contrast between these products and previous award-winning “Softouch” scissors designed nearly 10 years earlier. They felt that comfort was markedly reduced, and the inability to use them with either right or left hand was a definite drawback.

Leah Peterson, the Fiskars contact who submitted the products to the ASA competition, explained that, “Softgrip products are not a replacement for Softouch products (which continue to sell very well), but rather an extension of these popular products.”

In addition to reduction in fine control due to the larger full-hand loop which replaced the finger rings of conventional designs, Ms. Peterson further explained how some customers cited difficulty with the Softouch spring-open feature, which requires a wide grip range.

Finally, Ms. Peterson also noted that the “Rotary Cutters”, also featured in the previous case study, continue to be popular on the market, though a redesign was due in 2000.

Softouch Creators Move On

Jim Boda and Doug Birkholz left Fiskars in 1996 and founded Inspire Design Group, along with other members of Fiskars' technical staff who created the Softouch design. Inspire Design Group focuses on integrating their careful ergonomic research so well into product design that the user is unaware of it. Among their projects is the design of recreational products for the aging baby boomer market.

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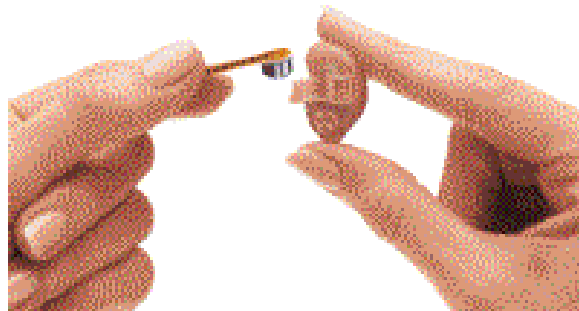
"Scissors and Shears", Consumer Reports, October, 1992; Vol. 57, No. 10, Consumers Union, Yonkers, NY; pp. 672-676.

October, 2000

Duracell Listens to Its Customers

Product Ventures, Ltd.
55 Walls Drive
Fairfield, CT 06430
www.productventures.com

For:
Duracell
Berkshire Corporate Park
Bethel, CT, 06801
www.duracell.com



“You don’t even have to think about whether it’s right side up or upside down - there’s only one way to do it”. --Hearing aid user

Hearing Aids Get Better; Batteries Get Smaller

“As hearing aids have gotten smaller, so have the batteries...”The number one issue is the batteries”, says one hearing aid specialist. She adds that some users wear their hearing aids as little as possible to avoid the ordeal of battery changing or relying on someone else for help.

Hearing aids are better than ever. New advances include improved chip technology, which allows professional tuning to provide the specific sound and voice levels lost from hearing ability, plus filter out irritating ambient sound. New technology also allows specialists to better define individual needs in hearing correction.

The social stigma attached to wearing a hearing aid has been greatly reduced by the development of less detectable, digital models, some fitting entirely within the ear canal. However, these newer hearing aids require battery changes as often as every week. Arthritis and poor eyesight, compounded with smaller zinc-air batteries, make this weekly chore an ordeal for some users:

“Oops, I’ve got it upside down.”

“...can’t get the silly box open...”

“...and my eyesight isn’t as great as it should be, either.”

“I feel like an ass.”

Hearing aid batteries have historically been sold in a “blister” card package with a dial type dispenser. The package requires the user to remove a single tiny button battery from the package and drop it into place inside the hearing aid. Sometimes, more than one battery drops from the package. “If you drop it over a thick carpet, you’re sunk,” says one user.

Market and Technology Shifts

In 2001, it was estimated that the U.S. market for hearing aid batteries is expected to grow six to eight percent in volume over the next five years (Gillette, 2001). Longer lifespans, higher levels of environmental noise, and increasingly powerful audio systems contribute to increasing incidence of hearing loss among the U.S. population. As hearing aid technology has improved, hearing aids have gotten smaller, and the stigma of using one has decreased. At the same time, these new smaller devices require more frequent battery replacement, some once per week.

As many as 28 million Americans have diminished hearing. Some 67 percent of these are over the age of 45, and 55 percent age 65-plus. Although hearing aids could benefit 95 percent of them, for a variety of reasons, only about 20 to 25 percent actually use them. Thirty percent of hearing loss in mature adults is caused by presbycusis, a condition in the aging process.

Sensorineural damage (nerve deafness) and loud noise over long periods of time are the other major causes of diminished hearing. In many persons, hearing loss is not a reduction in all hearing, but a reduced ability at certain ranges; for example, being able to hear a bass drum or a man’s voice, while straining to hear a trumpet, a child’s voice, or a song sung by a soprano (Hansen, 2001).

Company and Industry Overview

Part of the Boston-based Gillette Company, Duracell is the world’s leading manufacturer and marketer of high-performance alkaline batteries. Duracell also sells primary lithium and zinc air batteries, as well as rechargeable nickel-metal hydride batteries.

The Gillette Company is the world leader in male grooming, a category that includes blades, razors and shaving preparations. Gillette also holds the number one position worldwide in selected female grooming products, such as wet shaving products and hair epilation devices. In addition, the Company is the world leader in manual and power toothbrushes.

More than 90 percent of the zinc air battery market is used for hearing aids (Frost & Sullivan, 2001). First introduced for hearing aids in the 1980's, zinc air batteries have become the battery of choice as the power demands of modern hearing aids have increased. Zinc air batteries have superior shelf life and higher energy density (more power in a smaller package) than the alternatives. However, zinc air batteries use oxygen from the air for their chemical reaction.

To prevent exposure to oxygen before use, zinc air batteries are packaged with a small tab that adheres to the battery to create a seal. The tab must be removed to "activate" the battery before insertion. Removing this tiny tab is difficult for seniors with manual dexterity problems.

The EASYTAB Solution

To reduce fumbling with these powerful but tiny batteries and the tab, Duracell turned to consultant designers Product Ventures, Ltd. According to Javier Verdura, Vice President for Design and Development at Product Ventures, "We took an essential component that was negative and turned it into a positive, improving both the function and the usability of the battery."

Duracell saw an opportunity to introduce an innovative package system unique in the market to ease hearing aid battery replacement for consumers. "Duracell was seeking differentiation from competitors who offered "circular-dial" packaging, which made hearing aid batteries difficult to retrieve, load and activate," says Peter B. Clarke, president and founder of Product Ventures Ltd.

Development of this new package required management commitment to the risks inherent in any new product introduction, including the costs and difficulties of reinventing manufacturing and assembly processes. Duracell and Product Ventures turned to one-on-one interviews and usability testing with senior hearing aid users to guide the development of this entirely new approach.

Peter Clarke explains how user input was gathered and integrated into design development: "We conducted product use focus groups that illustrated the many shortfalls of existing packaging; and we determined that Duracell needed a new delivery system -- not just a new package. We recommended a custom designed tab to be used as a "tool" to easily remove the battery from newly developed packaging, which is rectangular and hinged for easy opening and closing. Inside the package, the batteries are secured in a single row with tabs facing outward for easy removal and discreet carrying. The tabs and packaging are color-coded, enabling consumers to easily identify their battery size."

The EASYTAB is grasped between the consumer's thumb and forefinger and used as a "tool" to remove the battery from its packaging to insert into even the smallest hearing aid. In addition, the long, brightly colored tab is clearly visible, even to people with limited vision, and even when the battery is dropped. Once the battery is placed in the hearing aid, the tab is removed, along with the seal, to activate the battery.



Market Response and Awards

With the development of DURACELL's EASYTAB hearing aid batteries, Duracell took a bold step forward in design and marketing of a product targeted to seniors. Management made the decision to redesign the product based on demographic trends pointing to increased demand for hearing aids and batteries by older persons.

DURACELL EASYTAB was introduced to retail outlets in October 2001, after the Company announced the product to the media in April 2001. Post-use focus groups confirmed that consumers were elated with the new EASYTAB feature. User-testers of the new package responded with, "Voila", and "Oh, that was easy." In the first month of sales, DURACELL EASYTAB inventory was completely sold out.

Competitors Energizer and Rayovac have responded by developing their own designs for a more user-friendly package. In 2001, EASYTAB received Chicago Atheneum's Good Design Award, as well as a Universal Design Award from the American Society on Aging.

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June, 2002

Ford Drives a Mile In an Older Person's Suit

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Customer Relationship Center
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Designing for All, Marketing for the Young

A popular television ad pictured a group of 20-something passengers barely wedging their Ford Focus into the last available space in a parking garage. Realizing they couldn't even open the doors, they popped the rear trunk lid and climbed over the fold-down rear seats. Another ad featured a similar group apprehensively holding full cups of coffee as their car rolls over a series of railroad tracks, demonstrating the car's smooth ride.



The 2000 Ford Focus

As ever-larger and thirstier SUV's met the gas crisis of 2000, renewed interest in practical small cars began to grow. Among new products ready to meet this interest was the Focus, Ford of Europe's attempt to develop a true "world car". Cited by a major consumer magazine as "very easy to get in and out of; the cabin has a spacious, airy feel, and the driving position is high, which makes for good visibility" Also noted was that spacious trunk, rear seat room and "climate-control switches that are easy to use and radio buttons that aren't a stretch to reach."

Understanding Lifespan Changes

These advantages were hardly accidental. The development program for the Ford Focus coincided with heightened awareness of the needs of older drivers among designers and engineers at Ford. “As we grow older, our vision changes. We’re more susceptible to glare, and we don’t adapt as quickly to changing conditions. It’s harder for elderly drivers to use their peripheral vision,” Jeffrey Pike explained. A design analysis engineer at Ford, Pike was describing how Ford was beginning to design for the growing population of senior drivers by sensitizing staff to the ergonomics of aging.

“It’s one thing to read customer feedback in a marketing study. It’s a whole different thing to feel what they’re feeling while driving a car, said Vitek Bhise, Manager of Human Factors and Ergonomics at Ford. Feeling the effects of changes in vision and other functional changes that come with aging was what the “Third-Age Suit” was all about. “With the Third Age Suit, you lose about 25 percent of your strength, you have about 25 percent less flexibility and it’s harder to get in and out of a car”, added Gretchen Zorbel, a Ford human factors and ergonomics engineer.

Workshops on Aging

The Third Age Suit was the result of a series of experiential workshops based on an exercise developed in Canada and organized by Age Concern, a UK charity. In the workshops, participants were “dressed” in goggles, ear plugs, restrictive arm bands, wrist and ankle weights, and gloves to simulate reductions in sensory abilities, range of motion, and strength that can occur with age. Participants were then given everyday tasks to perform, using only their residual abilities.

Younger Designers Suit Up

The workshops were so successful in helping participants to understand the effects of aging, that Ford decided to develop a simulation “suit” to sensitize their design and engineering staff. It was particularly useful for younger members of the staff. “When you’re young and fit enough to leap out of a car without effort, it’s hard to appreciate why an older person may need to lever themselves out of the driver’s seat by pushing on the seatback and the door frame”, said Mike Bradley ergonomics specialist in Ford’s Dunton, England design center. “But try leaping out while you are wearing this suit and you really understand the challenges we face.”



Ford's "Third Age Suit"

Show "Young", but Think "Ageless"

Ford's design development teams began using the Third Age Suits in ergonomics research to look toward the future needs of their customers.

"The numbers show that mature and elderly drivers are becoming an increasingly large percentage of the motor-ing public. So, with the Third Age Suit, we believe we have an advantage in knowing what that large demographic group demands", said Richard Perry-Jones, Ford's Vice President for Product Development.

Ford's television ad could just as easily have demonstrated the ease of entry and exit for a cane-user with the Focus's extra-wide doors and a number of other features especially useful for drivers with limitations due to age or disability. But Ford chose instead to follow a long-held automotive marketing approach: "You can sell a young man's car to an old man, but you can't sell an old man's car to a young man".

Adding Performance and Accessibility to the FocusAt the 2002 New York International Auto Show, Ford intro-duced a "tuned" version of the Focus, the ZX3. The ZX3 incorporated upgraded tires, brakes, air intake, exhaust, and suspension systems, as well as special paint and upholstery.



At the same time, Ford's Mobility Motoring Program unveiled a ZX3 with power-swivel driver and passenger seats and hand controls with simultaneous one-hand control of both throttle and brake.



This Ford is not only tuned for the street, it is tuned for active people with disabilities, said Chris Theodore, vice president of North America Product Development for Ford.

Ford's "Mobility Motoring" Program

Ford established its Mobility Motoring in 1992. Since then, the program has assisted more than 85,000 individuals and organizations with more than \$72 million in reimbursement funds. The program provides up to \$1,000 toward the cost of adaptive equipment or up to \$200 on alerting devices, lumbar support or running boards when installed on new Ford, Mercury or Lincoln vehicles.

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June, 2002

Marketing to Seniors with Style

Gold Violin
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www.goldviolin.com

Seniors as a Stand-Alone Market

“Seniors are now a stand-alone market”, says Connie Halquist, CEO of Gold Violin, pointing to the December 2000, cover of Money magazine’s Gift Guide 2000. The list includes expected gift headings such as Art, Home, Clothing, Sports, Babies, Books, and Seniors.

Connie’s sister and COO Ann Taylor is quick to add, “No one likes the label, ‘seniors’. Unlike other companies marketing to seniors, Gold Violin approaches the unique lifestyles of seniors and seeks products that support them with style.

“I created Gold Violin for the heroes in our world<ETH>people like my grandmother who live rich long lives and inspire us with their experience and insights. In our online store and catalog, you will find thoughtfully designed products and services to celebrate the achievements of the heroes in your life, said Hallquist.

“I figured I wasn’t the only one frustrated by trying to find special things for older relatives”, says Hallquist. “Millions of baby boomers are starved for time, juggling jobs, their own families and aging parents.” Although both Hallquist and Taylor joke that they have been accused of “monetarizing guilt”, 80% of their sales are not from baby-boomers for their parents, but by both baby boomers and their parents for their own use.



Ann Taylor and Connie Halquist

Functional products devoid of style need not apply at Gold Violin. “Our products are not just about function”, Ann explains. “There are catalogues with a low-end, hard-core medical orientation”, says Connie. “I decided to do the exact opposite.” In a sense, this is how Gold Violin was created. In 1993, Connie was searching for a gift for her grandmother. “I was tired of predictable gifts like perfume, assorted soaps or another picture of me, she says.



Victorian Walking Sticks

Instead, she bought a wooden cane and painted it with her own original design, creating a unique gift her grandmother treasured. “When I gave it to my grandmother, she was thrilled. My stylish walking stick matched her positive outlook on life. Oh, how she would brag to her friends about the thoughtfulness of her granddaughter.”

Going Beyond the Competition

With demographics and statistics pointing to a \$60 billion senior market, Gold Violin is not the first company to reach out to this market. In 1997-98, Centex Life Solutions, opened three locations near large cities of Washington DC, Chicago and Dallas to introduce the concept of “The Life Improvement Store”. Centex Life Solutions stores offered “merchandise and services to enhance peoples’ lives and making living at home better”, said Mr. Michael Albright, Chairman and chief executive officer of the Dallas based company.

The merchandise ranged from “100 styles of walking shoes to primary-colored mobility products, from allergy-control bedding, to home elevators, from aromatherapy to homeopathic remedies, and fitness equipment to travel accessories.”

Although the stores were designed around an upscale “Sharper Image” model, walkers, bath aids, and other assistive technology dominated the overall impression. Life Solutions’ approach was unsuccessful, and Centex closed their Life Solutions stores in 1999.

Ann Taylor notes that “brick and mortar” enterprises like these are inherently more expensive than e-commerce retailers like Gold Violin. She also points out that the unique nature of these products also requires more skilled (and more highly paid) retail staff.

Ann also notes that competing only on price with other retailers is difficult. “Gold Violin markets unique, even custom-designed products that are not readily available from other retailers.” That their catalog has over 300 products with both style and function may seem both encouraging and surprising. Gold Violin began in March, 2000 as an internet retailer only, then created a mail-order catalogue. A retail storefront may come later.

A Firm Marketing Foundation

Prior to founding Gold Violin, CEO Hallquist spent four years building Prophet Brand Strategy from a six person to a sixty person consulting firm with offices in San Francisco and New York. Prophet’s flagship clients included Audi, Discovery Channel, Levi Strauss & Co. and Williams-Sonoma. Before joining Prophet, she lived in the UK and served as a consultant for a leading snack food manufacturer. She has also worked in brand management at Kraft Foods.

Prior to Gold Violin, COO Taylor was Executive Vice President of the Thomas Jefferson Memorial Foundation, the private nonprofit organization that owns and operates Monticello, the home of Thomas Jefferson. Prior to joining Monticello, Ann was Financial Project Manager at James River Corporation. She began her career as a media planner at Ogilvy & Mather Advertising in New York.

Other Gold Violin staff and advisors include marketing professionals with experience at Avon Products, Gardeners Eden, Hold Everything, I. Magnin, Liz Claiborne, Pottery Barn, and Williams-Sonoma. In addition, Dr. Diane Snustad, Director of the Geriatrics Clinic at the University of Virginia, serves as an advisor.

Innovative Product Development

Hallquist and Taylor regularly attend major home and houseware trade shows looking for suitable products. When they discover an unmet product opportunity, they are not hesitant to pursue it. In fact, Gold Violin contracts with some suppliers to customize products for them, such as the common bath seat. Although most of these staple products are sold in white, Gold Violin had them produced in teal and peacock blue.

Hallquist even sought out fashion designer Pauline Trigere to create a designer line of products unique to Gold Violin, including a jacquard walker bag and a red leather pillcase.



Trigere Red European Pillcase

Trigere, herself 92, epitomizes Gold Violin's "lifestyle" approach: marketing products that support the customer's life without sacrificing style. This approach is evident in catalogue photos showing seniors not as dependents but actively involved in their own lives and those of their families. Many of these are famous photos taken from "Growing Old is Not for Sissies" by Etta Clark.

Seniors are an Internet Market

Gold Violin is riding a wave of seniors and baby boomers who are increasingly using the internet for product purchases. Taylor and Hallquist attribute this to the convenience of online shopping vs. the increasing hassle of retail shopping. Though they are still awaiting their first market analysis data, figures so far are very encouraging: approximately \$1.6 million in sales during their first 11 months of operation, with only a 4% return rate, compared to the 10% return rate common to gift markets. In addition to strong sales, Gold Violin gets a steady stream of positive customer feedback through letters and internet feedback sites.

"Senior citizens may comprise less than 10% of the total Internet population, but they're the second fastest growing group online (behind teens), and they've got the money to spend and time in which to spend it." (Adweek, 2000)

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April, 2001

LidsOff Adds to Ergo Approach

Applica Consumer Products, Inc.
Applica, Inc.
5980 Miami Lakes Dr.
Miami Lakes, FL 33014
www.applicainc.com



"A New Consumer Small Appliance Category"

On May 14, 2003, Applica announced it was ".creating a new consumer small appliance category with the launch of its new Black & Decker®* LidsOffT! Automatic Jar Opener". In fact, its interest in customers of all ages and abilities had begun years earlier.

Black & Decker Ergo Chopper

At the January, 2000 Housewares Show in Chicago, Applica introduced its Ergo line of small kitchen appliances-a handmixer, cordless can opener, electric knife, and food chopper. The products were designed to optimize handle configurations, handle angles, balance, weight, and functions and had been tested with consumers of all ages.



Black & Decker Gizmo Can Opener

In June, 2001, Applica introduced its GizmoT Can Opener. Cordless and designed to fit in the palm of the hand, the Gizmo was designed to operate over the sink, near the stove or on picnics and camping trips. It was also designed for hands-free operation - to automatically walk around the can and then automatically shut off.

In its press release for the Gizmo, Applica noted, “.those who suffer from arthritic or manual dexterity problems will appreciate the hands-free operation that relieves stress placed on the hand that is typically associated with more traditional can opening methods.” (Applica, 6/05/01)

Stuart Naft, industrial design manager at Applica Consumer Products Inc., noted that “appliances should be designed to accommodate a range of limitations, including lack of mobility or reduced vision. As a result, manufacturers can appeal to a broad market.” Controls should be easily read and understood, easy to turn, with larger knobs, and designs should communicate major functions, rather than secondary functions” (Jones, 2001).

Company History

In June, 1998, Windmere-Durable Holdings, Inc. acquired Black & Decker’s Household Products division, tripling its size and making it the #1 US maker of toaster ovens, can openers, and steamers. The company changed its name to Applica, Inc. in May, 2000.

Applica Consumer Products operated the U.S. distribution, marketing, and sales for Applica Inc. A large part of Applica’s business comes from small household appliances sold under the brand names of Black and Decker, Windmere, and Littermaid. Applica also markets small appliances and tools to the salon industry.

From Twistmaster to LidsOff

In 1998, Black & Decker approached Yale University with an offer to fund student design projects, based on B&D's internally generated ideas for new household products. In return, Yale would assign intellectual property rights for promising inventions to B&D. Yale University accepted the offer and encouraged student design teams to participate.

In 1999, a Yale student named Jen Davis chose the B&D design topic of an automatic jar opener. The completed "Twistmaster" worked well enough for her to submit the prototype device to the BF Goodrich Collegiate Inventors Competition and win.



LidsOff makes jar opening a one-hand operation. The prototype was designed to be accessible to people of all dexterity and strength levels, and to work with a wide range of jar and lid sizes. The general population - especially women - constituted the primary market because of difficulty in opening jars, particularly lids on vacuum-sealed jars. Secondary markets included the elderly, people with physical disabilities and children. Black & Decker acquired ownership of the Twistmaster in late 1999.

Rehabilitation Engineering Center Provides a Market Research Boost

By the time LidsOff was released in 2003, Applica had already demonstrated its interest in customers of all ages and abilities with the release of its Ergo and Gizmo small kitchen appliances. During the same period, The Rehabilitation Engineering Research Center on Technology Transfer (T2RERC) at the University of Buffalo had followed Jen Davis's development of the Twistmaster.

Through the sponsorship of the National Institute on Disability and Rehabilitation Research, T2RERC's mission is to facilitate the introduction of new products and technologies into the marketplace benefiting persons with disabilities.

The T2RERC staff saw Davis's Twistmaster described in an announcement of the BF Goodrich Collegiate Inventors Competition Award winners in early 2000 and offered help to B&D in bringing the idea to market, or reach out to other manufacturers if B&D did not wish to pursue it internally. Black & Decker confirmed their interest in the prototype but had several reservations about its functionality and marketability.

Through market research that included analysis of potential competitive products and a panel of consumers with a variety of functional abilities, the T2RERC concluded that the device had substantial commercial potential, given its ability to open a variety of jars with little effort from users. There were no existing products that both gripped the jar and twisted the lid, and those features received an overwhelmingly positive response from consumer panels.

Jim Leahy, Project Manager of the T2RERC stated, "Applica Consumer Products, Inc. encouraged consumers to evaluate initial concept models and to identify both the functional and design features that the ideal automated jar opener should have from the consumer point of view. In effect, these consumers were performing a type of 'consumer engineering' that would ultimately lead to the finished product."

Continued Development by B&D

Black and Decker felt that the T2RERC's approach offered a new perspective to their own internal primary market research on need, identified price points and estimated purchase intent. In October 2000, Black & Decker announced their decision to establish an internal design and development team for the product. They started the design process from scratch rather than building off of existing prototypes, to avoid constraining the design team. Over the next several months, they mocked-up several different models, each representing a different approach to opening jars.

In October 2001, B&D sent their revised model back to the T2RERC for Beta focus group evaluation. The Beta groups each involved seventeen potential consumers, consisting of a mix of the general population, elders, and people with disabilities. This group evaluated three product models, each representing a different approach to incorporating the features and functions.

Black and Decker selected their final product version based on consumer feedback from the Beta focus groups. The production version received approval in the Spring 2002, and LidsOff was introduced the following year.



The Finished Product

Packaging foods in jars offers advantages of assured freshness and resealability. But the difficulties of opening them have forced consumers to resort to rubber grips, dish towels, running under hot water, using scissors or knives, and banging on the counter.

Black & Decker's LidsOff was designed to open a wide multitude of jar lids - from larger lids found on pickle jars to small baby food jar lids. LidsOff is about the size of a standard countertop coffee maker. It utilizes a motor driven gear system and a lid-engaging unit that adjusts to the height and diameter of the jar lid to break the vacuum seal on a jar and unscrew the jar lid. It accommodates most standard sized jars measuring from four-and-a-half inches in diameter to eight inches in height.

As David Arnott, Marketing Director for Black & Decker®'s Kitchen Brand noted, the design requires minimal effort to open jars for all consumers ".whether you're young or a bit older, struggling from hand ailments or just struggling to escape the otherwise monotonous task of opening jars..."

Strong Promotion and Customer Response

An integrated marketing communications program was established beginning the second quarter of 2003. This program included direct response print and television advertising, public relations and web site support. Shelf displays were created for retail support. The projected advertising cost was estimated at \$1.5 million.

LidsOff was officially launched at the product show "Christmas in June" in New York City and went on sale through major retailers including Wal Mart and Target. The marketing program was successful enough that LidsOff was sold out well before Christmas, 2003. By January, 2004, the product was backordered by 50,000 units.

A Unique Application of Consumer Research, Design, and Education

Originally conceived as an aid to people with disabilities, LidsOff became a commercial product through determination that it would not only fulfill this role but also be useful and appealing to customers of all ages and abilities. Throughout the process, the B&D internal design team used the T2RERC as a complimentary resource rather than as a competing source of expertise and recognized the value of the RERC's consumer groups' input. Building on the success of the LidsOff collaboration, Applica and the T2RERC have begun working together on development of a digital toaster oven. The development of LidsOff, from Jen Davis's student project in 1998 to its commercial debut in 2003 illustrates a unique cooperation between design education, rehabilitation research, and commercial product design and manufacture.

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Nokia Helps Lead IT Industry to Customers with Disabilities

Nokia Corporation
Finland
www.nokiaaccessibility.com

Background

“Many of our phones and accessories already make functions easier, even though they were not developed directly for disabled consumers. We’re taking that one-step further and designing specifically with accessibility in mind”, said David J. Dzumba, Director of Industry Solutions for Nokia Corporation.

Nokia is a leading supplier of mobile, fixed and IP telecommunication networks including related customer services. Nokia also supplies solutions and products for fixed and wireless datacom, as well as multimedia and computer monitors. In 2000, Nokia’s net sales totaled \$27.0 billion. Headquartered in Finland, Nokia is listed on five European Stock Exchanges and on the New York Stock Exchange (NOK.A), has sales in over 130 countries and employs more than 60,000 people worldwide. Nokia maintains production facilities in 10 countries, as well as research and development facilities in 15 countries.

U.S. Government Mandates Accessibility

Nokia’s good intentions were reinforced by federal requirements of all manufacturers. Section 255 of The Telecommunications Act of 1996 required that all manufacturers of customer telecommunications products including cellular phones be usable by people with disabilities. “At first, we viewed this as a legislative requirement, said David Dzumba, “But as we got more involved and realized the impact we could have, it became a mission.”

In 1998, the potential impact became even greater. That year, Section 508 of the Rehabilitation Act Amendments was passed, adopting the Section 255 requirements in guidelines for procurement of information technology by all federal agencies. As a \$37 billion per year customer, the federal government effectively mandated universal design not only for telecommunications equipment, but for all electronic technologies. Section 508 took effect on June 21, 2001.

Challenges for Nokia Managers and Employees

Nokia established an internal Accessibility Solutions steering committee under David Dzumba. One of the first products of this committee was an in-house manual, “Meeting the Needs of a Global Marketplace”, to acquaint employees with its approach. “We took a grassroots approach, Dzumba says. “We said, “This is what we’re going to do, this is how we’re going to do it, and this is why””.



Nokia Accessibility Solutions leaders

Nokia Accessibility Solutions leaders David Dzumba and Michaela Tucker-Kinney

Dzumba, who holds a Master's degree in engineering telecommunications, admits to the appeal of design for customers with disabilities. "It's a chance to do a little bit of everything - product design, marketing and public relations, and interaction with legal and legislative affairs, not to mention the chance to work with a variety of organizations and advocacy groups. There's never a dull moment". Olli Kallasvuo, Corporate Executive Vice President - Nokia Americas, adds that accessibility is a clear direction for future Nokia products. "Every Nokia employee is in a position to have a positive impact on this initiative. We have the skills, talent, and resources to design new solutions for accessibility while developing this market," Kallasvuo says. "We are committed to continuing these efforts."

Accommodating Customers with Disabilities

Nokia is committed to pursuing accessibility solutions for all people, including individuals with disabilities," says the company's website. As an example, the Nokia LPS-1 and LPS-3 Loopsets allow people with hearing aids to use digital mobile phones without the typical buzz/hum interference. First launched in Europe in April 1998 and later in the US, the Loopset was designed by senior Nokia engineer Mikko Haho, hard of hearing since birth.



Nokia Loopset - Photo of senior engineer Mikko Haho, wearing a Nokia Loopset around his neck, connected to a Nokia cell phone, which Haho holds in his right hand.

Senior engineer Mikko Haho with Nokia Loopset and cell phone

Each Loopset has a built-in microphone for hands-free operation and is compatible with a variety of Nokia wireless phones. It uses induction technology to transmit the sound from the mobile phone directly to a person's hearing aid. It is available from Nokia dealers and Nokia itself.

Nokia mobile phones have other accessories to improve access for customers with a variety of disabilities - headsets, wheelchair holders, recharging stands, and vibrating batteries for hard of hearing users.

The Nokia Data Suite, meanwhile, allows hearing-impaired users to use text-based functionality (SMS/Internet/E-mail/fax) with a laptop and GSM phones. Nokia also provides wireless internet access with the Nokia Communicator.

Then there are various operating features. One-touch dialing provides instant access for checking messages and, more importantly, emergency situations such as calling 911. Easy-to-use interface and menus are smartly designed to "know" what you're thinking. Large screen displays with help menus make seeing and understanding the display simpler. Tactile feedback lets you know each time a key has been pressed, and adjustable ringing tones to accommodate various levels of frequency sensitivity. Nokia phones are also compatible with TTYs.

Nokia invites requests for user manuals in alternate formats, including Braille, large print, cassette tape, and text-only versions on disk through its Customer Care Center at 888-665-4228 (voice) or 800-246-6542 (TTY).

Industry Recognition

One reason for Nokia's market success leadership might be the company's willingness to appeal to all potential customers, regardless of ability. In recognition for their efforts toward communication accessibility, Nokia has been recognized by Wireless Week, The Los Angeles Times, and Mobile Phone News. In January, 1999, Nokia was named a "Next Generation" company for employment of people with disabilities by the editors of WE Magazine.

On June 30, 1999, Nokia received the Access Innovation Award from the Association of Access Engineering Specialists (AAES) for the Nokia LPS-1 Loopset. The award, which recognizes innovations and advancement in access technology, was presented during the Rehabilitation Engineering and Assistive Technology Society of North America (RESNA) annual conference in Long Beach, CA.

Planning Ahead

Nokia is far from finished with the efforts of its internal Accessibility Solutions steering committee. The company continues to conduct independent research and surveys, holding focus groups and developing training manuals and engineering guides for future product design and production. David Dzumba says, "We are determined to make the wireless future accessible to everyone. We believe we are far ahead in terms of awareness and product development", he says, "But there is still so much to be done."

Teaming with Assistive Technology

On August 16, 2001, Nokia announced a cooperative arrangement with assistive technology producer Prentke Romich Company to demonstrate Pathfinder compatibility with the Nokia 8290 mobile phone.

Pathfinder is a powerful communications tool equipped with a color touch screen, a static keyboard, and a built in dictionary that enables people, who are otherwise unable to speak, to build and synthesize sentences.

The cooperation between PRC and Nokia results in a solution that enables people using Pathfinder to make phone calls using an "off-the-shelf" cellular phone such as the Nokia 8290 wireless phone. By pressing a combination of keys that are synthesized into speech, Pathfinder controls the Nokia 8290 mobile phone via an infrared link, allowing Pathfinder to dial a number as well as to place and terminate a phone call. The system converts the Nokia 8290 to a hands-free phone by using a microphone to transmit synthesized speech and a separate speaker used for broadcasting the voice, or other sounds, being sent by the other party on the line.

"Nokia continues to deliver on its strong commitment to improving communication for all of its customers by working with Prentke Romich Company allowing us to provide even more advanced functionality." said Maini Williams, Research and Technology Access Unit Manager at Nokia.

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August, 2001

Oxo International Becomes a Universal Design Icon

World Kitchen, Inc.
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www.worldkitchen.com

Oxo History

In 1960, Sam Farber founded the successful kitchenware maker Copco, Inc. Before this, he had worked for 11 years for his father Louis, who owned Sheffield Silver. Farber's uncle Simon had founded Farberware in 1900. After 39 years in the kitchenware business himself, Sam Farber retired in 1988 at age 66. With all those years of experience, it wasn't until retirement that Farber realized the impact of his family's business on people with disabilities.



Copco Chopping Bowl

Previously, Copco had actually marketed several products useful for people with disabilities. Copco's bowl-shaped chopping block with rocker knife and large loop and knob handles on pots and lids were favored by many people with manual limitations. Curiously, little marketing advantage was ever taken of these products' attributes. Despite so many years of experience in the kitchenware business, Farber's ideas of inclusion of elderly and disabled customers were not brought into focus until his personal experiences brought the importance of the idea home.

Shortly after retirement, Sam and his wife, Betsey, rented a home in Provence, France for two months. Betsey had developed arthritis and the available kitchenware at their rented home was difficult and painful for her to use. The more cooking they did together, the more inadequate the utensils seemed. Betsey's knitting hobby only added to her discomfort.

For years, kitchen tools such as vegetable peelers were designed to be manufactured in the easiest, least expensive way. They were better than paring knives, but only just. Betsey's discomfort forced Sam to wonder, "Why can't there be wonderfully comfortable tools that are easy to use?"



Sam and Betsey Farber

In 1989, Sam Farber decided to unretire and establish Oxo International to produce kitchenware with older and disabled users in mind. Farber chose the name because it could be read horizontally, vertically, or upside down. The Farbers' son, John, took a leave of absence from his position as a vice president at Prudential Bache to help set up the business's finances.

Designers Lend a Hand

Well-known transgenerational designer Patricia Moore was consulted for advice, along with Smart Design, Inc., with whom Farber had worked before. In exchange for a small advance and a 3% royalty, Smart Design waived the usual fees to design the product line, Oxo Good Grips, which generated immediate demand at the debut at a San Francisco show in April, 1990.

The design incorporated plump, resilient handles for twist and push-pull tools like knives and peelers, while squeeze tools like can openers had hard handles. All handles were oval in cross section, to better distribute forces on the hand and enhance grip, even for wet hands. The measuring cups and spoons featured large, high-contrast markings for visibility.

In 1994, another line, Good Grips Sierra Club Garden Tools, began reaching the market. Next came a line of barbecue tools. Ideas for new products came from looking at common everyday products and finding ways to make them better.

By 1999, the Oxo product line had grown to 350, with the Swivel Peeler, one of the original 15 products, leading sales. Four lines were being produced for specialty stores such as Bed Bath and Beyond, Bloomingdale's, Crate

& Barrel, Linens N' Things, and Lechters, department stores such as Kmart ("Touchables" line), Target ("Soft Works"), and Wal-Mart ("Sensables"), as well as through mail-order catalogs.

Design Recognition

Since its debut, the Good Grips line has won worldwide acclaim, including awards from the Arthritis Foundation, Design Zentrum in Germany, Good Housekeeping, Metropolitan Home, and nearly-annual IDEA awards from the Industrial Designers Society of America. Good Grips have been selected for permanent collections at the Chicago Athenaeum, Cooper-Hewitt National Museum of Design, and the Museum of Modern Art. The products enjoy so much media attention that an advertising budget has been all but unnecessary.



Award-Winning Soap Pump Palm Brush (above) and Salad Spinner (below)



Consumer and Competitive Response

Pedrini, Farberware, and other kitchenware producers have followed Oxo's success with similar large-handled utensil designs. To counter competition in the lower price ranges, Oxo has established its own lower-priced line known as Good Grip Basics.

The Farber's Retire, Again

In 1992, the Farber's sold Oxo International to General Housewares Corporation and retired again in the fall of 1995. Sam hand-picked Alex Lee to join the company as Director of Product Development and later, its president. At 39, Lee brought with him a drive "to design easy-to-use products for the largest spectrum of the population, from healthy 20-year-olds on up."



Still popular: Oxo's Vegetable Peeler

Both Sam and Betsey Farber continued to travel and promote the concept of Universal Design. They appeared as keynote speakers at "Design for the 21st Century", a global conference on Universal Design on June 16, 2000 in Providence, RI, and discussed the background and development of Oxo International and its "Good Grips" line of products.

Oxo's Ongoing Challenge

In 1999, World Kitchen (formerly Corning Consumer Products, makers of Corelle, Corningware, and Pyrex) purchased General Housewares, along with EKCO Group, and adopted the World Kitchen name early in 2000. By 2000, Oxo International enjoyed an annual growth rate of 37%, with about \$60 million in annual sales. With little spent on advertising, the inviting design and high quality of Oxo's products made them the subjects of numerous print features and TV news shows.

Despite its status as a major (if not the foremost) standard bearer for Universal Design, Oxo must constantly reiterate its mission. President Alex Lee notes, "The idea was always, from the start, to make useful products for people of all ages and levels of dexterity." Still, Lee says, people sometimes think of Oxo as making, geriatric products for people with limitations." By continuing to rethink and redesign everyday tools, Oxo is a constant reminder of the common needs faced by people of all ages and abilities and the importance of Universal Design in meeting those needs.

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December, 2000

Philips' Interactive Healthcare Services: Putting the Patient in Charge

Royal Philips Electronics
Amsterdam
The Netherlands
www.philips.com

Company Background

The year 2001 was one of transformation for Philips generally and, in particular, for Philips in the United States. During the year Philips completed a \$5 billion, three-year acquisition program for Philips Medical Systems with the purchase of Agilent's Healthcare Solutions Group, ADAC Laboratories, ATL Ultrasound and Marconi Medical Systems. The result was a new Philips Medical Systems, the global number two player in medical diagnostic imaging equipment.

Prior to its acquisition by Philips, Agilent's Healthcare Solutions Group was a worldwide leader in clinical measurement and diagnostic solutions for the healthcare industry. The group had 4,500 employees and had revenues of more than \$1.5 billion in its 1999 fiscal year. Key products included: diagnostic cardiology, patient monitoring, ultrasound imaging, automatic external defibrillators, point of care diagnostic systems, related supplies, professional services and support. Agilent held leading market share worldwide in patient monitoring, cardiovascular ultrasound imaging and for critical-care information-management systems. Agilent's Healthcare Solutions Group was acquired by Royal Philips Electronics of Amsterdam, Netherlands, on August 1, 2001.

In the United States, Philips Medical is the second largest medical equipment imaging company (behind General Electric) and the single largest Philips business, with 10,500 employees. Royal Philips Electronics of the Netherlands is one of the world's biggest electronics companies and Europe's largest, with sales of EUR 37.9 billion in 2000. It is a global leader in color television sets, lighting, electric shavers, medical diagnostic imaging and patient monitoring, and one-chip TV products.

Managing Health Care At Home

"Congestive heart failure is the leading cause of hospital admissions for Americans over 65. Home-based technologies for self-management of this disease have become an effective approach to reducing unnecessary admissions and for enabling patients to take an active part in their own medical care". (Rich, 1999)



“Having this system in my house has changed my life because it’s given me more independence. It gives me more satisfaction in knowing that I’m doing alright and I don’t have to wait for somebody else to tell me that.” --Thomas Danna, patient

Growing Use of Telemedicine

Increasing costs of institutional care, restrictions on inpatient care by managed-care organizations, and the desire to “age in place” by individuals with medical conditions requiring regular medical monitoring, are driving the development of telemedicine products and services. Building on the success of home diagnostic tests such as those for pregnancy and glucose levels, technologies for managing chronic disabilities are developing rapidly. Home kidney dialysis and cardiac pacemaker monitoring are two of the procedures which previously required in-patient professional care but are increasingly done in the home, with minimal professional supervision.

Telemedicine began in the 1960’s with the use of ordinary telephone and wire communications by physicians who were physically remote from their patients. Since then high-speed data lines, advanced data compression technologies, and computerization of patient records have made telemedicine a much more powerful clinical tool.

As home health care and telecommunication technologies have continued to improve, patients have become increasingly involved in managing their own health care. At the same time, chronic conditions requiring regular monitoring are increasingly common among the growing elderly population. Congestive heart failure is among the most common of these conditions, requiring regular monitoring of blood pressure, weight, and heart rhythm.

Development of Interactive Healthcare Services

Philips’ Interactive Healthcare Services is among the first to employ telecommunications technology for remote monitoring of patients’ vital signs. Using portable, battery-operated measurement units which operate automatically or with a single push of a button, patients take their vital signs daily. The portable units transmit the data and the time by radio frequency automatically to the home telecommunications “hub”. The hub then transmits the data, using ordinary phone lines, to a comprehensive patient database accessible to the health care provider.

Industrial designer Gil Lemke joined Agilent’s Healthcare Solutions Group in 1999 specifically to develop the home technology for patients to monitor their blood pressure, weight, and heart rhythm. Lemke’s responsibilities included the ergonomics, industrial design, and mechanical engineering of the product.

Lemke's design drew from the experiences of his mother in law who had congestive heart failure, diabetes, arthritis, and high blood pressure. Originally, he had considered modification of a bathroom scale, but decided this would not be adequate. For one thing, his mother needed something to hold onto for balance, making accurate readings difficult. He wondered how many other potential users shared this need, as well as limitations of hearing or vision. At the same time, he was sensitive to seniors' preference for uncomplicated set-up, control, and maintenance. "The last thing they need is to have to go to a manual the size of a phone book", Lemke says.

After some initial research into mobility devices used by persons with disabilities, Lemke developed some concept sketches and crude aluminum-pipe mockups. One of the design challenges was to develop a design that could accommodate a wide variety of user sizes and abilities, yet be small enough for use in small apartments or mobile homes.

Lemke, along with a team of engineers and marketing staff, field-tested the first prototype among residents of small nursing homes and heart clinic patients. This first prototype was dubbed "Easy Rider" because it looked like the handlebars from a motorcycle, with controls as simple as possible. Lemke relates that users were unanimous in their approval of the design. The team continued with durability testing, including suspending 100-lb weights from the column handles, without any twisting or breaks in the structure.



Philips' in-home measurement and communication device

A large digital display makes reading easier with limited vision or under poor lighting. Battery power and RF data transmission was used to reduce the risk of tripping over power and data cables. The "Easy Rider" model was submitted to the 2000 American Society on Aging's Universal Design Competition, where it won an award for its innovative technology and simple design. It also won an IDSA Medical Design Excellence Award in 2000.

Market and technical testing has not been rigorously scientific to date, but rather designed to yield practical direction toward further development of the concept. The design has purposely remained simple, to make the product

easy to use and non-imposing to patients. Patients have responded favorably to the product, which have proven to be durable and reliable. Some have even refused to return the units, after their conditions have become better controlled.

Heart Patient Users

“It’s like an electronic house call. The patient gets attention. The provider gets information. And we maintain control of that information -- that’s essential.”

--Dr. Allen Hinkle, Senior vice president and chief medical officer
Anthem Blue Cross and Blue Shield
of New Hampshire

An important issue in the use of patient-operated technologies is diligence and accuracy. Patients with congestive heart failure must diligently monitor their weight. These patients, who may also be obese, are less inclined to weigh themselves regularly, much less report weight gains. Even minor weight gains may signal retention of fluids, which must be addressed promptly. It is not unusual for CHF patients to wait until they feel very sick before scheduling an office visit. At this point, it may be too late to avoid hospitalization.

Similarly, training in the use of these technologies is critical to effective monitoring. Usability of home health care technologies is paramount. If patients are not both willing and able to use it effectively, the results can be worse than no monitoring at all, since clinician, patient, or both may be misled into believing that signs are normal when they are not.

The benefits of effective monitoring go beyond the blood pressure, pulse, and heart rhythm data transmitted. The time stamp on recorded data also provides the clinician insight into other potential health issues. For example, if the data shows the patient took his blood pressure at 3:00 AM, the clinician can follow up on potential sleep problems.

Interactive Healthcare Services at Philips

Because of the growing need, the compelling business case, and the company’s history of contributions to health care development, Philips Medical Systems decided to take a leading role in the development of telemedicine products and services, says Dan Barton, Director of Marketing for E-Care Services for Philips Medical Systems. Philips acquired Agilent’s Healthcare Solutions Group on August 1, 2001. Barton estimated that over 5000 patients would be enrolled in Philips’ Interactive Healthcare Services across the U.S. by the end of 2002.

In addition to reducing unnecessary hospital admissions, the system facilitates prompt and appropriate response by the clinician. Philips’ Interactive Healthcare Service system includes thorough clinician training and tracking software to monitor daily patient measurements, store and retrieve historical data, and generate reports. Patient measurements which fall outside preset limits can be flagged for immediate follow-up by the health care provider.

According to a Philips press release, “By engaging patients as active participants in their own care and providing physicians and nurse case managers with daily access to timely, accurate, and relevant patient data, the Interactive Healthcare Services strives to improve the management of heart failure disease. Patients receive a set of portable, easy-to-use devices that measure and transmit vital signs from their home to their healthcare provider’s computer. The devices include a scale, a blood pressure unit, heart rhythm strip recorder, and a unit to transmit

the data using the patient's phone line. In a user study, patients using the system had a hospital readmission rate of 0.13 visits a year, compared with an average of 1.5 for patients not using the service."

Managing Medical Costs Through Telemedicine

We've seen firsthand that we can reduce admissions <ETH> and it's a sound business decision to invest in services that help lower cost and improve care."

--John W. Polanowicz, Vice President of Operations
University of Massachusetts Memorial Medical Center
(Agilent Technologies, 2002)

The cost-effectiveness of telemedicine technologies is just beginning to reshape the healthcare industry. Medicaid traditionally does not pay for less expensive alternatives to nursing homes, including in-home and community based care. That is starting to change with Medicaid waiver programs that help elders remain in their homes with assistance from visiting nurses and homemaker aides. For example, through South Florida's "Channeling" program, one of the state's first waiver programs in 1986, home health care costs about \$26 per day, while institutional care would cost at least 5 times that much.

At the same time, home health care visits to monitor weight, pulse, blood pressure, and heart rhythm (ECG) are also expensive. For patients with congestive heart failure, clinicians must be aware of even slight weight gains, which don't often occur in sync with regular office visits. Regular trips to the doctor can be difficult and expensive for patients with mobility and transportation difficulties. Some visits cost as much as \$500, including accessible van transportation services. For these reasons, insurance and managed care companies place limits on office and home healthcare visits. (Baker, 2001)

State and Federal Initiatives

Some 20 states have begun conducting projects to explore the effectiveness of telemedicine. The Veterans Administration is testing the concept through programs in Connecticut, Florida, Georgia, Maryland, and Texas (Baker, 2001).

The federal government is also taking an active part in studying the effectiveness of home healthcare technologies and services. Rehabilitation Engineering Research Centers (RERC's) on telemedicine at Catholic University in Washington, D.C., and The Shepherd Center in Atlanta, GA, are funded by the National Institute on Disability and Rehabilitation Research (NIDRR).

Many federal agencies, including the Department of Defense, Food and Drug Administration, National Library of Medicine, and the Public Health Service are taking an active role in development and regulation of telemedicine and other home health care technologies.

Today and Tomorrow

Home health care technologies such as blood pressure monitors, glucometers, and fetal monitors have given patients more information and more responsibility for their own care. The advent of telemedicine has added a new dimension of interaction between the health care provider and the patient. As a result, patients today have unprecedented access to medical information, and more and more (especially aging baby boomers) are taking advantage of it to become directly involved in their own health care.

Philips' Dan Barton sees Interactive Healthcare Services as part of this healthy movement toward healthcare that is both patient-centered and cost-effective. "This is a new approach, and payers are very risk-averse. But with the average hospitalization of a heart failure patient costing \$5-10,000, technologies that can help avoid the need for re-admissions quickly pay for themselves", Barton observes.

In the future, Barton foresees changes not only in clinical service delivery and payment systems, but also in smarter and less-intrusive technology. Technological advances and sensitivity to patient ergonomics will help to make these technologies increasingly reliable and accurate. An example of this sensitivity to user needs is Philips' HomeLab, a house designed to enable people to test technologies of tomorrow in a realistic setting over extended periods of time. Opened in April, 2002, HomeLab features a range of prototype technologies that are sensitive, personalized, adaptive and responsive to people. Among these experimental technologies is a bathroom mirror with biofeedback sensors (Newstream, 2002).

Tomorrow's elders, patients who have grown up with technology, are sure to be more receptive and demanding of health care technology. As these and other telemedicine technologies increase patients' abilities to actively participate in their own care, clinicians will find themselves adjusting to far more proactive customers - perhaps even the word "patient" will have to be changed.

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