



Cybox Trazer: a trailblazing technology measures and trains movement

Interactive virtual reality enters the realm of older adult fitness through this new offering from Cybox

This is the second article in a series of 6 profiling the recipients of the 2005 ICAA Industry Innovators Awards. Presented by the International Council on Active Aging® and sponsored by SportsArt Fitness, these awards honor excellence and creativity in the health and wellness field, and recognize organizations that have created cutting-edge active aging programs. In 2005, the awards program expanded to include the Industry Equipment Innovator category.

In 2005, the International Council on Active Aging® set out to select North America's most innovative new fitness equipment for active older adults—a challenging task, given the many worthy products on the market. In the end, the organization recognized the fun and functional Cybox Trazer® as the first-ever ICAA Industry Equipment Innovator.

Through its combination of interactive virtual reality and tracking technologies, Trazer motivates and measures such basic movement skills as balance and agility in individuals of almost any age and capability. This equipment couples visual and auditory cues with immediate biofeedback to create a true mind/body experience for users.

In addition to Trazer, Cybox offers many more products that are suitable for active older adults. These products were designed with features informed by the company's long and illustrious history in sports medicine and rehabilitation.

Founded in 1970, Cybox focused in its early years on designing specialized products to train or rebuild strength, muscular quickness and endurance—primarily for rehab patients, but also for

elite athletes. “We had to make these products adaptable and safe for tremendously varied populations with a wide range of physical limitations,” says Ray Giannelli, Cybox International's senior vice president of research and development. “A large number of these products are still in use today,” adds Giannelli, also senior VP of marketing.

In the years that followed, Cybox became the official sports medicine and rehabilitation equipment provider for the NFL, NBA, NHL, USTA, and the US Olympic Committee, as well as many other sports organizations. But customers also included the majority of America's leading hospitals, and private sports medicine and rehabilitation clinics.

Cybox developed products and programs used in the rehabilitation of older adults starting in the mid-1970s. “It was the interests and successes of our customers at facilities like the NYU Medical Center, Mass General, the Cleveland Clinic and VA Hospitals that originally got our attention,” recalls Andy Glass, a founder of the original Cybox company. “We actively supported a number of studies pertaining to factors affecting independence and quality of life in older individuals.”

Eager to apply to the expanding health club market what it had learned serving the medical and exercise science research markets, Cybox introduced its first Eagle strength-training line in 1984. The health and fitness markets have been the company's major focus ever since.

In addition to 150 specialized strength-training products, Cybox International now manufactures and markets high-end treadmills, award-winning cross-trainers, cycle ergometers, and the new Cybox Trazer. To find out more about Trazer, the *Journal on Active Aging*®

asked Andy Glass, now chief executive officer of Trazer Technologies Inc., and Ray Giannelli to tell us about this new Cybex offering and its benefits for older adults.

JAA: *What is the Cybex Trazer? And what was the catalyst for its creation?*

AG: Trazer technology is truly a new category of health and fitness product, from both a performance testing and training standpoint. Trazer can be likened to a flight simulator for exercise. It's a kind of high-tech video game that tracks body movement to use your real-world reaction time, quickness, agility, speed, power, dynamic balance and stability to drive the on-screen action in a virtual world. The catalyst for Trazer's creation was the desire to provide the missing link in fitness and rehabilitation programming—a means for connecting strength training and aerobic conditioning to the functional training requirements of work, leisure and sports activities.

JAA: *How did Cybex develop this product?*

AG: Cybex acquired the worldwide manufacturing and marketing rights from Trazer Technologies a few years after we developed and patented the original Trazer systems. As inventors and developers, we had broad visions of what might be possible if human movement could be accurately tracked and reliably displayed in 3 dimensions.

As the technology took shape and beta users reported their experiences, it became clear that our broad visions could become a reality. First of all, this thing was *fun!* Kids loved it. Athletes loved it. Patients of all ages complied better with rehab programs, then wanted to continue using Trazer to keep improving their performance after



The Cybex Trazer

medical discharge. Top sports performance experts like Mark Verstegen and Dr. Michael Voight immediately saw valuable applications, as did leading trainers, coaches and physical educators.

To achieve the apparent potential of the technology, we realized that we would need a partner with a solid technology background, large-scale manufacturing infrastructure, and worldwide sales, distribution and service capabilities—and equally importantly, a shared vision of the future of health and fitness. The Trazer Tech management team felt that Cybex International met these requirements. Cybex has since reengineered Trazer and commercial sales began last September.

JAA: *How does Trazer work?*

AG: Without getting too technically detailed, Trazer uses stereo optoelectronic position sensors to track movement of a small beacon that you wear on a belt placed at about your body center of gravity. The Trazer simulator core takes position measurements in 3 dimensions 250 times per second and combines these time-stamped position samples with time-stamped cue data. (*Cues* are what we call the on-screen visuals created by the Trazer *game engine*.) The body position samples are used to move an avatar [graphical representation] in the virtual world, so that it can interact with virtual targets and objects, and compete against virtual opponents essentially in real-time with real-time game scores. That avatar is you—energized by your reactions and movement capabilities. The beacon also serves to telemeter your heart rate to the simulator core anytime a compatible heart rate strap is worn. After an activity is completed, the Trazer CPU calculates and reports performance.

JAA: *What training and programming options are available with Trazer? And how can health and wellness professionals tailor these options to their older clients?*

AG: Trazer bridges the gap between what you do to strengthen the core and the extremities and build cardiovascular endurance, and what you need to do to translate this training into real-world functional and sports capabilities. Trazer has 23 individual testing, training and game activities, and there are many more to come. The duration, repetitions, rest periods, movement directions and distances, power and skill requirements, and even heart rate control of each activity can be almost infinitely customized to match the rehabilitation, fitness or sports-performance training goals, and the

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current physical limitations, of almost any client. These activities can be combined in sequences to create individualized, automated programs with diverse challenges of almost any length and intensity. These programs can be stored in each client's personal database.



Cybex Trazer combines interactive virtual reality and tracking technologies to motivate and measure movement skills.



JAA: Which abilities does Trazer measure and track? How can health and wellness professionals use this product feature to their clients' benefit?

AG: Trazer measures reaction time, acceleration and deceleration, movement speed and power, jump height and center of gravity control. These are the key elements of agility and physical functionality that were previously almost impossible to quantify. Trazer also tracks heart rate and caloric expenditure, and provides

overall measurements that can be used to gauge movement efficiency and cardiovascular response in realistic functional simulations. Future protocols will measure and train both static and dynamic balance.

We often use the old adage, "You can't manage what you can't measure." Trazer allows you to objectively assess each client, determine where specific strengths and weaknesses lie, design programs targeting these weaknesses, track progress to modify and optimize programs based on session-to-session results, and document program effectiveness. Results from every activity can be automatically stored in an easily portable database, so that performance analyses and progress reports can be generated from any PC.

Customers tell us that clients are continuously motivated "by the numbers," and that the numbers are great sales and member retention tools as well.

JAA: How does Trazer improve the physical well-being, function and performance of age 50-plus adults?

AG: Examples of this would fill a book, but let's cover just one in detail. Reaction time is a measure of your ability to perceive, interpret, and develop and initiate appropriate neuromuscular action to correctly respond to a change in your environment. A recently completed long-term study from the University of Edinburgh found that slow reaction time—a factor previously associated with other cognitive issues—was responsible for earlier death. A Cleveland Clinic study showed that reaction time had a higher correlation to falls than other performance factors. Reaction time, of course, is a prime performance factor that you can both measure and train with Trazer, and that is particularly relevant to aging.

Speaking generally, what could be more specific to the needs of older adults than functional, weight-bearing movement—the ability to safely and efficiently navigate your environment, whether it's a busy factory or office, a golf course, a mountain path or your kitchen? Trazer has been shown to dramatically improve the movement skills of people from 8 to 80.

We are also particularly excited about Mind and Body games that we are developing to combine cognitive challenges with movement. Recent research from both Japan and Sweden indicates that this kind of activity may be a powerful weapon against age-related mental decline, and may even slow the progression of Alzheimer's disease. These games will bring a whole new kind of fun, interest and benefit to fitness activities.

JAA: Is there any research that validates Trazer's effectiveness?

AG: A few studies have been completed and a number are ongoing or in development. A study performed at Belmont University documented Trazer's movement tracking accuracy by comparison to a 6-camera laboratory motion-analysis system. A University of Tennessee study showed that a Trazer program hastened recovery and improved outcomes following surgical repair of the anterior cruciate ligament in the knee. There are also many case histories from Trazer clinical users showing success with virtually every kind of problem affecting older adults.

JAA: How have aging Baby Boomers and/or older adults responded to Trazer so far?

AG: An excellent example is the Worcester, Massachusetts YMCA *Girls on the Go* program for ages 9–13. Trazer was so successful and helped generate so

much interest in this program that the YMCA modified the activities and measurements to offer a similar program to older adults. This program is getting a tremendous response.

Two themes we hear consistently repeated by both clinicians and trainers are *motivation* and *confidence*. Trazer is fun—clients look forward even to intense program activities. And, Trazer quickly improves functional performance in a very tangible way—clients feel that they are quicker, faster and more stable on their feet.

JAA: *Where does Trazer fit into Cybex's overall efforts to provide age-friendly exercise equipment?*

RG: Cybex's R&D and design emphasis produce features that are particularly important for safe, comfortable and effective exercise for older adults. This is a core philosophy that you will continue to see in every new Cybex product. Trazer is unique in that it enables completely new applications and capabilities. We see ways that Cybex can help its customers combine Trazer with other products to create programs that better address the very individualized needs of older adults who want to do more than just maintain a healthy medical profile. These are the people who seek *improvements* in physical well-being, function and performance, and who expect to maintain these capabilities until very late in life.

JAA: *How is Trazer advancing the industry, in your view?*

AG: Trazer is the first practical application of interactive virtual reality for health and fitness. Trazer will greatly increase the emphasis on fun and motivation in fitness programming, and on functional training and documentation as well. It will fuel interest in interactive exercise and in

other computer-enabled fitness and performance training applications, and related service opportunities.

Of particular importance is the fact that Trazer's patented measurements can be used to objectively assess, track, guide and document the effectiveness of the total, integrated fitness or rehabilitation program. We see opportunities for fitness service providers to charge for results rather than for access, and to prove that what they do works over and above weight loss and other highly variable statistics.

JAA: *What does Cybex hope to accomplish in the long term by developing such technologically innovative products as Trazer?*

RG: Cybex International is committed to using technology to deliver function, performance and results to our customers and their clients in a market that will change dramatically in coming years. The needs and expectations of the age group that has grown the health and fitness business over the past 25 years are changing at an accelerating pace. The expectations and preferences of the younger generations that *should* represent the next wave of fitness service consumers are so different that virtually no one is seeing success with them—yet. Cybex believes that technology is the solution that will cut across the entire age spectrum. ☺

The Journal on Active Aging® thanks Andy Glass, of Trazer Technologies, and Ray Giannelli, of Cybex International, for their help with this article. To learn more about Cybex or the Cybex Trazer, visit www.cybexinternational.com.

To learn how to apply for the 2006 ICAA Industry Innovators Awards, please visit the ICAA website.

Photos courtesy of Cybex International

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