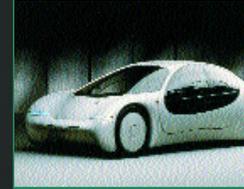
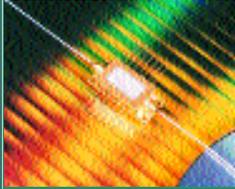


INTRODUCTION



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merica's strong support of world-class technologies has created a culture of innovation that will help our Nation remain competitive in the 21st century. We all can take pride in this support because innovation is key to producing technology breakthroughs that boost industrial and economic performance. However, we must also realize that such breakthroughs often have lengthy incubation periods; they can take years to mature into commercial products that become part of the fabric of everyday life. Some of today's most popular and useful technologies took more than a decade to go through the development process, mature, and find their markets, as shown in the table below.

HOW LONG DOES AN IDEA TAKE?			
ITEM	CONCEPT	COMMERCIALIZATION	TIME GAP
Transistor	1940	1950	10 Years
TV	1907	1936	29 Years
Helicopter	1904	1936	32 Years
Zipper	1891	1923	32 Years
Diesel Locomotive	1895	1934	39 Years
Radar	1887	1933	46 Years
Ball Point Pen	1888	1938	50 Years
Fluorescent Light	1852	1934	82 Years

MAKING BALLISTIC MISSILE DEFENSE A REALITY

The Ballistic Missile Defense Organization (BMDO) is working to provide active defenses against ballistic missile attacks and a technical base that will allow the Department of Defense to protect against increasingly sophisticated missiles around the world. These efforts are carried out through three broad program areas: theater missile defense, national missile defense, and technology readiness.

THEATER MISSILE DEFENSE

BMDO's theater missile defense (TMD) aims to protect U.S. forces, allies, and other countries from theater missile attacks. Three core TMD programs represent the bulk of BMDO's research, development, testing, and evaluation budget for fiscal year (FY) 1996.

- **PATRIOT¹ Advanced Capability-3.** The PATRIOT Advanced Capability-3 (PAC-3)—a hit-to-kill, single-stage interceptor—is designed to provide a missile defense for our troops and fixed assets as quickly as possible. It will help destroy short- and medium-range ballistic missiles and other threats in the atmosphere.

All PAC systems have four basic components; a radar set, an engagement control station, a launching station, and interceptors. Three increasingly sophisticated versions of PAC-3 will be built, with the final configuration projected to reach the field in 1999.

- **Navy Area Defense.** The U.S. Navy and BMDO have been working in partnership to develop a sea-based area defense capability that builds on the existing AEGIS²/Standard Missile air defense system. This system is based on AEGIS-class cruisers and destroyers, which already form the backbone of the U.S. fleet. AEGIS ships provide all elements of short- to medium-range missile defense and are particularly suited to protect forces moving inland from the sea.

A user operational evaluation system (UOES) will be developed in several phases. The UOES computer program will be completed in FY 1998. The UOES missile is projected to be available in FY 2000. Actual deployment may begin as early as 2002.

- **Theater High-Altitude Area Defense System.** BMDO's Theater High-Altitude Area Defense (THAAD) system will form the largest umbrella of missile protection in a theater, arching over all other missile defense systems. To accomplish this mission, THAAD will have long-range and high-altitude intercept capabilities to engage the entire spectrum of theater ballistic missiles. These capabilities will give U.S. forces the earliest opportunity to shoot down incoming missiles and the best chance to destroy them far enough away that falling debris will not endanger friendly forces.

The THAAD system consists of four major parts: truck-mounted launchers, interceptors, the THAAD radar systems, and the THAAD battle management (command, control, communications, and intelligence) system. Initial flight tests are under way. Beginning in late 1998, a prototype THAAD system will be available so that soldiers can comment on system design and conduct early operational assessments.



Courtesy of Raytheon Electronic Systems

- BMDO is upgrading the PATRIOT, which will help destroy short- and medium-range ballistic missiles and other threats in the atmosphere.

¹PATRIOT is an acronym for Phased Array Tracking Radar Intercept on Target.

²In Greek mythology, AEGIS is the name of the shield owned by Athena, goddess of wisdom and war, who loaned the shield to Perseus to block the gaze of Medusa.

NATIONAL MISSILE DEFENSE

BMDO's national missile defense (NMD) is concerned with the possibility of a limited ballistic missile strike against the U.S. homeland. The current NMD program works toward building, if necessary, a ground-based antiballistic missile system to effectively defend all 50 states against a small number of threatening warheads from rogue nations.

NMD's key components under development include a ground-based interceptor, ground-based radar, upgraded early-warning radar, a battle management system, and sensor technology. Over the next few years, flight tests are planned at the national test range in the Pacific to demonstrate these elements, individually and together as a system. If successful, these tests will indicate that an effective and affordable NMD system can be built if needed.

TECHNOLOGY READINESS

BMDO depends on advanced technology of all kinds to invigorate its ability to defend against increasingly sophisticated ballistic missile threats. Therefore, the continued availability of such technology has become a vital part of the BMDO mission. The BMDO Deputy of Technology Readiness is responsible for fostering advanced research and development of new BMDO technology.

The Science and Technology Directorate is a part of BMDO's technology readiness effort. This group manages four BMDO programs:

- **Innovative Science and Technology (IS&T).** The IS&T program pursues speculative, high-risk technologies that could spur a revolutionary leap in capability. Specific goals include quickening the pace of technology development and decreasing the time required to transform scientific breakthroughs into actual applications.
- **Small Business Innovation Research (SBIR).** The SBIR program funds small businesses to develop far-reaching technology innovations. Projects are funded in two competitive phases. In Phase I, the researcher demonstrates feasibility and develops a design concept; in Phase II, a prototype is built.
- **Small Business Technology Transfer (STTR).** The STTR encourages cooperative joint research between businesses and nonprofit research institutions. It is structured like the SBIR program and operated by the same BMDO personnel.
- **Technology Applications Program.** Recognizing the potential economic value of its leading-edge research and development, BMDO created a Technology Applications program. Guided by BMDO's Office of Technology Applications, this program seeks to promote the commercialization and interagency sharing of BMDO-funded technologies. It sponsors this report and manages all technology transfer efforts involving BMDO-funded technology.



TECHNOLOGY APPLICATIONS PROGRAM

- As the logo for the Technology Applications program, the linked chain signifies our ongoing commitment to link BMDO technology developers with other organizations that promote the technology's commercialization.

COMMERCIALIZING BMDO TECHNOLOGY

In its support of BMDO research and development (R&D), the Technology Applications program recognizes the importance of world-class technologies and their potential to influence the U.S. economy. The same technology that can protect the United States from ballistic missile attacks can also help U.S. businesses become more economically competitive. By creating new products with commercially promising BMDO technology, these companies can seize opportunities for profit and create new jobs. However, technology developers sometimes need help to convert their innovations into marketable products. To assist these developers, the Technology Applications program has established innovative, diverse, and proactive approaches that can be applied at various stages of the technology's development. The following sections discuss the program's approaches in more detail. The final section introduces new initiatives coming in 1997.

MAKING INDUSTRY AWARE OF BMDO-FUNDED INNOVATIONS

The Technology Applications program publishes many types of documents, raising industry awareness of BMDO-funded innovations. These documents are unique in the technology transfer community because their focus on technology areas is quite flexible. For example, one issue of our newsletter may highlight BMDO innovations having potential commercial applications in computers, manufacturing, and transportation; another issue may feature similar innovations in materials, sensors, and electronics. In another example, our special reports may explore BMDO innovations having potential commercial applications in only one industry—for example, medicine. Using both types of publications, our program spreads the word about BMDO-funded technology with high commercialization potential. The following describes our newsletter and special reports in more detail.

The Update Newsletter

To reach those who want to use BMDO technology, the Technology Applications program publishes a 12-page quarterly newsletter called the *Update*. The newsletter has been a major component of BMDO's technology push efforts, featuring BMDO innovations that already are being commercialized or that have potential commercial applications. By presenting technical solutions for which industry has a need or market, it also facilitates our market pull objectives. With more than 20 issues and 300 stories published since 1991, the *Update* has received and responded to over 13,500 requests for information. In fact, it has processed more than 7,600 requests in the past two years alone.

The *Update* can produce marketing contacts that lead to important business deals, as illustrated by QM Technologies (Albuquerque, NM). This company, mentioned in the Spring 1996 issue, received a substantial amount of visibility, which in turn resulted in discussions, negotiations, and eventually contracts with such major corporations as Caterpillar, Gillette, and Rockwell. Under these contracts, QM Technologies will demonstrate its material-improvement technology on manufactured goods, which may lead to more opportunities.

The Trymer Company (Leander, TX), mentioned in the Fall 1995 issue, also benefited from marketing contacts generated by the *Update*. "After the *Update* article ran, we were inundated with calls, both near and far away," explains Jon Schroeder, Trymer's president. "This tells us we have a viable commercial product that could sell anywhere in the world. Also, by talking with potential end-users, we were able to design a new unit cooled differently from the existing product." In addition to its water-cooled unit, Trymer now offers an air-cooled version for dry, remote regions.



■ The *Update* newsletter, pictured above, is a tool for informing industry about technology-rich developments from BMDO R&D. It is a major component of BMDO's comprehensive outreach program.

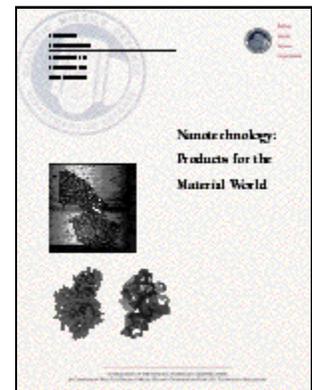
What's in the *Update*? The 1996 newsletters included feature stories highlighting ophthalmology, electric power generation, nanoscale materials, and flat-panel displays. A new "Bulletins" section highlighted items of interest to BMDO technology developers and the technology transfer community. In presenting BMDO innovations, the *Update* has an award-winning approach. It won a merit award from the Society for Technical Communication, Washington, D.C., Chapter, in early 1997.

Sometimes, there is so much information for a feature story that a separate, supplemental publication is developed. This document covers more technologies on the same subject and their commercial applications, giving readers a more complete picture of what BMDO-funded technology has to offer. Published supplements include the following:

- **Nanotechnology: Products for the Material World.** Nanotechnology—including materials and the manipulation of materials below 100 nanometers—is an emerging scientific field with enormous potential in the commercial sector. This 15-page supplement identifies 22 BMDO-funded technologies directly involved in nanotechnology areas, including electronic devices, lithography, and materials. It also discusses BMDO-funded advances in technology areas that support primary nanotechnology research.
- **Law Enforcement Technology.** For the fight against crime, law enforcement agencies are investigating new tools in many areas. This 15-page supplement highlights 19 companies with BMDO-funded technologies that have potential applications in law enforcement areas, including communications, information management, surveillance, weapons detection, and investigative tools.
- **Adaptive Optics Technology.** BMDO, interested in destroying enemy missiles with laser weapons, funded the development of adaptive optics (AO) technology to see clearly through the atmosphere. As a result, astronomers now can see faint stars more clearly. In addition, AO technology may have new applications in medicine and manufacturing. This eight-page supplement highlights activities of eight BMDO-funded organizations pursuing commercial uses for their AO technologies.
- **Intelligent Transportation Technology.** BMDO has funded a wealth of technologies—such as sensors, controls, displays, and communications—that can be used to improve the movement of people and goods in America. For example, many of the technologies used to guide missile interceptors at 20,000 miles per hour can help with navigation of cars traveling at 65 miles per hour. This 10-page supplement identifies 20 companies moving BMDO-funded technology into intelligent transportation markets.

Applications Reports

The Technology Applications program focuses on areas where BMDO-funded technologies have high commercialization potential or could significantly improve our economy and quality of life. As a result of these ongoing efforts, the Technology Applications program produces detailed reports highlighting these areas and technologies. The reports are designed to make industry aware of BMDO-funded technologies that exist now or are on the horizon. The following reports are available:



- Separate, supplemental publications cover more technologies than can be included in *Update* feature stories. Published supplements have focused on nanotechnology (pictured above), law enforcement technology, adaptive optics, and intelligent transportation technology.



■ This report speaks to the important ways our Nation's investment in ballistic missile defense is having a direct and supplemental bearing on medicine. The fruits of BMDO's technological advances are being seen in new techniques in the biomedical research laboratory, at the clinical bedside, and in the operating room.

- **BMDO Technology and the Electric Utility Industry.** Players in the electric utility industry are becoming ever more challenged by the dynamics of a more competitive economy. Advanced technology, in many areas, may lead this industry to higher performance and, often, higher returns. BMDO has funded advanced technologies in a wide range of areas that may help electric utilities meet these challenges. This report identified four areas where BMDO-funded technology can benefit utilities: power transmission and distribution, fossil-fuel power generation, environmental compliance, and load management. It highlights more than 40 technologies.
- **BMDO Technology Applications in Biomedicine.** The technical expertise used to solve the complex needs of missile defense has another fortunate spillover. It is enabling new biomedical technologies—some 10 years ahead of conventional equipment—that are beginning to make some diseases easier to detect and simpler to manage. This 96-page report highlights more than 60 technologies, in three major sections, that have resulted from or been improved through BMDO-funded research. The first section deals with existing technology, such as x-ray mammography and its conversion from a film-based to a digital technique. The second section explores emerging technologies, such as infrared detection of blood glucose and computer-aided diagnosis. Last, a section on enabling technologies discusses progress in data transmission and electronic storage, as well as high-temperature superconductors. The report can be found at <http://www.acq.osd.mil/bmdo/bmdolink/html/transfer.html> on the World Wide Web. In 1997, a follow-on to the first report will cover 35 new technology transfer stories.

Other applications reports available from the Technology Applications program include the following:

- **Energy Storage Technology.** Interested in power technology for satellites and power supplies for weapons, BMDO has funded many energy research projects, including new battery technologies. Building a better battery is not easy, and many research efforts are looking for new advances to help meet industry demand. With most of its content focusing on batteries, this 39-page report highlights the research efforts of 23 BMDO-funded organizations. Other energy sources—such as capacitors, flywheels, and fuel cells—are also described.
- **The Diamond Technology Initiative.** In the world of missile defense, diamond coatings promise more durable optics and mechanical parts; more efficient thermal management for electronics; and faster, more resilient semiconductors. With the opportunity for such a far-reaching payoff, the BMDO IS&T program created the Diamond Technology Initiative in 1986. Today, BMDO's investment in wide-bandgap semiconductor technology has played a major role in helping several U.S. companies introduce diamond-coated products to the marketplace. This 56-page report—our most requested publication—describes 25 projects funded by BMDO's Diamond Technology Initiative.

In addition, the Technology Applications program publishes yearly reports that review the top 50 commercial success stories emerging from BMDO technology transfer efforts. The following reports are available:

- **1995 Technology Applications Report.** This report highlights 50 1995 BMDO-funded technologies being commercialized in such areas as communications and multimedia, law enforcement, manufacturing, satellites, and transportation. It can be found at <http://www.acq.osd.mil/bmdo/bmdolink/html/transfer.html> on the World Wide Web and is also available in printed form.
- **1994 Technology Applications Report.** The report, available in hard copy, features 50 1994 BMDO-funded technologies moving toward the marketplace. Areas in which technology is highlighted include the environment, sensors, energy, software, microelectronics, superconductors, and the information superhighway.

Technology Applications Information System

The Technology Applications Information System (TAIS) contains hundreds of innovation highlights that describe BMDO-funded technologies either being commercialized or on the horizon. The database system is designed to suit those looking for new technologies for their specific needs. It also contains an extensive set of reference and assistance information, including a detailed listing of state and Federal technology transfer agencies.

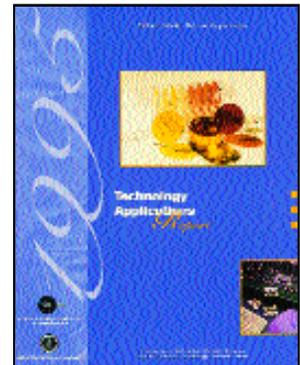
The TAIS can be a valuable tool for American businesses because they can find new technology that may give them an edge in today's competitive environment. Any American can use the service for up to three 30-minute blocks every day. New users can register online the first time they log on and will receive a database password within a few days. The system offers full-text searching and can handle modem transmission speeds up to 28,800 bits per second. Registration information can be obtained by calling (703) 604-3855.

In 1997, TAIS information will be moving to the information superhighway. The Technology Applications program is quickly building an on-line presence on the Internet and the World Wide Web. In fact, some BMDO technology information is already there, and can be accessed through the BMDO official home page, BMDOLink, at <http://www.acq.osd.mil/bmdo/bmdolink/html>. This web site includes downloadable files containing information from our *1995 Technology Applications Report*, as well as the *BMDO Technology Applications in Biomedicine* report. In the near future, the Technology Applications program plans to have its own World Wide Web site. Announcements will be made in upcoming issues of the *Update* newsletter.

Media Coverage

The Technology Applications program works with the media to leverage information that we disseminate through our publications. In most cases, our program staff respond to media queries by providing background information and organization contacts for a particular BMDO innovation. The media use this information to create new material, which is then published.

Sometimes, the newly published material can stimulate greater visibility for BMDO technology developers. For example, the Spring 1996 *Update* cover story, which featured four BMDO-funded technologies being transferred to ophthalmology, prompted a call from a *Wall Street Journal* editor. After speaking with our program staff, the editor wrote an article on three of the four technologies, which later appeared on the front page of the paper. A Maryland Public Television program, *TechnoPolitics*, also contacted us for more information about the ophthalmic technologies mentioned in the *Update* article. As a result, Guy Hammer, BMDO's Director of Technology Applications, appeared on this nationally broadcast show to discuss these technologies.



- This report was released in April 1996. It features 50 stories on new ideas, new products, and new companies resulting from BMDO technology.

In 1996, our program successfully worked with the press on at least 100 occasions, resulting in articles about technology commercialization and the program itself. Articles were printed in such daily publications as the *San Diego Union-Tribune*, the *Tampa Tribune*, *USA Today*, the *Wall Street Journal*, the *Washington Post*, and the *Washington Times*. Weekly publications—including *Aviation Week & Space Technology*, *Business Week*, and *Industry Week*—also printed articles. In addition, articles were published by such trade publications as *Advanced Materials & Processes*, *BioPhotonics International*, *Design News*, *Diagnostic Imaging*, *Federal Technology Report*, *Futurist*, *Industry.Net*, *Journal of Metals*, *Laser Focus World*, *Mechanical Engineering*, *Medical Laser Report*, *R&D Magazine*, *Sensors*, and *Traffic World*.

GUIDING BMDO-FUNDED RESEARCHERS IN THE COMMERCIALIZATION PROCESS

One of the most important tasks performed by the Technology Applications program is guiding BMDO-funded researchers in the commercialization process. Our technology transfer specialists have designed innovative approaches to support BMDO-funded innovations at two levels of maturity. For technology in the early stages of development, the program holds planning meetings to help developers identify potential market niches for their research products. For technology in the final stages of development, it holds application reviews to help technology developers fine-tune their commercialization strategies. Each approach is further described below.

Planning Meetings for Early-Stage Research

In 1996, the Technology Applications program introduced a trial series of planning meetings for first-time winners of Phase I contracts from BMDO's SBIR program. Called "Business Focus Workshops," these meetings are designed to provide a framework and expert contacts for innovative business development. The workshops are key to helping companies establish commercial interest in their BMDO-funded innovations early in the development process.



More than 20 BMDO Phase I companies participated in the initial set of workshops. In each workshop, a research representative from the SBIR-awarded company was teamed with a technology transfer agent and a business adviser to form a collaborative team. This team assessed the technology and produced a brief business case highlighting five components: a company introduction, the business opportunity, the technical edge, company resource requirements, and a preliminary development plan. Later, the researchers presented the business cases to a panel of commercialization specialists to get feedback on their plans and advice on their commercialization strategy. These sessions helped spotlight company development issues that needed critical attention before they grew into real problems.

■ The Technology Applications program convenes advisory panels for BMDO technology developers in early-stage research. Previous attendees have commented that some of the best advice comes from one-on-one conversations during breaks and at lunch.

The workshop response was positive. Several participating companies told the Technology Applications program of modifications or developments in their company structure, new proposals, partners, and intellectual property action that resulted from their participation in a Business Focus Workshop. One company responded: "Your team gave us a template for evaluating our business strategy. . . . As a result, we are now working with [a] law firm . . . and are negotiating a partnership with a . . . worldwide leader [in the field]." With regard to the technical aptitude of consultant panelists, one research representative from an SBIR-awarded company was "particularly delighted to find that two of the outside advisers were highly knowledgeable in the . . . field." Based on the first-round successes, the Technology Applications program is planning to implement a full-scale workshop program for new SBIR Phase I winners in 1997.

Reviews for Final-Stage Research

Technology Applications Reviews use a forum approach to provide commercialization advice and information to researchers with technology nearing the market. In these reviews, a panel of experts assesses and advises researchers on their commercialization process. The panel reflects the diversity required to make a business successful, with a wide range of expertise in such areas as venture capital, intellectual property, business formation, marketing, and strategic partnerships—all with focuses in different application areas.

BMDO-funded researchers use this expert advice to refine their business plans, with the goal of making their businesses more profit oriented and commercially driven. The reviews have been instrumental in the commercial success of dozens of small and large companies. As a result of these forums, many companies have revised business and commercialization plans, focused on new application areas, developed new industry contacts, and fostered new business relationships.

Since 1989, more than 200 inventors from industry and nonprofit organizations, 50 researchers from universities, and 40 researchers from the Government have presented their commercialization strategies in more than 40 Technology Applications Reviews. In 1996, the review process focused on such areas as biomedicine, commercial space, and nanotechnology. Some of the 1997 reviews are targeting power electronics, information networks, and industrial energy.

LEVERAGING COOPERATIVE RELATIONSHIPS

The Technology Applications program facilitates the transition of BMDO technologies to the commercial sector by leveraging cooperative relationships with a cross-section of professional societies, trade associations, and Federal agencies. Representative organizations include the Technology Transfer Society, Economic Development Administration, Bureau of Export Administration, Small Business Administration, Department of Commerce, and Department of Health and Human Services. The Technology Applications program has supported conferences and meetings with some of these groups, as highlighted below.

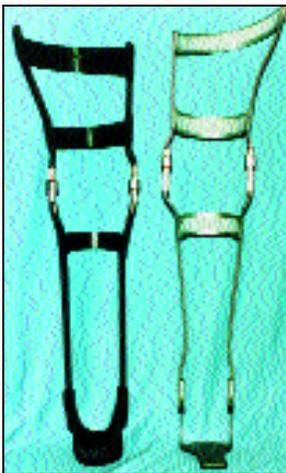
Meeting to Promote Innovative Technology for Women's Health

BMDO is involved in efforts to identify advanced technology for improving women's health. In late 1994, Dr. Dwight Duston, then BMDO's Director of Science and Technology, testified before a committee of the U.S. House of Representatives that several BMDO-funded technologies could improve the early detection of breast cancer.¹ As part of a 1996 follow-up to this testimony, BMDO joined the Federal Multi-Agency Consortium on Imaging Technologies to Improve Women's Health. In this collaboration, a technology transfer subcommittee reviewed innovative technologies for improving women's health from an inventory of 297 Federal agencies and laboratories. Of the 82 technologies given serious review, 6 of 14 selected for funding consideration were sponsored by BMDO: large-format digital sensors, avalanche photodiodes, acousto-optic tunable filters, active vibration isolation systems, uncooled infrared cameras, and polarization imaging and fluorescence spectroscopy devices.



■ Advanced Photonix's avalanche photodiodes (pictured above) are one of six BMDO-funded technologies selected for further consideration by a multi-agency consortium on imaging technologies to improve women's health.

¹Testifying before the Research and Technology Subcommittee of the U.S. House of Representatives' Committee on Armed Services at the Hearing on the Uses of Military Technology and Information in the War Against Breast Cancer.



■ BMDO funded SPARTA's structural materials research for a ground-based missile interceptor. This research has enabled the development of a new leg brace (pictured on left) that is much stronger, lighter, and easier to form than the conventional brace worn by paraplegics today (pictured on right).

Conference on Technology Transfer Measurement and Evaluation

In early 1996, BMDO supported a first-of-its-kind working conference on technology transfer measurement and evaluation in Santa Fe, New Mexico, with the Technology Transfer Society and the Engineering Foundation. The conference's aim was to bring together various technology transfer communities so that they could learn from each other's experiences in performance measurement and evaluation.

Conference Series for Small and Medium-Size Businesses

During 1996, BMDO participated in the U.S. Department of Commerce and U.S. Small Business Administration nationwide conference series called "Commercialization of Defense Technology." These conferences were designed to acquaint small and medium-size businesses with Federal assistance in moving technology to market. For example, the Charleston, South Carolina, conference focused on construction, energy, and environmental remediation technologies, while the Austin, Texas, conference centered on biomedical, computer, and semiconductor technologies.

TESTING INNOVATIVE, NEW MODELS TO COMMERCIALIZE BMDO-FUNDED TECHNOLOGY

Working with industry, academia, and other Government agencies, the Technology Applications program is finding new ways to jump-start the commercialization process by formulating and validating technology transfer models, two of which are described below.

Leveraging the Expertise of State and Local Development Groups

The Technology Applications program successfully demonstrated a new model for technology transfer, bringing together the Los Angeles Regional Technology Alliance (LARTA), the National Association of State Development Agencies, and 14 companies—7 of them funded by BMDO to develop antimissile defense technology. This innovative model was designed to leverage the business, financial, and marketing expertise of state and local economic development groups in southern California, reasoning that the groups' expertise may be useful to the commercial plans of the participating companies.

LARTA will use the information from the presentations to assess each company's needs and match them with organizations from its mentoring network. Companies with promising technology and a keen eye for commercialization will be invited to attend LARTA's Southern Venture Forum, a premiere event in which venture capitalists pay to meet with representatives looking for new capital sources.

Encouraging the Use of Innovative Technology to Help the Disabled

As early as 1989, the Technology Applications program encouraged that a strong, lightweight composite material designed for missile structures be used in medical applications to help the disabled. One of the most promising developments was a leg brace, made of composite parts, that was much stronger, lighter, more durable, and easier to form than conventional aluminum braces worn by paraplegics today. In a current demonstration program, BMDO is funding one of the leaders in composite research, SPARTA, Inc. (San Diego, CA), to develop a method of manufacturing long-fiber composite parts to be used as spinal implants and spinal braces.

BMDO's interest in this project is proving that long carbon fibers (up to 1/2 inch, compared with the conventional fiber length of 1/16 inch) can be molded into shapes and sizes that can be implanted or affixed to the human skeleton. A group of biomedical professionals has formed around this initial attempt. This model of cooperation, critical for medical certification and acceptance, can be used by others if the application proves successful.

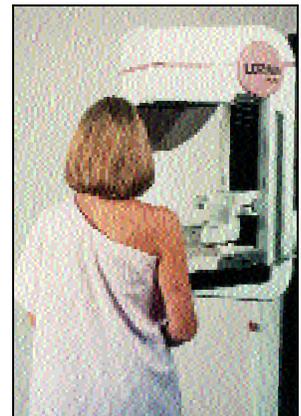
FINE-TUNING SPECIAL PROJECTS TO DEBUT IN 1997

The Technology Applications program is developing several special projects relating to BMDO technology transfer that are to be implemented in 1997 and 1998. The following project descriptions provide a sneak peak at what is in store:

- **BMDO Technology Applications CD-ROM.** This project will develop a compact disc read-only memory (CD-ROM) product to promote interest in the commercialization of BMDO-funded technologies in a wide variety of commercial applications. Primarily aimed at American industry, the CD-ROM will feature stories of companies successfully commercializing BMDO-funded technology, resources for high technology small business start-ups, and BMDO technologies available for licensing and their potential applications.
- **Educational Technology Initiative.** This effort will explore the potential of transferring BMDO-funded technology to the distance education market. In October 1996, BMDO participated in a Global Summit on Distance Education to obtain data on requirements.
- **Medical Diagnostic and Telecommunications Project.** This project will examine the possibilities of transferring BMDO innovations into medical imaging, diagnostics, procedures, and telecommunications. Involving other programs, such as National Aeronautics and Space Administration's (NASA's) Classroom of the Future and the U.S. Army's Battlefield Intensive Care Unit, the project could provide win-win situations for technology developers and the military.
- **Missiles to Mammograms Program.** This program will support the development of medical imaging technology to leapfrog the capabilities currently available and to achieve high quality and reliable mammography for combating breast cancer. This effort will initially focus on an interagency collaboration with NASA, the Public Health Service Office on Women's Health, and the National Cancer Institute.

The following sections of this report highlight the top 50 BMDO-funded commercial success stories for 1997. Many of these products that companies, universities, and laboratories are developing are currently on the market, while some products are just entering their commercialization phase.

For copies of any program publication mentioned in this section, contact the National Technology Transfer Center, Washington Operations at the address listed on the inside back cover of this report.



Courtesy of Irex Medical Corporation.

■ Mammography is critical for improving early detection of breast cancer. Through the Missiles to Mammograms program, BMDO will support the development of advanced imaging devices with the potential to reduce the mortality associated with breast cancer.