FAR WEST BULLETIN
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Federal Laboratory Consortium for Technology Transfer

Bechtel Nevada Pair Picked For R&D 100 Awards

Bechtel Nevada employees Craig Brooksby and Rob Saethre have been selected to receive a coveted R&D 100 Award for their accomplishments in developing an advanced, solid-state power source for an electron beam accelerator called the Advanced Radiographic Machine (ARM). Seven Lawrence Livermore National Laboratory staff members also won the award for separate contributions to the project.

Titled "Solid-State Power Source for Advanced Accelerators and Industrial Applications," the project was housed at LLNL, but the component testing, electro-optical development, and machine shop work was performed at DOE/NV's North Las Vegas facility.

Brooksby, whose contribution is in the area of mechanical design, created the architecture that has become the standard for solid-state pulsed power modulators that are being used in a variety of new applications such as the Stanford Linear Accelerator/Next Linear Collider and the DARHT Solid-State Kicker Pulser.

Saethre's award was earned through his advancements in electro-optical power and control for the modulator. These technologies are being advanced in future designs and will become a fixture in future modulators.

Known as the "Oscars of Invention" and the "Nobel Prizes of Applied Research", the R&D 100 Awards are presented by the editors of R&D Magazine to recognize the 100 most technologically significant new products and processes of the year. Past winners have included breakthroughs like Polacolor film, the flashcube, the digital wristwatch, antilock brakes, the automated teller machine, the liquid crystal display, the halogen lamp, and the fax machine.

The ARM source is a full-scale demonstration of a unique modular architecture that enables extremely powerful scientific and industrial machinery to benefit from the speed, precision, agility, and reliability of modern solid-state devices. This winning technology was featured in R&D Magazine's September issue, and was showcased during the 1999 R&D 100 Awards ceremony in Chicago, IL on September 23.

Continued on page 7

INSIDE

From the Regional Coordinator's Desk

This year the Far West Region is conducting our annual Regional Meeting/Training Session in Las Vegas, NV in conjunction with the National SBIR Conference on November 23, 1999. The interactive workshop offered this year is entitled "Corporate Growth & Profit Through Technology Commercialization". This custom designed program is based upon objectives developed for the needs of both federal laboratories and the high tech small business community and is open to the attendees of the SBIR Conference as well as the FLC attendees. Early registration for the workshop has exceeded 200.

The National SBIR Conference is being held November 21-23 at the Las Vegas Hilton. The SBIR Conference has provided the Region exhibit space and one-on-one tables which will allow the ORTAs in attendance to meet small business representatives in a highly focused and personalized setting. There will be hundreds of businesses looking for opportunities to partner with federal laboratories.

Progress is continuing on the national demonstration project, The Federal Resource Access Partnership Program. The Department of Commerce, in conjunction with the Far West Region and CORE 21, finalized the project questionnaires and over

Continued on page 7

A Lean, Low-emission Machine

Delphi Automotive Systems of Troy, Mich., and Pacific Northwest National Laboratory have teamed to develop a new technology that greatly reduces emissions from lean-burn engines, such as diesels. The non-thermal plasma technology is durable, compact and energy efficient, and can be incorporated into a vehicle's existing exhaust system to break apart and destroy oxides of nitrogen, or NOx, and particulates in auto emissions.

Initial tests on a diesel engine show a 55 percent reduction in NOx without the need to add additional hydrocarbons to the exhaust. The technology recently won the Financial Times Global Automotive award, which recognizes "technical development with the greatest potential to improve efficiency, safety, comfort, environmental performance or cost structure of motor vehicles and their associated services." Delphi and Pacific Northwest continue research aimed at optimizing the performance of the non-thermal reactor and catalyst materials.

Article courtesy of "PNNL TechNotes"
Contact: Marv Clement at (509) 375-2789

Researchers use a suite of analytical chemistry equipment to optimize the performance of an award-winning exhaust after-treatment prototype device that greatly reduces emissions from diesel and other lean-burn engines.

Berkeley Lab Discovers Asthma-Linked Genes

More than 14 million people in the United States suffer from asthma and other chronic respiratory ailments. The number of victims has doubled over the last 15 years and is still on the rise, with children living in urban areas particularly susceptible. Medical researchers have no explanation for this upsurge but it is approaching epidemic stature.

In a major breakthrough, researchers at the U.S. Department of Energy's Lawrence Berkeley National Laboratory (Berkeley Lab) have announced the discovery of two genes that contribute to the development of asthma. The finding suggests that decreasing the activity of these two genes could help reduce susceptibility to asthma attacks.

A team led by Dr. Edward Rubin and Derek Symula of Berkeley Lab's Life Sciences Division, and including scientists from the University of California, San Francisco campus, worked with transgenic mice (mice that carry human genes) and found that even subtle changes in the activity of the interleukin genes IL4 and IL13 can have an important effect on asthma susceptibility. Their research results were reported in the October 1 issue of the journal Nature Genetics.

Rubin's group has previously developed mouse models from a variety of human conditions including Down syndrome, sickle cell disease, and atherosclerosis.

In addition to his research group at Berkeley Lab, Rubin also leads the functional genomics program at DOE's Joint Genome Institute (JGI), a collaborative effort between Berkeley Lab and the Lawrence Livermore and Los Alamos National Laboratories as part of DOE's contribution to the Human Genome Project. Rubin credits his affiliation with JGI as a factor in the success of the asthma research.

"Our asthma research is a prime example of biology made possible by the Human Genome Project," he says. "It was our proximity to the actual group engaged in the genome mapping effort at JGI that led us into this investigation."

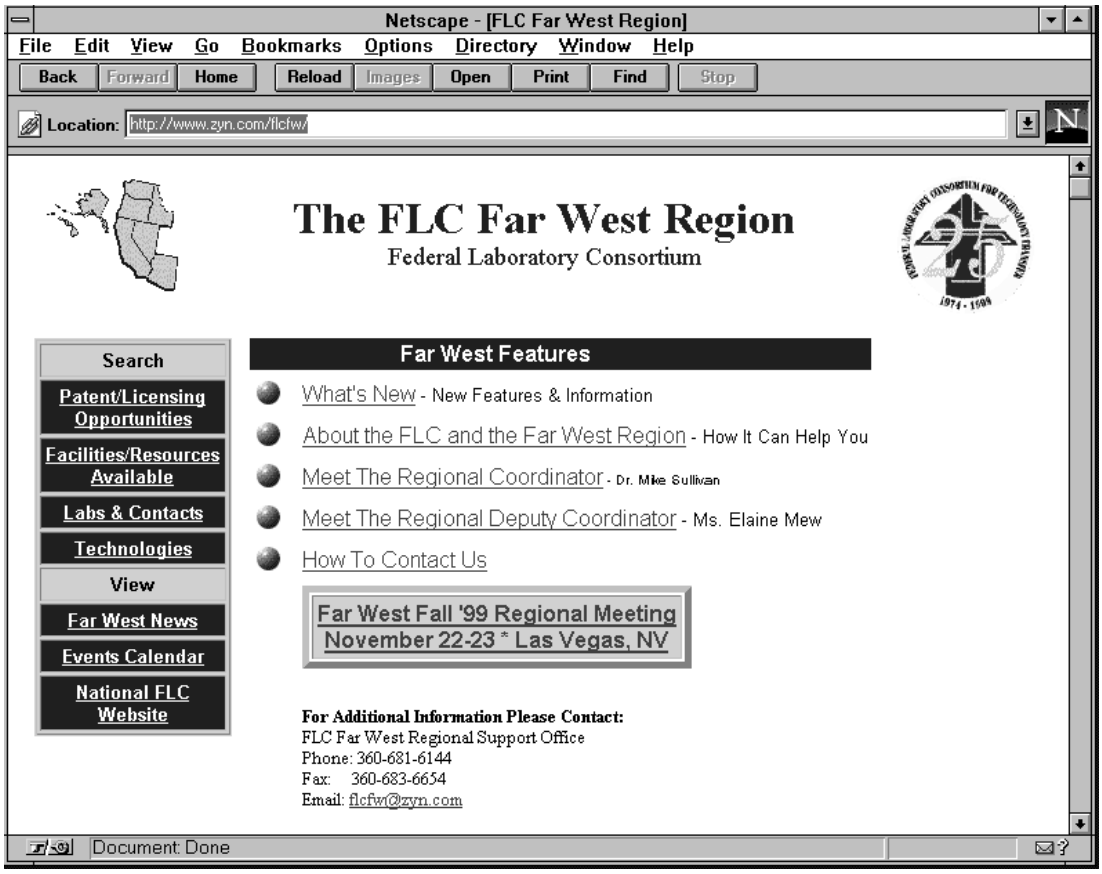
Because asthma is a complex genetic condition in which several genes, working in concert, ultimately determine an individual's susceptibility, it posed a major challenge to the traditional approach to genetic research which was used to identify single genes responsible for disorders such as cystic fibrosis and sickle cell disease.

Says Rubin, "The approach we used to pursue asthma genes may now be applied to other common complex genetic conditions, for instance hypertension and obesity, where large genomic regions have been implicated as containing genes contributing to a particular disease."

The project was supported by the U.S. Department of Energy (DOE), and the National Institutes of Health.
Contact: David Gilbert, degilbert@lbl.gov

Far West Region Creates New Website

The FLC Far West has created a new website dedicated to serving the needs of our region. The new site features important information and opportunities for Business, Industry, Academia and Government in an easy to use fast and friendly format. Some of the features included are:



Patent / Licensing Opportunities: Allows users to search and browse available patents & technologies for licensing. This simple interface will allows you to search by patent number, author, title and full text of the abstract. Information displayed by a successful search includes a short description of the opportunity, complete ORTA/Point of Contact data and the ability to go directly to the US Patent & Trademark Office database and/or the IBM patent server. Complete patent information and drawings are available from these sources.

Facilities/Resources Available: A search and browse area to find user facilities and other resources such as wind tunnels, environmental test chambers, and RF antenna test ranges available from the various Far West Laboratories.

Labs & Contacts: A simple search engine that allows you to look up a person , laboratory, or produce a list of labs, with a live links and a variety of sort options. Doing a search such as all Navy labs in the Far West Region is a snap!

Technologies: A search and browse area to find federal laboratory technologies, many of which are available for commercialization. These include industry clusters such as manufacturing, transportation, medical devices and environmental technologies.

Far West News: You will find current and past issues of the Far West Regional News in both easy to read html and Adobe Acrobat PDF formats.

Events Calendar: A regional calendar of technology transfer related events. The user also has the ability to post their own events on-line.

Partnering Opportunity Announcements: This is an area of the website where a company, laboratory or university can place a small announcement looking for a potential partner for a technology transfer opportunity. You will have the ability to place your own announcements using the on-line system. This feature will be available in December of 1999.

Link to the FLC National Website: If you don't find what you are looking for in the Far West Region, this link will take you to the FLC National Website.

Please stop by and visit our new site at:

www.zyn.com/flcfw

The Far West databases will continue to grow and offer new and exciting opportunities.

CRADA SUCCESS

SPAWAR Systems Center, San Diego Signed 8 CRADAs with Industry in FY99

- FUGRO Geosciences, Inc. – R&D methods for environmental subsurface geophysical investigations.
- Oceaneering International, Inc. – R&D of ultralight, U/W autonomous surveillance systems.
- Ocean Sensors, Inc. (SBIR) – Develop low-cost system of shallow water sensors.
- Santa Barbara Infrared, Inc. – Develop algorithm measuring minimum resolvable temperature differences of thermal images.
- Scientific Environmental Research Foundation (SERF) – Alternate uses of de-activated U.S. Navy Sound Surveillance System (SOSUS) stations.
- SDL Incorporated – Manufacture and integration of Polarization Independent Narrow Channel (PINC) Wave length Division Multiplexing (WDM) couplers.
- Sun Microsystems – Demonstrate feasibility Network Centric Re-engineering for enterprise level IT.
- Undersea Sensor Systems, Inc. – R&D of autonomous off-board surveillance sensor systems.

Vice-President Gore announced at the recent National Ocean Conference held in Monterey, CA, that SPAWAR Systems Center San Diego and the Scientific Environmental Research Foundation (SERF) have entered into a Cooperative Research and Development (CRADA). This agreement will allow SERF to use deactivated U.S. Navy Sound Surveillance System (SOSUS) stations as a data source for oceanographic research and educational efforts intended to create an awareness of the importance of the oceans to the environment.

Also attending the conference was President Clinton. He said that the opening of the deactivated SOSUS stations would help scientists "track marine mammals, predict deadly storms, detect illegal fishing and gain new insights into the complexities of climate change." SOSUS is a system of hydrophones and data processing equipment that was developed during the Cold War to monitor the activities of Soviet ships and submarines. SPAWAR Systems Center San Diego and its predecessor organizations have been involved with the design and development of SOSUS since its inception. Since the end of the Cold War, deactivated SOSUS sites have gone unused. The CRADA will allow this national asset to be used by the research and educational communities.

The SERF, with its private and public partners, has developed the National Oceanographic Environmental Monitoring System (NOEMS). NOEMS will use the deactivated SOSUS stations to collect ocean acoustic data for use by scientific investigators, educators and U.S. Navy researchers. The surplus SOSUS assets will permit scientists to do research in fields of science that relate to oceanography. Examples include:

- Monitoring and locating ocean seismic events
- Marine mammal research including monitoring and tracking
- Fisheries monitoring
- Deep ocean current monitoring
- Ocean temperature/pressure differentials (i.e., El Nino)

SERF and SPAWARSYSCEN SAN DIEGO will work together to establish the NOEMS infrastructure, including U.S. Navy approved data sanitization methods and procedures to enable SERF to generate unclassified products from the undersea surveillance data. This acoustic data will be collected, packaged and disseminated in many different forms such as aural recording, videotapes, compact discs and raw acoustics data. This data will be disseminated to a user community made up of research scientists, universities and K-12 students.

With the intense interest of the White House, SECNAV, SPAWAR, and the Oceanographer of the Navy, and with the help of all personnel concerned, the agreement was completed and approved within a two-week period. The SSC SD Program Manager for this effort is David Clark, (D71), Maritime Surveillance Division. The agreement was put together and shepherded through the approval process by Dale Gurley (D14), Office of Science and Technology.

Contact: Dale Gurley at (619) 553-5630

May 8-12, 2000

FLC National Meeting

Charleston, SC

With a theme of "Show Me the Way," the meeting will feature tech transfer training (beginner and advanced) sessions. Don't miss the first FLC meeting of the millennium!

Sherry Nacci, (856) 667-7727, snacci@utrsmail.com

Seafood Into 'Super Glue'

Laboratory Clones Mussel Proteins To Create Natural Waterproof Adhesive

When the U.S. military was looking for a strong waterproof adhesive, scientists at a Department of Energy laboratory in Idaho went straight to the experts — sea creatures that have been clinging naturally underwater for millennia. Mussels are the same delicacy often found next to the lobster and shrimp on a seafood buffet. The "feet" of the small mollusks produce an epoxy with adhesive-like properties that rivals any "super" glue on the market. Unfortunately, it takes about 10,000 mussels or mollusks to produce just one gram of adhesive, resulting in a prohibitive cost, not only in dollars but to the mussel population as well. So molecular biologists at the DOE's Idaho National Engineering and Environmental Laboratory (INEEL) are developing methods to clone the mussel's genes, through DNA technology, that will allow them to economically produce large quantities of the adhesive protein.

Because sea water breaks down even the strongest of conventional adhesives, a natural alternative is important to the Navy and private marine industry in building and repairing ships. Mollusks also attach to ships, increasing the drag, and therefore, decreasing the efficiency at which these large vessels operate. Understanding the adhesive will help to prevent this marine fouling.

The building industry also requires a stronger cementing element for manufacturing plywood, oriented strand and other building materials that deteriorate when subjected to water and moisture. Even the dental industry is looking for a better, safer adhesive for dentures and medical disciplines such as surgery and orthopedics are interested in new suture and prosthetic technologies.

Mussels are able to cling to surfaces because they produce attachment threads called "byssal threads." The "foot" of the animal has organs that secrete protein with a catalyst. It takes about one minute for the viscous substance to harden into a thread, attaching itself to a new surface. It enables the mussels to anchor to rocks and pilings in turbulent areas where food and oxygen are more abundant.

The INEEL, in collaboration with scientists at the University of California, Santa Barbara, is identifying five proteins that go into the thread makeup that constitutes the "glue." Cloning the mussel proteins is expected to be the crucial step in opening doors for developing this amazing epoxy. "Right now, companies like 3M and Allied Signal would need about a million mussels just to start their evaluation," says Frank Roberto, molecular biologist at the INEEL. "That's impossible to provide, but with a method of mass producing them through cloning," he adds, " industry giants will be able to test the natural super glue on their products." The ability to remain intact in sea water is only one advantage the "mussel glue" offers. "It doesn't require high temperatures to activate its cementing qualities as do other conventional waterproof glues," says Roberto. "And, it's also environmentally safe because it comes straight from nature, unlike the standard petroleum and tar-based glues now being used," he adds.

Contacts:
Ken Haas, (770) 908-1032, ideaken@aol.com
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Nick Nichols, (208) 526-1693, fnd@inel.gov

New Era Begins At INEEL

Following a 90-day transition period, Bechtel B&W Idaho, LLC took over the job of managing the Idaho National Engineering and Environmental Laboratory on October 1. Lockheed Martin Idaho Technologies Company stepped down September 30 after five years at the INEEL.

"BBWI is excited and proud of our opportunity to be the management and operations contractor at the INEEL," said Bernie Meyers, BBWI president and general manager, in an electronic message to employees.

Insulating Between The Lines

Efforts to manufacture cheaper, faster and smaller cell phones, digital cameras and other electronics have been hampered by the performance of materials in today's semiconductor devices. Industry is in search of improved insulating materials for use between the metal lines on silicon chips that minimize capacitance - charge buildup - as the metal lines are brought closer together. Lower capacitance can result in higher signal speed and lower power consumption.

Now, researchers at Pacific Northwest have developed a porous, silica thin film with a nearly 50 percent reduction in capacitance over high-density silica, the industry standard. Researchers are teamed with Sematech, a major semiconductor consortium, to develop, test and evaluate the technology.

Scientists dispense a solution on a bare silicon wafer inside a spin coating device (shown here) during the development of thin films for improved semiconductor materials.

Article courtesy of "PNNL TechNotes"
Contact: Marv Clement at (509) 375-2789

An Invitation To Entrepreneurs

CALSTART, host of the largest business incubator network in the country, is hosting its first semi-annual Venture Forum and Investment Conference. In attendance will be more than 100 angels, private investors, bankers, institutional lenders, and venture capitalists representing over $200 million. Similar forums in Southern California have led to more than $80 million in investment deals since 1994.

Featured speakers at this event will include Mr. Clay Womack, CEO of Direct Stock Market, and Mr. Bill Reichert, President of garage.com. A total of 20 companies will be chosen to become presenters. Each presenter will need to attend a full-day training workshop, and a half-day dress rehearsal prior to the event.

The process begins with your business plan. To be considered as a presenter, you must submit three copies of your business plan before December 3, 1999. Companies who contribute to environmental, advanced transportation, energy and high technology industries are particularly encouraged to participate.

The conference date is February 1, 2000 at the Pasadena Convention Center in Pasadena, CA. Presenters will be announced and contacted on December 31st. The training workshop will be on January 11, 2000 and dress rehearsal will be on January 25-26. Each company must submit three (3) copies of their business plan, a $250 non-refundable, one time, participation fee and a company fact sheet, complete with contact information of company principles and of the host incubator.

Each company who applies will receive three reviews of their business plan, provided by members of an elite group of business professionals including consultants, educators, and investors (a $3000 value) and admission for two to attend the investment conference (a $100 value). Each company will be responsible for its own travel expenses and accommodations associated with the events of this conference.

Contact: WestStart/CALSTART, (626) 744-5600
http://www.calstart.org.

NASA to Grant $480,000 to Inspire High School Youth

"During the next few decades NASA will be launching a fleet of automated robots to explore the Solar System. We want to empower the next generation of students to be the designers of these intelligent machines," said Mark Leon of NASA's Ames Research Center, Moffett Field, CA. To help achieve this goal, NASA is providing $480,000 in grants to 80 high schools across the nation in a unique robotics program to inspire students to follow careers in science and technology.

The challenge for students from each of the approximately 300 competing schools is to design a robot to accomplish a series of tasks both quickly and efficiently. The robots are then allowed to compete in an arena setting to determine a winner.

In the NASA Ames Region, student-made robots will "clash" in competitions to be held March 30 - April 1, 2000, at the San Jose State University Event Center, San Jose, CA. This region includes Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, Oregon, Utah, Washington and Wyoming. Regional winners are eligible to compete in the national championship robotic games April 6 - 8, 2000, at Walt Disney World's EPCOT Center, Orlando, FL.

Tom Dyson (650) 604-6601, and Joseph Hering (650) 604-2008, both of Ames, have additional information about the NASA-FIRST regional robotics games.

Honeybees All The Buzz In Landmine Detection

The latest in fashion for bees this summer – a high-tech tracking backpack – also may help find millions of landmines scattered throughout the world.

If honeybees can be trained to seek the chemical components of explosives, the ability to track bees and analyze their hives could help pinpoint landmines or unexploded ammunition on firing ranges or old battlefields.

Engineers at Pacific Northwest National Laboratory have modified commercially available radio-frequency tags for bees to "wear" so they can be identified. Special electronics and software also designed by Pacific Northwest are mounted on man-made beehives to "read" the identification of each bee from the tiny tags.

Researches hope that while bees are out foraging for pollen they'll also pick up traces of the chemicals found in explosives that leak from landmines into soil and water.

"Bees are like flying dust mops. Wherever they go, they pick up dust, airborne chemicals and other samples," said Dr. Jerry Bromenshenk, an entomologist at the University of Montana, who is coordinating this project. Bromenshenk has pooled resources from three federal agencies and three national laboratories to conduct this research, which is funded by the Defense Advanced Research Projects Agency, the central research and development organization for the Department of Defense.

In a field test in May, several bees were outfitted with the tags, each weighing less than a grain of rice. Pacific Northwest engineers determined that the radio-frequency fields didn't interfere with bee activity, but that the tags should be made smaller to lesson the impact on bees' flight. Sokymat of Switzerland and its U.S. representative, North American Research Inc., are working to reduce the size of the tags.

A beekeeper holds honeybees that are helping researchers at Sandia National Laboratories and the University of Montana determine whether foraging bees can detect buried landmines. In the foreground are two unfused antitank mines. (Photo by Randy Montoya)

A second field test at Sandia National Laboratories will study 50 tagged bees to determine the greatest distance bees can forage and how long it would take them to reach the landmines. In that test, a reader will track each time a bee leaves the hive, which way it is heading and when it returns. A system of analysis tools being developed by Sandia, Oak Ridge National Laboratory and the Environmental Protection Agency will be installed in the hives to scan for chemicals such as TNT.

Contact: Marv Clement at (509) 375-2789

continued from page 1:

From the Regional Coordinator's Desk

5,000 are being mailed out to businesses. The business needs identified by the responses will be matched to the resources, technologies, and intellectual property at the region's member laboratories and the universities and college members of CORE 21. This is an opportunity to leverage your laboratory assets by addressing identified and focused needs.

As we have previously discussed, the Far West Region is aggressively moving ahead in the electronic media services provided by the region. We have created a comprehensive Far West Regional home page http://www.zyn.com/flcfw. One of the special features of the home page allows you to advertise your laboratory key assets to the public and private sectors through an "Opportunities Page." It is our goal to provide value added tools and techniques through this home page to help position your laboratory for the 21st Century in Information Technology and E-Commerce.

continued from page 1: ***R&D 100 Awards***

The ARM accelerator is designed to produce bursts of x-rays that will help scientists to examine the effects of aging on the nation's nuclear weapons stockpile without the need for nuclear testing. The prototype source for ARM houses over 5000 transistors and delivers a burst of 165-megawatt pulses at a maximum pulse rate of 2 megahertz. When compared with the state-of-the-art in accelerator power systems, this source exceeds all previous performance records by a factor of 400 in repetition rate, or speed, and a factor of 1000 in pulse duty, or average power.

This project is the first application of solid-state power for high-current induction accelerators. The power source gives a single accelerator so much versatility that it performs as if it were many accelerators operating in parallel-at cost savings of $100 million per accelerator.

Contact: Elaine Mew at (702) 295-2943

Far West Region Sponsors Joint Training Workshop

The Far West Region, as part of its on-going training program, is sponsoring an interactive workshop "Corporate Growth and Profit Though Technology Commercialization". The Center for New Venture Alliance (CNVA) was retained to custom design the workshop to meet the mutual needs of federal laboratory representatives and small high tech firms.

The overriding objective of this workshop is to enhance the ability of both parties in the required partnership of commercialization to deal with identifying technology opportunities in the laboratories; the management and valuation of technology; and the creation and maintenance of "Win-Win" relationships between the laboratories and their small business partners. It is obvious that the more each party in a partnership knows about the total process the more effective the partnership will be. This was the goal of the Far West Region in having CNVA modify their workshop design to incorporate the high tech small business representatives from the SBIR program into the workshop environment with the laboratory representatives.

The demand for this type of collocated integrated training has been proven by the early registration numbers for the workshop which have exceeded those for a proposal preparation workshop at the SBIR conference.

The Region intends to solicit input from both laboratory and small business attendees to evaluate the effectiveness and value of this training workshop. The results will be shared with the national FLC training program.

CNVA Contact: Dr. Larry Udell, Executive Director (510) 888-1998.

Upcoming Events

November 21-23, 1999
Fall '99 SBIR National Conference & Far West Regional Meeting
Las Vegas, NV
(360) 683-5742 * www.zyn.com/sbir

January 18-20, 2000
Pacific Design Engineering Show 2000
Anaheim, CA
(301) 996-9421 *
www.pacdesignshow.com

January 23-28, 2000
NASA Ames Research Ctr. Conference on Information Technology for SBIR & STTR Programs
Moffet Field, CA
(650) 604-5063

May 8-12, 2000
FLC National Meeting
Charleston, SC
(856) 667-7727 * snacci@utrsmail.com

May 9-11, 2000
Sensors & Motion Control Expo
Anaheim, CA
(203) 882-1300 * www.sensorexpo.com
www.motioncontrolexpo.com

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