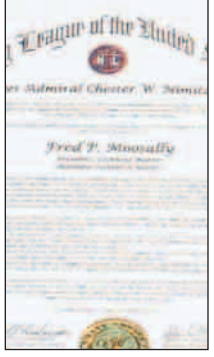

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IRADical Concepts

Corporate-wide research and development approach balances near-term payoff with long-term vision

From networking to nanotechnology. From radar to rocket fuel. With hundreds of research and development projects spanning a broad spectrum of technologies and lines of business, Lockheed Martin's R&D approach appears to be as complex as the challenges it tackles.

But look more closely, and you'll see a carefully considered portfolio of projects that are designed to advance an overarching strategy.

"Our research and development portfolio reflects what we are as a Corporation," says Jack Hammond, vice president of technology. "We are primarily an integrator of high technologies. We can't do everything ourselves, so we have to be good technology buyers and good technology developers — and we have to be smart enough to know what we want to buy and what we want to make."

That "smart" approach to R&D has enabled the Corporation to become increasingly effective at sharing ideas and new technology development across multiple domains, coordinating at both the business area and corporate levels. It includes pursuing internally and customer-funded projects, partnering with outside laboratories and universities, and staying current on the latest breakthroughs and game-changing ideas around the world.

All of this activity results in a corporate-wide collection of more than 500 projects and programs that can be

See R&D p. 2

An example of R&D work in the area called disruptive technologies is the development of microelectromechanical systems at Lockheed Martin Advanced Technology Center and Sandia National Laboratories. Here, Sandia researcher Doug Adkins examines one-quarter cubic-inch mini-robots weighing less than one ounce.

International Pride

Chile and Lockheed Martin share commitment to Chilean F-16 program

For Chilean air force officials, the nation's first F-16 to roll off of the assembly line at Lockheed Martin Aeronautics Company in Fort Worth, Texas, last month represented a milestone in a new era of modernization for an air force with a proud tradition and a bright future.

For LM Aero, the completion of the first of 10 Chilean F-16s represented an important step in welcoming another nation to the F-16 family, and the emotion was no less sincere for LM Aero program leaders than for the Chilean officials.

"We understand the importance of this program to Chile, and we recognize the tremendous amount of effort and investment that this represents for the Chileans," says John Balderston, Chile F-16 program director. "They are a great customer. They're incredibly resourceful, hard-working and professional. And I share the pride

See F-16 p. 8

Lockheed Martin Aeronautics Company delivers the first of 10 F-16 aircraft to Chile (above).

Model Behavior

Business areas turning Diversity Maturity Model results into road map to success

Lockheed Martin defines diversity as one team that encourages the individuality of each employee to achieve mission success. But diversity is more than just a buzzword; it's a commitment that business areas across the Corporation are taking seriously.

The Diversity Maturity Model (DMM), introduced last fall, tracks the progress Lockheed Martin has made in building the most inclusive work environment possible. As an enterprise, the company now has a consistent benchmark with a common set of criteria to measure maturity levels and identify opportunities for improvement.

Lockheed Martin as a Corporation received an initial DMM assessment of 2.0 or *Enlightened* on a scale of 1-5 that also included 1) *Foundational*, 3) *Embraced*, 4) *Integrated*, and 5) *Institutionalized Inclusion*. This fall, the company will complete a second DMM assessment, and the overall corporate objective is to move the bar to 2.5.

See Diversity Maturity Model on p. 9

Formula For Success

Presidential award-winner Tamara Kolda shares enthusiasm for math and science

Editor's Note: Career Paths *appears periodically featuring individuals with unique, interesting and successful careers at Lockheed Martin.*

If information is a wonderful thing — and most people would agree that it is — we certainly live in wonderful times. Never before have we been able to measure so many things, generate so much data, and provide access to so much information as we do today.

But making sense of all this information is a whole different matter, and that's where Lockheed Martin's Tamara Kolda comes in. A researcher at Sandia National Laboratories' Livermore, Calif., campus, Kolda is a bright new star in the constellation of mathematicians who are helping a wide array of scientists — and even non-scientists who simply use search engines — to analyze and understand data more effectively.

Still in her 30s, Kolda has already developed several new computational algorithms that are in widespread use, and she is currently working on mathematical techniques that are useful in finding patterns and relationships in what may seem like random data, something that has great potential to assist homeland security efforts, for example. She has authored or co-authored dozens of journal articles, conference papers, and technical reports.

The scientific community recognized Kolda for the quality of her work by selecting her for a Presidential Early Career Award for Scientists and Engineers. She was one of only 57 young scientists to receive the award in 2004.

Kolda has been fascinated with mathematics since childhood, when she attended several summer camps geared toward science, including one sponsored by NASA at the Goddard Space Flight Center. But she adds that she didn't decide on a college major until she realized that she kept filling up her schedule with math courses. Since then, her career has been anything but happenstance.

En route to earning a Ph.D. in applied mathematics from the University of Maryland in 1997, she joined professional organizations and attended many conferences. She didn't just show up, but rather made it a point to introduce herself to leaders in the field and to tell them a little bit about her and her interests, so they would be more likely to remember her.

The approach worked. "I went to my first professional conference in 1996, and many people I met there say they remember me from that conference," she says. "When you introduce yourself and put yourself in context — not just your name, but where you're from and what you do — and then send a follow up e-mail reminding them that you met them and again putting yourself in context, that's an amazingly effective tool for getting people to remember you."

That's one of the tips that Kolda passes along to the next generation of up-and-coming young mathematicians in her role as a mentor to 12 post-doctoral students and interns at Sandia, and as a featured speaker at universities, including the University of Maryland, New York University, Princeton and Stanford.

"Now I find myself meeting young people and trying to remember who they are. They're the up-and-coming people, and it won't be long before they're the people to know."

"Sometimes I give practical advice about how to meet people whose papers you've read, and sometimes I share stories about my career," she says. "Mostly I'm just supportive of them and I listen to what they're doing."

Tamara Kolda, a researcher at Sandia National Laboratories' Livermore, Calif., campus, is helping a wide array of scientists and engineers to analyze and understand data more effectively.

She also contributes to her field by participating in professional organizations. She's secretary of the Society for Industrial and Applied Mathematics (SIAM) Activity Group on Computational Science and Engineering and serves on the editorial board of the SIAM Journal of Scientific Computing. She also is active in the Association for Women in Mathematics.

Setting an example is something that comes naturally to Kolda because of the enthusiasm she has for her work. A principal member of the technical staff, Kolda came to the Computational Sciences and Mathematics Research Department at Sandia-California, a Department of Energy facility operated by Lockheed Martin, in 1999, after completing a postdoctoral fellowship at Oak Ridge National Laboratory.

"There's an excellent group of researchers here, and the quality of the work being done is outstanding," she says. Plus, she has been able to see directly the value that her work has for researchers and scientists in a variety of fields.

For example, engineers often are faced with the challenge of needing to optimize a certain aspect of a system, such as safety. Many variables affect safety, from system design to strength of materials, and Kolda has written software that automatically changes the parameters and "searches in the design space" for the optimal combination.

As her profile has risen in her peer community, Kolda has found that she no longer has to exercise her techniques for meeting leaders in her field, because in most cases she already knows them. But that doesn't mean there still aren't important new names to remember.

"Now I find myself meeting young people and trying to remember who *they* are," Kolda says. "They're the up-and-coming people, and it won't be long before they're the people to know." ■

INFO For more information about Tamara Kolda, as well as links to her articles and papers, visit her homepage at **http://csmr.ca.sandia.gov/~tgkolda**.

Moorestown, N.J., Student Wins National Space Day Contest

Ian DiMedio, a fourth-grade student at Moorestown Upper Elementary School in Moorestown, N.J., was named the winner of this year's national Space Day T-Shirt Art Contest sponsored by Lockheed Martin. In the photo at bottom left, he presents his design, which will appear on the official 2005 Space Day t-shirt. At top left, his grandfather Ronaldo DiMedio shares the excitement of winning. More than 800 students in 10 states participated in the contest, which was judged by the national Space Day program. Students in grades four through six submitted artwork that reflected the theme "Return to the Moon." The artwork of the seven finalists will be displayed at the 2005 Space Day celebration on May 5 at the National Air and Space Museum's Steven F. Udvar-Hazy Center in Chantilly, Va. As the overall Space Day T-Shirt contest winner, DiMedio will receive an all-expenses paid trip to the celebration, where he will be recognized. Space Day, an educational initiative established by Lockheed Martin in 1997, uses space-related activities to inspire and prepare young people to pursue careers in science, technology, engineering and mathematics.