

# Technological Leadership

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CENTER FOR THE DEVELOPMENT OF TECHNOLOGICAL LEADERSHIP / INSTITUTE OF TECHNOLOGY

## Innovations in Global Strategy

Accelerating Positive Change

# From the Director CDTL contributing on many fronts



Massoud Amin  
H. W. Sweatt Chair  
in Technological Leadership  
Director, Center for the  
Development of Technological  
Leadership

Professor of Electrical and  
Computer Engineering

**T**he strategic plan of the Center for the Development of Technological Leadership (CDTL) calls for the center to shape technological leadership and management worldwide, enhance its global reach, and create world-class programs. It is a privilege for me to offer an update on our progress toward these goals during the last six months.

## Greater reach

- Building on nearly three years of planning, Institute of Technology (IT) Dean Steven Crouch and I recently visited colleagues in Egypt to launch a joint master's program in Management of Technology (MOT) at Nile University.
- More than 200 dignitaries, including Minister of Communication and Information Technology, Dr. Tarek Kamel, and the Prime Minister of Egypt, Dr. Ahmed Nazeef, attended the Jan. 11 signing ceremony in Cairo. The launch marked the first such collaboration between the University of Minnesota and a Middle Eastern or North African nation.

## More tailored offerings

- In early summer, CDTL and Fissure plan to launch a new joint certificate program in technological leadership and advanced project management.
- In November 2006, CDTL and the University of Minnesota in Rochester offered the eighth Rochester Signature Series, which shares the best of MOT. The next eight-day series is planned for fall 2007.
- In fall 2006 and spring 2007, CDTL delivered several in-house technological leadership and management programs for senior staff from IBM in Rochester and plans to develop more short courses for industry partners in 2007 and 2008.
- In fall 2007, CDTL will offer the seventh annual Technology Futures Forum on technology foresight for industry executives and academic leaders.

## Looking ahead, we are excited about growing and increasing our impact.

- CDTL is now home to five endowed chairs. We look forward to the contributions of our current and new chair holders.
- Our alumni continue to do well. Nearly 80 percent of alumni surveyed hold management positions, and 27 percent, or 124 of 471 MOT alumni, are executives.
- Our strategic plan emphasizes four new areas that build on core strengths and add value to Minnesota's economy. In the near future, we will explore technological management of biosciences and medical devices, energy and environment, infrastructure, and cyber/IT security technologies.
- We've also begun a two-phase capital project remodeling process, beginning with renovation of the main MOT classroom. As a self-supporting center, we will raise funds for the project and will share more information shortly.

The future looks bright. At CDTL, we are working on developing leadership capabilities to strategically enhance security and quality of life, and serve our society in Minnesota and beyond. Thank you for your commitment and support of CDTL's mission.



The signing ceremony for the launch of our joint MOT program was held on January 11th at the Smart Village near Cairo, with participation of over 200 dignitaries including Prime Minister Dr. Nazeef, Minister Dr. Kamel, President of the Board of trustees, senior colleagues and professors from Nile University.

Back row (left to right): Dr. Allam, Dr. Ezzat, Prof. Tarek Khalil (president of IAMOT). Front row (L to R): Dr. Masilhi, Dean Steven Crouch (UMN), Dr. Ahmed Nazeef (Prime Minister), Dr. Tarek Kamel (Minister of Communication and Information Technology), Prof. Massoud Amin (UMN).

## Endowed chairs

- Established in October 2006 through a generous \$4 million endowment, the Gemini Chair in Technology Management will help Institute of Technology undergraduates broaden their leadership capabilities. The search for the chair holder, who will teach an undergraduate course on technology leadership development, began in November 2006.
- The search for the W.R. Sweatt Chair in the Management of Technology is also underway, with finalists announced in spring.



Be prepared for the exciting opportunities and harsh realities of the new world

# The New Business Normal

PHOTO BY MASSOUD AMIN

**A** trip to China four years ago led to an important moment of reckoning for business technology leader Michael Wright. As he toured business operations with a Chinese colleague, the picture of new global realities came into sharp focus for Wright. The snapshot featured a world of countless global competitors and collaborations, where innovation and change occur at lighting speed and winning leaders nimbly orchestrate all the necessary parts to adapt successfully.

"The epiphany was in front of me—the networking, the communications, and the knowledge that knew no boundaries to fuel it all," says Wright. The trip motivated Wright to take his observations and his more than 25 years of experience in the high-technology industry and shape a view of the business landscape.

In their 2005 book, *The New Business Normal: The Perils and Promise of New Global Realities*, Wright and co-author Walter Ferguson make their case for that view. The new business normal,



Michael Wright teaching the "Business Strategy in Technical Companies" course at CDTL's Technical Leadership Development series on February 19th in Rochester, MN.

# The norm today means global enterprises that operate 24 hours a day, seven days a week.

PHOTO BY MASSOUD AMIN

Jama Mosque,  
New Delhi, India

according to Wright and Ferguson, is territory that some business leaders will embrace and that others will find uncomfortable.

## In the know

Wright knows much about the changing environment for high-technology companies. His career includes a variety of leadership roles, CEO, COO, executive vice president, and vice president of marketing and sales, in companies on the cutting edge of developing technologies.

He worked for semiconductor-related leaders Integrated Air Systems, General Signal, Integrated Solutions, and Empak and participated in the instrumentation, filtration, lithography, materials, and software industries. He founded Wright Williams & Kelly, Inc., the largest privately owned provider of cost-of-ownership software and operational cost modeling tools for the semiconductor and other technology industries.

As president and COO of Entegris, Inc., the Minnesota-based provider of materials integrity management to the semiconductor, microelectronics, life sciences, and fuel cell industries, he helped engineer significant corporate growth from \$260 million in revenue in 1999 to \$700 million in 2005.

Since 2005, Wright has also shared his insights with Management of Technology (MOT) students at the Center for the Development of Technological Leadership (CDTL) and with the Rochester technical community as part of the CDTL Signature Series. He recently left

Entegris and Minnesota to lead a new start-up, Octavian Scientific, based in Portland, Oregon, as president and CEO.

## Different in so many ways

The new business normal involves a new set of standards, assumptions, and practices that are now vital to marketplace success, says Wright.

The norm today means global enterprises that operate 24 hours a day, seven days a week. It means a network of organizations that form a sophisticated supply chain working in concert, thanks to advances in information technology. It means developing and delivering new products faster and faster in markets with plenty of global competition. It means understanding the customer experience in depth and engaging customers.

As Wright points out, it is not for the fainthearted, but it does offer potential.

"There are opportunities, but you are going to have to move quickly on opportunities," says Wright. "If you are innovative, you will find new directions."

Companies that make the investment in research and development are in the position to advance and launch technological innovations. Increasingly, Wright says, technology developments will emerge from collaborations among coalitions of companies, universities, national labs, and government agencies. This "open research model" allows companies to leverage assets.

## Trees and change

At first glance, it may seem challenging to find the connection between trees and the changes that are already occurring in the global marketplace, but Wright uses the example to demonstrate the nature of the change.

PHOTO BY MASSOUD AMIN





Karnataka State Capital building in Bangalore, India. Karnataka is one of 29 states in India.

"If you take a look at a tree within a reasonable proximity over the course of a year, the changes seem imperceptible, but yet they are there," he says. "That is a metaphor for the marketplace. The changes are often small shifts, but they are continuous shifts."

Technology-driven companies, in turn, need to make their own shifts to correspond with the changes. More than ever before, Wright says, customers are defining those shifts, and companies and engineers must understand the customer better than they ever did before.

"As engineers, you need to be able to see past product specifications and ask what does it mean to the customer," he says. "You'll need to learn to look at the customers and really understand their problems before developing solutions."

Applied research remains at the heart of a company's interest in technology development. "Companies will continue to take technologies and combine them in new and unique ways," says Wright. "They also will look at how to optimize and make more efficient existing technologies or look at some combination of existing technologies."

To put this into an economic context, Massoud Amin says, "The U.S. scientist and engineers working in R & D make up about 75 out of every 10,000 people employed. The U.S. spending in R & D accounts for 2.5% of the GDP, yet the results rippling outward from the investments in technology—and its related educational base—account for over 60% of the past growth of the American economy," explains Amin. "I don't mean to overstate the roles of science and technology. But nations that invest in those fields of human capital do better economically than those nations that do not."

### Leadership traits

In a world where markets can disappear literally overnight, the new breed of corporate leaders rely on flexibility and an ability to mobilize corporate resources to pursue new directions in an instant.

Versatility and flexibility are far more important qualities in leaders than specialization, Wright argues. A focus on deep specialization makes it more difficult to gain the broad cross-functional experiences that are critical to leading technology companies in the new business normal.

**The challenge as a leader is to reinforce the values that are important and forge a framework that supports the strategy, values, and culture.**

*Michael Wright*

# The times they are a changing



PHOTO BY MASSOUD AMIN

The model of the leader as commander-in-chief no longer works well in the new business normal. The post-World War II business manufacturing-based environment emphasized tight controls, efficiency, and measurement. Instead, business leaders will use their skills to build effective teams, motivate staff, and move groups toward consensus.

"We're moving from the closed fist of command and control to the open hand of giving and receiving," he says. The challenge as a leader is to reinforce the values that are important and forge a framework that supports the strategy, values, and culture.

"Performance is the residual of behaviors," he says. "When you influence the right behaviors, the performance will follow. To change the performance, you really have to understand how the behavior developed."

Because the pace of change is accelerating, the long-term view of business becomes a vital consideration, Wright says. Rather than a traditional focus on maximizing short-term profits, the long-term view allows leaders to better consider the impact of emerging trends. The company then can make the necessary course corrections to remain a viable player.

## Passion for learning

As the world opens, the value of education continues to rise, says Wright. Knowledge will play an even greater role in development of technological innovations and in the success of businesses.

For leaders, the importance of knowledge means pursuing learning with a passion, since understanding the changing environment demands a constant stream of information and a tolerance for ambiguity.

"You are going to have to be very comfortable with gray," Wright says. "There are so many circumstances when you don't know the answer, yet you as a leader must act."

In a world where senior engineers are working in tandem with global counterparts who they may not formally meet, the willingness to commit to new actions, pursue new knowledge, and make connections can make all the difference in moving forward.

"It isn't enough to just have a toolbox now," Wright says. "It's how you use your abilities and skills. To be a global leader takes a great deal of maturity, judgment, and courage."

Educational opportunities, such as the M.S. in MOT, fit well in the new world because they help prepare technology leaders for marketplace changes.

"I really enjoyed teaching in the program, and I learn from it, too," he says. "It's a risk-free environment and a place where students can blossom."





# Pedestrian Safety

**W**hen Peter Buchen moved to the Twin Cities from Rochester, he found a home that he and his family liked in a suburb near work. When Buchen looked around the neighborhood and indeed most of the rest of the metropolitan area suburbs, he noted with dismay one missing element.



“I was surprised by the lack of sidewalks in most of the suburbs,” says Buchen. “I had children, and it concerned me. My daughter was just learning to ride a bike. My son learned to ride on the sidewalks in Rochester, but we couldn’t do that here.”

Several years later, he decided to return to the questions that nagged him earlier: Why were sidewalks plentiful in urban areas and not in surrounding suburbs? And even more challenging: Could that change?

It was his participation in the Infrastructure Systems Engineering (ISE) program at the Center for the Development of Technological Leadership that offered Buchen the opportunity to investigate his concerns about the lack of sidewalks. Buchen studied the issue for his capstone project.

A 19-year veteran of the Minnesota Department of Transportation (Mn/DOT), Buchen has filled a number of engineering roles, including design engineer and project manager, in different locations throughout the state. He joined Mn/DOT right after earning his bachelor’s degree in civil engineering from the University of Wisconsin.

Before coming to the Twin Cities, he spent nine years in Rochester as a design traffic engineer. Now, as manager of the airport development section in the Mn/DOT Office of Aeronautics, he and his staff oversee the distribution of federal funds for local airports throughout the state.

“I had always wanted to get a master’s degree,” he says. When he learned about the ISE program through Mn/DOT, he liked the content and format, and was eager to return to school. “I just thought this was a great opportunity.”

The timing also was good for his capstone topic. As a result of school funding cuts, his school district cut back on transportation, asking high school students that lived within two-mile radius to walk, again fueling his concerns about safety and the lack of sidewalks.

He began by collecting information from a variety of sources including the Federal Highway Administration and the American Association of State Highway



**Peter Buchen found compelling reasons for sidewalk development and also discovered interest in and support for increasing the number of sidewalks from transportation, civic, health, and safety advocates.**





**As a part of his ISE capstone project, Buchen surveyed local suburban governments to learn more about their perspectives and plans on the topic. “Seven out of eight communities that responded now have an ordinance requirement for either sidewalks or trails in new developments.”**

*Peter Buchen*

and Transportation Officials (AASHTO). He found compelling reasons for sidewalk development and also discovered interest in and support for increasing the number of sidewalks from transportation, civic, health, and safety advocates.

For example, of the 45,000 fatalities that involve automobiles in the United States, 11 percent are pedestrian related. “Nearly 5,000 people a year are dying on the roadway as a result of some encounter with vehicles,” says Buchen.

In fact, the rise of the automobile is one major contributing factor to the current absence of sidewalks in many suburban areas, he says. After World War II, the increasing use of automobiles, the growing population, and the booming development of suburbs combined to work against sidewalk development. On the other hand, major urban areas were constructed during a period where pedestrians ruled.

In today’s world, though, the pendulum is swinging again. Pedestrian friendliness is a factor in some rankings of most livable cities, he says. Even the Centers for Disease Control and Prevention, in promoting the benefits of walking, wants to see additional pedestrian options.

“As I looked at this and the issues that are related to it, such as walking, it turns out there is a concern from many places,” he says. For example, AASHTO and other engineering organizations were encouraging sidewalk development.

Most recently, Congress passed legislation to increase the number of children who walk or bike to school. Minnesota received \$8 million as part of the federal Safe Roads to School Program, which funds local projects to establish safe routes to school.

As part of his project, he surveyed local suburban governments to learn more about their perspectives and plans on the topic. “Seven out of eight communities that responded now have an ordinance requirement for either sidewalks or trails in new developments,” he says. In part, those and other communities are reacting to concerns from citizens.

While communities are including sidewalks as part of new development, building them into the existing infrastructure can be more challenging, says Buchen. Reconstruction projects may offer opportunities, he says, especially because it’s



easy to select targets, such as schools, libraries, and community centers, where retrofitting roads with sidewalks offer the most benefit for the investment.

His capstone summarizes the results of his research, including the latest on design standards. It offers local governments a guide on incorporating sidewalks into their planning. “We have the tools,” he says. “It really comes down to a local government policy issue.”

Buchen was a bit surprised to find the well-spring of support for sidewalks. “I learned that things are changing,” he says. “It’s positive to see that happening.”

Overall, his ISE experience also proved a positive for Buchen, who was able to apply the project management tools that he learned in class to his work and also benefited by working with other students in the class with different backgrounds and perspectives.

“It gave me more exposure to issues that I wouldn’t have seen otherwise,” says Buchen, who graduated in December 2006. “It’s been beneficial in so many aspects.”



# Conflict-Friendly Waters

**T**om Fiutak tests the conflict management awareness of Management of Technology (MOT) students in his class almost immediately. He asks students to think about the ways that their organizations handle conflict, such as in a more open or more closed manner. They rate their organization on a seven-point scale, and then they stand by the number that they select in a visual display of the contrast in conflict management approaches that exist among organizations.

The exercise helps demonstrate the importance of organizational culture and individual perceptions, two starting points for delving into conflict management issues.

Fiutak makes a point of involving and engaging students during the popular Conflict Management course as a way to drive some important points home. By the end of their time together, MOT students experience the nuances and complexities of conflict, walking away with a better understanding of the leadership skills and techniques that allow them to turn what many consider a negative into a powerful positive force.

The MOT faculty recognized early the value and importance of nurturing these skills in students. From the very start, the program included the class. Fiutak, at the time assistant director of the Conflict and Change Center at the University, agreed to teach the first class and enjoyed it so much that he returned year after year.

As one of the leading experts in conflict management, negotiations, and mediation, Fiutak also has provided mediation consulting and training throughout the world, including Poland, the Czech Republic, Hungary, Bulgaria, Moldova, France, Egypt, Germany, Malta, Thailand, Tanzania, and India. He also consults with the World Bank and assisted with New York's post-9/11 initiative to examine the redevelopment of lower Manhattan.

The course fills a number of purposes, including helping MOT students prepare for their participation in the program, which involves healthy doses of working in teams.

"We want to unwrap the fundamentals of conflicts in groups," says Fiutak. "I want to give them a common set of experiences as a group that they can transfer into their academic work."

Most students also face the challenges of working in on-the-job teams and understand that some teams can reach beyond their objectives and other teams do not fare as well. "I also want them to adapt what they learn outside of the academic sphere to prepare them to better participate on all kinds of teams."

The first step really starts with understanding both external and internal factors that impact organizational conflict.



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*Tom Fiutak*

**“Human interaction creates conflict, adding strong minded, intelligent people to business and technology amplifies this conflict. The key is how to use it as an opportunity for leadership, which begins from within and fundamentally depends on values like courage, decency, honesty, empathy, care. Those values are independent of the course we choose in life. They apply to whatever position we hold and in whatever situations we may be. Conflict can provide stimuli for positive change. It is a point of bifurcation with potential options and new opportunities. If you aspire to leadership, know the road ahead, park your ego at the door, and cultivate a quiet mind. Humility is fundamental.”**

*Massoud Amin*

Fiutak asks students to take a closer look at their own organizations. Does the organization encourage diversity of opinions? Can issues be raised freely? What is the process for dealing with disagreements?

While the analysis helps students learn more about the environment in which they navigate, they also must spend some time exploring their own reactions to conflict and the ways in which they tend to deal with conflict.

“It’s also important for them to know their own self-perceptions of conflict and cooperation, as well as their communication style and preferences,” says Fiutak. “Then they can begin to see how they can impact situations.”

Organizations and leaders make choices about conflict that can contribute in many ways to their effectiveness. In fact while many want to just avoid conflict, encouraging conflict is an important part of a leader’s job, Fiutak says.

The ‘conflict-friendly organization,’ as Fiutak coins it, allows for the expression and interaction of diverse opinions and open discussion. As a result, the conflict-friendly organization benefits from the participation and involvement of its members, who are free to bring forth ideas and challenges. In turn, this environment supports innovations and the path to change.

Fiutak is completing a book, *Conflict as an Agent of Change*, which describes the value of such an approach. Leaders play a vital role in setting the tone for such an organization, he says.

The most effective leaders, Fiutak says, are those who spend much of their time allowing

for open discussions, inviting staff to participate, and setting the stage for managing conflicts.

“Leadership supports conflict and conflict management,” he says. “Effective leaders are also highly skilled negotiators.”

CDTL director Massoud Amin agrees on the importance of negotiation to leadership. “Human interaction creates conflict, adding strong minded, intelligent people to business and technology amplifies this conflict,” says Amin. “The key is how to use it as an opportunity for leadership, which begins from within and fundamentally depends on values like courage, decency, honesty, empathy, care. Those values are independent of the course we choose in life. They apply to whatever position we hold and in whatever situations we may be. Conflict can provide stimuli for positive change. It is a point of bifurcation with potential options and new opportunities. If you aspire to leadership, know the road ahead, park your ego at the door, and cultivate a quiet mind. Humility is fundamental.”

By the end of the class, MOT students gain knowledge about their organization’s ability to manage conflict and their approach. They work on awareness and skills that will help them as technology leaders to promote the conflict-friendly environment.

“The point is to give them the realistic nuts and bolts about social conflict,” Fiutak says. “It’s important to have a realistic view of your power and the power of others and to be able to discuss positions from different points of view.”

# Adaptability at Work

**First in a series: Alumni reflect on creativity and resilience as they combined fast-tracked careers, family, life with master’s classes**

**W**hen she became the third Management of Technology (MOT) female student to welcome a new baby while in the program, Melissa Boom Coburn gave new meaning to making it all work.

Like fellow MOT and Infrastructure Systems Engineering (ISE) students, Coburn was working full time and maintaining her family life. Yet, she was able to add another important responsibility to her plate – that of new mom to her second child.



It's no accident that MOT and ISE students know how to manage their time efficiently. As a significant life experience, the program demands time and attention. Information sessions for students talk not only about the benefits, but also the commitment, and the program's orientation includes candid discussions about the challenges of integrating this new academic pursuit with work and life.

"Work-life balance was once the term for our students' ability to juggle work, school, family, and friends," says Diana Cooper, CDTL manager of educational services. "Now we use the term 'work-life integration.' You just can't keep every facet of life separated when you are working on a degree at CDTL."

Students rely heavily on support from their families and organizations and creatively manage their time, Cooper says. In return for its investment, she says, the organization sees positive impacts as students apply their knowledge on the job.

Families, too, see changes. "Spouses of students have told me they have seen their husband or wife energized by the intense learning experience, noting that their spouses are realizing their full potential in the process," says Cooper.

After working at Seagate for seven years, Coburn decided to return to school. She heard about the MOT program from her Seagate mentor. "My husband recently completed his master's degree, and my daughter was nearly two years old," she says. With four semesters and a clear beginning and end, the program's format proved as attractive as its content.

"For me, the most important element over the two-year program was centered on time management," says Coburn, senior industrial engineering manager. "There were not enough hours in the day to do everything that I wanted to do. I had to find help to do the things that I normally do."

She hired a housekeeper and shopped for groceries online, and her husband assumed more responsibilities. At work, she selected school assignments that related to on-the-job issues and delegated more.

The birth of her second child in her second year of the program, though, required a new plan. She turned to the program and her family for some creative solutions.

"The MOT program and faculty were very supportive," she says. "They arranged video streaming that I could use to catch up on classes."

Two weeks after the birth, she returned to the classroom. CDTL arranged for a nursing room for Coburn. "We are committed to the success of our staff, faculty, and students, accommodating them if we can," says Massoud Amin, CDTL director. "In this case, it meant providing a private place for a nursing room."

It also meant adjustments at home. "Hats off to my husband who would take every other Friday off of work to bring the baby to school so that I could feed my child."

Coburn also finished building a home during her program, and the balancing act required heavy support in many corners of her life: Seagate, M.S. in MOT program faculty and staff, her study group, husband, and her family. Still, all was not possible.

"My biggest trade-off was missing nightly story time with my daughter—something my husband would do so I could retreat to the study room."

After she graduated in 2006, she resumed story time and still uses many of the ways to save time that she began during her program, including the housekeeper and online shopping.

"I think communication was key, and remembering that what worked well one day for balancing your life isn't necessarily going to work the next week," says Coburn. "Bottom line: Understand your high priorities, plan your decisions with your family, and let people help you."

**In the next issue:** Look for the second part of Adaptability at Work series, which features the stories and comments of MOT alumni Dan Good from Seagate, Kate Plaisance from Cargill, and Gary Noel from Medtronic, as well as ISE graduate Val Svensson from the Minnesota Department of Transportation.



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*Diana Cooper, Manager of External Relations and Educational Services*

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Alternative format available upon request.

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