Back to the Future: State of the College 2008

By Domenico Grasso
Dean, College of Engineering and Mathematical Sciences

The year was 1896. UVM President Matthew H. Buckham, traveling though England and Scotland, delivered a lecture at Oxford University.

When he was introduced to one of the Oxford dons as the president of UVM, the don responded, “I have been there. I have traveled extensively in the various parts of the world, and I have seen many beautiful places, but there is only one view I have ever seen that is finer than the western view from the tower of the University of Vermont.”

President Buckham in a delighted tone of voice asked, “I should like to know what the other view is.” “Well,” the don replied, “it is the eastern view from the tower of the University of Vermont.”

As has become custom on this beautiful campus, today we join together to celebrate the progress and accomplishments of our distinguished College, to reaffirm our collective purpose, and to look to the east, west, north and south — as well as to the future: a future that presents both challenges and great potential rewards.

For that future, we remain dedicated to:

“A Curriculum design to promote intellectual rigor and original thinking and to integrate the entire curriculum into a coherent whole.”

These words, timely for our efforts to transform interdisciplinary curricula for science and engineering today, were actually conceived for UVM almost two hundred years ago by its president, James Marsh. Marsh’s writings of his era inspired not only UVM’s own John Dewey but also such inspirational and intellectual leaders as Emerson and Thoreau. And the words continue to inspire us today as we — the inheritors of this great and beautiful University — carry on the responsibility of living up to his challenge of integrating our College curriculum, one based on excellence in technology, engineering, science, and math — with holistic approaches to problem formulation and solution.

It is in this spirit that we want our computer science, mathematics, statistics, and engineering students to use their time at UVM to also explore the humanities, languages, arts, communication, design, and collaboration across disciplines.

This is how we will prepare our University of Vermont students to tackle the most pressing and critical issues of our time, from energy security to environmental quality. They are the ones who will inherit our rapidly changing, technology-rich world of new ideas flying at Internet and cell phone speeds from one side of the earth to the other to their colleagues and competitors.
To quote from the National Academy of Engineering, in a report just as relevant to mathematicians and scientists across the U.S., we need to ensure our students are not “learning disciplinary technical subjects to the exclusion of a selection of humanities, economics, political science, language, and/or interdisciplinary technical subjects.”

And in the words of Daniel Pink, a writer sought for his insight around the world and author of *A Whole New Mind*: “The era of left brain [sequential, logical, deterministic] dominance is giving way to a new world in which artistic and holistic right-brain abilities mark the fault-line between who gets ahead and who falls behind.”

One of the fulfilling roles of Dean is that I travel often to visit with alums of this College and speak with academic, business, and government leaders.

I let them know of all we are trying to do — from expanding the undergraduate curriculum holistically to creating a Spire of Excellence in complex systems: an emerging, computationally-intensive field that has the potential to bring engineering, computer science, math and statistics, and the humanities together in new and valuable ways.

The people I meet on these visits — entrepreneurs, established business leaders, decision-makers, international colleagues — are all impressed with what is happening in our College. They know that we — in the true spirit of our UVM predecessors Buckham and Marsh — are helping to ensure UVM and our College give students the education of the future. Not the past.

Our ability to do that is the measure of our success.

**Reaffirming Our Vision**

As has become a tradition for me each year, I would like to reaffirm our collective College vision, passed unanimously by you in 2005.

*The College of Engineering and Mathematical Sciences will offer distinctive undergraduate and graduate programs of national stature in engineering, computer science and mathematics, emphasizing the unity of knowledge in a liberal education context, and preparing graduates for leadership roles in society as well as in their chosen profession.*

*The College will be a treasured resource for the state of Vermont and will be marked by faculty excellence and innovation in both education and scholarship, and by creative students disciplined in academic rigor, continuous self-discovery, effective communication, critical thinking, and socially responsible decision-making in order to build a sustainable future as members of the global community.*

It is now 2008, and I am honored to say that the State of the College of Engineering and Mathematical Sciences at the University of Vermont is extremely strong — stronger than it has ever been. We have more publications, more hires, more undergraduates, and growing respect and interest from Vermont and the nation. This is thanks to all of you.
In a moment, I will go through many of our specific accomplishments of last year — and remark on the challenges we have that lay ahead. First, however, I would like to take a moment to thank all of you for your service to our students. We are becoming a popular College on campus — with increasing enrollments and ever better students asking for admission to our fold. The dedication of so many of you to those students, to experiment with new ideas that motivate their learning and to be true mentors is not unnoticed. This is the core of our mission at UVM, and those of you who rise to the challenge and reward of innovative, engaging, and exciting teaching are our most valuable asset.

I would also like to take a moment to recognize the academic unit heads, College administrators and staff for their work over the past year. Jeff Marshall, Bob Jenkins, Jim Burgmeier, Sean Wang, Jun Yu, and Bill Lakin — all of you have led major programs and initiatives in the College and I appreciate your service.

To College-wide staff who so often work behind the scenes, the academic and research enterprise does not exist without you. Joan Jordan, Marnie Owens, Joan Rosebush, Dawn Densmore, Josie Herrera, Monika Ursiny, Mary Reilly, Sharon Sylvester, Karen Bernard, Kurt Anthony, Michelle Mayette, Karen Wright, Penni French, Meggan Roberge, Laurel Zeno, Anthony Fouche, Floyd Vilmont, Keri Toksu, Tim Raymond, Victor Rossi, Jim White, and Lora Campagna — thank you.

And I would like us all to take a moment to also especially recognize Assistant Dean Dan Harvey for his tireless efforts on behalf of our College. His keen insight, his ability to manage the most complex and challenging of issues with unparalleled professionalism, and his dedication to excellence for our College goes above and beyond expectations each day. Thank you, Dan.

Into this excellent College, it is with great pride that we have continued to hire the best, brightest, and most exciting new talent.

**New Hires**

In the coming months we will welcome Dr. Arne Bomblies as an Assistant Professor in the School of Engineering. Professor Bomblies has a BS in chemical engineering from Cornell University, an MS in civil/environmental engineering from the University of Colorado, and a PhD in civil/environmental engineering from MIT. Among his many awards, Professor Bomblies has received the MIT IDEAS award for Innovation, Development and Enterprise.

Bomblies’ research is novel, insightful, and groundbreaking, focusing on the use of complex systems approaches to model malaria transmission. His position in CEMS was made possible through the $6.7M EPSCoR grant from the National Science Foundation awarded to UVM for complex systems approaches to the environment. We are lucky to have him.

We were also fortunate to attract Dr. Greg Warrington as an Assistant Professor in the Department of Mathematics and Statistics. Professor Warrington received his BA in mathematics from Princeton University and his PhD in mathematics from Harvard University. He has held positions as a Visiting Assistant Professor at University of Massachusetts, Amherst, and was an NSF Postdoctoral Fellow at University of Pennsylvania. Currently, Warrington is Assistant Professor at Wake Forest University and holds an NSA Young Investigator's Award as well as a Wake Forest Sterge Faculty Fellowship.
He has been the recipient of a Lilly Grant Award, an American Mathematical Society Project NExT Fellowship, and a Bok Center Teaching Award at Harvard.

Professor Warrington's research expertise is in the field of combinatorics and algebra. His research complements and expands the CEMS Mathematics Department's existing strengths, especially in the fields of combinatorial design theory, graph theory, group theory, and number theory. He is also enthusiastic about helping to enhance the College's initiatives in complex systems research.

Dr. Mary Dunlop, will also be joining the School of Engineering as an Assistant Professor. Professor Dunlop received her BSE in mechanical and aerospace engineering from Princeton University, and her MS and PhD in mechanical engineering, both from Caltech. Professor Dunlop's many honors include a DOE Computational Science Graduate Fellowship, Best Student Paper Award from the American Controls Conference, and the John Marshall II Memorial Prize for Independent Research at Princeton.

We look forward to Professor Dunlop joining the College in a full-time capacity in January of 2010, after she completes a post-doctoral fellowship at Joint Bioenergy Institute at Lawrence Berkeley National Laboratory.

Finally, Associate Dean Melody Burkins joined us last year. As many of you already know in your work with her, she has brought new perspectives and energy to College partnerships as well as an excellence in strategic academic and research management. Burkins gained her PhD and MS in earth and ecosystems science from Dartmouth College and her BS in geology from Yale University.

She spent time in Washington DC in the AAAS Congressional Science and Technology Fellowship program and then as a legislative aide to Vermont’s Senator Leahy before moving back to Vermont and leading multidisciplinary research programs as well as directing federal relations here at the University of Vermont.

Just this past year, Dr. Burkins was appointed to the National Academy of Sciences’ US National Committee for the Geosciences.

In the spirit of welcoming our entire CEMS community back this fall, I hope you have saved the date of Sunday, October 5th, to join my wife Susan and me at our home in Shelburne. Families and significant others are welcome. You should have received an official invitation late last week and both Susan and I hope to see you there.

Faculty Accomplishments

As it was last year, the list of our faculty accomplishments this year is impressive and gives me, President Fogel, and Provost Hughes great pride in our College. Examples include:

- Assistant Professor Josh Bongard was featured in a BBC article and invited to attend the 2008 Frontiers of Engineering Conference.
- Research by Assistant Professor Paul Hines was featured in Scientific American.
- In the inaugural year of UVM AERO and Project Greenspeed (an effort to build a hybrid race car), advised by Drs. Frolik and Hines with technical expertise from Mr. Floyd Vilmont, the car
won four major awards this spring, was invited to Vermont’s Thunder Road and Stowe Classic Auto Show this summer, is being featured in Vermont Business Magazine’s outreach to Vermont high school students this fall, and recently received a $25,000 gift from one of our successful alums, Mr. Roy Crowninshield.

- The 2008 SIAM Conference on Discrete Mathematics was held here at UVM.
- Professor Jeff Dinitz was named a 2008 Distinguished University Scholar.
- Former Prime Minister of Norway Gro Brundtland, who has also served as Director-General of the World Health Organization and was the leader of the first international group to define “sustainability,” will deliver a CEMS-sponsored Aiken Lecture.
- A new professional development short course, EMERGEneering, generously subsidized by the State of Vermont, will make its debut.
- Environmental activist and actress Daryl Hannah will visit and lecture in the Spring of 2009, also sponsored by CEMS and the Aiken Series.
- An IBM Faculty Award was granted to Dr. Tian Xia.
- New faculty member John Voight was featured on the front page of the Burlington Free Press in a story about how math protects people from information theft.
- CEMS hosted delegates from Chongqing University who are collaborating with UVM to address the environmental quality challenges of China’s Three Gorges Dam.
- Another successful UVM CEMS first: the launch of the UVM Winter Sportec Competition.
- Dr. Frederic Sansoz received the prestigious NSF CAREER Award.
- For the second year, CEMS hosted Stephen Wolfram’s prestigious 2008 New Kind of Science Summer School.
- Engineers Without Borders UVM Chapter worked to create potable water overseas.
- Professor George Pinder published a new book on the physics of flow in porous media.
- Professor Michael Wilson published a new book on Littlewood-Paley Theory.
- A $6.7M NSF EPSCoR grant was awarded for complex systems and the environment.
- And last, but by no means least, five excellent faculty members were successfully tenured and promoted: Jeff Frolik, Donna Rizzo, Maggie Eppstien, Chris Skalka, and Rich Single.

[For more details on these accomplishments, please see our News Archive.]

Administration

This year, we also had impressive benchmarks in our faculty and administration:

- Robert Jenkins, former Dean of the College and Director of the School of Engineering, was appointed to the UVM Flint Professorship of Mathematics, Natural, and Technic Science.
- Dr. Kenneth Golden was appointed to the Williams Professorship of Mathematics.
- Drs. Foote, Snapp and Marshall, and Dan Harvey are working hard to lead a successful updating of our College By-Laws.
- Our CEMS budget and administrative teams are working smoothly and innovatively with the Offices of the President, Provost, and Vice Presidents across campus.
• We have continued to invest in student recruitment, updating our student recruitment video, improving our website, improving the program for Admitted Student Visitation Days, updating our postcard, outreach, and email campaigns to highlight the Vermont advantage, and began to exploit the YouTube venue.

• Our College-wide Board of Advisors continues to be extremely supportive of our growth and change.

• We continued our Deans Distinguished Lecture series. This past year, we hosted:
  o David Pensak, former chief computer scientist at DuPont, Founder of multiple AI/complex systems companies, and professor emeritus at Wharton
  o Dr. Chris Wood, VP of the Santa Fe Institute
  o Dr. Brian Wells, Senior Principal Engineering Fellow at Raytheon
  o Dr. Joseph Sussman, Professor of Civil Engineering and Engineering Systems at MIT
  o Dr. Ken McLeod, Chair of Bioengineering at Binghamton University

• We sponsored a thought-provoking art show at the Fleming Museum and at Burlington City Arts and underwrote STEM programming at Vermont Public Television (VPT).

• We began to create new partnerships with the ECHO Science Museum at the Leahy Center for Lake Champlain.

• CEMS faculty were featured in *Emerging Science*, an EPSCoR-funded VPT series.

These are remarkable accomplishments and I am sure I did not list them all.

And it is with this strength that we will also face challenges. An infusion of base funds from the Provost over the past several years, coupled with well-considered spending throughout our Schools and Departments, gives us a solvent College in strong financial standing today.

However, we are part of a larger community and economy and — along with every other unit on campus — we were asked earlier this summer to make a 1% rescission to our expected FY09 budget. I am pleased to say we pressed the Administration about the need for quality student services and education — and the importance of our ABET accreditation — so were able to negotiate rescissions that kept all staff and services to support students and the faculty, as well as fund all new faculty positions with reasonable startups.

Yet: Looking ahead to the FY10 budget process, I want everyone to know university finances will not get easier. Our hope is to leverage our excellent, increasing student recruitment as well as success and innovation in research productivity, continued State outreach, and new partnerships into an even more robust budget for the College next year. However, because of a 5% rescission in the State appropriation to the University, we may be facing up to a 2% rescission this coming year.

I — and all of your senior leadership in the College — will do all that we can to again ensure those budget rescissions do not affect the quality of our teaching, research, and innovation College-wide.
Education

Turning to our core mission of educating undergraduates, we have continued accomplishments on this front as well. These include:

- **ABET Assessment Process**: We are in our ABET self-study year. Dr. Jeff Marshall with many years of experience negotiating the ABET will lead our effort over the coming months. I ask everyone to please do all that you can to help make this a positive experience for all involved.
- **New Degrees**: We are in the final stages of approval for the BA degree in engineering. The president, provost and members of the Board of Trustees have all indicated strong support for this degree. We also continue to move forward on many other curriculum reform efforts to better prepare our students for the 21st century.
- **Student Experience in Engineering Design (SEED)**: The new capstone design program that debuted last year in the school of engineering is continuing with exciting new projects, sponsors, and with sustained enthusiasm.
- **A Center for Student Success** has been designed and will be opening soon. It will feature a dedicated venue for tutoring, career counseling, and academic advising and will be reporting directly to Dean Jordan.

Enrollment

- Compared to last year, our applicant pool is up another 16% — to over 1800 applications — for 200 openings. This is up from 790 applications four years ago.
- Our total enrollment is 734 undergrads up from 537 just four years ago. The entering students claimed a combined average verbal and math SAT of 1217, which is 30 points above the University average.
- The latest figures on our College-wide student/faculty ratio is 13.9:1 with a goal of 15:1 and an overall University goal of 16:1.
- Last year we awarded 139 BS degrees, 38 MS degrees. and 10 PhDs.

Research & Strategic Initiatives

*Research Grant Activity*

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<th>Fiscal Year</th>
<th>Proposals Awarded</th>
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<tr>
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**Publications**
As a College, we published 119 journal articles, up 17% over last year.

**Graduate Students**
At the graduate level, we have 143 total graduate students of which 77 are Masters students and 66 are Doctoral students.

**Technology Transfer**
CEMS faculty were responsible for 8 disclosures and 1 patent last year, with the ideas valuable enough for a $61,000 investment by the UVM Office of Technology Transfer. CEMS is also now served by a new technology licensing officer focused on the physical sciences.

**Outreach / Public Relations**
- We have adopted a strongly proactive approach under the leadership of Dawn Densmore, moving news stories out weekly, if not several each week.
- Our Design TASC (Technology and Society Connection) and GIV Engineering Summer Institute are flourishing.
- The GIV Engineering Summer Institute was connected with the NSF-sponsored Global Challenge and, in 2008, several of the Global Challenge international student participants are applying to UVM. These are outstanding students who could attend school virtually anywhere.
- We supported PROJECT PORCHLIGHT where high school students distributed approximately 2800 free compact fluorescent light (CFL) bulbs to households in Burlington and Winooski during the Institute.
- A new organization was formed — UN-PAC — composed of engineering sustainability students who worked on product packaging.
- UVM CEMS led major articles showcasing our programs in PE magazine and IEEE Technology and Society Magazine, and provided the keynote address at a Mellon Foundation–sponsored Symposium on Engineering and the Liberal Arts held at Union College.

**Development**
As you may know, with the hire of VP Marc Diamond, the office of Development and Alumni Relations has been re-structured. None of the Colleges or Schools will have specifically assigned development officers. The intent is that this new structure will be more efficient and provide all academic units with the potential to access gifts from donors across disciplines.

Our CEMS development metrics are very good and getting better every year:

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<th>Fiscal Year</th>
<th>Donor Gifts</th>
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<td>2006</td>
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Additional Strategic Initiatives

- We have two upcoming visits to the IBM Hawthorne site to discuss major collaborations.
- We co-sponsored, with Lt. Governor Dubie, a visit from MITRE Corporation senior leadership to discuss collaboration on complex systems and cybersecurity topics.
- Vermont Advanced Computing Center (VACC) will be moving to CEMS under my leadership. We welcome Andrea Elledge, Roger Aspinall, and Bob Devins as members of our community from the VACC and look forward to working with you and others across campus on this important initiative.
- The Vermont Environmental Engineering Advisory Council — chaired and staffed by UVM CEMS leadership — issued its preliminary report and visits are scheduled with Vermont’s Secretary of Commerce and Community Development to major environmental engineering firms across the nation to discuss Vermont opportunities.
- Partnership with EPSCoR and the Transportation Research Center continue to support significant work in CEMS with much of it focused on complex systems.
- CEMS is working with UVM’s Office of Sponsored Programs to ensure CEMS activity on interdisciplinary grants — some of which is not adequately recognized in current UVM-wide metrics for research productivity — truly showcase and reward your innovative and collaborative efforts, providing even more incentive for cross-disciplinary work.

Facilities

We have completed approximately $750,000 in renovations in Votey to accommodate new research labs. I would also like to note a remarkable trend in interdisciplinary research proposals, and a growing willingness by the faculty to share research lab space. It is this approach that will help us all succeed.

CEMS is in the second tier of UVM priorities for a new building and we have already begun space discussions and planning with UVM’s plan management consultants. Initiatives surrounding fundraising for the building are the priority of our CEMS Board of Advisors Executive Committee and I’m looking forward to these discussions — and a new vision for a Science and Engineering Complex at UVM — progressing as rapidly as possible.

New Faculty Searches

Last year, you all took on the added challenge of several faculty searches. I know this stretched your time thin and I truly appreciate the effort, especially as it brought in such excellent candidates as Bomblies, Warrington, and Dunlop.
This year, we will again be searching for the very best in new faculty to serve our students, grow our College, and invest in our Spire of Excellence in complex systems research. Knowing the challenge, I have asked for additional administrative support for the searches and am working to streamline and coordinate the process, combining search teams and outreach.

Our searches this year include five in the School of Engineering:

- Director SoE
- Intelligent Infrastructure
- Bioengineering
- Transportation & Energy Systems
- Biofuels (non-tenure track, shared with Extension)

We also will have one in Mathematics and Statistics, focused on Statistics. And one in Computer Science, specifically in Intelligent Systems.

I would like to offer my sincere thanks to those faculty members who have already consented to serve on or chair various committees. You will be instrumental in our continued quest to hire the best and brightest!

**Concluding Remarks**

Just two weeks ago, I was fortunate enough to join 3000 Vermont educators to hear Daniel Pink deliver a lecture on the future of education and global competitiveness. He began his presentation by asking: Will we, as U.S. educators, prepare our students for our past or for their future?

The world is very different from what it was when many of us started our careers. The fundamentals of scientific and engineering knowledge have not changed, but how we elect to apply them certainly must.

I again remember the prescient UVM President James Marsh, who foresaw the needs of the 21st century while working by the lanterns of the 19th century. He told us to create curricula that integrated ideas across disciplines, to teach the whole student. To ensure a Unity of Knowledge is the core for UVM. And I watch as eloquent writers — EO Wilson, Daniel Pink and Derek Bok — urge us to rise to the challenge of a changing, complex world in need of creativity, insight, and cross-disciplinary skill.

Our College can be at the forefront — many of you already are — in guiding the next generation of global citizens who have learned they must integrate technical and scientific knowledge into what President Marsh called a coherent whole “to call forth into conscious and active exercise the powers of the mind.”

This is the paradigm we have inherited as UVM citizens and through our University of Vermont academic lineage.

We are at an exciting time — for our professions, the state, and the world. The ultimate measure of our success will be how we teach our students and graduate students — and how our collective work to
advance educational paradigms, research innovation, and service to our communities improves the world around us. We must be both local and global. We need to think of the far-reaching material and intellectual merits of our work.

Between the presidencies of James Marsh and Daniel Fogel, our College

was born out of necessity and opportunity,

experienced a golden era of productivity,

and struggled for its very existence.

Today, CEMS is strong and vibrant and is clearly recognized as one of the critical cornerstones for the success of the University and the State. We must sustain this effort and realize our vision of being widely recognized as a treasured resource of the State of Vermont.

I personally look forward to the day when we advance the vision further, to include being a treasured, invaluable, and irreplaceable resource of knowledge for the nation and the world.

You — the faculty, staff, and students of CEMS — have the talent, potential, and vision to make this a reality.

I am sincerely looking forward to working with you all in the year ahead. Thank you.