Good afternoon to you all!

I am very pleased to welcome you to our traditional fall luncheon and the “State of the School” address of the Viterbi School of Engineering.

I am even more pleased that so many of you could be here today. As always, this forum gives us an opportunity to review the past, and set goals for the next year. And, this year, to set goals for the next several years….

It was suggested to me that all I needed to say was: “The state of the school is fine. Thank you for coming.” Then we could all go back to our offices and get some work done.

I was tempted, but there are just too many important things to talk about. I will try to be brief, but not too brief. In Shakespeare’s “Hamlet”, there’s a character named Polonius. He likes to give a lot of advice. But one of his more famous suggestions is to be brief: “Brevity is the soul of wit.”

Polonius did follow his own advice. Tragically, and shortly through the play, however, he gets himself stabbed. It was brief- the outcome not so witty… So, in the interest of getting through this speech all in one piece, you will allow me to sacrifice some brevity…

This is a very special time at the Viterbi School, and at USC. In fact, it is a pivotal one. The Viterbi School is a much different place (and for the better) than five years ago. We witnessed significant accomplishments, some of which you will hear about shortly. But, at this very juncture we have a renewed mandate, for me as a dean, but also for the school overall, to create an even brighter future. This should not be an incremental brightness- but a new brilliance! And I believe that in today’s global world of rapid changes, this mandate is not simply an aspiration- it is a necessity.

President Nikias has challenged USC to become a place of “undisputed elite status”. I would phrase the challenge for our school somewhat differently: paraphrasing a highly praised book, it is how to go from “Very Good to Great”. (Those of you in the leadership of the school know that Jim Collin’s book “Good to Great” has been, let’s say, a required reading this summer…)

The moment is pivotal, particularly for engineering schools. Consider the following:

- Engineering is empowering society. At the Viterbi School we have coined this as “engineering+”. (You will see a copy of my last February speech to the Trojan League on this subject on your table.)
- NAE President Chuck Vest said at last year’s NAE Grand Challenges Summit at USC- “We live in the most exciting era for science and technology in human history”.
- We live in the era where innovation (ultimately technological) fuels the world’s economic engine.
At the same time:

- Globalization currents are sweeping the landscape of higher education in engineering
- Global economies are dramatically changing
- The US and the world is facing novel, unprecedented challenges. The NAE aptly bucketed these Grand Challenges into four categories, “sustainability”, “health”, “security”, the “joy of living”. (To which I would very much like to add, “societal organization” - I know it is venturing a bit too far into human behavior.)

So, I believe that engineering will be fundamental

1. To help continue the unprecedented economic growth worldwide- one that has lifted billions from poverty (in the “exponential” pace driven by Moore’s law- which, incidentally, is progressively threatened by its approaching end).
2. To help solve daunting new global challenges (and the unintended consequences of technology); and
3. To improve the human condition, whether in security, health or the advancement of the mind and the spirit.

We are at a privileged place - the opportunity is ahead of us to shine brightly. Our challenge would be to grasp it - carpe diem. Shakespeare said, “What's past is prologue; what's to come, is yours and my discharge.” And, “All the world’s mine oyster, which I with sword will open.” Now, I am not recommending buying swords for this task… Instead, we will need to first formulate answers to some deep and fundamental questions:

**What do we want to be? What is our ambition?**

Collins provides a helpful hint. Planning for our trajectory should be based on the intersection of three sets:

(1) Be what you are deeply passionate about;
(2) Be what you are best in the world at; and
(3) Marshal the resources to enable this to happen.

Deeply passionate about… Best in the world at… Resources…

During the preceding summer, the school’s leadership held many brainstorming sessions about these issues. And we will hold many more in the very near future with all the school’s constituencies, including all of you.

Here are four items that I believe speak for many of us in our **passion** about this place:

1. *Be the place of global attraction of top talent, whether they are students and faculty (and staff)- from anywhere in the world. And provide the culture and the environment for these talented people to flourish.* To phrase it in mathematical terms, in today’s non-linear world, we must be a steady, global attractor… whether physical or virtual, but always driven by our ideas and programs.
2. **Provide continuous added value to our curriculum, our programs, our infrastructure.** This is the challenge of continuous, relentless innovation.

3. **Be the catalyst for innovation- to fuel the economic growth of Los Angeles, Southern California, the United States- and the world, in the general context of engineering+.** And,

4. **Lead globally to advance solutions to global challenges,** from energy and sustainability to security and infrastructure, to health and medicine, to scientific discovery and technological innovation.

Be deeply passionate about; be best in the world at; marshal resources.

The first two will define our vision; the third, the way to enable it. I will call upon you this year to help us refine our vision. And we will work relentlessly in the years to come to marshal the resources to accomplish it.

But now, let’s review how we are doing (with emphasis in the last five years, but also reference to the very latest state)- then, we can return to the question of where we are going, and how to get there.

*Editor’s note: The dean spent the ensuing portion of his speech to review recent advances in the school. For purposes of this audience, this portion is placed at the end of this article.

From the short account about the state of the school, you can see why I think we are a very good place, on the verge of becoming great. Our challenge will be how to go about that. But this will demand to answer: What is our ambition? Our aspirations? There is not a simple answer- and there may be many answers!

Formulating a vision requires the engagement of all our constituencies- one that we will pursue this year. It will lead to the formulation of a school-wide strategic plan. More importantly, it will help us think deeply and fundamentally.

How do we get there? Here are some simple, powerful hints:

1. Recruit the right people (our President calls them “transformative”).
2. Confront the brutal facts: What are ours? Be brutally honest, but keep unwavering faith that our vision will prevail in the end
3. Encourage the climate for truth to be heard
4. Execute what you consider important
5. Cultivate a culture of excellence, where disciplined people engage in disciplined thought and take disciplined action (intensity).
6. Finally, remember that sustainable transformations follow a systematic pattern of buildup and breakthrough. We cannot simply skip buildup through large or misguided acquisitions.

You will recall that in the past, my vision was encapsulated in four succinct, simple goals. I wanted all of us to work for the Viterbi School to be:

- First at USC
- A Leader in the Nation
• With Constantly Improving Quality, and
• Excellence in All Our Endeavors

It was then augmented by wanting all our constituencies to be fortunate to be associated with the Viterbi School. (I will open a parenthesis now: This past weekend at the President’s football party (the word party is a misnomer, as we are actually working hard during that event) I was talking to a parent at a very senior position in an engineering company, whose son is at our school: She said to me: You should feel so fortunate to be the dean of the best engineering school in Southern California. At that moment, I realized how telling it was of the circular meaning of the above message, with me as an advocate and as a constituency all at the same time.)

This vision certainly remains, but I believe that we must adjust and re-focus it. I firmly believe that successful research universities, such as ours, are now measured by their ability to attract intellectual capital, whether students, faculty, or research staff, who produce innovation in all its forms, from education to research to commercialization. Therefore, we must add the two new dimensions:

• Nurturing the culture for the school to be the source of the next great innovation and
• Advancing engineering's potential as the enabling discipline of our times - in what we call Engineering+

The Viterbi School has already played a pivotal role in the communications revolution that has transformed the world during the past half century. The Information Sciences Institute was a pioneer of the Internet. And Andrew Viterbi’s algorithm has enabled the faithful transmission and reproduction of signals amidst the cacophony and chaos of signals that crowd the ether. These two dramatic discoveries have brought unprecedented advances in the lives of everyone on our planet. Now, our next challenge is for the Viterbi School to become the cauldron for the next important innovation to have worldwide impact, and to be recognized as such. This distinction will place the school unambiguously and unquestionably as a global center of engineering excellence.

But there are other notions to consider as well:

Consider globalization. In the past, technology advanced globalization. Now, globalization of science and technology advances science and technology. Our ambition should be for USC to be among the research institutions that leads the world in higher education and research. Our challenges are global- and so should be their approach for their solution. We can accomplish this as follows:

1. Educate our students to be global leaders. Programs that help in this direction should include exchange of students, overseas educational programs, but also the routine use of technology (Technology-Enhanced-Access-to-the-Classroom) to partner in education with elite global institutions.
2. Partner globally in research to solve global challenges. Develop alliances and mechanisms with elite global institutions to affect the solution of global grand challenges, from sustainability to global health.
3. Lead in the global diffusion of core values and the pursuit of truth.
4. Continue to be the university that attracts the largest number of international students, who bring talent and resources and will help promote the USC global brand.

5. Promote and increase the USC brand overseas by its effective representation via USC "embassies" abroad, alumni engagement and international development.

Consider also becoming staunch advocates of the power of engineering (in the US and globally) by supporting the Changing the Conversation movement of the NAE, where the theme is

1. No profession unleashes the spirit of innovation like engineering
2. Few professions turn so many ideas into so many realities
3. Few have such a direct and positive effect on people’s everyday lives
4. We are counting on engineers and their imaginations to help us meet the needs of the 21st century

These are all thoughts to consider as we are honing on our vision for this remarkable school.

There is one final, but crucial question: **What will drive the economic engine for this change?** This is the third ingredient for a successful transformation. Let me first, report that the fiscal year 2011 ended in the black, once again, as in all prior five years. The first three weeks in the Fall semester also show that we are right on target in meeting our budget projections for 2011. However, like everyone else, we are always vulnerable to global changes, and the global economy. We should be always alert and vigilant in these unsteady financial times and to wisely use and invest our resources.

Last week, USC President Nikias announced a $6 billion fundraising campaign. Sometime within the next year, Viterbi will also announce its own campaign- after our strategic vision has been crystallized through the involvement of all our constituencies: Faculty, Staff, BoC. Our goal has been preset: it is one half-a-billion dollars (OK, and to follow course- this would be the largest ever campaign for the school, probably one of the largest of engineering schools- I will ask my statistician about that...) Considering our past campaign performance, this is a challenging (as it should be) but reachable goal.

The unprecedented **USC campaign** will provide the means for us to move from Very Good to Great. It will fund the hiring of transformative faculty, endowment for student scholarships and faculty chairs, the completion of the naming of our departments and centers, the creation of new research facilities and the launch of new academic programs.

Eleven years ago, an anonymous donor made a $20 million gift to USC. The purpose was to increase the representation of women in science and engineering — a program we now know as WiSE. If not for that gift during the last campaign, Viterbi would be absent at least four Career/Young Investigator Awards, two PECASE Awards, three MIT TR 35 awards, untold research grants and two USC valedictorians. It is as simple as that.

In Shakespeare’s “Twelfth Night”, the saying goes: "Be not afraid of greatness: some are born great, some achieve greatness, and some have greatness thrust upon them.” Well,
as a school we can cross the first one off the list. Our origins are very humble. And we certainly cannot wait for the third- that does not work in a free, competitive society. Our challenge is achieving greatness on our own — here’s where this campaign, unprecedented among universities, will provide the means to move us. And I am very confident that with your support we will do just that.

So, let’s start building the transition from

Very Good to Great

For an institution with a culture of excellence that is elitist in the meritocratic sense; disciplined, in being relentless and selfless; highly entrepreneurial; innovative; and visionary.

This will be the goal that I will dedicate my next term as a dean. In the Fall of 2011, our vision is 20/20. I ask you to join me in that effort. Thank you again.

*Editor’s note: The text below is the middle portion of the dean's speech listing the state of the school and recent accomplishments since May 2011.

This fall, the entering freshman class is, once more, the envy of USC- once again topping all previous classes. Since the new test was introduced in 2006 the average SAT has increased by nearly 50 points. Thirty percent of the class are university scholars; almost one-fourth have perfect math scores on the SAT or ACT; just over 30 percent are women; with students represented from 22 different countries; 36 different states; and having incredibly diverse backgrounds and interests. These are some very bright students!!

These stats take human form in freshman Naa Adei Mante (Nah-uh-day Montay), the daughter of Ghanaian immigrants, a USC Trustee and Mork Family scholar who was honored by the governor of her home state of Maryland as the Boys and Girls Club 2009 “Youth of the Year.” Naa Adei had her choice of elite universities, including Georgia Tech, Carnegie Mellon, Brown, but chose USC because she felt a unique sense of support- and cherished our strong female student and faculty representation in the school.

More impressive is how many of those students will be graduating with engineering degrees. In the crucial freshman year, the Viterbi return rates to engineering have steadily increased: from 84% four years ago to 93% last year- and a four-year graduation rate from 50% several years ago to 72%. (The six-year graduation rate is close to 87%).

These are outstanding gains for what is arguably the most demanding major in the university.

Many of our students chose to attend Viterbi and USC rather than other top institutions. Like the Duke of Norfolk says in “Richard the Second”: “The purest treasure mortal times
afford is *spotless reputation.*” And indeed, the Viterbi brand is getting stronger! Our job is to ensure that four years from now those students will know that they could not have made a better choice!

New educational programs add immense value to our curriculum and make a big difference. I will cite a few over the last years:

- Freshman Academies- since 2005
- Math Ownership- since 2004
- Division of Engineering Education- since 2007
- Capstone Design Innovations - 2007 to present
- Engineers as Teachers - 2009
- NAE Grand Challenges Scholars - 2009
- X-Prize Foundation entrepreneurship course - Spring 2010
- i-Podium - Spring 2010
- The Maseeh Entrepreneurship Prize Competition - Fall 2010
- Improv Sessions for Communications - Spring 2011

This last spring, we offered — through our distance-learning facility — the first ever joint class (led by Stephen Lu) between the Viterbi School, Peking University and Taiwan National University: This was a remarkable collaboration of students between one island, two continents and three premier universities. This exchange culminated in a three-week, in-person visit to Beijing, where all three universities worked together late into the night in an atmosphere I likened to “kindergarten meets Google.” We call this new “no-distance-learning” innovation as *iPodia* — using immersive video, top faculty and students from multiple universities to challenge the possibilities of engineering education. The next step is to add additional partners from other parts of the world and form a true global alliance (a *star alliance* for engineering education).

I should also mention Professor Alice Parker. She has been a true leader in the Division of Engineering Education. Her interdisciplinary Alternative Energy Projects class this semester — co-taught with Kathy Shing and ISI researcher Gordon Roesler — combines honors students among our juniors and seniors with graduate students. Their current plan is to generate actual prototypes in cost-effective solar power. And with Jim Moore’s recent appointment in charge of Academic Programs, I expect that we will see dramatic new added value to all these initiatives.

As a result of the tireless efforts of our MAPP office, our MS program has experienced dramatic changes in quality and composition over the years. During the last five years, the applications to our MS program have *tripled*— in fact, they increased by almost 50% (from 5,993 to 8,311) just last year. Applications from China increased by a factor of almost 10, during the same period, doubling again last year. We have also seen more-than 64% growth in the full domestic application pool, with a 25% increase in non-DEN domestic applicants this fall. Many of these applicants increasingly come from top ranked universities. Additional global efforts are planned this year in Brazil, Vietnam, Turkey and Canada. With keeping enrollments flat, this increase will result in continuously increased quality.

These numbers make up for the decrease we still experience in industry-supported
domestic students. Many companies have revised their tuition-assistance policies, and while we are preferred partners with companies, such as Boeing and Lockheed Martin, we have taken a hit in such enrollments. Creating professional MS degrees will most likely help reverse this trend.

Through the combined efforts of the doctoral office and the academic departments we have a strong new PhD class with 190 new PhD students. That's 10% larger than last year. And we have three times as many entering underrepresented PhD students as two years ago; eight NSF and NDSEG PhD fellows, the highest number ever for the school; while about 10% more Ph.D. students graduated in 2010-2011 over the previous year.

Literally, just yesterday, Juan Miguel Rocamora — one of our new Ph.D. candidates in biomedical engineering — was honored by the president of UNAM for graduating with that university’s highest GPA in 20 years: a perfect 10 out of 10. UNAM isn’t just some provincial academy — it is arguably one of the most prestigious universities in all of Latin America. Juan is now working alongside Francisco Valero-Cuevas in the Brain-Body Dynamics Lab.

How did this happen? In 2008, with Francisco’s help I led a Viterbi delegation down to Mexico City. A memorandum of understanding (MOU) was signed by myself and UNAM’s dean of engineering. Two years later, another agreement — Mexico’s National Council of Science and Technology (CONACyT), Mexico’s NSF, agreed to fund full tuition and stipends for 10 Ph.D. students at a time. Juan Miguel was among the very first to receive these fellowships at USC.

The school’s research is at an all-time high in both excellence and volume, growing by almost 10% compared to the prior year and by almost 60% over the last five years.

Engineering has truly become the great enabling discipline of our times — one that can unlock the mysteries of other sciences, even the humanities and the arts. Our emphasis on Engineering+ research is reflected in major efforts and awards in the areas of health, energy, homeland security, and education.

In collaboration with the USC Keck School of Medicine, this semester we launched a new program — Health, Technology and Engineering at USC or HTE@USC. Twelve selected graduate students — six future PhD engineers from Viterbi, six future MD doctors from Keck — are now spending the next four years together. This is unique in American academia, both for the length of the program and the depth of the curricular commitment. Imagine the relationships born out of this, the new technologies, the new ways of thinking about health care.

And in addition to HTE@USC, we have initiated collaborations with the Annenberg School of Communication, the Social Sciences and SPPD.

Engineering+ also manifests itself in many shapes — but few as dynamic as the brick and mortar incarnation of the Convergence of Molecular Sciences and Engineering (CMSE) building, a planned 120,000 sq ft building jointly between USC Viterbi and the USC Dornsife College of Letters, Arts and Sciences. This building is now moving forward fast, with a possible opening date of Fall 2014. It will act as a magnet for world-class faculty and research, with major research laboratories, numerous collaborative spaces
and state-of-the-art shared equipment facilities, including nanofabrication facilities. I am grateful to the USC President Max Nikias and USC Provost Elizabeth Garrett for their support of this effort.

Earlier this summer, Viterbi joined M.I.T. and Stanford in the elite lineup of institutions receiving two 2011 MURI awards. Daniel Lidar and Milind Tambe both won Department of Defense Multidisciplinary Research Initiative (MURI) support to lead multi-institutional efforts in their respective fields: behavioral game theory and quantum computing.

Also this summer, under the leadership of Norberto Grzywacz, we won a prestigious Coulter Foundation award. As part of this $5 million program, Viterbi, Keck, the Stevens Institute and the Los Angeles Basin Clinical Translational Science Institute (CTSI) will develop biomedical engineered solutions that will save, extend, and improve patient lives.

As you probably know the school is the centerpiece of a very large Department of Energy smart grid project, cost-shared by the Los Angeles Department of Water and Power. This includes research in controls, cybersecurity, and demand response.

More examples of societal relevance are our many efforts in K-12 outreach, now combined under a new Center currently dubbed "VK-12", which includes the NSF RET Site led by Maja Matarić and Gigi Ragusa and the recently awarded NSF GK-12 grant led by Krishna Nayak. These efforts provide opportunities for faculty and PhD student involvement in K-12 teacher and student training, and are networking teams toward other funding opportunities.

Next month marks another landmark event in the nearly 40-year-history of ISI. On October 28, we will become the first academic entity in the world to host a quantum computing system. Working in partnership with an industrial sponsor, Daniel Lidar of our EE and his team, in partnership with ISI, will capitalize on the mind-bending properties of quantum particles to perform complex calculations impossible for today’s traditional computers. Daniel will be joined in this effort in January by new EE assistant professor Ben Reichardt, coming to us from the University of Waterloo, where he is a leader in the Institute for Quantum Computing.

It is traditional at this meeting to also mention our new faculty. We had a strong recruitment class totaling ten new faculty this year: Some are already here, some will join us in the Spring, and some next Fall.

Behnam Jafarpour joined the Mork Family Department of Chemical Engineering and Materials Science as an assistant professor. He comes to us from Texas A&M University after three years as a junior faculty there. He focuses on understanding, modeling and management of energy resources and environmental systems.

Also from Texas A&M, Pat Lynett joined the Sonny Astani Department of Civil and Environmental Engineering as Associate Professor after spending a Guggenheim Fellowship in Princeton.
The faculty joining us in the Spring will be led by two new chairs, one for the Sonny Astani Department of Civil and Environmental Engineering and another for the Epstein Department of Industrial and Systems Engineering, as well as with a senior female faculty in EE. They will be joined by Wei Wu of the Ming Hsieh Department of Electrical Engineering as associate professor, having previously served at Palo Alto in Hewlett-Packard. Wu has been a pioneer in nanoimprint lithography technology.

Several others will join us next Fall.

Our faculty continue to raise the stature of the Viterbi School by earning an impressive array of honors at an increasing rate.

We all know about Technology Review’s list of the “World’s 35 Top Innovators Under the Age of 35.” It’s an impressive club. During the previous two years, Viterbi has been a standard-bearer of that impressive club with wins by Andrea Armani, Ellis Meng, and Michelle Povinelli. We have been equally proud this year to know that another two of our junior faculty are among this year’s honorees, Bhaskar Krishnamachari and Jernej Barbic.

Think about it: Five of the world’s 105 top young innovators during the past three years were from the Viterbi School. My “statistician” says that only MIT can claim as many young innovators during that span. “Good to Great” suggests: Recruit the right people and get them to stay on the bus! Andrea, Ellis, Michelle, Bhaskar, Jernej — to extend the bus metaphor even further — you’re making the bus look awfully good right now!

The list doesn’t end there.

Alex Dimakis and Rahul Jain of the Ming Hsieh Department of Electrical Engineering, Andrea Hodge of AME and Qiang Huang of the Epstein Department of Industrial and Systems Engineering all received NSF CAREER Awards. Huang is the latest recipient earlier this summer.

Andrea Hodge of the Department of Aerospace and Mechanical Engineering (AME), was awarded a three-year Alexander Humboldt Foundation Research Fellowship.

Kai Hwang of EE and CS won the 2011 Founders Award of the International Parallel and Distributed Processing Symposium.

Jay Kuo of EE and CS was appointed editor-in-chief of the Institute of Electrical and Electronics Engineers Transactions on Information Forensic and Security for 2012-2014.

Terry Langdon of AME was elected a Fellow of the Materials Research Society. Langdon also received the NanoSPD Achievement Award at the 5th International Conference on Nanomaterials by Severe Plastic Deformation.

Renowned wireless theorist and EE Professor Andreas Molisch was elected to the Austrian Academy of Sciences, was named co-recipient of IEEE’s Donald G. Fink Prize Paper Award, and was selected winner of the James Evans Avant Garde Award of the IEEE Vehicular Technology Society.
The Vietnam Education Foundation named **Cyrus Shahabi** of CS a visiting Faculty Scholar for 2011-2012. Grantees will engage in academic activities in Vietnam, and are considered ambassadors who will “represent with pride” their country and culture.

Internationally acclaimed optics and photonics innovator **Alan Willner** of EE received the 2011 IEEE Photonics Society’s (IPS) Engineering Achievement Award.

**Don Paul**, who leads the USC Energy Institute, now under the Viterbi umbrella, will receive the SPE Digital Energy Award.

**Tony Maxworthy** will receive the top prize in Fluid Dynamics in the upcoming APS meeting.

Our beloved **Sol Golomb**, who is celebrating 50 (five oh) years on the engineering faculty this year, was honored with an honorary degree at the Technion earlier in the summer.

And just yesterday, **Mel Breuer** received the Lifetime Contribution Medal from the IEEE Test Technology Technical Council. Mel is recovering from surgery- and we wish him well.

If I add that in the **last 4 years, 6 members** of our faculty were elected to the **National Academy of Engineering**, I can probably say that we are becoming a place that indeed attracts, the best talent in the world, in students and in faculty, both junior and senior- and empowers them to flourish.

I have mentioned often before that engineering is empowering society by supplying existing, and creating new, tools, devices, methodologies- and by exporting ways of thinking, of innovating and of communicating.

This empowering attribute could not be more aptly summarized but in the articulation in February of 2008 by the National Academy of Engineering (the NAE) of the Grand Challenges for Engineering. Many, if not all, address important societal issues. And their solution is not going to be simply technological. It will include the combined efforts of technologists, innovators, businessmen, educators, policy makers and communicators.

The Viterbi School has been a national leader in promoting these challenges. We co-organized along with Duke University and Olin College, the first national summit on these grand challenges in March 2009 in Raleigh, NC. And, we hosted last October 2010 the second national summit, this time in the West Coast, co-sponsored with Caltech and sponsored by Lockheed Martin. It was an outstanding national event. What is next? At the conclusion of the first summit, I mentioned that we should aim to become global: the Davos of Engineering! (Probably to become infinitely more useful and productive than the other Davos…) Well, I am pleased to tell you that we are making great progress in that direction and are planning for a global summit in 2013. Details will follow.