Stevens Institute of Technology
Research & Entrepreneurship Lecture Series – Inaugural Lecture

“Innovation and Entrepreneurship: Driving the Modern-day Mission of a Land-Grant Institution”

FINAL REMARKS

Presented by Dr. Nicholas P. Jones
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Babbio Auditorium
Stevens Institute of Technology
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Good afternoon everyone, and thank you for the opportunity to speak today as part of Stevens’ Research & Entrepreneurship Lecture Series. It’s a real pleasure to get to engage with everyone here at Stevens—an institution that puts research, innovation, and entrepreneurship on center stage. It’s clear from the many conversations I’ve had today—from all I’ve learned about Stevens and its people—that by fostering, recognizing, and rewarding innovation you have developed an extraordinary, entrepreneurship-focused educational environment. It’s a place where students, faculty, and industry professionals can join forces to nurture new technologies from concept to market. It’s also where students and faculty are finding ways to solve pressing problems, in part by introducing breakthrough technologies in health, science, engineering, cybersecurity, and many other fields.

This approach to your academic culture is very meaningful. It adds a dimension to higher education that’s desperately needed as people increasingly look to institutions like Stevens—and the people who study and work here—for not only guidance and leadership, but also for ways to have a positive impact in addressing global challenges. Stevens’ stated mission is: “To inspire, nurture, and educate leaders in tomorrow’s technology-centric environment, while contributing to the solution of the most challenging problems of our time.” It’s a noble and essential mission that you all are living every day, and you should be applauded for that and take great pride in it.

We focus intently on research, innovation, and entrepreneurship at Penn State as well—with tremendous, groundbreaking work across disciplines that is already having, and will continue to have, beneficial consequences worldwide. I’m eager to
share some of those stories with you today. While our institutions are different in size and scope, Penn State and Stevens still have a lot in common, in ways that really make an impact.

**SLIDE 2 – Penn State: A Long, Rich History**

Having been founded in 1855, Penn State has a long, rich history and is a widely recognized name, so like most people you probably know at least a few things about the University. We are a top-tier public research university, and many know Penn State for its exemplary academic programs in engineering, business, and agriculture, among others. We’re also Pennsylvania’s only land-grant university, a status I’ll discuss in more detail that still drives our broad mission of teaching, research, and public service.

And yes, of course you know we have a top-tier athletics program. We also faced extraordinary challenges in late 2011 that made news worldwide and forced Penn State and its people to look inward and assess the university and ourselves in ways we never had before. The events took a large toll, and the impacts are still being felt, but they are not keeping us from moving forward in support of our mission.

There are many things that people don’t know about Penn State—important and meaningful attributes that prompted me in 2013 to resign my position as the Dean of the Whiting School of Engineering at Johns Hopkins University in Baltimore to become Executive Vice President and Provost at Penn State. I considered it an exciting and extraordinary opportunity, and you’ll soon see why.
I work principally at our largest campus, University Park, which is our administrative hub in the center of the Commonwealth. But we have 24 thriving campuses throughout Pennsylvania, as you can see on this map, and they serve students and communities through our tripartite mission of teaching, research, and service. We are one University, geographically distributed, and in my role I visit and engage with faculty, staff, students, and administrators at each campus at least once a year.

Our total enrollment for Fall 2015 comprised more than 97,000 people, including approximately 83,000 undergraduate and 14,000 graduate students. Some students choose to remain at one campus for all four years, while others spend their first two years at one campus and transition to another for their remaining two years. To transition between campuses, the only requirement is that you meet the entrance requirements for your selected major, and the vast majority of our majors can be completed in this fashion. We call it the “2+2 plan,” and it’s a popular route to a Penn State degree. Historically, about half of our undergraduate students have traveled this path in a typical year, which speaks to our commitment to the access to affordability of a higher education throughout Pennsylvania.

Penn State as an institution includes the 24 campuses and the nearly 100,000 students, but also 17,000 faculty and staff, a teaching hospital that provides care to more than a million patients a year, more than a half-million active alumni, and an online
World Campus that empowers anyone to pursue a higher education—anytime, anywhere.

Our World Campus enrollment—students studying exclusively online—exceeded more than 17,500 in 2015-2016, reflecting nearly 13 percent growth in headcount over the prior year. Our online courses are the same ones that we offer on campus, with the same faculty and myriad opportunities for on- and offline engagement. Students can choose from more than 125 of the most in-demand degree and certificate programs in education, business, engineering, technology, health care, and more, and new degree programs are being added quickly and often. *U.S. News & World Report* recently recognized our World Campus at the nation’s No. 1 online bachelor’s degree program. It’s also in the top 7 nationwide for online graduate education offerings, including our MBA program.

**SLIDE 5 – Solid Commitment to Research**

Meanwhile, Penn State’s commitment to meaningful, impactful research across disciplines is strong and unwavering. The University’s research expenditures totaled $801 million for 2014-2015, marking the fifth consecutive year they have exceeded $800 million. The total included $510 million in funding from a variety of federal agencies and departments, reflecting the balance and breadth that have long characterized Penn State’s research enterprise. We have a very diverse portfolio that reflects our broad base of expertise across all fields.

Our balance is demonstrated by multimillion-dollar awards for new or ongoing work in areas as diverse as a Department of Energy-supported program for designing
energy-efficient buildings, a national data coordinating center for asthma research sponsored by the National Institutes of Health, a federal bus-testing program conducted for the U.S. Department of Transportation, and the design and development of anti-torpedo technology for the U.S. Department of Defense.

Thanks to our very talented and tenacious faculty, we continue to maintain a strong overall portfolio despite the continued effects of ongoing financial constraints in Washington and in Pennsylvania, which only recently released its 2015-2016 budget appropriation to Penn State after a legislative impasse that lasted several months.

SLIDE 6 – Did You Know?

Penn State also has a few attributes that make it unique. Did you know that the Penn State Breazeale Nuclear Reactor is the longest-operating licensed research reactor in the United States? The reactor received its license in 1955 and marked its 60th anniversary last August.

And have your heard about Penn State’s Berkey Creamery? Students hand-dip about 750,000 cones and bowls of ice cream each year in the Creamery store, and our renowned “Short Course” has attracted some of the biggest names in ice cream, from Baskin-Robbins to Haagen-Dazs. For six days a year, industry professionals flock to Penn State from around the world to learn how to craft perfect ice cream. Ultimately, the Berkey Creamery’s mission is to support the teaching, research, and outreach programs of the Department of Food Science; to provide quality dairy products to students in on-campus housing; and to maintain an economically viable retail outlet for dairy products to the University community.
Moving forward, the concept of discovery remains foundational in U.S. higher education, and so it is at Penn State. Through advanced research and scholarship, we seek and instill new knowledge and understanding, and foster creativity and innovation, for society’s benefit. Now more than ever before, universities like Penn State and Stevens must focus intensely on discovery to drive meaningful change, actively encouraging and promoting innovation and entrepreneurship, and maximizing the positive effects of leading-edge research and technology. Only then can 21st-century educators truly extend their reach and impact through the core tenets of teaching, research, and service.

So, how do we do that? How do we sustain, drive, and evolve the modern-day mission of Pennsylvania’s only land-grant Institution?

Earlier this year, Penn State published its strategic plan for 2016-2020, titled “A Commitment to Impact.” Penn State’s vision, mission, and institutional values are interwoven throughout the plan, and they ultimately will fuel its success. Six foundations underpin all University endeavors and are considered fundamental to implementing the plan. These foundations—Enabling Access to Education, Engaging Our Students, Fostering and Embracing a Diverse World, Enhancing Global Engagement, Driving Economic Development, and Ensuring a Sustainable Future—connect to, empower, and sustain our values as an institution.
The plan has five thematic priorities, and we cite “Transforming Education” as the first one: “Penn State will be a leader in the transformation of education, including enhancing access to it, as it fulfills its land-grant mission in a 21st-century context and continues to drive discovery-focused research across disciplines.” Achieving this will require Penn State to use its size, scope, reach, intellectual capital, and resources to help reimagine higher education, making it accessible to all sectors of society and augmenting our focus on research-driven innovation and entrepreneurship.

**SLIDE 9 – Land-Grant Institutions: A Nationwide Impact**

Our longtime land-grant mission informs and emboldens our new strategic plan – in part because some may think that mission lacks contemporary relevance, and because some may still find the concept a little nebulous. What does it mean, exactly, to be a land-grant institution? In the context of the burgeoning technological advances of the 21st century, why should we care about, much less support and sustain, a land-grant mission?

For starters, I should mention that the list of land-grant universities is longer than one might think. Penn State is one, and most other Big Ten schools, including Rutgers, also are land-grant institutions. But did you know that the Universities of Guam, Hawaii, Massachusetts, and the District of Columbia are, as well? Also on the list: the New Jersey Institute of Technology. There is at least one land-grant institution in every U.S. state and territory. It’s a select but robust list of many excellent universities that focus, like Penn State, on the pillars of teaching, research, and service.
Having spent about three years at Penn State, one of my biggest surprises has been the extent to which people – from faculty and staff to current students and alumni – really believe in our land-grant mission. They fundamentally understand what it is and why it matters, and it’s a source of great pride. I’ve even had job candidates mention it as a reason they wanted to work at Penn State.

SLIDE 10 – Key Federal Actions and Support

According to the Association of Public and Land-Grant Universities, a land-grant institution is one that has been designated by its state legislature or Congress to receive the benefits of the Morrill Acts of 1862 and 1890. The original missions of these institutions, as set forth in the first Morrill Act of 1862, involved teaching agriculture, military tactics, and the mechanic arts, as well as classical studies, so that members of the working classes could obtain a liberal, practical education. Over time, land-grant status has implied several types of federal support.

The first Morrill Act provided grants in the form of federal lands to each state for the establishment of a public institution to fulfill the act’s provisions. At various times, money was appropriated through legislation such as the second Morrill Act of 1890, although its funding provisions are no longer in effect.

A key component of the land-grant system is the agricultural experiment station program created by the Hatch Act of 1887. The act authorized direct payment of federal grant funds to each state to establish an agricultural experiment station in connection with the land-grant institution there. The amount of this appropriation varies from year to year, and a large portion of the federal funds must be matched by the state. To
disseminate information gleaned from research at the experiment stations, the Smith-Lever Act of 1914 created a Cooperative Extension Service associated with each land-grant institution. This act authorized ongoing federal support for extension services and requires states to provide matching money in order to receive the federal funds.

Passage of the first Morrill Act reflected a growing demand for agricultural and technical education in the United States. While several institutions had begun to expand upon the traditional classical curriculum, higher education was still widely unavailable to many agricultural and industrial workers. The first act was intended to provide a broad segment of the population with a practical education that had direct relevance to their daily lives. The second Morrill Act then sought to extend access to higher education by providing additional endowments for all land-grants.

SLIDE 11 – Penn State’s Evolution as a Land-Grant Institution

The Commonwealth of Pennsylvania chartered Penn State 161 years ago to bring modern science to bear in making agriculture more productive and efficient. Penn State admitted its first class in 1859, and the General Assembly three years later designated Penn State the Commonwealth’s sole land-grant institution. As we perhaps should remind our current learners, in those early years, Penn State students attended school from February to December without a break, performed three hours of manual labor every day, and ate in a building that students described as “a shanty behind Old Main,” the building we still use as our administrative hub in University Park.
In the 1880s, the institution expanded its curriculum, and programs in engineering, the sciences, and the liberal arts were developed. In the early 1900s, we introduced cooperative extension and other forms of outreach programming. Penn State Extension is an educational network that gives people in Pennsylvania's 67 counties access to the University's resources and expertise. It helps individuals, families, businesses, and communities throughout Pennsylvania with information and educational programs designed to support productive, profitable, and competitive businesses and a strong agriculture and food system.

Other significant developments included formation of the Graduate School in 1922 and the establishment of campuses beyond University Park beginning in the 1930s, the locations I showed you earlier that we now call our Commonwealth Campuses. The College of Medicine and teaching hospital were established in 1967 with a gift from the charitable trusts of Milton S. Hershey. The World Campus emerged about three decades later, making Penn State one of the first major accredited universities to provide online education.

So, clearly, we've come a long way since the days of the “shanty behind Old Main.” Yet, in 2016, it is worth noting that Penn State remains the Commonwealth of Pennsylvania’s only land-grant institution. What does that actually mean today?

The world is obviously a much more complex place than it was in the 1860s. The land-grant mission and the perceived need for it emerged during a time of widely
different social contexts, financial and intellectual resources, and national priorities. Now, Penn State is charged with adhere to that mission in a contemporary, global context, with students, faculty and staff engaged in research, teaching, and service initiatives increasingly driven by technology and innovation, and not constrained by state or even national boundaries.

Ultimately, the land-grant mission itself has not changed with time, but its intended impact has. The land-grant legacy emphasizing educational access, research, and outreach remains. But given societal shifts, demographic changes, enhanced technologies, and global connections, the mission today is also about having simultaneous local, national, and global impact in a broad range of areas.

Christine Geith, the Assistant Provost and Executive Director of MSUglobal at Michigan State since 2001, recently wrote that, “Land-grant universities share a core set of ideals. These include making high-quality education accessible, developing research and technological innovations that address the public good, and infusing contributions to solving the world’s grand challenges into the student experience.

“These ideals,” she writes, “are becoming even more important as the higher education landscape changes dramatically. Some institutions are setting up units, or have already, that help their institutions adopt innovations while staying true to their roots.”

And that, in fact, is what Penn State is doing—allocating more human, financial, and other resources to research, innovation and entrepreneurship. This University-wide
effort represents what it means to be living the modern-day mission of a land-grant institution, today and in the years to come.

How does this approach manifest itself in our programming and initiatives? I could cite many examples, but want to spotlight a select few today.

**SLIDE 14 – Invent Penn State**

I’d like to start with an already quite popular and successful initiative introduced by Penn State President Dr. Eric Barron in January 2015. Called “Invent Penn State,” the initiative is a collaboration, one in which students, faculty, and campuses work with businesses and communities across the Commonwealth to improve the lives of Pennsylvanians and, ultimately, the people of the world. The aim of “Invent Penn State” is to drive job creation, economic development, and student career success by connecting researchers with the people who can help bring their discoveries to the marketplace. This will benefit the communities we serve and the innovators working among us. Penn State is developing a culture that encourages, nurtures, and rewards entrepreneurship—not just in science, technology, engineering, and math disciplines, commonly referred to as STEM fields, but also in the arts, health and human development, education, and more.

With “Invent Penn State,” the University’s entrepreneurial ecosystem is already beginning to crystalize. President Barron committed $30 million to putting into place the organization and people to guide and support its partners along their entrepreneurial pathways, as well as working with students to encourage ideation, and then helping them to kick-start those ideas into promising new companies. This investment included
a one-time, start-up and capital funding, as well as annual funding of more than $5 million, although we expect that number to grow as we share our vision. The initiative facilitates collaboration with communities and corporations, making available Penn State's massive intellectual resources. We're partnering with alumni to mentor students, shepherd fledgling businesses, and invest in promising, innovative startups.

**SLIDE 15 – Happy Valley LaunchBox**

As a part of the Invent Penn State initiative, the University introduced Happy Valley LaunchBox, a no-cost business accelerator program with co-working space in downtown State College, adjacent to our University Park campus.

Happy Valley LaunchBox launched late last year by soliciting applications from the community, as well as from Penn State faculty, students, and staff, seeking entrepreneurial teams with scalable business concepts. The support services offered to selected teams would include a 10-week business startup training program; co-working space; one-on-one mentorship from local entrepreneurs and Penn State alumni; and access to professional consultation and research resources such as the Penn State Law Entrepreneurial Assistance Clinic, the Penn State Office of Technology Management Intellectual Property Clinic, the Penn State Small Business Development Center, the Farrell Center for Corporate Innovation and Entrepreneurship; and the University Libraries.

The five inaugural LaunchTeams included:

- Lockeroom, a platform for managing youth sports teams and leagues;
• **Project Vive**, *(vee-vay)*, a speech assistance technology that provides a low-cost, effective device to support people who cannot talk;

• **ReDi Index**, a tool offering guidance and methods to measure an organization’s recycling efforts;

• **Scenomi**, a software-as-a-service concept that helps healthcare organizations identify and quantify the value of their technology investments; and

• **Somnus**, a medical device that more accurately diagnoses sleep apnea.

Last month, Invent Penn State hosted a “graduation” for all five startups and announced the next cohort of 10 startups that will participate in LaunchBox’s summer session, beginning the week of May 23rd. Moving forward, LaunchBox will select three cohorts per year, for an ultimate capacity of 30 business startups.

Beyond Happy Valley, the Invent Penn State initiative also provided seed grant funding for six additional entrepreneurship center programs in Commonwealth Campus communities: Abington, Behrend, New Kensington, Harrisburg, Lehigh Valley, and Wilkes-Barre. And I’m thrilled to announce that just last week at our Board of Trustees meeting we announced that LaunchBox sites will open in the coming year at Penn State’s Schuylkill, Great Valley, Berks, and York campuses, with many more to come.

**SLIDE 16 – The EdTech Network**

Another offering that has emerged from the Invent Penn State initiative is Penn State’s EdTech Network, which promotes active collaboration among companies, students, faculty, staff, and alumni to foster transformational education technology. The
Network has four main goals: to improve learning for all of our students, bolster learning and the overall student experience through our World Campus, advance the educational technology sector through economic development efforts within Invent Penn State, and advance Penn State student entrepreneurship.

The first EdTech Summit, held last November, brought together more than 70 leaders from more than 50 companies. Through this event, new connections were made that are leading into key partnerships. The engagement of EdTech partners will enable us to improve student learning in ways we may have not been able to do without the partnerships. For example, Tutor.com allows World Campus students to have 24/7 access to retired faculty members who are working as tutors. It would have been almost impossible and very costly for us to mobilize and provide this or an equivalent service on our own.

To facilitate the growth of the EdTech Network, we're adding office, manufacturing, and research space for our partners to co-locate to Innovation Park at Penn State, a rapidly expanding 118-acre campus in University Park that the Network calls home.

Meanwhile, Dreamit, an accelerator based in New York City and Philadelphia, is partnering with Penn State to create a vertical program specific to the EdTech Network. Dreamit will provide entrepreneurs with mentorship, access to a global network, connections to industry players, and up to $100,000 in direct investment. Entrepreneurs are expected to spend a week per month in one of the Dreamit hubs in Philadelphia, Baltimore, New York City, or Houston. The first cohort of 12 startup companies started
work in March, and this program is already considered a great success. As a part of the accelerator, up to 15 students will receive internships to work with the startups, gaining valuable entrepreneurial experience.

**SLIDE 17 – IST Startup Week**

Another of our engaging, entrepreneurship-focused programs is Startup Week, hosted by Penn State’s College of Information Sciences and Technology. The week originated as a celebration of successful entrepreneurs and innovators in the fields of technology and security. Since then, it has grown and developed to showcase the wealth of possibilities that exist for enterprising students as emerging thought leaders in the areas of innovation and entrepreneurship.

Now in its fifth year, this event has drawn speakers from around the country, including many Penn State alumni who have created well-respected and valued businesses and products in today’s technology market. Among the ranks are founders of high-profile companies such as Dropbox, Reddit, Scribd, Twitch.tv, and Weebly. In addition to inspirational talks, Startup Week includes pitch competitions, entrepreneur office hours, a Student Entrepreneurship Summit, an innovation expo, and networking events. Through this annual event and other initiatives, such as entrepreneur-in-residence scholarships and the addition of an entrepreneurial minor, the College of IST is at the forefront of our focus on innovation and business growth.

**SLIDE 18 – New “Learning Spaces”**

Meanwhile, we have the ongoing development of unique “learning spaces” at Penn State. One example is Maker Commons, which provides students with
opportunities to explore maker technologies as part of their coursework, research, or entrepreneurial endeavors. Maker Commons is equipped with 32 MakerBot desktop 3D printers and includes the Invention Studio, an exploration lab for rapid prototyping.

Maker Commons is housed in the Pattee Library’s Knowledge Commons at our University Park campus, but individuals from all Penn State campuses — including the World Campus — can design, upload and 3D print projects via a secure online portal. Completed projects are delivered via the same system used for intercampus library materials requests.

Faculty and students are already finding uses for 3D printing across multiple disciplines. For instance, Penn State’s Lunar Lion project, which aims to land a spacecraft on the moon within the next decade, uses 3D printers to build engine models and assorted small parts.

Mitchell Lester, a sophomore majoring in mechanical engineering and a member of the Lunar Lion team, put it quite well, saying, “When you start working with 3-D printers on a regular basis, you start to think in 3-D. And when you get to hold the final product in your hands, it ignites a great desire to learn — not just in the classroom, but on your own time, too.”

SLIDE 19 – Global Entrepreneurship Week

I mentioned the Penn State Small Business Development Center earlier, and it merits attention as well, in part because of its support of our Global Entrepreneurship
Week. The center offers entrepreneurs free services to evaluate business plans, provide market research, and clarify regulations specific to businesses in Pennsylvania.

According to the center’s Annual Impact Report, in 2015, the staff assisted 156 new clients, of which 116 were student entrepreneurs. The center secured $7.5 million in financing, started 29 businesses, sent 17 new products to market, and organized 100 events for Penn State’s Global Entrepreneurship Week.

**SLIDE 20 – Innovation in Action**

These are only the most prominent examples of Penn State’s rapidly growing focus on technology, research-driven innovation, and entrepreneurship. Almost daily stories emerge of groundbreaking research, innovation, and entrepreneurship in action across Penn State. For its final course project, a group of Altoona engineering students created a solar-powered tractor. Pictured here is Mitch Robinson, a student in our College of Earth of Mineral Sciences, recently launched Nametag, an online service geared toward new graduates that combines a resume builder, personal portfolio creation tool, and curated career advice to help job seekers. And, just announced, several Penn State industrial engineers are part of a nine-university, four-year, $4.75 million collaborative research project funded by the U.S. Department of Agriculture that is focused on increasing the efficiency of blueberry production.

**SLIDE 21 – Why It All Matters**

Ultimately, every individual's exploration, research, and innovation is crucial to the future of Penn State, and by extension to society, and we're seeing examples of great work every day.
Our University has incredible depth, breadth, and diversity of talent, along with tremendous resolve and energy. With all key stakeholders working together, the elements are in place for Penn State to extend its reach and impact through teaching and learning, research, and service.

Continued hard work, creativity, and dedication – through Invent Penn State and many other meaningful programs and initiatives – will enable our institution to achieve true impact, living its land-grant mission as an extraordinary 21st-century global university.

SLIDE 22 – Embracing Risk to Achieve Impact

I’d like to conclude by sharing a great quote from Reid Hoffman, the co-founder of the online professional network LinkedIn. He said, “An entrepreneur is someone who jumps off a cliff … and builds a plane on the way down.” At Penn State and Stevens … well, it’s great that we have an abundance of people eager to do some serious cliff jumping and plane building!

When it comes to research, innovation, and entrepreneurship, risk is always inherent. That's what innovation requires: Ideas. Experiments. Mistakes. More ideas. More experiments. More mistakes. … Until it all comes together. Until it works. Until the plane gets built and is fit to fly.

The key is not to eschew risk, or to studiously avoid the things that might not work. Doing so would result in avoiding the things that might actually work! Instead, our
job – our mission – must be to embrace risk and take chances, allowing for the mistakes we'll make on the road to major accomplishments and the resulting impacts that we seek.

SLIDE 23 – Thank You, Questions, Comments

I now can take some questions or comments. Thank you for your attention and for having me join you today. It's been a pleasure.

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