President Barack Obama   June 12, 2015
The White House
1600 Pennsylvania Avenue NW
Washington, DC 20500

Dear President Obama:

The Maker Movement has gained incredible traction across the Nation, transitioning from a grassroots activity where anyone can 'tinker' or 'hack' new innovations, to one that has real impact on industry, research and the education. Making comes with the opportunity to catalyze the emergence of new economies, identify new manufacturing processes, foster small businesses and job growth, accelerate design and prototyping, as well as to maintain our competitive advantage by incorporating agility into manufacturing. Recognizing this, in the Summer of 2014, you hosted first ever White House Maker Faire was held in Washington DC to celebrate Making's successes and highlight the opportunities for impact, innovation and creativity.

As part of this national effort to emphasize Making, 153 Higher Education Institutions committed to 'Fostering a Generation of Makers', signing a letter of support to the President of the United States. This network of institutions, coordinated by Carnegie Mellon University, Case Western Reserve University, Bucknell University and five other leading schools of Making, committed to supporting Making on their campuses in a diversity of ways.

Since last year, our institutions have capitalized on the momentum generated, coordinated to advance our shared agendas and empower Making on every campus. To this end, a subset of higher education institutions has come together to form the MakeSchools Alliance (see http://MakeSchools.org). The Alliance will capture best practices and support research that examines the impact of Making on learning, student retention, and degree completion in STEM fields. It will also serve as a network, dynamic platform, and one-stop online resource for information on higher education institutions regarding initiatives, programs and collaboration that foster Making. Since December 2014, information on nearly 40 colleges and universities can be found on the Alliance's online platform. Leveraging this information, our institutions have prepared a special report for you on the 'State of Making in Higher Education' designed to articulate work to date, success, impact and next steps for Making at our institutions (see http://makeschools.org/week_of_making/report).

Now, one year since the first White House Maker Faire and the original commitment from Higher Ed institutions, we also want to take this opportunity to renew and reaffirm that each of our institutions is committed to take one or more of the following steps to promote Making, including:

- Allowing students that are applying for admission to our institutions to submit their Maker portfolio;

- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Supporting research that advances making technologies and facilitates greater access to making experiences such as the development of new tools for desktop manufacturing;
- Expanding access to university shared facilities and scientific instrumentation to Makers;
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship;
- Providing scholarships to students based upon excellence in making; and
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations.

With a landscape review of Making and the formation of an Alliance of institutions as milestone achievements for us in the past twelve months, we will continue to work together in the year ahead to establish even more comprehensive steps for our schools and universities to support new Makers, increase K-12 and industry pipelines for students, as well as enhancing access and inclusion in higher education experiences and opportunities through Making.

We thank you for your continued support of Making and for your leadership and commitment to advancing U.S. research and education. We look forward to your working with you and your Administration to make this initiative a huge success.

Signed,

Arizona State University	Lorain County Community College
Art Academy of Cincinnati	Massachusetts Institute of Technology
Boise State University *	Minneapolis College of Art & Design
Bucknell University *	Mississippi State University *
California College of the Arts	Morehouse College *
California Polytechnic State University	New York Institute of Technology
California State University, Northridge *	North Carolina A&T State University *
Carnegie Mellon University *	Pennsylvania College of Art & Design
Case Western Reserve University *	Penn State *
Cerritos College	Parsons School of Design
College for Creative Studies	Purdue University *
Cornell University *	Oregon College of Art and Craft
Georgia Institute of Technology	Ringling College of Art and Design
Howard University *	Santa Clara University *
Indiana University *	School of the Museum of Fine Arts,
Jackson State University	Boston (SMFA) *
James Madison University *	Sierra College *

Sonoma State University *
Tennessee Tech University *
Texas A&M University *
Texas State University-San Marcos *
The University of Iowa *
The University of Pennsylvania
The University of Texas at El Paso *
The University of Toledo *
Tufts *
Tulane University *
Union College *
University of Arizona
University of California, Berkeley
University of California, Irvine *
University of Central Florida *
University of Delaware *
University of the District of Columbia
University of Florida *
University of Hawaii at Manoa *
University of Illinois at Urbana-Champaign *

University of Massachusetts Amherst *
University of Massachusetts Lowell *
University of Miami
University of Michigan
University of Michigan-Dearborn
University of New Haven
University of Oregon *
University of St. Thomas *
University of Texas at Dallas
University of Texas Tyler
University of Tennessee Knoxville *
University of Vermont – CEMS
Virginia Tech
Virginia Commonwealth University
Washington University in St. Louis
West Virginia University
Worcester Polytechnic Institute *
Yale Center for Engineering Innovation and Design *
Youngstown State University *

•   Indicates institution participating in the MakeSchools Alliance

Institution Commitments

As part of the Week of Making, higher ed. institutions are committing and re-committing their support for the Maker Movement and highlighting how Making is transforming our campuses.

Each institution that signed the letter to President Obama was invited to describe their individual commitments to Making, milestone achievements and planned future actions to help fostering Making on their campuses.

- Art Academy of Cincinnati
- Bucknell University
- California College of the Arts
- Case Western Reserve University
- Carnegie Mellon University
- Cerritos College
- Cornell University
- Howard University
- Indiana University
- Jackson State University
- Lorain County Community College
- New York Institute of Technology
- Oregon College of Art and Craft
- Parsons School of Design
- Purdue University
- Ringling College of Art and Design
- Santa Clara University
- The University of Michigan Center for Entrepreneurship
- The University of Pennsylvania
- Tufts University
- University of Arizona
- University of California, Berkeley
- University of Central Florida
- University of Delaware
- University of Florida
- University of Hawaii at Manoa
- University of Massachusetts Lowell
- University of Michigan
- University of Michigan-Dearborn
- University of New Haven
- University of Tennessee Knoxville
- University of Texas at Dallas
- University of Texas Tyler
- University of Vermont - CEMS
- UT Dallas School of Engineering and Computer Science
- Virginia Tech
- Washington University in St. Louis
- West Virginia University
- Worcester Polytechnic Institute
- Yale University - Center for Engineering Innovation & Design

Art Academy of Cincinnati

Ohio · http://www.artacademy.edu

Specific Commitments:

- Allowing students that are applying for admission to these institutions to submit their Maker portfolio
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing
- Expanding access to university shared facilities and scientific instrumentation to Makers
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship
- Providing scholarships to students based upon excellence in Making
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

Bucknell University

Pennsylvania · http://bucknell.edu

Specific Commitments:
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;

Achievements in the past 12 months and future plans:

We have updated existing Makerspaces, and are creating two new Makerspaces on campus in Summer 2015. We have created a campus-wide Making advisory board to report to administration on Making activities. We are implementing a "viral" training and badging process that will empower students to train each other. We are planning a number of launch events for making and the newest makerspaces that will draw students, faculty, and staff from across campus to cultivate interest in a large audience.

Working to disseminate current work in making on campus through scholarly channels to other interested schools, including presentations / papers at ASEE, Union College ELE, ASU Maker Summit, AIChE, and on-campus venues.

Hosted a booth at the World Maker Faire with faculty and students.

Hosted competitions, skill sessions, and training sessions to get students involved. Continued to offer funding support for student projects through the "nifty idea" fund.

Invited "maker experts" including Dale Dougherty, to campus as part of a public speaker series that cut across disciplinary boundaries.

California College of the Arts

CA · http://www.cca.edu

Specific Commitments:
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
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Case Western Reserve University

Ohio · http://thinkbox.case.edu

Specific Commitments:

- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
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- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

Achievements in the past 12 months and future plans:

Per our commitment from last year's WH Maker Faire, CWRU began the renovation work on the first phase of Think[box]'s new home in 50,000 sf Richey-Mixon building, and construction is going as planned, with the transition from temporary space to permanent space planned for mid-August 2015, prior to the opening of classes. A donor ribbon-cutting is planned for October 1st, and the public "unveiling" is scheduled for Tuesday, October 27th as part of our first annual Innovation Summit: Models of Innovation. The following link allows the public to view the progress: http://lincoln-cam.case.edu

Think[box] is an open facility both on and off-campus, even in the temporary space. Over the last 12 months, we have expanded the number of community tours to help our external friends understand that they are able to use the facility (there is a culture of disbelief around this!). The one-on-one and group meetings have been critical to this messaging, as we have had over 98,000 visitors (based on our automatic counter) since opening 12/12/12, with that number increasing rapidly over the last six months.

As Think[box] use has grown and we have had more participation by faculty, additional senior projects—as well as freshman SAGES courses—are using Think[box] to consider ideas and how to move from idea to product. This includes leveraging all of the project ideas coming from our entrepreneurship support groups such as Blackstone LaunchPad, which will be opening its office within the new Think[box] space, although strong relationships exist now. Since its opening on December 12, 2012, Think[box]-related projects have seen $2.5M in external investment.

CWRU has been working diligently with community partners in the development of the NEO Regional Makers Network, which consists of monthly meetings, development of an asset

database, and identification of joint projects with goals to move the region forward as a whole in support of makers.

Carnegie Mellon University

Pennsylvania· http://cmu.edu

Specific Commitments:
- Allowing students that are applying for admission to these institutions to submit their Maker portfolio
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
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Achievements in the past 12 months and future plans:

Expand and Develop New Maker Educational Opportunities at Carnegie Mellon
Carnegie Mellon has moved boldly to put maker education at the heart of its strategies to enhance student experiences in creativity, technology, culture and entrepreneurship. Eight new cross-disciplinary minors related to maker education were launched in 2014 as part of CMU's IDeATe Network.

Among the first universities to allow students to submit maker portfolio's as part of the admissions process, CMU has worked aggressively to expand campus engagement in developing criteria for the review of maker submissions.

Expand the Maker Infrastructure on Campus
Carnegie Mellon opened new maker space in its Hunt Library in 2014, creating a central campus location for 24/7 maker education and learning. Occupying space on two floors this space includes a physical computing lab, a virtual computing cluster and collaborative design space.

The University also opened its Integrated Innovation Institute to provide both an educational setting for programs integrating design, business and education as well as providing flexible

maker space. One of the first student initiatives of this program was a competition undertaken to utilize maker applications for innovations to address the needs of the homeless.

Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organization
Carnegie Mellon launched a Learning Media Design Center (LMDC) to provide a focal point for interaction and capacity building with the region. Throughout 2015 the LMDC is working to aggressively engage with local schools and identify opportunities for Carnegie Mellon to contribute to expanding maker education activities and facilities across the region. Carnegie Mellon's College of Engineering is working with Catalyst Connection, the Manufacturing Extension Partnership center for Southwestern Pennsylvania, to enable small first to engage with additive manufacturing technologies.

In collaboration with the New App for Making in America Initiative, a U.S. DOL funded workforce innovation initiative engaging the Pennsylvania AFL-CIO and the Three Rivers Workforce Investment Board, Carnegie Mellon help secure approval of the first ever U.S. DOL maker apprenticeship. CMU will help ensure that this apprenticeship realizes its potential as providing a valuable tool for integrating maker initiatives into workforce training and development strategies.

Finally, Carnegie Mellon is proud to have provided a hub to support the growth of the MakeSchools Alliance. Bursting from the enthusiastic response of the higher education community to the first National Maker Faire, the Alliance is fostering the development of best practices and collaboration to advance the development of maker initiatives.

Cerritos College

California · http://www.cerritos.edu

Specific Commitments:

- Allowing students that are applying for admission to these institutions to submit their Maker portfolio
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing
- Expanding access to university shared facilities and scientific instrumentation to Makers
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship
- Providing scholarships to students based upon excellence in Making
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

Cornell University

New York · http://www.engineering.cornell.edu/

Specific Commitments:
- Allowing students that are applying for admission to these institutions to submit their Maker portfolio
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
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- Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing
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Achievements in the past 12 months and future plans:

Cornell University is helping to lead the efforts of the Higher Education Makers Alliance with CMU to develop rubrics that could be widely used towards the assessment of Maker portfolios within college admissions processes. Cornell's efforts are particularly focused on the assessment of professional design principles including but not limited to problem identification, performance metrics, testing rigor, risk assessment, and project planning and execution. This work is based upon the success of measuring similar criteria within the Intel-Cornell Cup, a national embedded systems innovation competition.

The Cornell University Systems Engineering Lab serves as one of the main Maker Spaces on campus with over 7,000 sq. ft. and table space for over 150 students. This lab is planned to undergo a $570,000 renovation, supported entirely by Systems Engineering, the College of Engineering and the University, over the coming year to support collaborative, multidisciplinary work in this space for the next 8-10 years. Additional Maker spaces supported by the Electrical and Computer Engineering department as well as the University Libraries will be explored this coming year as well.

The Cornell Maker Club is starting the development of new Educational Modules to help train new Makers in skills, particularly electrical engineering skills, to enable them to truly enjoy our

Cornell Maker Club. The goal is that once tested and refined, these could be made available more broadly.

The Cornell Systems Engineering Lab, the Intel-Cornell Cup, and the Cornell Making Club will be hosting a U.S. FIRST Robotics competition kick-off event at Cornell for the next season of the competition inviting all of the surrounding high schools and leading them in workshop activities to learn more about engineering design processes.

The Intel-Cornell Cup will be releasing a new series of freely available professional design guides to add to the already popular set of guides made available at http://www.systemseng.cornell.edu/intel. These guides were tested successfully throughout the year with students on Cornell Making and Making-related projects, and are now being polished for release this Fall.

A 12 week hardware accelerator program within the Rev (Ithaca Business Incubator) will be developed and run supporting both student and community teams exploring the jump from Maker to product developer. Working closely with potential customers teams will learn both prototyping and entrepreneurship skills through 3 successive four week sprints. The program will conclude with a "Demo Day" event.

The Systems Engineering program is developing a new Maker Club Pro initiative that will start this Fall and enable all students (seniors or otherwise) to develop their projects more professionally, with additional academic advising, and for course credit. The current Cornell Maker Club will still function as a club and "idea incubator" allowing any student to explore and test new ideas. The Maker Club Pro initiative will help empower those Maker students who wish to take their ideas further with additional resources and guidance. These projects will be encouraged to explore entrepreneurship opportunities through programs in the Rev (Ithaca Business Incubator) and the Pitch Your Prototype Make competition.

After being the presenting sponsor and giving a keynote talk at last year's MakerCon, Cornell plans to return this year as a participant in both events, focusing on promoting entrepreneurship at MakerCon with the Pitch Your Prototype events and focusing on STEM education from the efforts in the Intel-Cornell Cup. The College of Engineering will also be sponsoring a booth at the NYC World Maker Faire and the Intel-Cornell Cup will be exhibiting at the National Maker Faire.

The Entrepreneurship@ Cornell, Cornell Systems Engineering, the Johnscon School of the NYC Campus, and the Cornell College of Engineering also pledged the commitment of sponsoring and participate in the Pitch Your Prototype Finals: a national Maker competition encouraging American Makers of all ages to promote their Maker inventions as new potential products. This on-line competition with public community voting will conclude with the top 5 finalists being invited to the NYC World MakerCon to make their "pitch" at the Innovation Showcase.

The Pitch Your Prototype competition and this coming year's involvement in the NYC World MakerCon comes out of Cornell's past presentation sponsorship of the NYC MakerCon and Maker Faire as the first university to officially partner with Make. However, the Pitch Your Prototype competition is based more so upon the success of the Entrepreneurship Award within the Intel-Cornell Cup national embedded system design competition which motivated college students to transform their engineering inventions into the basis of a new company business plan. The Intel-Cornell Cup, which shares the innovative and empowering spirit of the Maker Movement, also develops a number of widely popular engineering professional design guides. These guides target identified national curriculum gaps and are part of the motivation behind the Educational Modules. As these guides also extend concepts focused on by the Next Generation Science Standards, the U.S. FIRST kick-off event is being designed to help these young Makers start to develop these design skills as well. Furthermore, as many of Cornell Maker-esque projects have focused on building communities of Makers, such as the Intel-Cornell Cup, the Rev Ithaca Startup Works, and the Cornell Xraise, the new Maker's project website seeks to be the next step in bringing many of these collaborative efforts even closer together. Finally, the accelerator program builds on the entrepreneurship curriculum taught at Cornell's eLab program and Rev Ithaca Startup works as well as learning's from completed prototyping projects for Rev companies.

Howard University

District of Columbia · http://www.howard.edu

Specific Commitments:
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
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- Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing

Achievements in the past 12 months and future plans:

As part of a directive to increase innovation and entrepreneurship on campus, Howard University President, Dr. Wayne Frederick, has fast tracked development of an innovation space to contain 7,000 sq. ft. of co-working and making spaces. The space will be outfitted with 3D printers and laser cutters to assist in the development of physical prototypes. The space is currently under construction and is slated for completion during Fall 2015.

In addition to facilitating prototyping, the newly renovated space will provide the basis for programming including: hack-a-thons/make-a-thons: events where students form teams to create prototype projects in 24-36 hours; and startup weekends: much like a hack-a-thon, startup weekends bring students together to form teams during a fixed duration event lasting 48-54 hours.

The Center for Advanced Manufacturing (CAM) [see additional information below] is hosting its 3rd Annual Additive Manufacturing Summer Camp for students in grades 6 – 12. The camp will be hosted at Howard University and introduce students to 3D printing of polymer materials. The camp will host 2 cohorts of students in June and July.

In 2012, the National Nuclear Security Agency (NNSA) established a consortium-based program which created a collaboration between Historically Black Colleges and Universities (HBCUs) and DOE/NNSA's sites/labs. The consortium brings a heightened awareness of nationally important research at NNSA plants to HBCUs with a common interest in STEM research fields. NNSA currently supports 4 consortiums.

The Consortium for Advanced Manufacturing is comprised of the following HBCUs and industry partners:
- Alabama A&M (AAMU)
- Clark Atlanta University (CAU)

- Hampton University
- Honeywell FM&T Kansas City Plant (KCP)
- Howard University
- Lincoln University
- North Carolina A&T (NC A&T) – Lead University
- Oak Ridge National Laboratory (ORNL)
- Southern University of New Orleans (SUNO)
- University of the District Of Columbia (UDC)
- Y-12 National Security Complex

Additive Manufacturing (AM) has come to the forefront as one of the most promising approaches to both improve the efficiency (energy, time, and materials) of the manufacturing process and significantly reduce the prototypical stage of product development. In general, research in the AM research field has many sub-disciplines ranging from understanding the physiochemical properties of the materials to be printed to integration of AM systems. The technology is potentially disruptive, and vast amount of research needs to be performed before AM parts could be deployed in the nuclear stockpile. Industry is looking to the universities to supply students with knowledge in the AM arena that can fill existing critical skills gaps. Additive Manufacturing provides the ideal research platform to establish a STEM pipeline from MSI's to the NWC.

Indiana University

IN · http://indiana.edu

Specific Commitments:
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
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- Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing
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- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

Achievements in the past 12 months and future plans:
At Indiana University, there is a strong commitment to encourage learning through making. While there have been pockets of maker activity in the past, we are pleased to be in the process of beginning a new phase of making and learning. The following is an overview of four initiatives that are currently underway, or are in the design phases of construction:

The MILL – The IU School of Education plans a Fab@School educational space, called the Make, Innovate, Learning Lab (MILL). The design and development of the makerspace is planned for summer 2015. Upon completion, the MILL will support teaching and learning with new digital fabrication technologies, framing Indiana University's School of Education as a leader in the maker education movement by offering a dedicated space for undergraduates, pre-service teachers, graduate students, associate instructors, research assistants, faculty, and staff members to come and learn, teach, and research through making. There will also be a tie-in with existing community outreach programs such as Saturday science and art programs. With the mission to connect departments in the School, the MILL presents a hands-on learning environment of high-tech materials such as laser cutters, 3D printers, and Arduinos, as well as low-tech materials, such as Legos, cardboard, tape, and sewing. Open to all disciplines, the MILL represents a step toward reframing teacher education, providing the next generation of teachers with hands- and minds-on skills to become designers of their future creative classrooms. Furthermore, the space is intended to bring together researchers from diverse disciplines to foster new collaborations and synergistic research.

IU Fine Arts Think Tank (http://www.indiana.edu/%7Efinaweb/test/cms/fina/) – The School of Fine Arts is reorganizing new spaces to accommodate new FabLab equipment and is undergoing an overhaul of the existing curriculum to include new technologies across all levels of the curriculum.

IU CEWiT Space – The Center of Excellence for Women in Technology (CEWiT) (http://cewit.indiana.edu/) has plans underway to support innovative uses of technology on campus through a hands-on digital lab, interactive displays of new technologies, and a shared workspace.

New FabLab @ IU – On the university's 5-year strategic plan there are new plans within School of Informatics and Computing to create a state-of-the-art FabLab center to coincide with the opening of their new building. Planning is underway to guide the development of this space. The MILL space in the School of Education is tied to this larger strategic initiative.

Community outreach and volunteer services have been rendered by many graduate students in the area of making and learning. Service workshops in the areas of e-textiles, circuitry, 3D printing, and other maker activities were offered to community organizations by students of several schools, including the School of Education, the School of Informatics and Computing, the School of Fine Arts, and IU/Purdue University, as well as collaborative initiatives with Ivy Tech. All of these outreach and service-learning opportunities have been very successful, are increasing in enrollment, and involve people throughout the campus and local community. In particular, several workshops have been geared toward professional development of teachers and school leaders to encourage learning through making, beginning at a young age. We have also seen students render volunteer services at local library teen centers, after-school makerspaces, and many other community sites that work with youth and adults. Here is a selection of the strongest service-learning and mentoring partners:

Monroe County Public Library (www.mcpl.info/category/blogs/teens-ground-floor) has diverse ongoing initiatives, including the opening of their new teen digital creativity center, ongoing drop-in maker programming, and Maker Days of Summer.

The Bloomington Project School (http://www.theprojectschool.org) partnered with IU faculty and students for the design of a mobile MakerCart, which includes a laser cutter and other makerspace staples. The Bloomington Project School is continuing their MakerCart programming, leading the way in maker and fab educational programming in K-8 nationally.

BloomingLabs (http://www.bloominglabs.org) is an adult- and youth-serving hackerspace that was co-founded by an IU staff member. It recently relocated into a larger space, becoming a leader in making in Bloomington by offering a diverse range of equipment and workspaces to community members.

Makevention (http://makevention.org/) is an annual showcase for regional makers to share their creations and resources. It is hosted by BloomingLabs at the Bloomington Convention Center, and attracted more than one thousand makers last year.

CraneTech is a recently opened makerspace by the nearby NSWC Crane Naval Base in Perry, IN, launching new educational programming this year. Graduate students have volunteered and

participated in the afterschool programming. Faculty and staff from Indiana University were consulted in the early stages of planning the space at Crane Naval Base.

The IU School of Education, under the leadership of Dean Gerardo Gonzalez, recently designated $50,000 for the awarding of new faculty grants to research making and makerspaces. Seven faculty received support to hire students, research collaborations with local schools, and develop innovative uses of materials and new lines of faculty research, which will happen over the course of the next year.

There are opportunities to make around campus and the community, and the MILL (the IU School of Education makerspace) will be an additional dedicated space on campus, particularly for use in learning, teaching, and research through making, accessible to cross-campus affiliates. Additionally, spaces in the schools of Fine Arts, Informatics and Computing, as well as areas within university libraries will also be used to encourage learning through making. Courses in these schools are open for enrollment by students from other campus departments and schools. Maker technologies in both the digital and analog worlds are being utilized in innovative ways across the campus and will be a major part of future university initiatives. The student-run 3D printing and open source electronics club, BFabs, has demonstrated digital fabrication software and hardware at the local, state, and national level. Fine Arts and School of Education faculty are organizing IU Makes (http://www.iub.edu/~iumakes/), a series of maker-related workshops and talks that have attracted makers nationwide and has led IU outreach workshops and jewelry workshops for local middle-school girls using 3D modeling software, and printers, and more recently, IU Makes attracted the attention of the Intel Perceptual Computing Lab, whose Lab Director and interaction designer visited IU and provided a hands-on workshop on perceptual computing tool kits.

Graduate student work has included work in makerspaces both nationwide and internationally, focusing on expanding the long-term ethnographic work and the understanding of learning and teaching through making. Dissertations and capstone projects at the School of Information and the School of Education are written to contribute to maker culture. Classes, including the IU School of Education Apprenticeship course, have given graduate students opportunities to connect with the larger Maker community through service-learning and collaborative research projects in the context of making.

There are plans from the university to officially initiate a Maker minor (Make-to-Learn) for graduate and undergraduate students, which will be cross-listed between Fine Arts, Education, and Informatics. The new minor will offer four courses: 3D Modeling & Rapid Prototyping, Arduino & Physical Computing, Special Topics (with guest lecturers by visiting researchers), and Educational Theory, including a Course Practicum. The new minor will prepare students to think, create, and innovate, ultimately creating a new technological workforce currently absent in Indiana University's course listings, yet in high demand at all levels of educational institutions.

The IU School of Education regularly partners with Makevention (http://makevention.org/), CraneTech (afterschool program associated with the Crane Naval base), BloomingLabs

(www.bloominglabs.org), the Monroe County Public Library (www.mcpl.info/category/blogs/teens-ground-floor), the Wonderlab science and technology museum (www.wonderlab.org), the Maker Education Initiative (www.makered.org), Indiana Connected Educators network (www.iceindiana.org), the North Dakota STEM Network (www.ndstem.org) to name but a few, as well as the National Writing Project (http://www.nwp.org). The IU School of Informatics and Computing also regularly partners with the Bloomington Expressive Arts Training (http://www.btonbeat.com) and other community and national partners.

Jackson State University

MS · http://jsums.edu

Specific Commitments:
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing
- Expanding access to university shared facilities and scientific instrumentation to Makers
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

Achievements in the past 12 months and future plans:
The 21st century is epitomized by a new period of creativity. In response to this new area of always ready and always available information, the grad opening of Create represents the the completion of a new digital teaching and learning ecosystem at JSU.

Create is a maker space, which provides the resources for students to build any physical or virtual project they can imagine. In this space students can build virtual presentations, use green screen chroma key system or animations to place themselves inside a virtual environment; build physical presentations through CAD design software and 3D printing; and build beautiful presentation displays through a state-of-the-art plotter system.

The completion of JSU's digital teaching and learning ecosystem brings together the creation and dissemination on new digital content through Innovate. The new content developed in Innovate uses the framework of the PRID process (see below) to develop high-quality and relevant digital content. This digital content features project-based assessments, where students use new technology to create new knowledge. The goal is to prepare students with the thinking and creative skills to compete in any environment.

Digital Content
PRID - The Pedagogical Redevelopment of Instructional Design
Having focused on the general education core for the curricular basis of the iPad initiative, JSU further enhanced this foundation through the Pedagogical Redevelopment of Instructional

Design (PRID). The PRID project developed an intentional design to build a set of digital textbooks focused on student learning. Student learning outcomes are organized through sets of interdisciplinary skills. Students are assessed for mastery of competencies, which lead to project-based summative assessments.

Lowered Student Costs

JSU is leveraging CyberLearning, Innovate, and PRID to drastically reduce costs for students and provide high-quality digital textbooks for students. The University has partnered with the publishing group, Words & Numbers, to produce new digital textbooks for general education core courses. Textbook costs for students will be reduced by over ninety percent (90%) through the development of new digital course materials. Cost reductions will be achieved through the replacement of traditional published textbooks, which average costs of $200, to JSU published digital content, which will be sold to students for $9.99.

The digital textbooks will also provide a revenue stream for the colleges. Seventy percent (70%) of the revenue generated by the sale of the $9.99 digital textbooks will return to the colleges through sales on the iBookstore. Departments may use the resulting revenue to create digital content for courses outside of the general education core or for faculty development. The benefits of lowered student costs, flexible delivery and assessment focused on competency-based curricula, strengthened and coordinated student learning outcomes through an emphasis on student skills, instant updates to digital texts, and revenue generation for departments together provide a blueprint for replication across the country.

Curricular Implementation
Project/Problem-Based Learning

The learning outcomes of the curriculum bring together active inquiry, critical thinking and foundational competencies to develop a student skill set that understands which questions to ask and why to ask them, processes a methodology of deconstruction to parse the issues at play, and possesses the foundational skills to understand relevant information for the reconstruction of an imagined future.

The learning outcomes are further delineated into skills, which are reinforced throughout the scaffolded learning plans of the student learning cohorts. The curricula of the learning cohorts are organized by common topics, which act to reinforce relevance for students and provide a common framework to discuss interdisciplinary solutions for problem-based assessments.

This process of problem-based learning is heightened through the collaboration of project-based teams. The projects that form the summative assessments of students require an interdisciplinary team to achieve the desired outcome. These learning cohort teams are facilitated through CREATE (Image 2), a center for project-based learning. In CREATE, students move throughout the four phases of project-based learning: Discuss, Conceive, Realize and Build to develop physical and virtual solutions to problem/project-based assessments or assignments/learning scenarios.

Last summer, Jackson State University hosted Estella's brilliant bus, an educational service, which brings technology education to underprivileged communities.   The University hosted the group and brought together Black Girls Code along with our Innovate Center and Digital Intellectual commons to provide training in coding for middle school and high school students from central Florida. The group left JSU to complete in the Essence Technology Summit in New Orleans, LA and won first prize in the hackathon. This summer the group will return and our collaboration will expend to include a full hackathon in our new Create Center and a Jackson Town Hall meeting to elevate coding and making in the Jackson community.

The Scaleup Jackson Innovation Expo is a one-day event on the campus of Jackson State University that will exhibit a showcase of the innovation assets of Jackson, Mississippi across three main vectors (education, workforce and entrepreneurship) contained in one space. It will put on display for a local, regional and national audience a futuristic coordination of elements needed to generate greater efficiency in the local innovation ecosystem with intentional on-ramps to exponentially improve the productivity of underrepresented populations and bolster regional competitiveness.

In addition to the exhibit arena, attendees will participate in the following activities:
•	Student Fast Pitch Competition – Proposed Issue: How would you use technology to raise awareness, interest and engagement in Jackson's local innovation ecosystem?
•	Prototype Hackathon: Mapping Jackson's Local Innovation Ecosystem
•	TED Talks by successful founders: (Technology Access Foundation, Hawken Entrepreneurship School, Atlanta

MSCEI, in partnership with JSU and the City of Jackson, will develop a budget to include in a Strategic Plan for development of the ScaleUp Jackson Innovation Corridor. The corridor will attract local, state and national attention and become a model that attracts visitors from around the country to Jackson. MSCEI will be the anchor tenet in the Jackson Innovation Corridor and serve as the education partner that aligns JPS, JSU and Midtown Public Charter School, and connects them (and other schools around the state) with after school, weekend and summer programs for students interested in the following:
•	Coding Courses / Challenges
•	Prototyping /Maker Spaces
•	Gaming / App-building
•	Robotics / Engineering Competitions
•	Hackathons / Ideation Activities
•	Startup Weekends / Pitch Competitions
•	Weekend workshops / seminars / forums / entrepreneur education / student startup incubator
•	Summer STEAM immersion (see Level Playing Field Institute's SMASH program for JSU campus)

Lorain County Community College

Ohio · http://www.lorainccc.edu

Specific Commitments:

- Allowing students that are applying for admission to these institutions to submit their Maker portfolio
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Expanding access to university shared facilities and scientific instrumentation to Makers
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

Achievements in the past 12 months and future plans:

Lorain County Community College (LCCC) through its FabLab and Nord Advanced Technology Center commits to broadening our engagement regarding the community-facing resources and assets here at LCCC and with our partners in industry and higher education. LCCC is working to bring "making" to the forefront of our community-engagement strategy, and can measure both through increased outreach activities and likewise, community use of our assets at the Fab Lab and Nord ATC as well as through affiliate sites and educational partners.

For this year's Week of Making, LCCC will hold engaging workshops, demonstrations, and tours beginning Saturday June 13th and continuing into the week. This includes making technologies in 3-D printing/additive manufacturing and many other forms of fabrication including CAD design/make, laser cutting and other advanced manufacturing applications.

LCCC is a partner with and advising member of AmericaMakes, the National Additive Manufacturing Innovation Institute in Youngstown, OH, in addition to regional Maker community initiatives in Northeast Ohio. Future development plans for technology innovation acceleration at LCCC include an Additive Manufacturing Innovation Center located within LCCC's Desich SMART Center for Microsystems Commercialization.

New York Institute of Technology

NY · http://www.nyit.edu/engineering

Specific Commitments:

- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Expanding access to university shared facilities and scientific instrumentation to Makers
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

Achievements in the past 12 months and future plans:

Recognizing the significance of the Maker Movement to an enriching experience for our students, our school is committed to take one or more of the following steps to promote Making, including:

- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Expanding access to university shared facilities and scientific instrumentation to Makers;
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship;
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries,museums, schools, after- school programs, labor unions, and community-based organizations.
- Organize periodic events to support this community. For instance, this month, NYIT is co-sponsoring the upcoming Long Island Maker Festival in June. NYIT is the lead organization for the "Meet A Scientist" session, and providing volunteers and materials to make this event a success.

As "Making" provides an accessible platform for inventions and collaborative problem solving, NYIT is providing students with access to its new Entrepreneurship and Technology Innovation Center (ETIC), which supports our students as they utilize making technologies to pursue new ventures and small businesses creation. The ETIC is a conduit for strategic partnerships between "makers" and entrepreneurs, venture capital/angel investors, industry on the one hand, and academia and the workforce on the other hand.

Oregon College of Art and Craft

Oregon · http://www.ocac.edu

Specific Commitments:

- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing
- Expanding access to university shared facilities and scientific instrumentation to Makers
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship
- Providing scholarships to students based upon excellence in Making
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

Parsons School of Design

New York · http://www.newschool.edu/parsons/

Specific Commitments:
- Allowing students that are applying for admission to these institutions to submit their Maker portfolio
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing
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- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship
- Providing scholarships to students based upon excellence in Making
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

Achievements in the past 12 months and future plans:
Parsons School of Design is embarking on the construction of new Making Center facility that will be open to students across our entire population including students in other programs of The New School. This new, state-of-the-art facility will be completed early in 2016 establishing a new standard in the relationship between making and learning at one of the counties leading design schools.

Purdue University

Indiana · http://www.purdue.edu/

Specific Commitments:
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing
- Expanding access to university shared facilities and scientific instrumentation to Makers
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship

Achievements in the past 12 months and future plans:

Over two years ago several students approached Purdue leadership with the request to have a maker space so students can have a place to launch businesses and more importantly create an entrepreneurial ecosystem. Purdue worked with the students to create The Anvil, a makerspace patterned after maker spaces seen in Silicon Valley. Purdue was so supportive of this group and its mission that they provided the space to The Anvil rent-free. In a years' time, The Anvil outgrew its space and Purdue recently helped the group to find new space that was co-located across from the student center. Although other groups also utilize some of the new space, the Anvil is the main tenant.

Purdue leadership continues to support our students and The Anvil by facilitating connections to industry, VCs, and governmental groups. Because of these connections, the local city government became heavily involved and provided The Anvil financial and other resources, and encouraged them to create businesses as well as participate in other maker spaces that the city leaders started.

Purdue offers a number of avenues for students to become an entrepreneur through a variety of education and outreach methods. To demonstrate to the broad community our strong commitment to the maker culture, Purdue has invested in creating a number of educational programs to guide students along this path. An example of one such program is the Certificate in Entrepreneurship and Innovation Program that our Provost office manages. Over a thousand students have completed this certificate program since it began several years ago. The program grants a certificate upon completion and offers the opportunity for Purdue undergraduate students in all disciplines to earn an academic credential in entrepreneurship complementary to their major. Students receive inspiration from a team of faculty who are

successful, practicing entrepreneurs and who are passionate about teaching and mentoring students. Students learn about entrepreneurship through robust curriculum that exposes them to the knowledge, as well as the leadership and communication skills that individuals need to be successful entrepreneurs. They apply their knowledge through experiential learning activities and a rich ecosystem of experts and business incubation resources.

In addition to the Certificate in Entrepreneurship and Innovation Program, there are a number of additional programs and courses that are available to students such as the Global Experiential program and global entrepreneurship and innovation courses that helps students to become more fluent in global business issues. Another is the Interns for Indiana program that provides limited internship funding to a student so they can work in a start-up and gain first-hand experience in starting a company. This program was recently incorporated into a broader maker program as a way to further support and expand its impact. Additionally there is a program dedicated to helping women develop their leadership skills and abilities, and includes opportunity to work with mentors.

The courses are not limited solely to undergraduate. The Technology Realization program is focused on graduate students and is a campus-wide program that introduces and teaches the principles for moving ideas and technologies emerging from the lab bench out to the marketplace as a viable business opportunity.

In addition to university-wide programs, certain colleges are changing their curriculum to emphasize the importance of a maker culture. For instance, the Purdue Polytechnic Institute (formerly the Purdue College of Technology) is requiring all students to participate in one of two different certificate offerings, including one focused on entrepreneurship and the maker culture starting in the spring 2015/fall of 2016.

And finally, Purdue does not focus solely on its own students. We are also invested in engaging with the community and encouraging high school kids who have an interest in entrepreneurship. During the summer a Jr. or Sr. in high school can participate in an intensive summer camp that teaches them the ins-and-outs of commercialization. This program has been on-going for several years and was recently incorporate into another maker program so it can be further expanded.

Purdue continues to expand various funding sources and offer business plan competitions that are open to Purdue staff, faculty, and students. Several new funds were announced this year. Additionally, Purdue changed a number of policies around IP ownership for students and faculty that were found to be barriers to moving technology to commercialization. Because of these changes, Purdue has already seen a doubling in the number of start-up companies in the first year of implementing these changes.

Purdue offers a number of spaces with state-of-the-art equipment for students and faculty alike to design and develop new technologies as part of a class or a start-up they have initiated. Because of the popularity of these spaces, several colleges have invested significant funding

into renovations so they can expand capacity and offer the most state-of-the-art equipment (such as 3D printers).

To further illustrate Purdue's support for the maker culture, we recently announced a sizable donation from the Lilly Endowment that will help us construct the Innovation Design Center. The new center was envisioned by and for students. The center – accessible 24 hours a day and seven days a week - will provide Polytechnic and Engineering students with open-bay space, collaborative areas and computer-aided design studios in which they can develop, build and test extracurricular and course-based design projects. Through maker spaces such as the Innovation Center, students will enter the workforce with an enhanced skill set developed through their hands-on activities, and contribute to moving technology forward.

There are a number of capstone courses that are available for students that offers them a way to practice the art of making. In fact, the Purdue Polytechnic Institute is adding a requirement that to graduate each student will complete a capstone experience. Many of these capstone projects will be sponsored by industry and will include an industry mentor to help guide the team of four students while they develop a solution. Although the majority of the projects will be funded by industry, there will be an option to allow teams to work with a non-profit or governmental agency to help them solve a perplexing technology problem that they lack expertise while the student team gains practical learning experiences.

Other examples of maker-style capstone courses that are part of the Certificate Entrepreneurship and Innovation.   ENTR48000 Emerging Enterprise which is a capstone program that provides a team of students the opportunity to work on a venture genuinely launched through the full development of a business plan and interact with leading entrepreneurs and speakers from various disciplines. Another program is ENTR48100 Consulting for Emerging Enterprises that allows students to act as a consultant with local business or non-profit organizations.

Ringling College of Art and Design

Florida · http://ringling.edu

Specific Commitments:

- Allowing students that are applying for admission to these institutions to submit their Maker portfolio
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Expanding access to university shared facilities and scientific instrumentation to Makers
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

Santa Clara University

California· http://www.scu.edu

Specific Commitments:
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
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- Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing;
- Expanding access to university shared facilities and scientific instrumentation to Makers
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

The University of Michigan Center for Entrepreneurship

Michigan · http://cfe.umich.edu

Specific Commitments:

- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing
- Expanding access to university shared facilities and scientific instrumentation to Makers
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

Achievements in the past 12 months and future plans:

Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
During the past year, we have made several commitments to the use of our Maker Space:
1 – Our Maker Lab was originally conceived to provide serve to all students/faculty/staff in our School of Engineering. Motivated by last year's National Day of Making, however, we committed to opening access to students/staff/faculty throughout our entire University. This policy is now in place, and more than 600 students/staff/faculty are currently trained to use the Lab.
2 – We also made a commitment to expand our Lab. Implementation of this is underway. Renovations on a new space that will more than double the size of our current Lab are nearly complete, and we hope to move into that space during the summer of 2015. In addition, we have committed a new fund of approximately $50,000 to expand the offering of tools and resources in the Lab. This includes two new 3D printers (bringing the number we have up to 5), a new laser cutter (in addition to the one we have), and a variety of other new machines.

Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers
Our Maker Lab was originally conceived to support education. In this regard, we have worked hard over the past year to expand the number of students it serves as well as the number of courses/projects/clubs that it serves. We have more than doubled these numbers across the board.

Furthermore, with our move to a new Lab (see Commitment 2), we are committing to develop and implement an active outreach program to local schools, and this summer we will be working with local teachers and after-school programs in order to start providing such services.

Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing
During the past year, we have started a new initiative to develop low-cost bio-printer capabilities. We have just demonstrated the first wave of this project, which involved the retrofitting of an open source 3D printer kit in order to print encapsulant for biological proteins. Next year, we hope to build on this project by adding new functions, to possibly include the printing of biological entities, the addition of incubation capabilities, etc.

Expanding access to university shared facilities and scientific instrumentation to Makers
As part of our new Strategic Plan implementation process, we have identified tools, equipment and other resources that can potentially be shared across multiple university entities (e.g., the School of Engineering and the College of Arts and Sciences). It will take several years to achieve this plan since it will involve the development of an entirely new "STEM" complex on our campus.

Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship
One of our projects this year involved the initial development of a low-cost bioprinter in collaboration with a new small business enterprise. This project will continue next year. We also have an initiative to apply the use of 3D printers in social entrepreneurship projects through our Frugal Innovation program.

Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations
We are very interested in making our new and expanded Maker Lab a regional/community resource. In fact, it was our participation in the MakeSchools telecons leading up to last year's Day of Making that inspired us to do this given the programs that we heard about going on at other universities.

Once we move in and get our new expanded Lab up and running (summer 2015), we hope to, over time, establish the Lab is a vital community resource. We plan to start this by developing an educational outreach program, which will be developed initially during summer 2015 with a local teacher and an after school program.

We are also looking into the ability to establish community/adult education courses as well as a variety of partnerships with local industry.

Other Relevant Activities

In Summer 2015, we will also be opening a new "EDVenture" Lab that will be housed next door to our expanded Maker Lab. The EDVenture Lab (EDVenture = engineering + design + new ventures) will complement our Maker Lab by providing a creative space for developing new student-developed enterprises. Activities in the EDVenture Lab will include workshops and mentoring experiences with collaborating faculty from our Business School, Law School and College of Arts & Sciences. We will use this Lab to improve our student's practice of design thinking and of introducing them to concepts such as business models. We hope to also use the EDVenture Lab program, combined with our expanded Maker Lab, to foster new industrial partnerships with businesses in the area.

The University of Pennsylvania

PA · http://www.upenn.edu

Specific Commitments:
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
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- Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing
- Expanding access to university shared facilities and scientific instrumentation to Makers
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

Tufts University

Massachusetts · http://maker.tufts.edu

Specific Commitments:
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing
- Expanding access to university shared facilities and scientific instrumentation to Makers

Achievements in the past 12 months and future plans:

Tufts University opened up Jumbo's Maker Studio, a product development and educational makerspaces on campus. It is also set up as a test environment for educational research on makerspaces in schools. A student led group updated Tufts' Crafts Center, an arts and crafts focused makerspace, with new tools and equipment. This includes the better organization of their current tools and supplies as well as the addition of soldering stations and a 3d printer. We also launched Jumbo's Maker Network to connect students to these spaces through a website, maker.tufts.edu. Since none of the facilities are physically connected, this allows each to be aware of the offerings and capabilities of the other as well as better organize campus wide maker events together.

Tufts Student Teacher Outreach Mentorship Program (STOMP) integrated more maker activities for undergraduates to use when visiting local classrooms. Tufts' Center for Engineering Education and Outreach scheduled 2 summer camps for young makers to take place in the summer of 2015.

Jumbo's Maker Studio has made itself available to graduate students to experiment with the physical layout of the environment and how that enables use and learning. Some of the projects involve tray systems to make set up and breakdown easier and tracking system to help educators know how the resources are being used. Tufts has also been involved with setting up makerspaces in a local elementary and high school and examining how the students and educators make use of the spaces.

Jumbo's Maker Network not only connects Tufts' makerspaces digitally but also informs the students about other facilities and resources on campus. This includes meeting and presentation spaces, digital design resources, advanced prototyping equipment, and other campus resources. It also provides students with the appropriate information and contacts to gain access to those resources.

University of Arizona

Arizona · http://www.arizona.edu

Specific Commitments:
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

University of California, Berkeley

California · http://engineering.berkeley.edu

Specific Commitments:
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing
- Expanding access to university shared facilities and scientific instrumentation to Makers
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

Achievements in the past 12 months and future plans:
As evidenced by the upcoming launch of the Jacobs Institute for Design Innovation, Berkeley Engineering remains fully committed to integrating opportunities for making into our undergraduate education and beyond. In February of this year, we celebrated the topping out ceremony for Jacobs Hall, a dedicated design & prototyping facility which opens on August 20, 2015. We have introduced new courses, from an introduction to digital fabrication, to an interactive seating design competition, the results of which will be on display at the National Maker Faire later this month.

University of Central Florida

Florida · http://ucf.edu

Specific Commitments:
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

Achievements in the past 12 months and future plans:
This past year a group of graduate students from UCF College of Engineering and Computer Science heard about the needs of a 6-year old boy from the local community who was missing his right arm from just above the elbow. On their own initiative and time they made use of the UCF Maker Space facilities, services, and support to build an arm for the young boy. They delivered the arm in July of last year and subsequently made the blueprint for the arm available online at no charge for others to be able to use to provide similar value in their local community.

The student team then went on to form and launch Limbitless Solutions, a non-profit organization devoted to using additive manufacturing to advance personalized bionics and solutions for disabilities while building a generation of innovators who use their skills and passion to improve the world around them. They have since continued to make use of UCF Maker Space facilities and services and offer additional opportunities for UCF Maker students to make a "Tangled"-inspired arm delivered in January to a 7-year old girl (http://www.limbitless-solutions.org/madelyn-rebsamen-2/), a custom "Iron Man" arm delivered in March by Robert Downey Junior and the team (http://mae.ucf.edu/limbitless-solutions-alex-pring-meet-iron-man/), as well a custom "Blue Man"-like arm delivered in April by Blue Man Group and the Limbitless Solutions team to a 12-year old boy (http://today.ucf.edu/3d-arm-team-ucf-create-center-change-world-provide-limbs-children/). Today, Limbitless Solutions has a pipeline of projects they are working on to be delivered to children of various ages and needs.

Recently, Limbitless Solutions has partnered with UCF to form the Center for Advanced Biomedical Additive Manufacturing (CABAM), a research and development organization dedicated to advancing their Making technologies in order to provide other student and community Makers greater access to CABAM certified Maker facilities, catalog of blueprint

designs, and custom-build Maker experiences available at a series of affiliate partners across the world

This past Fall UCF hosted our first I-Corps course for students and researchers to experiment with Maker-preneurship. UCF I-Corps Site program is partially funded by a 3-year grant from the National Science Foundation to train 96 teams consisting of students, a researcher, and an experienced entrepreneur mentor. Over the course of 10 weeks participating teams are given $2,600 to develop a Minimal Viable Product (MVP) and test and validate assumptions about the commercial path and potential of an invention by getting out of the lab and interviewing more than 100 potential customers, strategic partners, and sales or marketing channels.

One of the eight teams selected in the competitive process for our first cohort was the result of a senior design project from UCF's Mechanical Engineering program - http://make.xsead.cmu.edu/projects/projects/29. The students formed a start-up company, Talon Simulations, and used the UCF I-Corps program to test hypotheses about the market need for an affordable and effective simulator for flight schools and the general aviation industry https://icorps.cie.ucf.edu/sub/talon-simulations/

Beginning this Fall, the UCF's NSF I-Corps program will do additional outreach and provide curricular program elements to encourage senior design students to experiment with Maker-preneurship and validate assumptions about the business model through participation in the I-Corps program.

In March of this year UCF was awarded two Regional Innovation Strategies i6 grants from the U.S. Economic Development Agency to foster a culture of innovation throughout the region - https://cie.ucf.edu/ucf-awarded-federal-grants-to-expand-entrepreneurship-outreach-in-central-florida/ . One of these was a $500,000 award to be used to extend the UCF I-Corps program and on campus Maker Spaces into Maker Spaces Proof of Concept Centers (POCC) across five counties in Central Florida. In addition resources such as a region-wide mentor network, assistance with developing SBIR/STTR proposals, educational programs, and preferred access to early stage seed funding opportunities will be provided to Makers utilizing the POCC.

http://www.eda.gov/oie/ris/i6/2014/atlanta/university-central-florida-i6.htm .
The first of these expansions announced is with Starter Studios, an accelerator program located in downtown Orlando - http://starterstudio.com/ with others to be announced in the coming year.

University of Delaware

DE · http://www.udel.edu

Specific Commitments:

- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing
- Expanding access to university shared facilities and scientific instrumentation to Makers
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

University of Florida

Specific Commitments:
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing
- Expanding access to university shared facilities and scientific instrumentation to Makers
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship

Achievements in the past 12 months and future plans:

The College of Engineering has sponsors a free-to-print ProtoLab where enrolled Engineering students print there designs and prototypes ant no cost. The prototyping lab was developed to encourage students to "Just Make It" and transform their ideas into a reality. Within the next few years, the College of Engineering will build the NEXUS Building, which will house state of the art prototyping equipment including CNC Mills/Lathes, Laser Cutters, 3D Printers, Water Jet Cutters, PCB Board Manufactures for uses in curriculum and as a shared resource of the college.

Opening Fall 2015, Infinity Prototyping Labs is a new facility on the ground floor of the new Infinity Hall innovation dorm rooms. Co-operated by the College of the Arts and the College of Design, Construction and Planning, it will house a variety of creative and manufacturing technologies and provide hands on assistance for students, faculty, and community partners.

Spearheaded by the University of Florida Libraries, Made@UF is a new university initiative that provides students with the necessary equipment and training to develop mobile applications. The MADE@UF lab is equipped with a variety of different devices to enable students to develop mobile applications for both iOS and Android devices.

Examples of Makerspaces at UF include: ProtoLab, Infinity Prototyping Labs, Made@UF : Open Engineering NEXUS Building : 2017

The College of Engineering will offer a course in 3d printing within the next year. This course will provide students a background in 3d printing with an emphasis on RepRap style 3d printers. The overall objective of the course is for the students to learn the basics of 3d printing, purchase a kit, and build a fully functioning 3d printer to take home and use at the end of the semester. This course is in coordination with the college's initiative to "Empower the New Engineer." Our

goal is to put the tools and expertise for MAKING in the hands of students as soon as possible for use throughout their academic and professional careers.

The University of Florida has always housed a wide array for tools and manufacturing resources available to students. However, sometimes students are unaware of where these resources are and whom to contact to access them.   It is because of this reason that there is a push to develop a portal that will list all of the on campus resources on location.

This portal will have a tab for every type of manufacturing operation (ex. CNC, Laser, Water Jet, PCB, Arduino, 3dPrinting, etc.). The portal provides a brief overview of how to design and submit a file to be manufactured. Our goal is to have everything that is available at the fingertips of our students and faculty so that they can start a project knowing exactly what they have available to them. This is a collaborative effort between several different Colleges within the university and will be implemented by the end of the summer 2015.

The College of Engineering offers an Engineering Entrepreneurship Certificate for students that successfully complete several additional courses. These courses Empower the new engineer with business-oriented skills while at the same time using their technical skills to design and produce a product.

Engineering Innovation introduces students to the concepts of innovative thinking and innovation practices. Using lectures, case studies, team exercises and guest speakers, the course teaches life skills in innovative thought and action that students can use in careers ranging from starting companies to executing research and development projects in large companies.

Engineering Entrepreneurship introduces engineering students to the concepts and practices of technological entrepreneurial thinking and entrepreneurship. Using lectures, case studies, business plans and student presentations, the course teaches life skills in entrepreneurial thought and action that students can utilize when starting technology companies or executing research and development projects in large companies.

The Gator Hatchery is a Student Incubator that offers student entrepreneurs workspace, office support, mentors and other resources necessary for a startup to succeed faster. This course is offered through the College of Business and will satisfy the requirement of senior design with engineering students.

University of Hawaii at Manoa

Hawai'i · http://www.eng.hawaii.edu/

Specific Commitments:

- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing
- Expanding access to university shared facilities and scientific instrumentation to Makers
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

Achievements in the past 12 months and future plans:

UH has created a Fablab with $60k investment from the College of Engineering. The lab has helped lead to student teams winning the UH Breakthrough challenge (http://pace.shidler.hawaii.edu/bic).

PhD, MS and undergraduate students have helped with summer programs for getting high school students and middle school students exposed to Making in the UH Fablab. The summer program supported is the Native Hawaiian Science and Engineering Mentorship Program (NHSEMP). The popularity of Making has encouraged NHSEMP to collaborate with the Fablab to also help undergraduate projects supported by the program.

The Fablab is exposing its manufacturing capabilities to the campus through a student-designed printing system. The Fablab will also be opened to students to receive training and access to its capabilities which include 3d printing, lasercutting, and PCB manufacturing.

The Fablab will support the UH iLab effort which will be the central innovation laboratory created at the system level and slated to be opened in the Fall of 2015. These efforts will be open to the UH campuses and will be aimed at attracting multidisciplinary projects.

Several senior capstone design projects have been completed using 3d printing and other Maker technology. To highlight some examples, one group created a 3d printed quad copter that allowed the students to experiment with controls for the quadcopter and work towards

creating a convertible quadcopter/airplane. Another group created an interior monitoring system that could wirelessly transmit temperature, humidity, and lighting conditions of rooms inside a building (for energy efficiency applications). Yet another group is using 3d printing to enable research into graphene-based devices. The University of Hawaii has joined the Georgia Tech led Vertically Integrated Projects (VIP) program which is transforming the way in which design and build projects are done by involving juniors, sophomores, and even freshman in the process.

UH has worked with a local benefactor and inventor, Dr. Grover Liese, in developing technology for road safety and consumer products. By allowing the inventor to work with students, both sides benefited.

UH College of Engineering has become involved with the Venturewell Epicenters Pathways to Innovation program. As a part of this membership, the group has started a pathfinder project on creating tools, activities, and enhancements to the Maker movement on campus.
allenge (http://pace.shidler.hawaii.edu/bic).

University of Massachusetts Lowell

Massachusetts · http://www.uml.edu

Achievements in the past 12 months and future plans:

The University of Massachusetts Lowell is excited to announce the opening of our new 8500 sqr. ft. Makerspace. The space, opening officially this coming fall but in use during the summer, features 3D Printers, Laser Cutters, CNC Machines, Lathes and other equipment for students to prototype their designs. The space will bring together majors from across campus, especially those from all disciplines of engineering, from Freshmen Design Courses to Senior Capstone Courses.

University of Michigan

MI · http://umcfe.com

Specific Commitments:
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing
- Expanding access to university shared facilities and scientific instrumentation to Makers
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

Achievements in the past 12 months and future plans:
The University of Michigan Center for Entrepreneurship continues to advance and support the Maker movement through creating new specialized courses supporting Makers in wood, metal and other materials as well as encouraging more multidisciplinary prototype and practica experiences. We sponsor a large and well attended Makethin event drawing teams around the country that grows in size and stature annually. We are currently remodeling three different student areas on campus to support Maker activities and creation. These activities will continue to expand as part of our commitment to making.

University of Michigan-Dearborn

MI · http://umdearborn.edu

Specific Commitments:
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;

University of New Haven

CT · http://www.newhaven.edu

Specific Commitments:
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship

University of Tennessee Knoxville

Tennessee · http://www.utk.edu

Specific Commitments:
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing
- Expanding access to university shared facilities and scientific instrumentation to Makers
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship
- Providing scholarships to students based upon excellence in Making

Achievements in the past 12 months and future plans:
Have hired four new faculty members at assistant to full professor whose expertises are in advanced manufacturing, including 3-D printing.

University of Texas at Dallas

TX · http://ecs.utdallas.edu

Specific Commitments:
- Allowing students that are applying for admission to these institutions to submit their Maker portfolio
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing
- Expanding access to university shared facilities and scientific instrumentation to Makers
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship
- Providing scholarships to students based upon excellence in Making
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

Achievements in the past 12 months and future plans:
Our own Maker space launched last year with 5000 square feet of project space and seven 3D printers.

University of Texas Tyler

Texas · http://www.uttyler.edu

Specific Commitments:
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

University of Vermont - CEMS

Vermont · http://uvm.edu/cems

Specific Commitments:

- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

UT Dallas School of Engineering and Computer Science

Texas · http://www.utdallas.edu/utdesign/

Specific Commitments:
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing
- Expanding access to university shared facilities and scientific instrumentation to Makers
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

Achievements in the past 12 months and future plans:
UT Dallas formed a new makerspace student organization and dedicated over 3,000 square feet of space in the UTDesign Senior Capstone studio to makers. The launch of the new "UTDesign Makerspace" was held on February 12 with over 300 hundred attending. UTDesign Makerspace is available for free to all UT Dallas students, faculty and staff and company's that sponsor UTDesign Capstone projects. In addition to the dedicated space for maker projects, Makers have access to 15,000 square feet of additive and subtractive manufacturing shops, seminar rooms, conference and ideation space, and storage. This summer, the UTDesign Makerspace is hosting solar car and quad copter high school student camps, and over 20 K-12 computer coding camps.

Virginia Tech

Virginia · http://www.vt.edu

Specific Commitments:
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

Washington University in St. Louis

Missouri · http://wustl.edu

Specific Commitments:

- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Expanding access to university shared facilities and scientific instrumentation to Makers
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

West Virginia University

West Virginia · http://wvu.edu

Specific Commitments:
- Allowing students that are applying for admission to these institutions to submit their Maker portfolio
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing
- Expanding access to university shared facilities and scientific instrumentation to Makers
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship
- Providing scholarships to students based upon excellence in Making
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

Achievements in the past 12 months and future plans:
1. Campus-wide entrepreneurship initiative
2. Creation of Launch Lab & Maker Lab
3. State-wide competitions
4. Engagement with community partners through Business Engagement Office & Extension

Worcester Polytechnic Institute

Massachusetts · http://www.wpi.edu

Specific Commitments:

- Allowing students that are applying for admission to these institutions to submit their Maker portfolio
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Supporting research that advances Making technologies and facilitates greater access to Making experiences such as the development of new tools for desktop manufacturing
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

Achievements in the past 12 months and future plans:

WPI milestones over past 12 months (June 1, 2014 to present)

- Week of June 9, 2014 – WPI teams up with NASA to host the Third annual NASA Sample Return Robot Challenge
- June 14, 2014 – WPI hosts TouchTomorrow, a festival of robots, science and technology on the WPI campus
- Nov. 7, 2014 – WPI hosts SAFER Symposium (Symposium on Advancement of Field-Robots for Ebola Response)
- Dec. 3, 2014 – WPI participates in the Designing a Robust and Sustainable Higher Education Maker Network Workshop
- May 1-2, 2015 – Intel-Cornell Cup – WPI is Grand Prize winner for Team WALRUS entry (Water and Land Remote Unmanned Search Rover); another WPI team wins a first-place prize at event for creating a soft robotic hand.
- June 12-13, 2015 – WPI participates in the National Maker Faire.
- Academic year (2014-2015 – WPI announces creation of Foisie Innovation Studio, a state-of-the-art facility on campus that will focus on collaborative learning and transformative projects.
- Academic year (2014-2015) – During the past academic year, 715 WPI students completed projects in 26 countries.

- DARPA Robotics Challenge Finals (June 5-6, 2015) – Team WPI-CMU finishes in seventh place (out of 24 teams) as part of international robotics competition in Pomona, Calif.

Yale University - Center for Engineering Innovation & Design

CT · http://ceid.yale.edu/

Specific Commitments:
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Expanding access to university shared facilities and scientific instrumentation to Makers
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, after-school programs, labor unions, and community-based organizations

Achievements in the past 12 months and future plans:
The Yale Center for Engineering Innovation and Design continues to break down barriers between departments and organizations, with great making-success this year with a number of collaborations including programs/partnerships with faculty and students from the Department of Music, the Department of French, and the Yale Farm.

Personalized Responses

Each institution was also invited to contribute a personalized letter to President Obama. The following institutions are next included:

- Bucknell University

- California College of the Arts

- California State University, Northridge

- Case Western Reserve University

- Indiana University

- New York Institute of Technology

- Purdue University

- Santa Clara University

- University of Delaware

- University of Hawaii at Manoa

- Virginia Tech

- Worcester Polytechnic Institute

June 2, 2015

Dear President Obama:

Last year, Bucknell University was proud to join the Maker Schools Alliance and provide a detailed commitment to the support of making on campus and building a generation of makers. This year, we are pleased to update you on Bucknell's work and share our making-related goals for the future. Making embodies our institutional mission by enabling our students to integrate technical skills in the support of creation and social engagement. We are eager to expand our work in this area.

Our current work builds upon last year's commitment letter by following through on the promised creation of the maker spaces, so that students can take advantage of these spaces to learn 21st century skills. In particular, last year's commitment focused on the making environment, expanding spaces and tools. This year, we are committing to developing more makers by expanding the pool of people involved in making at Bucknell.

We believe that it is critical that the tools and mindset of making be available to the broadest possible population, not a restricted few. With that in mind, for the coming year we plan to:
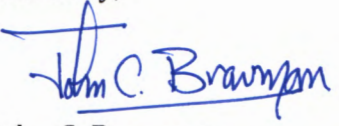
- Open a central, on-campus Bucknell Maker Space within the 7th Street Studio craft shop (August, 2015), which will bring making technologies to students, faculty and staff in every discipline for use both in and out of class.
- Open the Electronics Maker Space within the Electrical and Computer Engineering department, enabling Bucknell community members from across campus to experiment and fabricate novel electronics.
- Implement our "viral" training protocol to increase participation in making by students from a wide range of backgrounds and prior experience levels.
- Host "maker jams" for students and faculty to increase comfort and familiarity with tools and processes for individuals in STEM, Arts, Humanities, and Social Sciences.
- Continue to promote our "Outside the Classroom" initiative to establish making as a part of student culture by providing skill-learning sessions, funding for individual students' projects, and design competitions.
- Promote the development of entrepreneurial mindsets in our students by providing immersive opportunities in skill building, the design process, and value creation including our successful B-Fab workshop, K-WIDE, and the Biz Pitch competition.

- Form a Makerspace Advisory Board to oversee and promote these efforts.
- Build on the work that Bucknell faculty and administrators have developed with the Maker Schools Alliance throughout the year to help expand making and associated pedagogy, and sustain the work of the Alliance into the future.

Making has the potential to be a transformative idea in higher education. As personal computers expanded the range and depth of problems that could be addressed a generation ago, making will enable ideas, that otherwise would have stayed on paper, to become workable prototypes, useful tools and art. At Bucknell, we see the Maker Movement emancipating engineering and technology in a way that opens these fields to all learners, and we are proud to provide our students with this opportunity.

Sincerely,

John C. Bravman
President

CCa CALIFORNIA COLLEGE OF THE ARTS
San Francisco & Oakland

June 12, 2015

President Barack Obama
The White House
1600 Pennsylvania Avenue NW
Washington, DC 20500

Dear President Obama:

The Maker Movement has gained incredible traction across the Nation. Transitioning from a grassroots activity where anyone can 'tinker' or 'hack' new innovations, to one that has real impact on industry, research and the education. Making comes with the opportunity to catalyze the emergence of new economies, identify new manufacturing processes, foster small businesses and job growth, accelerate design and prototyping, as well as maintaining our competitive advantage by incorporating agility into manufacturing. Recognizing this, in the Summer of 2014, you hosted the first ever White House Maker Faire, D.C. to celebrate Making's successes and highlight the opportunities for impact, innovation and creativity.

As part of this national effort to emphasize Making, 153 Higher Education Institutions committed to 'Fostering a Generation of Makers', signing a letter of support to the President of the United States. This network of institutions, coordinated by Carnegie Mellon University and seven other leading schools of Making, committed to supporting Making on their campuses in a diversity of ways.

Since last year, our institutions have capitalized on the momentum generated and coordinated to advance our shared agendas and empower Making on every campus. To this end, a subset of higher education institutions have come together to form the Make Schools Alliance. The Alliance will capture best practices and support research that examines the impact of Making on learning, student retention, and degree completion in STEM fields. It will also serve as a network, dynamic platform, and one-stop online resource for information on higher education institutions regarding initiatives, programs and collaboration that foster Making. Since, December 2014, information on nearly 40 colleges and universities can be found on the Alliance's online platform. Leveraging this information, our institutions have prepared a special report for you on the 'State of Making in Higher Education' designed to articulate work to date, success, impact and next steps for Making at our institutions.

Now, one year since the first White House Maker Faire and the original commitment from Higher Ed institutions, we also want to take this opportunity to renew and reaffirm that each of our institutions is committed to take one or more of the following steps to promote Making, including:

- Allowing students that are applying for admission to our institutions to submit their Maker portfolio;
- Investing in Makerspaces that are accessible to students across the campus, or serving as "anchor tenants" for commercially-operated Makerspaces;
- Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
- Supporting research that advances making technologies and facilitates greater access to making experiences such as the development of new tools for desktop manufacturing;
- Expanding access to university shared facilities and scientific instrumentation to Makers;
- Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship;
- Providing scholarships to students based upon excellence in making.
- Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries, museums, schools, afterschool programs, labor unions, and community-based organizations.

With a landscape review of Making and the formation of an Alliance of institutions as milestone achievements for us in the past twelve months, we will continue to work together in the year ahead to establish even more comprehensive steps for our schools and universities to support new Makers, increase K-12 and industry pipelines for students, as well as enhancing access and inclusion in higher education experiences and opportunities through Making. We thank you for your continued support of Making and for your leadership and commitment to advancing U.S. research and education. We look forward to working with you and your Administration to make this initiative a huge success.

Respectfully,

Stephen Beal
President

College of Engineering and Computer Science
Office of the Dean

President Barack Obama   June 05, 2015
The White House
1600 Pennsylvania Avenue NW
Washington, DC 20500

Dear President Obama

California State University, Northridge (CSUN) is very pleased to reiterate our commitment and support of the Maker-Faire Initiative that was launched year ago to help advance a number of our shared national priorities, such as STEM education, innovation, entrepreneurship, and advanced manufacturing.

By way of background, CSUN is one of 23 campuses in the California State University system. With an enrollment exceeding 40,000 students, CSUN is among the largest single campus universities in the United States. CSUN is the only four-year institution of higher education committed to responding to the multicultural community of the San Fernando Valley in the city and county of Los Angeles. The College of Engineering and Computer Science at CSUN is home to over 4,500 students and graduates approximately 600 students per year with undergraduate and graduate degrees in Engineering and Computer Science. It is renowned for its "hands-on" approach to learning that provides students with several excellent opportunities for undergraduate research, and laboratory work, as well as internships and industry experience.

Here are some of the highlights from the past year that underscore CSUN's long standing commitment to promote advanced manufacturing and student success in the STEM disciplines:

- CSUN was selected to host one of the four White House STEM workshops on October 7, 2014 to lower barriers and enhance student success in the STEM disciplines. Archives from this signature event may be found online at https://www.youtube.com/user/cecscsun.

- CSUN President Dr. Dianne Harrison was invited and attended the College Opportunity Day of Action that you hosted in December 2014. In reaffirming CSUN's commitment, President Harrison noted "As one of the largest and most diverse universities in the country, CSUN has a tremendous impact on both college access and completion. CSUN is enriching the STEM (science, technology, engineering and mathematics) student pipeline and improving student outcomes through a variety of high-impact practices. CSUN will do its part by supporting research and career pathways, strengthening project-based learning and programs that link coursework to the world of work through engaged STEM research and careers starting in the first year of college."

- In October 2014, CSUN was awarded a $22 million National Institutes for Health BUILD grant. BUILD@CSUN will scale up research training and mentoring to diversify the biomedical workforce. The goal is to develop rigorous and sustainable training programs for underrepresented students, using a

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model of research development that incorporates best practices from literature and experience. Within BUILD laboratories, students and faculty members will engage in their ongoing research in a cooperative social environment.

- In September 2014, CSUN's AIMS[2] program (www.ecs.csun.edu/aims2) supported by a US Department of Education HSI-STEM grant received national recognition from Excelencia in Education for its efforts to promote and enhance the graduation of underrepresented minorities in engineering and computer science.

- In 2014 we completed a major redesign our technical shop areas to emphasize CSUN's strengths in manufacturing. The redesigned technical shop is equipped with a diverse array of high tech manufacturing equipment that is accessible to trained students not only from CSUN, but partners such as startup companies from the LA Incubator (www.laincubator.org) that has established a satellite center at CSUN. Pick My Solar is one of the startup companies mentored by LACI@CSUN and is led by CSUN Engineering Management alumnus Max Aram. They have already picked up a prestigious grant from the Department of Energy, and have been recently named this year's Outstanding Small Business by the U.S. Small Business Administration's Small Business Development Center. See http://csunshinetoday.csun.edu/media-releases/pick-my-solar-an-lacicsun-company-captures-outstanding-small-business-award/ for additional information.

- CSUN is a part of the Verdugo Creative Technologies Consortium that was selected to receive a 2014 California Career Pathways Trust grant from the California Department of Education. This $ 6 Million grant will strengthen and enhance our collaboration with Glendale Community College with whom we already collaborate on the US Department of Education HSI-STEM grant (www.ecs.csun.edu/aims2) and build strong career pathways for students in our region from Glendale USD and Burbank USD. Our partners on the grant include Glendale Unified, Burbank Unified, Glendale Community College and the Verdugo Workforce Investment Board. The grant which is led by Glendale Unified focuses on preparing students for high wage, high growth career opportunities in three broad industry sectors: Entertainment (Digital Arts), IT, and Manufacturing with an emphasis on Entrepreneurship and Innovation. For additional information please see http://csunshinetoday.csun.edu/education/csun-faculty-break-down-silos-to-help-train-tomorrows-workforce/

- The College of Engineering and Computer Science has a culture of supporting innovation and celebrates the success of its students through annual events such as the Project Showcase: http://www.csun.edu/sites/default/files/sdps20150415.pdf .

- CSUN graduate students James McCloskey (Master's Student in Manufacturing Systems Engineering and Management) and Lily Thiemens (Master's Student in English Literature) were recently awarded the first-place prize and $7,000 for The Miller Ingenuity Challenge, a national competition aimed at encouraging more individuals to pursue careers in the manufacturing industry. The national contest, which received more than 30 submissions, was launched in celebration of the opening of Miller Ingenuity's Creation Station, a Google-like think space in the middle of the factory. Under the leadership of CEO Steve Blue, Miller Ingenuity a Minnesota-based rail manufacturing company launched the contest to share how it gained its success in order to strengthen manufacturing in Minnesota and throughout the U.S. See

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for details.

- Prof. Bingbing Li from Manufacturing Systems Engineering and Management and his students led by Jorge Zubiate won first place at the 2015 SMI Product and Manufacturing System Design Contest sponsored by the Small Manufacturer's Institute for their project entitled "Hybrid Layered Manufacturing 3D Printer". The 2015 SMI Product and Manufacturing System Design Contest was held in April 2015 at the NTMA training center at Santa Fe Springs, CA.

- Through the College's Ernie Schaeffer Center for Entrepreneurship and Innovation we are developing programs to engage students in advanced manufacturing and entrepreneurship utilizing the latest technologies, and 3-D Printers, complemented with advanced material characterization capabilities.

- And finally, CSUN is taking the lead in the Los Angeles region to serve as a respected source of talent and continuing education in engineering that serves a variety of industries including Aerospace, Biotech and Clean Tech to name a few.

The Maker-Faire initiative will continue to benefit teams of students working on innovative projects and is already making a significant impact on engineering instruction in universities like ours that have a diverse student body with unique educational needs. You have our full support and renewed commitment for this initiative. We are excited to be leading this endeavor to enhance "hands-on" experiences for students in advanced manufacturing through the Maker-Faire Initiative and look forward to expanding our contributions on this important national imperative.

Sincerely,

S. K. Ramesh, Ph.D., Fellow IEEE
Dean

ABET Board of Directors, (2013-2015)
President-Elect, IEEE-HKN (2015-16)
Chair, 2015 IEEE EAB Pre-University Education Coordinating Committee
URL: http://www.csun.edu/engineering-computer-science/ramesh

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Barbara R. Snyder
President

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May 27, 2015

President Barack Obama
The White House
1600 Pennsylvania Avenue
Washington, DC 20500

Dear Mr. President:

Earlier this month you welcomed one of our students to a White House gathering of global entrepreneurs. Undergraduate Felipe Gomez del Campo (Felipe is on the far left in the photograph below) founded FGC Plasma Solutions two years ago after inventing a device that uses plasma to make jet engines burn fuel more safely and efficiently. During that event, you emphasized the importance of investing in young entrepreneurs and education worldwide, "… all of this matters to us – to our shared prosperity and to our shared security." We could not agree more.

President Barack Obama greets young entrepreneurs in the vestibule of the Eisenhower Executive Office Building South Court Auditorium prior to remarks at the 2015 Presidential Ambassadors for Global Entrepreneurship (PAGE) and Young Entrepreneurs event, May 11, 2015. (Official White House Photo by Pete Souza)

Twelve months ago I wrote to you about think[box], Case Western Reserve University's innovation hub, as an example of how higher education contributes to the nation's emerging maker movement. Today it is my pleasure to share a brief report on our progress since then.

As I promised when I wrote you last May, we launched construction on the 50,000 square-foot full-sized building in the fall, and are on schedule to open the first phase of this space when the fall semester starts in August. In addition, multiple student start-ups – including Felipe's – have

emerged from the pilot version of the project, raising more than $2.4 million in grants, philanthropy, sales and other support for their efforts. Meanwhile, we continue to hear from federal agencies, universities, schools and companies all seeking advice and insights regarding how to create comparable efforts of their own.

Just last week, in fact, think[box] manager Ian Charnas was a guest of scientists at NASA's Jet Propulsion Laboratory (JPL). They were eager to learn how think[box] helps accelerate innovation processes. Last month, think[box] figured prominently in a *Chronicle of Higher Education* article about the marker movement and universities (http://chronicle.com/article/The-Maker-Movement-Goes/229473).

April 20, 2015

The 'Maker Movement' Goes to College

Institutions gamble on open workshops as engines of entrepreneurship

Lisa DeJong

A Case Western Reserve student (left) works with a staff member to drill a hole in a mold of a laryngoscope. The aim of the project is to measure the pressure patients feel during medical procedures.

Meanwhile, in January we sent nine student teams to the vaunted Consumer Electronics Show (CES) in Las Vegas. The trip was a collaboration between think[box] and Blackstone LaunchPad, a campus program that provides a broad range of services and assistance to student and alumni entrepreneurs. Finally, we recently launched an intellectual property venture clinic at our law school, where professors and students provide counsel to budding business leaders – including Felipe.

One of the most important lessons of our experiences in encouraging entrepreneurship is the necessity of collaboration. We would not have achieved anywhere near the gains we have to date without engagement from across the campus – and well beyond it. The Burton D. Morgan Foundation has provided critical support.

The State of Ohio and Lorain County Community College have proved valuable partners, and alumni innovators and area business leaders have come together to provide both advice and essential funds for the structure and nascent student projects. In many ways, our effort aligns with the measures you announced on the day you met Felipe – from the Presidential Ambassadors for Global Entrepreneurship to the Spark Global Entrepreneurship coalition to this summer's inaugural White House Demo Day and sixth annual Global Entrepreneurship Summit. Each spring we celebrate our inventors, scholars and entrepreneurs at an event we call Research Showcase, and this fall we will host our first-ever Innovation Summit to engage leaders from academia, industry, government and nonprofit sectors in discussions of how to advance our efforts even more effectively.

At the same time, we continue to explore ways to engage our immediate community more directly, both through outreach to Cleveland-area high schools and collaboration with MAGNET, the nonprofit organization you visited in March, and the state Manufacturing Extension Partnership that helps support it. We have seen firsthand how creating an ecosystem of individuals and organizations committed to common goals catalyzes progress in ways we never could have imagined. Felipe, a native of Mexico who became a U.S. citizen last year, puts it this way: "I always wonder what it would be like if I wasn't at Case [Western Reserve] and in the U.S., and if I didn't have the support and resources that I do here."

We are proud of all that Felipe and his peers have accomplished on our campus, and look forward to seeing all that he and his classmates go on to achieve using the skills and experiences that they have gained here. We remain deeply grateful for your support for entrepreneurship and the maker movement, and look forward to sharing still more success stories next year.

Sincerely,

Barbara R. Snyder
President

BRS/cs:jv

June 9, 2015

The Honorable Barack Obama
President of the United States of America
1600 Pennsylvania Avenue, NW
Washington, DC 20500

Dear President Obama:

As you observed during your visit to our campus on March 10th, Georgia Tech continues to leverage its position as one of the finest technological institutions in the world along with a culture of innovation and entrepreneurship to foster a commitment to the maker and design culture on our campus and in our city. We are excited to update you on the growth of our commitments made last year and share with you the new ways we are making entrepreneurial confidence a signature feature of undergraduate learning at Georgia Tech.

One of our most exciting endeavors is the **InVenture Prize** at Georgia Tech, an annual interdisciplinary innovation competition open to all undergraduate students and recent graduates of Georgia Tech. The competition brings together student innovators from all academic backgrounds across campus in an effort to foster creativity, invention, and entrepreneurship. This year's top finishers competed on live TV for $35,000 in prize money, free US patent filings, and a spot in Georgia Tech's startup accelerator program, Flashpoint. The 2015 InVenture Prize was the largest yet (526 students) and had representatives from most of the Atlantic Coast Conference (ACC) universities in the audience as we plan a possible ACC-wide innovation competition that would build off of the InVenture Prize's success.

Inspired by the InVenture Prize, the **InVenture Challenge** was started by two Georgia Tech alumni who teach high school math and science with the goal of encouraging innovation and inspiring K-12 students to identify a real-world problem and test a solution. Students from any participating K-12 school in Georgia are eligible to compete, and the top teams are invited to showcase their project alongside their collegiate counterparts at the InVenture Challenge Expo. The number of participating schools grew to 11 this year, giving more of Georgia's students the opportunity to be recognized for their achievements in innovation. The InVenture Challenge builds on work already being done by Georgia Tech faculty and staff to develop and grow Maker spaces in Georgia school systems like Griffin-Spalding and Gwinnett.

At Georgia Tech, we believe in intentionally providing the opportunity for students to explore entrepreneurship as part of their traditional education in the classroom. The fastest growing example is **Capstone Design**, a culminating course offered to undergraduate students in several disciplines to design, build, and test prototypes with real world applications. The course provides students the opportunity to work with open-ended, interdisciplinary challenges proposed by industrial and research project sponsors. At the end of each semester, students showcase their efforts at the Capstone Design Expo, where they display and pitch their inventions to a panel of judges, invited guests, media, and their peers, while competing for cash prizes. Six years ago, the Expo consisted of fewer than 30 teams, all from the School of

Mechanical Engineering. This spring, we were thrilled to hold the largest Capstone Design Expo yet in the McCamish Pavilion basketball arena. The event had almost 200 teams with more than 1,050 students participating from 11 Georgia Tech schools. Many of the teams were interdisciplinary, which is a growing trend at the Expo.

A new, less traditional opportunity on campus is **HackGT**. Created by Georgia Tech's Startup Exchange, HackGT is Georgia Tech's first official national hackathon and is scheduled to be held in September 2015. More than 1,000 hackers from across the nation will represent their universities at the biggest event of its kind in the South. With judges from The Coca-Cola Company and MailChimp, sponsors including Apple and Bloomberg, and a grand prize of $60,000, HackGT is sure to set the standard for college hackathons.

Georgia Tech students are also creating products, ideas, and venture concepts that are geared toward creating a better world through the **Ideas to Serve** (I2S) Competition. I2S is primarily a competition of ideas where creativity, imagination, and technology are applied to solving social and/or environmental problems. The competition supports students who are passionate about developing solutions that are focused on showing concern for social and environmental outcomes as well as for economic return on investment—the "triple bottom line." This year's winners include the design of a toothbrush to fit the needs of people with disabilities, the development of technology that allows produce to ship without spoilage, and an educational tool that encourages long-term exploration in young students while immediately improving academic performance and test scores.

Georgia Tech's **Innovation and Design Collaborative** (IDC) takes an interdisciplinary approach to innovation and invention to transcend boundaries and activate Design Behavior throughout the student body. With spaces like a design library, a prototype workshop, and an idea incubator, IDC brings students, faculty, and industry together to foster creativity and an entrepreneurial spirit in the classroom and beyond. During the 2015 spring semester, IDC supported four classes and there are plans for IDC to support 14 classes.

Other growing entrepreneurial efforts on campus include **Startup Lab**, a course where students hear from experienced entrepreneurs and then team up to develop a startup idea of their own. First offered in 2014, about 30 students signed up. Last spring, more than 120 registered. **Startup Summer**, a faculty-led, student-focused 12-week program where student teams launch startups based on their ideas, inventions, and prototypes, saw 79 teams apply for eight spots as demand for these programs continues to increase.

One of the most popular resources for our students is the Georgia Tech **Invention Studio**, a free-to-use, student-facilitated, design-build-play space open to all Georgia Tech students. Students meet and mentor each other and create things for academic coursework as well as independent projects using $1 million of capital equipment including 3D printers, laser cutters, an injection molder, and milling devices. The Invention Studio, centrally managed and maintained by an undergraduate student group with support from university staff, demonstrates the value and sustainability of hands-on, design-build education to stimulate innovation, creativity, and entrepreneurship in our undergraduates. There are plans to open more Studios on campus because of the increasing demand for such a space.

Our alumni, friends, and corporate partners continue to show great interest in student innovation and entrepreneurship at Georgia Tech through their generous **philanthropy**. Earlier this year, Texas Instruments Incorporated committed to giving $3.2 million to support the construction of a plaza and maker space that will provide students an environment to work together to solve

technology design challenges. Additionally, a major gift from Georgia Tech alumnus Chris Klaus will give students a chance to design their own inventions and build their own startups through CREATE-X, a collective of programs designed to equip students with the knowledge and skills to be entrepreneurially confident. Gifts like these allow Georgia Tech to meet the growing demand by our students for an entrepreneurial education.

In our **community**, Georgia Tech continues to be involved with the fast growing Atlanta Maker Faire through both ongoing financial support and volunteers to organize the event. Georgia Tech's support helped grow the Atlanta event from 10,000 visitors in 2013 to more than 30,000 visitors and 200 makers in 2014, all while keeping the event completely free to the public. This year, through Georgia Tech's continuing support, the Atlanta Maker Faire aims to welcome 50,000 regional community members in 2015.

We at Georgia Tech are dedicated to creating an innovation ecosystem that nurtures entrepreneurs of all kinds to discover, make, and design, not only to create technology solutions but also to improve the world around us. Thank you for visiting our campus last spring and for your investment in creating a Nation of Makers and using your influence to advance our shared priorities related to STEM education, innovation, and entrepreneurship.

Sincerely,

G. P. "Bud" Peterson
President

INDIANA UNIVERSITY

OFFICE OF THE
PRESIDENT

June 5, 2015

President Barack Obama
The White House
1600 Pennsylvania Avenue
Washington, DC 20500

RE: State of Making in Higher Education

Dear Mr. President:

It is my pleasure to affirm Indiana University's strong commitment to creating a "Maker Culture". Indiana University will celebrate its bicentennial during the 2019-2020 academic year. In my State of the University Address in October of 2014, I outlined IU's Bicentennial Strategic Plan, a five-year plan of goals to be accomplished by our bicentennial in 2019-2020. The seventh priority in that plan is our commitment to supporting an entrepreneurial culture. In an era in which there is a national shortage of STEM graduates, in which design has emerged as a critical component of product competitiveness, and in which there is an expectation that research universities should contribute to state and local economic development, the lack of programs in design and engineering at IU Bloomington must be addressed. Thus, as part of the Bicentennial Strategic Plan, I have initiated a planning process, which by now is far along, to assess the feasibility of establishing a new program in IT-related engineering on the IU Bloomington campus.

Such programs are vital if Indiana University is to reach its full potential to provide relevant and rewarding educational opportunities; to contribute more extensively to the state's economic development; and to contribute to the state and national need for STEM graduates. IU must develop a robust campus culture of building and making—not to replace the grand traditions of exploration, reflection, analysis, and creativity that are so strong on the campus, but rather to expand and deepen those traditions.

Plans to establish more extensive programs in design at IU Bloomington are already well advanced. The Department of Apparel Merchandising and Interior Design and the Department of Studio Art have voted overwhelmingly to establish a new School of Art and Design, which would be located within the College of Arts and Sciences, in the same way that the Media School and the School of Global and International Studies are now located within the College. This school would also include IU's exceptional Center for Art and Design in Columbus—a city renowned for its innovative contemporary interior and exterior design. The proposal for this new school is now moving into its final approval stages and it is expected that a proposal will go to the Trustees for their consideration for approval in the coming months.

In addition to these new schools and course offerings, faculty, staff, and students at Indiana University have been enthusiastic in creating less formal Maker Spaces for the benefit of all. The Bloomington campus's School of Education has plans for a new Fab@School educational space, which they are calling the MILL (Make, Innovate, Learning Lab), to support teaching and learning with new digital fabrication technologies; the School of Fine Arts is reorganizing new spaces to accommodate new FabLab equipment and is seeing an overhaul of the existing curriculum to include new technologies across all levels of the curriculum; IU's Center of Excellence for Women in Technology (CEWiT) has plans underway to support innovative uses of technology on campus through a hands-on digital lab, interactive displays of new technologies, and shared workspace; and also on the five-year plan, the School of Informatics and Computing is preparing to open a new state of the art FabLab center to coincide with the opening of their new building.

In conclusion, I strongly support the Maker Movement initiative that your office started last year, and IU will continue to actively participate in its events and reports. We invite you and your staff to visit any one of our campuses so that we can show you the exciting projects in Making that are taking place every day at Indiana University.

Sincerely,

Michael McRobbie

Michael A. McRobbie
President

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June 8, 2015

President Barack Obama
The White House
1600 Pennsylvania Avenue NW
Washington, DC 20500

President Obama:

As the Dean of the School of Engineering and Computing Sciences at New York institute of Technology I'm pleased that our School is fully committed to fostering an integrated educational model for our students that accelerates design and prototyping, new manufacturing processes, technology innovation and invention. To that end, NYIT is infusing modern engineering systems and Maker technologies to support agile academic environments, introducing new technology and learning tools, such as 3D printing, wearable devices, robots, smart materials along with novel programming languages and software.

Recognizing the significance of the Maker Movement to an enriching experience for our students, our school is committed to take one or more of the following steps to promote Making, including:

➢ Supporting education, outreach and service-learning that is relevant to Making, such as encouraging students to serve as mentors for young Makers;
➢ Expanding access to university shared facilities and scientific instrumentation to Makers;
➢ Encouraging students to use their senior design projects to experiment with Making and Maker-preneurship;
➢ Participating in regional efforts to create a vibrant Maker ecosystem that involve companies, investors, skilled volunteers, state and local officials, libraries,museums, schools, after-school programs, labor unions, and community-based organizations.
➢ Organize periodic events to support this community. For instance, this month, NYIT is co-sponsoring the upcoming Long Island Maker Festival in June. NYIT is the lead organization for the "Meet A Scientist" session, and providing volunteers and materials to make this event a success.

As "Making" provides an accessible platform for inventions and collaborative problem solving, NYIT is providing students with access to its new Entrepreneurship and Technology Innovation Center (ETIC), which supports our students as they utilize making technologies to pursue new ventures and small businesses creation. The ETIC is a conduit for strategic partnerships between "makers" and entrepreneurs, venture capital/angel investors, industry on the one hand, and academia and the workforce on the other hand.

New York Institute of Technology is pleased to join the Making network of institutions committed to supporting Making on their campuses in a diversity of ways. By this letter, I would like to renew and reaffirm the commitment by the School of Engineering and Computing Sciences at NYIT.

Sincerely,

Nada Anid, Ph.D.

PURDUE
U N I V E R S I T Y ®

June 1, 2015

President Obama
White House
Washington, DC

RE: State of Making in Higher Education

Dear President Obama,

On behalf of Purdue University, I would like to re-affirm our strong commitment to creating a "Maker Culture" at our university. We strongly support the Maker Movement initiative that your office started a little over a year ago and will continue to actively participate in its events and reports. At Purdue, the maker culture is interwoven into the very fabric of our great university, starting many years back, and is easily illustrated by the very fact that our university's nickname is the "Boilermakers". Our students are strong-willed, hard-working, and skilled at not just simple professions, but masters of the often insurmountable challenge of making something - out of nothing. Our culture has gone unchanged on our campus, from our founding to today. Once, we forged things from steel. Now, we build things even stronger. Faster. Smaller. More intricate. Awe-inspiring. Artful. We make things because we know the idea alone isn't enough. It must be proven. It needs to be made real — whether it's a word on a page or a chemical reaction. Our slogan says it all, *"We are Purdue. What we make moves the world forward."*

Our story is but one of many that demonstrates the enormous leadership across this great nation that is committed to the Culture of Making. Our overview is but a brief snapshot of the many exciting things happening at Purdue to energize our students to become Makers. We have invested significant funding and resources into providing Makerspaces for our students that offers the necessary tools to turn their innovative ideas into prototypes and beyond. We have assembled staff and faculty who provide necessary training, courses, capstones, mentoring, and access to funds to take their innovations from dreams to prototypes. Our students are creating companies; creating jobs; and contributing to this great nation. With the ever changing landscape and a global economy, Purdue leadership realized that we needed to be nimble and change how we teach our students. As a result, we are expanding the number of entrepreneurial courses that will give our students practical experiences and mentoring with business leaders so they can succeed. We've even gone as far as transforming an entire College, which is the first of many great steps we will take towards flipping how we educate our students to better prepare

them for the Maker Movement they will join upon graduation. We are educating our students to become tomorrow's leaders - to become Makers.

In closing, I would like to extend an invitation to you and your staff to visit us so we may showcase the exciting things happening at Purdue. Also, you can count on our support. And together, we can make what moves the world forward.

Sincerely,

Gary R. Bertoline, Ph.D.
Dean and Distinguished Professor

May 19, 2015

President Barack Obama
The White House
1600 Pennsylvania Avenue NW
Washington, DC 20500

Dear President Obama:

As the *Jesuit University in Silicon Valley*, Santa Clara University has embraced the maker movement as a critical element of our academic program, sparking creative innovation and developing an entrepreneurial mindset among our students. Having created our own Maker Lab three years ago as a means to gauge student interest in such a resource, we are happy to report that use of this Lab has exceeded all expectations. More than 600 students, staff and faculty from across the University made use of the Lab this past year for a variety of courses, capstone projects, and personal endeavors. The range of projects developed during this time included an underwater robot, a prosthetic limb, and a water sampling system. The importance of the Maker Movement to our campus and beyond has been presented to our University community and alumni through a blog post located at: http://scu.edu/alumni/illuminate/thoughts.cfm?b=619&c=22340

The success of our Maker Lab has motivated us to recommit ourselves to many of the objectives we endorsed as part of the 2014 National Day of Making. First and foremost, we are expanding and moving our Maker Lab into a larger area in a new building with dramatically improved infrastructure support. In conjunction with this, we are acquiring additional 3D printers, laser cutters, and other tools of making for this expanded Lab.

We are also pleased to report that, largely due to our interactions with other universities in the MakeSchools consortium, we will be developing new programs for the Lab that will ultimately turn it into a resource not just for the University but also for our surrounding community. We will start this during the summer of 2015 by working with local teachers and after school programs to develop education and outreach curricula and activities that will exploit our facilities. We have also started to explore how we can leverage the Lab to offer educational short courses to the surrounding community and to enhance partnerships with local companies. Finally, we are becoming "maker-preneurs" ourselves with projects like the development of a low-cost 3D bio-printer, which is being created by students and faculty in conjunction with a local small business.

Our Maker Lab is a strong complement to our programs in innovation and entrepreneurial thinking, which constitute a pillar of our new University Strategic Plan. This new Plan includes the development of a new engineering and science STEM complex on campus, and this complex will ultimately feature an even larger suite of maker areas.

We are very pleased with the White House's support of this important movement and to be involved with the MakeSchools consortium. We agree that the Maker Movement can improve education, spark innovation, and bolster economic development. We look forward to taking advantage of new Maker-related opportunities offered through government agencies and contributing to the spirit of making throughout the country.

Best Regards,

Godfrey Mungal, Dean
Sobrato Professor of Engineering
Santa Clara University, School of Engineering
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UNIVERSITY OF DELAWARE®

College of Engineering

OFFICE OF THE DEAN

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June 1, 2015

The Honorable Barack Obama
President of the United States of America
1600 Pennsylvania Avenue, N.W.
Washington, D.C. 20500

Dear President Obama,

Here at the University of Delaware's College of Engineering, we know a little something about making. For the past 150 years, we have been training the business and engineering workforce that powers manufacturing and innovation up and down the I-95 corridor. Our graduates are leaders in business and product development at companies like Siemens, DuPont, WL Gore, and Astra Zeneca, where they are known for being hands-on, creative, and persistent. It all starts with their training here at University of Delaware, where our unofficial motto is, *We Build Engineers*.

We are the university that pioneered Problem Based Learning. In our mechanical engineering program, our students design and build as part of their curriculum each and every semester. Our freshmen build structures from "industrial erector sets" – this year, bridges from PVC – and learn that true innovation involves failing fast and frequently on the path to creating a successful design (Figure 1). Sophomores and juniors focus on commercial product design in collaboration with local industry. This year's sophomores developed IKEA-inspired furniture for dorm rooms.
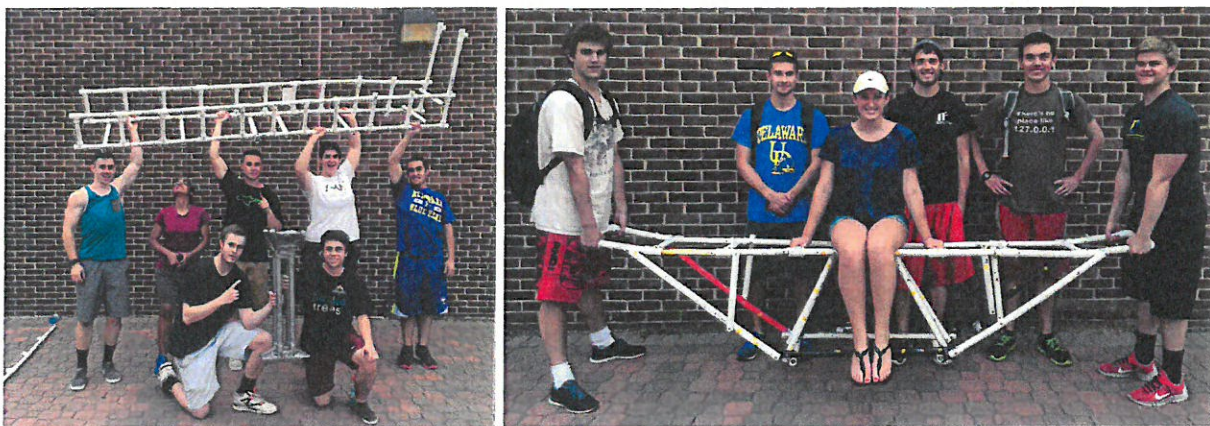

Figure 1: Freshmen with their bridge designs

Our seniors participate in the Interdisciplinary Design Program, which brings together students from engineering, business, and the arts to solve real-world problems from industry, non-profit, and academic partners. On an annual basis, we partners with over 30 companies, generate nearly one dozen new patents, and are consistently recognized as leaders in design at national conferences and competitions. Examples from this past year include:

- DriveSim: A driving simulator for surgeons to use when evaluating driving ability of patients following knee surgery (Figure 2). A transition to mass manufacturing is being explored through an industry partner through the SBIR grant mechanism.
  - 1 patent pending
  - NSF I-Corps funded project
- SimuCare: A line of wearable simulation systems developed in partnership with our school of nursing and theater department designed to improve the training of young clinicians by allowing them to safely perform invasive procedures on standardized patient actors. The prototypes are currently being transitioned to an industry partner who will mass manufacture and distribute these systems, thereby improving the safety of patient care nationwide.
  - 2 patents pending
  - 1st place at the International Meeting on Simulation in Healthcare
  - 1st place at Design of Medical Devices Conference
- Orthopaedics in Action: Unique, hands-on curriculum for classrooms that features real-world challenges from orthopaedic surgery and biomedical engineering. The Complete Kit (Figure 2) includes five stand-alone classroom lessons.
  - Currently for sale through manufacturing partner, Sawbones ®
  - Sponsored by The Perry Initiative, a non-profit partner
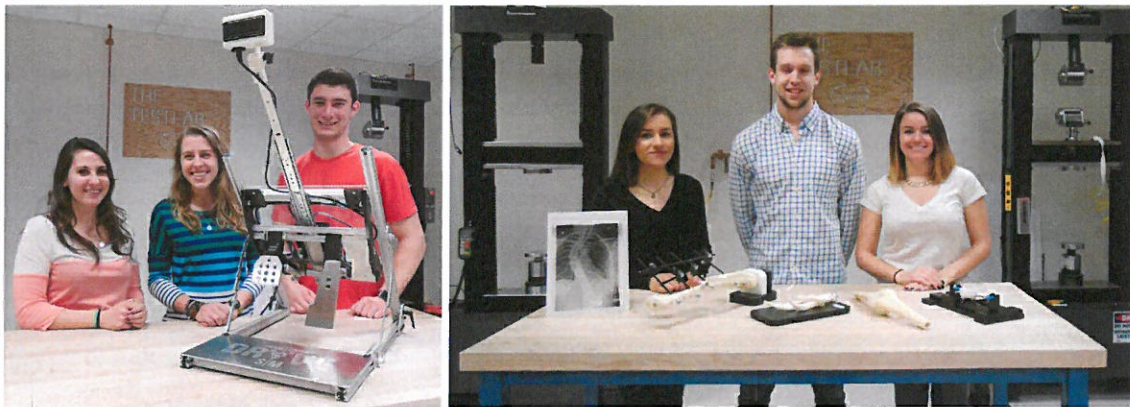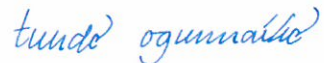

Figure 2: DriveSim (L) and Orthopaedics in Action (R)

As you can tell from these examples, we clearly know how to build; but we believe in more than just "making stuff." It is also necessary to know why and how to create. That is why our institution has invested heavily in curriculum and infrastructure that allows our students to create products that are not only commercially successful but also impact society in a meaningful way. From the moment they step on campus as freshmen, our engineering students are focused on solving the Grand Challenges in Engineering: health, sustainability, security, and joy of living, which are used as a framework for introductory courses and the criteria for project selection by our faculty in our capstone design course. The design activity on our campus is concentrated in one of several open-access maker spaces: our 5,500 square foot Design Studio located in our mechanical engineering building. The Design Studio includes workspaces for rapid prototyping, digital fabrication (e.g., 3D printing, laser cutter), electronics, healthcare-focused design (wet lab for tissue work and physiology stations), and design validation and testing. We boast the most maker space per student of any university in the country, and our students put it all to good use.

Even the Design Studio itself was designed and built by our students, with financial contributions from our alumni, college, and university.

The University of Delaware's College of Engineering wholeheartedly supports the maker movement and the White House's efforts to inspire the next generation of entrepreneurs and inventors. We are excited to be a part of this coalition of universities nationwide to grow the maker movement, and we are happy to lend our expertise to this effort in terms of developing inspiring curriculum and infrastructure.

Sincerely,

tunde ogunnaike

Babatunde Ogunnaike
William L. Friend Chaired Professor of Chemical Engineering
Dean, College of Engineering

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June 5, 2015

Dear President Obama,

Virginia Tech has always been a university of makers. From our founding in 1872 as a land-grant institution, we have been known as a place for "hands on, minds on" education. Our future builds upon this tradition and expands it with strong emphasis on both our rural campus in Blacksburg and our urban platform in the National Capital Region. A primary goal is to leverage our existing presences to create globally-recognized innovation districts; the maker movement and its transformative impact on creativity and entrepreneurship are at the heart of such places. More specifically, we encourage making through the following initiatives:

Creating student and community-facing makerspaces
Student shops and design/prototyping spaces have long been a core of the Virginia Tech experience. In 2012, the Design, Research, and Education for Additive Manufacturing Systems (DREAMS) lab unveiled the DreamVendor, the world's first 3D printing vending machine. Since then, the university has added several more spaces that encourage people to come and experience 3D printing technology for themselves. The newest initiative is a 3D printing laboratory at the Northern Virginia Center, supported by 3D Systems MakerLab Club and Ten80 Education.

Engaging with civic and industry groups to strengthen the maker ecosystem
Makers in the university have already collaborated with university extension offices, nearby school districts, organizations promoting STEAM and SEAD, public libraries, business improvement districts, and economic development agencies. We offer free or low-cost classes for educators designed to show them how to integrate 3D printing technology into the K-12 curriculum, particularly to meet engineering education standards. Our Institute for Creativity, Arts, and Technology (ICAT) offers an instrument making summer music camp and recently hosted the Governor's School Maker Conference. This fall, we will again be a key contributor to the Virginia Science Festival with activities all across the state.

Of course, Virginia Tech is also a powerful engine for discovery research that supports making across numerous disciplines. These factors, combined with our strong culture of service, will ensure that makers have a durable and positive impact on the U.S. economy for many years to come. We look forward to working with you and the many other higher education institutions that have joined this effort.

Sincerely,

Kenneth H. Wong
Associate Dean of the Graduate School and Director of the Northern Virginia Center

Invent the Future

June 8, 2015

President Barack Obama
The White House
1600 Pennsylvania Avenue NW
Washington, D.C. 20500

Dear President Obama:

Nearly one year ago, as the Commencement speaker at Worcester (Mass.) Technical High School, you stated that you wanted the nation "…to learn from Worcester Tech." In that same spirit, I'd like to suggest that the nation can also learn from our university, Worcester Polytechnic Institute, just a few miles up the road.

WPI – in conjunction with dozens of other universities nationwide – is in the midst of a Maker Movement, which is very much alive and well in the United States. As you know, the Maker Faire held at the White House last June was proof of this important movement to promote innovation and creativity in our students. We believe the core messages espoused by the Maker community will allow students to elevate their skills in science, technology, engineering, and math (STEM) fields.

As a member of the MakeSchools Alliance, WPI is committed to nurturing this Maker culture and ensuring that young people across the country have access to the facilities, programs, and tools that will allow them to be engaged in some extraordinary projects.

As one visible sign of our commitment, WPI is investing in critical Makerspaces as we plan to build a state-of-the-art facility on campus that will focus on collaborative learning and transformative projects. The innovation studio will have a lasting impact on generations of incoming WPI students and on our campus.

Further, WPI is engaged in a host of groundbreaking projects, including the DARPA Robotics Challenge in California, an event held last week that brought together more than two dozen robotics teams globally all seeking to find ways to leverage humanoid robots for disaster response efforts.

This global project follows an effort two years ago in which WPI was one of 23 entrants in the Solar Decathlon competition in China. WPI – in conjunction with two other universities – built the Solatrium using composite materials and a solar energy system to provide all the electric needs of a family. In fact, as part of this project, WPI selected Worcester Technical High School to assist the WPI Solar Decathlon team.

Our commitment to this movement can best be shown, though, through our projects around the world. For the past 40 years, WPI's innovative project-based curriculum has made a direct

impact on countless communities worldwide. During the past academic year, 715 WPI students completed projects in 26 countries.

I'd like to give you a few examples of our recent project work:

- In Cape Town, South Africa, WPI students earlier this year worked to create space for a preschool and a playground while helping to upgrade a shantytown with water sanitation and electricity.

- In Thailand, four WPI juniors studied hill tribe forest management in Amphoe Galyani Vadhana (AGV), a district in Northern Thailand. The team recommended using GIS mapping to support hill tribes' rights to reside on and use conserved forest areas throughout Thailand.

- Starting in July, five WPI women will work on projects associated with the extensive $5.25 billion Panama Canal Expansion Project, which will double the canal's cargo capacity. The Panama experience—in which students work as interns for the Panama Canal Authority—blends interdisciplinary research and design, professional skills, and intercultural communication.

- And closer to home, WPI students, in collaboration with Worcester Earn-A-Bike, have worked to create an adaptive bicycle for Worcester area adults with Down syndrome, cerebral palsy, and autism spectrum disorder.

These examples bring to life the nature of the Maker movement, and showcase how students are making a direct impact on some of the world's most pressing challenges.

Once again, the WPI community looks forward to working closely with the extended Maker community as well as the White House to ensure that the next generation of young people will have the access and ability to work on truly impactful projects.

Sincerely,

Laurie A. Leshin
President
Worcester Polytechnic Institute