Voiland College of Engineering and Architecture Strategic Plan, 2015-2020

Introduction and Context:

As **the** Land Grant University for the State of Washington, Washington State University has a unique heritage of *advancing* knowledge through creative research, *extending* knowledge through innovative education programs, and *applying* knowledge to enhance quality of life and to fuel economic growth. The genius of the land-grant university system signed into law by Abraham Lincoln in 1862 is still relevant today – providing high quality teaching, research and outreach programs that are accessible to all citizens and that are responsive, relevant and impactful to society.

Much has changed in higher education, at Washington State University, and specifically in the Voiland College of Engineering and Architecture over the last few years. Consequently, we are at a watershed moment in VCEA, with unprecedented opportunities before us. Increasing demand for our graduates from industry and government leaders has meant that our program is growing in reputation at the university, state, and national level, and there is increased understanding of the important work that we do in this college.

Our very recent changing of the name of the college to the Voiland College of Engineering and Architecture, honors the lifelong accomplishments and unflagging support, by chemical engineering alumnus, Gene Voiland and his wife, Linda. Our new name provides unprecedented opportunity as well as a great responsibility to represent the very best attributes of the Voilands that we wish to emulate: excellence, vision, accountability, and integrity.
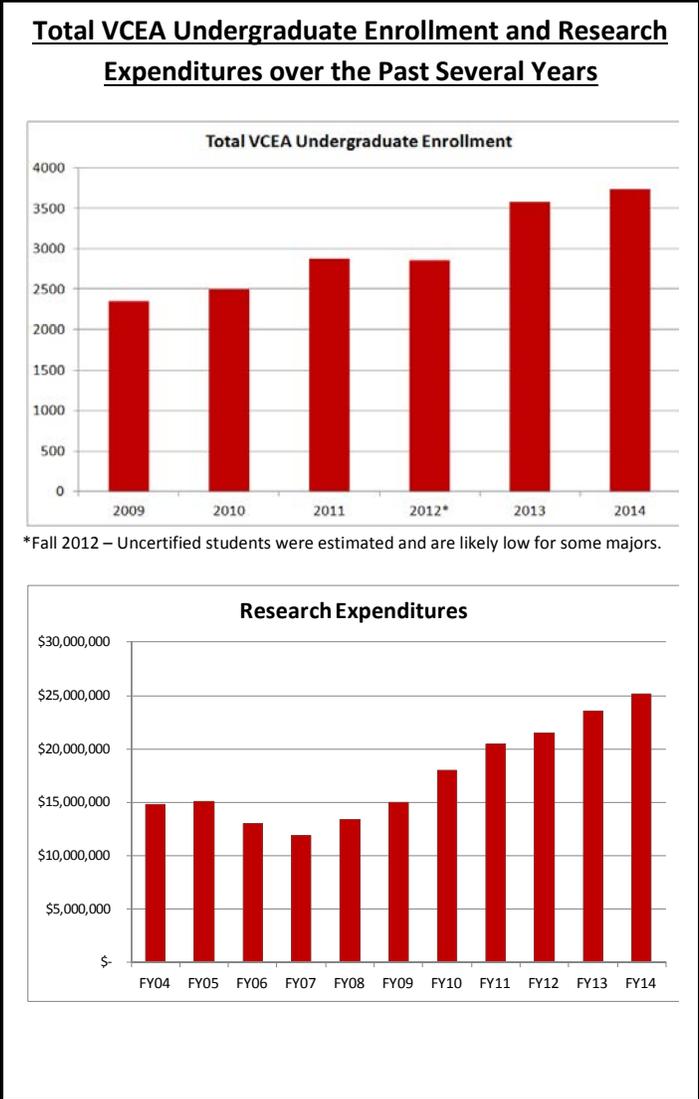
We have been able to garner major investments in our infrastructure, and we will be very pleased to move some of our signature, interdisciplinary research programs into our first new building in nearly 20 years, the PACCAR Environmental Technology Building. Moreover, with the new WSU Pullman Campus Master Plan, we look forward to better than ever possibilities for additional new buildings especially for housing our signature interdisciplinary research and education programs. In a spectacular example of a novel, interdisciplinary integration, the new School of Design and Construction was recently formed and presents new opportunities for collaborations and interdisciplinary partnerships across our college and across the university.

During the last 5 years, there has been a paradigm shift nationally in how higher education is viewed by legislators and the public, from the perception of higher education as a societal good to the perception of higher education as a personal benefit, so that a larger portion of the cost of higher education is borne by the student. For many students, this means graduating from college with a large student debt load or working full-time while going to college or both. In response to growing demand across the state of Washington for access to engineering education for place bound students, we established a hybrid model of delivery of the BSME degree program first in Bremerton and now also in Everett, and we have expanded our engagement in both locations by increasing the number of students served. Along with the Pullman, Tri-Cities and Everett campuses, this offers increasing opportunities for place bound students throughout the state. New technology associated with online or distance delivery of

coursework is sharpening the competitive arena as many universities aggressively compete for students. Still, there are definite advantages for those students who elect to attend college at a residential campus or through a hybrid program that offers a portion of the coursework in the community. It is more important than ever that we strive to provide the best value for our stakeholders: our students, the state, those corporations that hire our graduates, the agencies that fund our research. In response, we have developed innovative ways to deliver our programs and be responsive to industrial needs in ever more locations, including Bremerton and Everett.

One of these high-value advantages is our unique capstone design course experience, which is largely based upon real, industry design challenges, and is especially noteworthy for providing good hands-on experience and industrial engagement. We also have a high percentage of our students involved in extracurricular student clubs, and they may choose among 40+ groups within the college alone! These and other experiential opportunities enable our students to assemble a portfolio of activities and leadership experiences that make them very attractive and in high demand by employers. Enrollments in nearly all of our programs have skyrocketed and we are approaching 4000 students enrolled in our undergraduate programs (see graph in sidebar) along with more than 650 graduate students. In recognition of this as well as the state's keen interest in our high demand fields, both the state and the university have made very significant new investments in our college to allow us to invest in additional faculty and staff, to accommodate the increased student numbers. The Engineering Expansion Initiative provided an initial boost in state funding to VCEA in exchange for a commitment that we would educate an increased number of engineering students. That was followed by a second state initiative in the 2013-2015 biennium that provided additional funding for Computer Science, as well as Engineering, programs.

Being able to grow our college in terms of faculty and staff will mean that, with thoughtful hiring practices, we can build out our college so we more fully establish our areas of preeminence upon which our academic and scholarly reputation depends. Philanthropic investments by individuals

Total VCEA Undergraduate Enrollment and Research Expenditures over the Past Several Years

Total VCEA Undergraduate Enrollment

*Fall 2012 – Uncertified students were estimated and are likely low for some majors.

Research Expenditures

such as Gene and Linda Voiland and corporations such as PACCAR have been instrumental in this strategy. Such investments have enabled us to attract and retain distinguished faculty who lead our preeminent foci, to develop new educational and research facilities, and to build programs that enhance our student's education.

Thoughtful hiring will also position us to lead through research, scholarship, and innovation aimed at addressing grand challenges around energy, environment, health, and technology. Our research expenditures have more than doubled in the past 7 years to over $25M in FY14 and we anticipate that this trend will continue as we focus on core research areas and continue to hire outstanding faculty at all ranks. As we build strengths in these core areas, we also have opportunities to collaborate with colleagues from across the WSU system in the university's strategic priorities in Global Animal Health, Agriculture, Clean Technology, and Renewable Bioenergy. Added to that, the university's pursuit of a medical school on the health sciences campus in Spokane provides tremendous interdisciplinary and collaborative research and educational opportunities among the VCEA and Medical Sciences faculty and students. This will position our researchers to better compete for NIH funding in addressing grand challenges in protein systems, biomaterials, medical and bio-informatics, assisting the aging population and people with cognitive disabilities, and biomedical engineering, to name a few.

Finally, the Vice President for Research is working to shape the research agenda for WSU around high-impact, interdisciplinary grand challenges for which there already exist significant expertise at WSU. Our eminent faculty has realized for some time that the solutions to society's grand challenges will lie at the interfaces between many disciplines, and the research themes that characterize much of our research are inherently interdisciplinary. Thus, the VCEA is very well-positioned to benefit from the VPR's strategic planning; we conducted a similar exercise as part of our previous strategic planning activities, and are well prepared to contribute and influence the university's directions. In short, we are at a confluence such that we may never see this level of opportunity to shape our future again.

Being attentive now to the changing higher education landscape, and being clear and deliberate on our priorities, strengths, goals, and metrics will position the VCEA well into the future as a leader among engineering colleges at land-grant, research-I universities. Conducting impactful research addressing the grand challenges, delivering technology and innovation to our stakeholders in the state and beyond, and graduating the next generation of highly sought-after innovators, designers, and leaders, the VCEA plays an important and critical role in elevating Washington State University as one of the world's most influential and well-regarded universities. We look forward to a new era of "Collaboration. Innovation. Transformation!"

Mission:

As a core college in a Research University with Very High research activity (RU-VH)*, as well as a land grant university, our mission is threefold:

- To conduct fundamental and applied disciplinary and cross-cutting **research** that leads to new knowledge, transformative technology and innovative designs.

- To **educate** and prepare students through state-of-the-art programs, preparing them for professional careers and leadership in engineering and design professions.

- To **engage** people, industry and communities to improve quality of life and enhance economic development.

 *Research University with Very High research activity, according to the latest Carnegie Classifications

Vision:

Founded on the principles of collaboration, innovation, and transformation, the Voiland College of Engineering and Architecture is a world leader in providing solutions to societal grand challenges and quality, "work-ready, day-one" graduates.

Values:

We whole-heartedly endorse the values stated in the WSU Strategic Plan:

- **Quality and Excellence:** We are committed to providing quality and excellence in all our endeavors.

- **Integrity, Trust, and Respect:** We are committed to ensuring trust and respect for all persons in an environment that cultivates individual and institutional integrity in all that we do.

- **Discovery, Innovation, and Creativity:** We are committed to the pursuit of inquiry and discovery and to the creation and dissemination of knowledge.

- **Land-grant Ideals:** We are committed to the land-grant ideals of access, engagement, leadership, and service to bring the practical benefits of education to the state, nation, and global community.

- **Diversity and Global Citizenship:** We embrace a worldview that recognizes and values the importance of diversity, global interdependence, and sustainability.

- **Freedom of Expression:** We are committed to the free exchange of ideas in a constructive and civil environment.

- **Stewardship and Accountability:** We are committed to serving as ethical and responsible stewards of University resources.

Research and Scholarly Programs:

We note that the National Academy of Engineering, in 2008, identified 14 Global Grand Challenges for Engineering (see side bar). Engineering colleges across the country are challenged with addressing these, and other societal grand challenges for engineering, as outlined by the National Academy of Engineering, and with preparing the next generation of engineers to be able to contribute effectively to these efforts (http://www.engineeringchallenges.org/).

Most of these are aligned around larger themes in energy, environment, health, security, and technology innovation – the very themes that the VCEA has previously identified as well. These themes characterize much of the scholarly work ongoing in the VCEA, and it is clear that the VCEA faculty is engaged in scholarly activity that is of significant societal benefit. These themes are highly interdisciplinary, frequently interconnected, and highly collaborative. In addressing these themes, faculty researchers in the VCEA collaborate with colleagues from across the college, the university, and the country, even around the world. Below is a sampling of the impactful research ongoing in the VCEA related to these broad themes.

Energy

Meeting future energy needs will require a set of solutions that includes making the most effective use of our existing resources while also developing renewable, environmentally friendly energy systems, designing innovative processes that reduce both energy and water usage, and minimize adverse impacts on the atmosphere and global climate. This additionally requires developing new building materials and structural systems for "green architecture" and addressing our nation's aging infrastructure with novel and innovative technologies designed to reduce resource usage. Specific topics related to energy and energy efficiency for which VCEA faculty members provide leadership at the university, regional, and national levels include:

National Academy of Engineering (NAE) Global Grand Challenges for Engineering

- Making solar energy economical
- Provide energy from fusion
- Restore and improve urban infrastructure
- Manage the nitrogen cycle
- Provide access to clean water
- Develop carbon sequestration methods
- Advance health informatics
- Engineer better medicines
- Reverse-engineer the brain
- Prevent nuclear terror
- Secure cyberspace
- Enhance virtual reality
- Advance personalized learning
- Engineer the tools of scientific discovery

- Advanced materials for utilizing new energy sources like hydrogen and solar power; and improving energy storage – improving batteries, developing positron energy storage, and hydrogen storage
- Composite materials – developing sustainable infrastructure materials for the construction industry, infrastructure; and lightweight composite materials to reduce fuel consumption on aircraft

- Chemical catalysis for fuel processing – chemical catalysis of raw materials to higher value products and fuels, fundamental understanding of catalysis and reaction engineering for conversion of fossil fuels and biomass feedstocks
- Bioproducts and biofuels development – development of all aspects of biofuels/bioproducts economy, pyrolysis of biomass and other raw materials, conversion of biomass to biomaterials and biofuels, including the use of waste materials, such as forest residues and construction wastes, as feedstocks
- Renewable energy sources and the power grid - ensuring the reliability of the power grid as diverse, intermittent energy sources such as solar and wind are integrated
- Fuel cell systems – development of new fuel cell systems that directly convert bio-based jet fuels to electricity for on-board power systems in the more electric aircraft and for automobiles
- Sustainable infrastructure and design – production of cost-efficient solutions to energy challenges through renderings, models, ideas, and management strategies (digital and physical) that encourage high-performance, high-quality buildings meeting developer and/or client demands for aesthetics, time, and money

Environment

Population growth and global development will challenge the earth's air and water resources for the foreseeable future. We already see many changes, from the historic drought in California, to increasing severity and incidence of forest fires, to competing demands for water resources, and to the specter of global climate change. Our air, water, and land systems are inextricably linked, and our understanding of these systems will require interdisciplinary, collaborative research, the results of which will inform resource management and policy, as well as mitigation approaches. The faculty in the Voiland College of Engineering and Architecture play leadership roles in addressing these grand challenges around air and water resources specifically in the following areas:

- Water resources – understanding of global systems and interactions between land and atmosphere, earth systems modeling, hydrologic impacts of global change, regional and national scale water resource modeling and management
- Aquatic sciences – water quality studies, nutrient and pollutant cycling, and statistical analyses in water bodies
- Air quality studies – regional air quality modeling and measurements, agriculture and air quality, nitrogen cycling, biogenic emissions, carbon cycling, nutrient and pollutant deposition, urban air quality, global change, and remote sensing
- Energy and clean technology systems design and implementation – developing new or improved sources of clean energy, improving energy efficiency, and developing sustainability of infrastructure and design through interdisciplinary collaborations
- Interactions between water resources, water quality, climate change, and human behavior in both agricultural and urban environments – watershed modeling for informing public policy that is economically and scientifically sound

- Catalysis - Development of new catalytic conversion systems that mitigate adverse impacts of transportation systems; new systems to capture carbon dioxide and convert it to drop-in fuels and chemicals, thus mitigating global climate change

Health

New challenges to human health, including addressing the needs of an aging population, managing emerging diseases in a world in which our global mobility can spread outbreaks at a frightening pace, new technology developments in medical device technologies, and utilizing the vast amounts of data in a way that produces information for timely decision-making, are all areas of opportunity for engineering, computer science, and design disciplines. The faculty in the Voiland College provides leadership in health-related research in the following areas:

- Biofilms – understanding all aspects of biofilm growth and interactions, including interactions with wounds, sensor development, bioremediation, wastewater treatment, safe foods, or biochemical production.
- Bioengineering - New understanding of how cardiac muscles work and cells move will all have dramatic impact on the quality of life of our aging populations; new systems that allow the advanced separation and detection of marker proteins thus enabling proactive treatment of chronic and infectious diseases.
- Materials - new bone and cartilage replacement materials, leading to reduced incidence of post-surgery infection, improved durability for longer joint replacement lifespans, and lowered risk of the body's rejection of the device.
- Bioinformatics – designing algorithmic solutions for data-intensive life sciences applications, including genomics, proteomics, and metabolomics; drug and vaccine development; epidemiology; and tracking food- and water-borne diseases.
- Devices and sensors – Sensor networks and machine learning for monitoring systems that are not based upon video; automating resident activities; allowing disabled or elderly people to remain independent and improve their quality of life.

Security

Security and safety are important in all aspects of our personal lives as well as for businesses, large-scale manufacturing, transportation, communications, computation, and virtually every aspect of modern society. Within the Voiland College, our research efforts in Security and Safety include a focus on the power grid, the development of smart sensors and sensor networks for making homes safer, synthesis of crystals for harmful substance detection, environmental protection (as described above), and large scale data analysis to better understand threats to individuals, populations, and society as a whole. Some specific aspects of our research in this area include:

- Smart power grid – developing software platform to test the Smart Grid to prevent blackouts and more efficiently, reliably manage shared energy systems. Researchers in our well-known power engineering program are key contributors to national efforts to develop a smart and more efficient electric power grid. Our researchers helped produce a smart grid demonstration project that led to Pullman becoming the region's first smart grid community. Using smart grid technologies, the Pacific Northwest Smart Grid Demonstration Project is testing new devices, software and advanced analytical tools to enhance the power grid's reliability and performance.
- Smart sensors – sensor networks find a wide array of applications, from smart homes, to smart grid, to many other sensor networks and multi-modal information systems such as "smart plugs" that monitor power consumption of individual devices to permit internet-based monitoring and real-time control for energy efficiency. In addition, we are involved in research on pervasive sensing systems for a variety of applications including volcanic activity monitoring and machine learning, among other applications.
- Detector technology – advances in crystal growth technology to improve the quality of single crystals used as detectors for radiation and other harmful substances is a key component of the work done by the Center for Materials Research. This technology will improve detectors and reduce reliance on countries with low-cost labor where such crystals are typically fabricated.
- Computational and data sciences - Faculty and students at the Voiland College of Engineering and Architecture, in collaboration with faculty from other colleges and institutions, are engaged in computational and data science research that is transforming our global future. This life-changing research addresses a broad range of issues and needs, including:
    - Data-driven control systems for smart home projects that enable the elderly and people with cognitive disabilities to stay at their homes for as long as possible;
    - Projects involving data collection, data analytics, and data visualization for highly efficient electric power management in well connected, smart cities;
    - Using massive data in better understanding how diet, hygiene, and cultural practices around the world relate to human milk composition and infant health.

Technology Innovation

In June, 2011, President Obama declared a national priority in manufacturing within the US and on advanced materials, and particularly computational materials science. Two high profile programs were announced at that time; the National Network for Manufacturing Initiative (NNMI), and the Materials Genome Initiative (MGI). These were aimed at the development of a network of public-private partnerships in manufacturing in the form of large research centers for manufacturing, and at speeding the time it takes to develop a new material, respectively. Some of our areas of research effort in this area include:

- Advanced manufacturing – Advanced manufacturing at WSU includes computational, experimental, and developmental efforts.

- Three-dimensional printing has been a staple of research at WSU for well over a decade, including research and development in metals, ceramics, and polymers. Current efforts in 3D printing include bio-materials, aerospace, and a variety of electronics applications.
- Capabilities for research in manufacturing of composite materials at our Composite Materials Engineering Center (CMEC) include true pilot scale capability for layup and processing of composites.
- Aerospace manufacturing research is addressed in areas of adhesives and multi-materials to the development of models for optimization of metals processing.
- Design and manufacturing of electronics spans the range of applications from processing of circuits and nanostructures in a clean room to exploitation of multi-materials and multi-physics processes from nano-machining to micro-lens fabrication to functionalization of nanomaterials for polymer nano-composites to drug delivery and biological feature detection.
- Virtual reality for optimization of manufacturing processes has had strong industrial support at WSU over the past couple of decades.

- Advanced materials – Research in advanced materials includes all materials classes with specialists in each of the major materials classifications. We have clusters of strong researchers in the areas of polymer-based composite materials, metals and solid mechanics, and electronic materials. We have strong interdisciplinary interactions in this area with Physics and Chemistry faculty members, who, along with VCEA researchers, make up the interdisciplinary Materials Science and Engineering PhD program.
- Computational materials – Multi-scale computational expertise in materials and process development exists within VCEA for all materials classes. Modeling at the atomistic and first-principles level exists for applications in fundamental materials and catalyst development, at the meso-scale for materials defects and interactions, and at the macroscale for complex materials systems and performance of engineering components during processing and in service.

Areas of Preeminence

The academic and scholarly reputation of WSU and VCEA are heavily dependent on the college identity associated with a few areas of excellence that are identified and invested in. These areas are characterized as being distinctive, interdisciplinary, and based upon core competencies. WSU has similarly identified several areas of excellence that include (but are not limited to) Global Animal Health, Clean Technology, and Agriculture.

There are five areas of preeminence for VCEA and they include:

- **Electric power grid** – this is a long-time area of preeminence, dating back to the days of the engineering research center, and WSU engineering involvement in the development of the series of hydroelectric dams on the Snake and Columbia Rivers.
- **Chemical catalysis** – built upon long history of expertise in fossil fuel production, our chemical catalysis group is focused on the development of advanced catalysis and reaction engineering

systems that enable the more effective use of existing fossil resources, mitigating environmental impact of transportation fuels and removing carbon dioxide from the atmosphere, while also enabling a future that makes more effective use of materials that were previously considered waste.

- **Air quality research** – The Laboratory for Atmospheric Research (LAR) is the oldest air pollution control group in the country. The LAR was an interdisciplinary research group long before interdisciplinary activities were recognized and encouraged. LAR has a history of major contributions including elucidating the role of vegetation in tropospheric ozone formation, development of emissions measurement methods, atmospheric organic compounds measurements, and predictive regional air quality modeling.

- **Materials science and engineering** – In the early days of MSE at WSU, research was focused on metallurgical materials and wood-based materials. Currently, group members are still strong in metals and wood composites, but are also noted for contributions in computational materials and solid mechanics, composite structures, advanced manufacturing techniques, biomaterials, crystal growth, and anti-matter applications, among others.

- **Engineering for Health** – Our research is increasing fundamental understanding about biomaterials, molecular and cellular biological processes, biomechanics, behavior of pathogenic bacteria, and the spread of disease – research that will lead to improvements in health and the quality of life for millions of Americans. Researchers are also developing health-assistive smart environments to make our lives as pain free as possible.

There are also four additional emerging or desired areas of preeminence. These are primarily listed as emerging due to the existing depth of expertise within the VCEA, they are being built out now. Wherever possible, it is necessary to take advantage of the expertise and interests of other campuses, colleges and departments from around the university. Fortunately, such opportunities will likely exist as the Vice President for Research determines strategic research priorities for Washington State University, going forward.

- **Water resources** – We will build upon interdisciplinary collaborations and links of VCEA faculty with faculty from across the university, in the Laboratory for Atmospheric Research, the State of Washington Water Research Center, the Center for Environmental Research, Education and Outreach, the Center for Sustaining Agriculture and Natural Resources, and Puyallup Extension Center. This emerging opportunity leverages our current activities that include the BioEarth Regional Earth System Modeling, WISDM watershed integrated systems dynamic modeling, NSPIRE nitrogen systems, and policy oriented integrated research and education.

- **Smart systems** – This area of emerging preeminence is characterized by our faculty primarily in computer science that are experts in data mining, sensor networks, pervasive computing, artificial intelligence, and machine learning. Adding to that expertise, computer science faculty members work with colleagues from other disciplines to apply machine learning and develop smart systems that address societal needs, such as the smart homes program that was mentioned earlier that is improving quality of life and reducing health care costs associated with institutional care.

- **Computational and data sciences** – Leveraging our emerging core competency in machine learning, we will collaborate with colleagues in applied math and applied statistics, take advantage of hiring opportunities in data base management and data analysis, and provide computational and data science expertise to specific application domains among WSU and VCEA signature areas, including global animal health, agriculture, computational materials, air and water resources, and health sciences.
- **Sustainable infrastructure and design** – while our nation's aging infrastructure is in need of investment, we also recognize that the finiteness of our resources and the complexity of social, economic, and environmental needs must also be balanced against the benefits of new or renovated infrastructure and buildings – the so-called "triple bottom line." Moreover, buildings represent nearly half of the energy usage in the US. Designing and engineering energy efficient buildings and dealing with the nation's aging infrastructure will require careful consideration of energy usage, environmental, community, and economic impacts and will require interdisciplinary approaches.

Context in relation to the WSU Grand Challenges

In September, 2015, WSU described five Grand Challenges that are being addressed by WSU scholars in association with collaborators across the world. These challenges "capitalize on the University's fundamental and applied research strengths (and) focus WSU's research, innovation and creativity in specific areas to achieve broad societal impact." The research and educational aims of Voiland College, as described in the 2015-2020 Strategic Plan, map well to these priority areas identified by the university.
The challenges are described in brief as follows
(see https://research.wsu.edu/research-initiatives/grand-challenges/):

1. **Sustaining Health:** The uncompromising pursuit of healthier people and communities
2. **Sustainable Resources:** Supplying food, energy, and water for future generations
3. **Opportunity and Equity:** Promoting an informed and equitable society, expanding individual opportunity, and advancing social justice
4. **Smart Systems:** Harnessing technology to improve quality of life
5. **National Security:** Fundamental research to protect America

VCEA's broad themes of Energy, Environment, Health, Security, and Technology Innovation map almost directly to the Grand Challenge areas for WSU. Energy and Environment are critical for the Sustainable Resources Grand Challenge. Technology Innovation covers a wide swath but certainly applies to the Smart Systems Grand Challenge, and Health and Security are self-evident in fitting in with the Grand Challenge themes 1 and 5, respectively. In addition, VCEA's Areas of Preeminence and Emerging Areas embody critical research strengths fundamental to the Grand Challenges. The Grand Challenge area of Opportunity and Equity is a theme that is espoused in VCEAs educational goals directly, but is also included in many areas of research where policy, accessibility, and economics play key roles in our research (eg. ESIC, LAR, CMEC, and SERC all have research strengths in these areas).

Goals and Subgoals

Theme 1: Exceptional Research, Innovation, and Creativity

Goal 1: Increase productivity in research, innovation, and creativity to enhance reputation and address the grand challenges and opportunities of the future.

Goal 2: Further develop VCEA's unique strengths and opportunities for research, innovation, and creativity based on its locations and land-grant mandate to be responsive to the needs of Washington State.

Goal 3: Advance VCEA's reach both nationally and internationally in existing and emerging areas of achievement.

Theme 1 Sub-goals

1.a. Grow and diversify extramural research funding.

1.b. Attract, retain, and develop high-quality research faculty system wide.

1.c. Develop and sustain the physical and technological infrastructure, resources, and expertise to support increased research and scholarly productivity system wide.

1.d. Build upon VCEA's current and emerging areas of research excellence and international reputation.

1.e. Increase engagement and productivity of graduate students, postdoctoral associates, and undergraduates in mentored research.

Theme 2: Transformative Student Experience

Goal 1: Provide an excellent teaching and learning opportunity to a larger and more diverse student population.

Goal 2: Provide a university experience centered on student engagement, development, and success, which prepares graduates to lead and excel in a diverse United States and global society.

Goal 3: Improve curricular and student support infrastructure to enhance access, educational quality, and student success in a growing institution.

Theme 2 Sub-goals

2.a. Enhance student engagement and achievement.

2.b. Increase the size, diversity, and academic preparedness of the undergraduate and graduate student populations in Pullman and urban campuses.

2.c. Produce graduates who are highly sought by post-baccalaureate and post-graduate employers and graduate/professional programs.

2.d. Align student recruitment, admissions, and retention to enhance access, inclusiveness, and student success.

Theme 3: Outreach and Engagement

Goal 1: Increase access to and breadth of VCEA's research, scholarship, creative, academic, and extension programs throughout Washington and the world.

Goal 2: Expand and enhance VCEA's engagement with institutions, communities, governments, and the private sector.

Goal 3 Increase VCEA faculty, staff, and students' contributions to economic vitality, educational outcomes, and quality of life at the local, state and international levels.

Theme 3 Sub-goals

3.a. Increase the impact of VCEA research, scholarship, creative and outreach activities on quality of life and economic development within the state and region.

3.b. Increase access to the VCEA for place-bound, non-traditional, first-generation, and other under-served and underrepresented students.

3.c. Contribute to economic security, stability, social justice, and public policy through research, education, and design.

3.d. Increase VCEA's global presence and impact.

3.e. Improve VCEA's reputation with external constituencies.

Theme 4: Diversity, Integrity, and Openness

Goal 1: Create and sustain a diverse, inclusive, and equitable community of scholars and students.

Goal 2: Cultivate a system-wide culture of organizational integrity, effectiveness, and openness that facilitates pursuit of the college's academic aspirations.

Goal 3: Steward and diversify resources invested by students, the public, and private stakeholders in a responsible way to ensure economic viability of the institution.

Theme 4 Sub-goals

4.a. Recruit, retain, and advance a diverse mix of faculty, staff, and students, including women and those from underrepresented groups.

4.b. Maintain respectful, inclusive, and non-biased behavior in all university environments.

4.c. Increase employee productivity and satisfaction.

4.d. Strengthen administrative accountability, innovation, creativity, openness, transparency, and collaboration to advance the college's mission.

4.e. Utilize strategic plans, valid and reliable data, and evaluation indicators to align investments of resources with college priorities.

4.f. Expand, diversify, and effectively steward funding to advance VCEA's mission.

Implementation Plan

Theme 1: Exceptional Research, Innovation, and Creativity

Goal 1: Increase productivity in research, innovation, and creativity to enhance reputation and address the grand challenges and opportunities of the future.

Goal 2: Further develop VCEA's unique strengths and opportunities for research, innovation, and creativity based on its locations and land-grant mandate to be responsive to the needs of Washington State.

Goal 3: Advance VCEA's reach both nationally and internationally in existing and emerging areas of achievement.

Theme 1 Sub-goals implementation plan:

Subgoal	Tactics	Metrics
1.a. Grow and diversify extramural research funding.	• Incentivize and reward interdisciplinary efforts • Pursue joint appointments with PNNL and other government agencies where appropriate • Enhance collaboration with industry, national laboratories, and other universities • Proactively enable the development of embedded corporate laboratories or offices as opportunity arises • Engage high level visiting scholars to establish collaborative research in our signature areas • Be more responsive to industrial stakeholders by improving communication between administration and individual PIs • Aggressively market, promote and fund-raise to support research facilities and programs • Maintain an effective administrative staff • Improve laboratory facilities as outlined in 1.c. • Improve the effectiveness of our faculty in obtaining extramural funding in all categories as outlined in 1.b.	• Research expenditures and % from industry • Number of cross-disciplinary, international, and multi-institution grant awards (tracked by eREX and org/budget numbers, OGRD) • Research funds raised through development efforts • Number of faculty members below the 25th percentile of research expenditures
1.b. Attract, retain, and develop high-quality research faculty system wide.	• Establish a process for faculty to buyout time to develop new research directions and to encourage innovation • Establish flexible faculty workloads to optimize the balance between high quality undergraduate instruction and building, maintaining, and growing vital research programs. (Refer to the VCEA faculty responsibility guidelines.) • Implement strategic recruiting and hiring of top faculty at the appropriate balance of rank and international prominence (for Sr. hires) • Proactively advance faculty prominence by nominating qualified individuals for high visibility awards. • Increase number of Washington State and National Academy members	• Number of Washington State Academy and NAE members • Number of prestigious awards won by faculty • Number of professional society fellows • Number of CAREER awards or Presidential awards from NSF, DOE and DOD

	• Ensure high standards for tenure and promotion
	• Support new faculty
	   o VCEA seed grants
	   o Assist new faculty with proposal strategy and preparation through training (along with OGRD) and writing/editing assistance
	   o Improve mentoring of new faculty for research, teaching and student advising	

1.c. Develop and sustain the physical and technological infrastructure, resources, and expertise to support increased research and scholarly productivity system wide.	• Improve computational facilities and internet connections
	• Focus resources (space, equipment, graduate assistantships) on signature areas
	• Establish seed grants for strategic equipment purchases
	• Develop more center type facilities where researchers have access to shared instruments that are too expensive to buy and maintain for a single PI.
	• Maintain a Highly Qualified Technical Staff
	   o Work toward recruitment/retention of high quality personnel (strong research and technical skills) at the research staff level. Sufficient technical support personnel at all levels
	   o Centralize some common support infrastructure (especially servers and computer support.)
		• Number of externally supported research centers
		• New/revamped square footage of research space
		• Number/TT-FTE of technical staff and Research Professorships

1.d. Build upon VCEA's current and emerging areas of research excellence and international reputation.	• Invest preferentially in VCEA signature themes and emerging priority areas • Improve inter-departmental and interdisciplinary reach of research in our signature and emerging areas	• Peer review number from annual report • Research expenditures from the signature areas • Number of peer-reviewed publications • Number of patents awarded
1.e. Increase engagement and productivity of graduate students, postdoctoral associates, and undergraduates in mentored research.	• Increase the number of highly qualified PhD students. • More strategic and organized student recruiting • Improved facilities (see 1.c) • Faculty mentoring to help with individual student recruiting	• Percent RAs on external funding • Student publications per GSE • Number of UG publications • Fraction of UGs involved in Resaerch

Theme 2: Transformative Student Experience

Goal 1: Provide an excellent teaching and learning opportunity to a larger and more diverse student population.

Goal 2: Provide a university experience centered on student engagement, development, and success, which prepares graduates to lead and excel in a diverse United States and global society.

Goal 3: Improve curricular and student support infrastructure to enhance access, educational quality, and student success in a growing institution.

Theme 2 Sub-goals implementation plan:

Subgoal	Tactics	Metrics

2.a. Enhance student engagement and achievement.	• Student clubs
	  o Increase support and visibility for student professional clubs by fund raising and visible space allocations.
	• Continue to enhance the Innovation Zone space. This space will offer students a chance for independent, hands-on learning.
	  o Fund raise to renovate, improve, or construct student experiential learning spaces.
	• Launch a Co-op program across the college
	• Encourage and increase the number of undergraduate students working on undergraduate research, and participating in undergraduate research presentations and posters,
	• Improved Courses and curricula
	  o Smaller class sizes, particularly for introductory courses.
	  o Limit class sizes to 50 students.
	  o Implement better course assessment practices
	  o Incorporate more experiential learning into our curricula
	  o Build state-of-the-art teaching laboratories with appropriate technical and administrative staffing
		• Percentage of students in clubs
		• Pass-rate for FE exam
		• Number of prestigious student awards
		• Donation amounts for undergraduate programs and space
		• Fraction of students with Honors college enrollment
		• Fraction of classes with less than 50 students
		• Number of undergraduate students working on undergraduate research
		• Number of undergraduate students giving research posters and presentations at WSU events such as Showcase
		• Number of undergraduates appearing as authors on refereed journal articles

2.b. Increase the size, diversity, and academic preparedness of the undergraduate and graduate student populations in Pullman and urban campuses.	• Provide better support for struggling students
	  o Improve curriculum advising experiences by reducing the student/advisor ratio.
	  o Improve graduate student advising by ensuring that the graduate student to graduate coordinator ratio remains low
	  o Improved tutoring services and space
		• Number of students served by tutoring services
		• Fraction of students who are members of under-represented groups
		• Student/Advisor ratio
		• Fraction of retained first-generation college students
		• College enrollment (total graduate and undergraduate students)

2.c. Produce graduates who are highly sought by post-baccalaureate and post-graduate employers and graduate/professional programs.	• Improve the skills of teaching faculty and TAs
	  o Creation of a "Teaching Academy" to train faculty members on best practices and to reward the best teachers.
	  o Host a NETI workshop so that all faculty have an opportunity to participate, and provide more similar types of opportunities
	  o Provide better support for struggling students via improved and more tutoring and training for TA's.
	  o Provide effective internal and external mentoring, such as that developed under the ADVANCE grant, for new faculty.
	  o Provide teaching mentoring to new faculty members.
	  o Improve the faculty mentoring (advising) of the students by providing mentoring/advising training for all faculty members.
	• External learning and industry relations
	  o Establish an Experiential Learning and Professional Practice Program/Industry relations office at the college level to help facilitate practical experiences and employment
		• Job placement rate of graduating students
		• Fraction of students going to graduate school
		• Fraction of faculty who participate in professional development opportunities (such as NETI, Frontiers, etc.)
		• Fraction of students who complete an internship/co-op experience

	opportunities for the students.
	  ○ Develop formal experience-enhanced programs (internship/co-op, entrepreneurship, int'l studies, REU, interdisciplinary studies, etc).
	  ○ Increase entrepreneurship training opportunities
	• Graduate student training in teaching and mentoring
	  ○ Teaching fellows program	

2.d. Align student recruitment, admissions, and retention to enhance access, inclusiveness, and student success.	• Support programs such as the Louis Stokes Alliance for Minority Participation (LSAMP) as well as the Team Mentoring Program (TMP), by encouraging faculty members to participate in these programs and by educating students as to the opportunities available. • Increase the amount of scholarship support available to students and increase the diversity of the pool of students eligible to receive scholarship support. • Develop recruitment practices to attract women and under-represented minorities to VCEA programs at WSU. ○ Adapt certain UCORE type courses to highlight the benefits of VCEA degrees.	• SAT/GRE scores • Percent retention • Student enrollment and retention across under-represented groups

Theme 3: Outreach and Engagement

Goal 1: Increase access to and breadth of VCEA's research, scholarship, creative, academic, and extension programs throughout Washington and the world.

Goal 2: Expand and enhance VCEA's engagement with institutions, communities, governments, and the private sector.

Goal 3 Increase VCEA faculty, staff, and students' contributions to economic vitality, educational outcomes, and quality of life at the local, state and international levels.

Theme 3 Sub-goals implementation plan:

Subgoal	Tactics	Metrics
3.a. Increase the impact of VCEA research, scholarship, creative and outreach activities on quality of life and economic development within the state and region.	• Develop more industrial consortia, pursue GOALI awards, emphasize research collaborations and grants from private companies and LSDF, JCATI and similar research that requires industrial involvement • Increase the number and quality of graduates – Increase number of significant student awards received • Increase sponsorship and hosting of symposia and conferences/workshops that target industry representatives • Increase the amount and impact of intellectual property resulting from VCEA research as evidenced by an increase in commercialization, licensing, and patents • Show leadership in codes and standards development in areas of research strength • Increase the impact of specialized infrastructure on industries in the state and region through an increase in the amount of "fee for service" extension from industrial users • Strengthen internship programs and develop a strong co-op program for students • Serve the community and the profession by participating in activities designed to improve and preserve the body of knowledge in engineering, computing, and design	• Number of start-up businesses from VCEA research and outreach • Total research and development expenditures from industry (reported to NSF/ASEE) • Patents applied for/awarded • Number of invention disclosures • Royalties and other revenue from commercialization activities
3.b. Increase access to the VCEA for place-bound, non-traditional, first-generation, and other under-served and underrepresented students.	• Increase development of on-line courses where it is reasonable to do so – Continue to emphasize Engineering and Technology Management, and develop MS Programs in software engineering, and potentially other professional MS degrees • Strengthen and continue to develop and grow, non-Pullman sites that serve place-bound and under-served students, including the Tri-Cities, Vancouver, Bremerton, and Everett locations • Strengthen student clubs and programs that support URM groups (SWE, NSBE, SOLES…)	• Total undergrad. and graduate enrollment (minority, first-generation, low-income) • Urban campus enrollment (Spokane, Tri-Cities, Vancouver) • Enrollment at other sites

	• Increase efforts specifically aimed at fundraising for scholarships for under-represented students • Develop college-level focused recruitment on URM groups – continue efforts with Latino parents, etc. • Leverage programs aimed at URM populations to increase diversity of the student population in VCEA, (including involvement in the LSAMP, TMP, AGEP and GEM programs) • Support mentoring programs such as TMP, SWE, Boeing, etc. • Increase faculty diversity to help attract URMs and provide role models • Proactively advance faculty prominence by nominating qualified individuals for high visibility awards.	
3.c. Contribute to economic security, stability, social justice, and public policy through research, education, and design.	• Encourage continued influence on public policy, particularly through ESIC, LAR, and CEREO • Increase interaction with the Ruckelshaus Center • Encourage continued research in areas of cyber and software security and security of the power grid • Encourage and incentivize short-term faculty-industry exchange programs. • Continue research efforts in the signature theme areas of sustainability and smart systems and environments	• Number of Schools and Departments with advisory boards that include alumni and constituency representatives • Total annual college expenditures
3.d. Increase VCEA's global presence and impact.	• Provide greater opportunities for international experiences for students, including the Building Bridges and Engineers Without Boarders programs • Continue recruitment of international students and exchanges with international scholars • Develop strategic partnerships with targeted international universities • Increase participation in Fulbright program (with faculty and students) • Enhance exchange programs with international universities • Expand projects with WSU International Programs Office	• International student enrollment • Number of faculty participating in international activities • Number of students participating in study abroad and other significant international experiences
3.e. Improve VCEA's reputation with external constituencies.	• Improved strategic communication, including focused press releases to prominent media and regular communication with Deans around the country • Improved marketing planning • Leverage the recent rebranding and naming of the college • Vigorously communicate successes in national polls and rankings for our programs • Do a better job of nominating and promoting faculty and students for prestigious awards	• Peer assessment score from ASEE • Media, social media, and website analytics (number of views)

Theme 4: Institutional Effectiveness: Diversity, Integrity, and Openness

Goal 1: Create and sustain a diverse, inclusive, and equitable community of scholars and students.

Goal 2: Cultivate a system-wide culture of organizational integrity, effectiveness, and openness that facilitates pursuit of the college's academic aspirations.

Goal 3: Steward and diversify resources invested by students, the public, and private stakeholders in a responsible way to ensure economic viability of the institution.

Theme 4 Sub-goals implementation plan:

Subgoal	Tactics	Metrics
4.a. Recruit, retain, and advance a diverse mix of faculty, staff, and students, including women and those from underrepresented groups.	- Assure diversity and inclusion efforts are visibly and consistently supported at the highest levels of leadership. - Improve mentoring of assistant and associate professors and students - Continue successful programs from Advance aimed at the hiring and advancement of underrepresented faculty. - Develop and implement social media tools to improve outreach to underrepresented groups. - Assess and reward data-informed efforts by colleges and areas to improve recruitment outreach to underrepresented groups. - Develop and implement a recruiting plan for faculty and graduate students	Percent of students and faculty from underrepresented groups
4.b. Maintain respectful, inclusive, and non-biased behavior in all university environments.	- Maintain and strengthen units, programs, and spaces that promote community building, intercultural exchange, and a diversity of voices. - Recognize contributions to an inclusive and respectful work environment in employee performance evaluations. - Perform exit interviews for each departing faculty member and departing students to better understand the issues.	- Key indicators from biennial institution-wide Employee Engagement Survey - Results from exit surveys
4.c. Increase employee productivity and satisfaction.	- Improve functionality of information technology systems for administrative processes, student services, and research. - Recognize productivity in employee performance evaluations. - Communicate openly and with appropriate timeliness on issues of relevance to students, faculty, staff, and external constituencies. - Reduce the administrative burden on high-performing faculty and staff. - Regularly review current work environments and processes for improvement. - Use data/information gathered from the employee engagement survey to improve work environment. - Provide resources for professional development.	Average employee satisfaction rating from Employee Engagement Survey (faculty, staff)
4.d. Strengthen administrative	Undertake regular evaluation of academic units, programs, centers, and institutes to ensure	Average employee satisfaction rating

accountability, innovation, creativity, openness, transparency, and collaboration to advance the college's mission.	resource alignment is consistent with university goals and productivity. • Conduct evaluation and implement improvement of administrative processes to ensure maximum efficiency and effectiveness. • Remove administrative barriers that prevent entrepreneurial innovation. • Improve administrative and academic analytics capabilities to improve decision-making. • Improve day-to-day communication from college administration.	from Employee Engagement Survey (faculty, staff)
4.e. Utilize strategic plans, valid and reliable data, and evaluation indicators to align investments of resources with college priorities.	• Engage key constituencies in decision making, governance, and strategic planning. • Report annually on progress toward goals of strategic plan. • Focus on harnessing individuals and units to partner on large, programmatic initiatives that advance WSU's intended institutional profile. • Map VCEA priorities to university, state, and federal plans.	•
4.f. Expand, diversify, and effectively steward funding to advance VCEA's mission.	• Expand revenue from summer session, online education, and not-for-credit offerings. • Maintain VCEA development resources at levels in excess of $10 million per year. • Strengthen existing professional graduate degrees and develop more opportunities in this area.	• Revenue from summer session, online programs and not-for-credit offerings • Annual VCEA private support

VCEA Priority Metrics and Benchmarks

The tactics and metrics for each sub-goal of the VCEA strategic plan are described in the tables that follow. By recommendation of the External Leadership Board of the college in June 2015, and through discussions at the VCEA Leadership Retreat in July 2015, a number of "priority metrics" were identified. These metrics most readily indicate our progress in areas of emphasis for the college. Tier 1 metrics and the WSU and average peer numbers are shown below:

Tier 1 Metrics:

1. Research Expenditures (and /TT FTE)
2. Average number of citations over the past 5 years
3. Total Publications in peer-reviewed journals
4. Number of NAE, NAS, and Institute of Medicine members
5. Number of Graduate Students and Post Docs (and /TT FTE) (MS, PhD – total students and degrees)
6. UG Student numbers (and /TT FTE)
7. Job Placement rate for UG Students
8. Fraction of female and URM students (total and graduates)

Metric	WSU (FY2014)	Benchmark/Goal
1. Research Expenditures	$28,073,696	$46,800,000
RE/TT FTE	$212,679	$360,000
2. Total number of citations/TT FTE/year (5 year average)	44.6	100
3. Total Journal Publications/TT FTE/year (5 year average)	5.3	6
4. National Academy members	1	2
5. Graduate Enrollment	691	1035
MS	284	450
PhD	407	585
6. UG Enrollment	3741	4500
7. Job/Postgrad Placement Rates for UG students	76%	90%
8.a. Fraction Female Students	26.8% Grads, 14.1% Tot	Top 50% of Eng. colleges
8.b. Under-represented minorities	Grad: 104 UG: 661	Top 50% of Eng. colleges

Tier 1 Metrics Performance and Annual Goals:

| Metric	FY14		FY15		FY16		FY17		FY18	FY19	FY20
	WSU Engineering	IEC Peer average	WSU Engineering	IEC Peer average	WSU Engineering	Goal	WSU Engineering	Goal	Goal	Goal	Benchmark Goal
Research Expenditures	$ 28,516,696.00	$ 82,166,516.38	$ 28,120,330.05	$ 84,679,369.38	$ 33,004,410.00	$ 33,150,000.00	$ 36,352,495.08	$ 35,100,000.00	$37,700,000.00	$41,600,000.00	$ 46,800,000.00
VCEA Only	$ 25,115,950.00		$ 24,801,608.00		$ 28,306,935.00		$ 32,427,029.03				
TT Faculty	145	196	152	201	156		154				
VCEA Only	130		135		141		143				
SDC							21				
RE/Faculty	$ 196,666.87	$ 419,052.46	$ 185,002.17	$ 421,129.23	$ 211,566.73	$ 255,000.00	$ 236,055.16	$ 270,000.00	$ 290,000.00	$ 320,000.00	$ 360,000.00
VCEA Only	$ 193,199.62		$ 183,715.61		$ 200,758.40		$ 226,762.44				
Citations/TT FTE over 5 yrs			223			250		275	325	400	500
Journal Publications/TT FTE over 5 yrs			26.5			25		25	25	25	25
NAE Members	1		1	5	1	1	1	1	1	2	3
Degrees Conferred	165		168		195		207				
MS	116		118		123		144		150	168	180
PHD	49		50		72		63		59	64	70
UG	596		703		730		776		765	792	810
Graduate Enrollment	691	1340	732	1410	739	725	742	775	865	950	1035
MS	284	666	296	706	285	300	332	325	375	420	450
PhD	407	674	436	704	454	425	410	450	490	530	585
UG Enrollment	3731	4850	3833	5200	3715	4000	4039	4100	4250	4400	4500
Job placement rates for UG Students			0.76			90%		90%	0.9	0.9	0.9
% Female Students											
UG	14.10%	18.93%	13.90%	19.81%	14.30%		14.44%		20.00%	21.00%	22.00%
UG Percentile (Female)	0%		0%								
Grad	26.80%	22.11%	27.00%	21.94%	23.00%		27.00%		27.00%	29.00%	31.00%
GRAD Percentile (Female)	92%		92%								
Female Percentile Benchmark			50%			50.00%		50.00%	50%	50%	50%
Under-Represented Minorities											
UG	12.70%	8.62%	13.30%	8.99%	13.30%		13.30%				
UG Percentile (URM)	85%		77%								
Grad	4.00%	4.79%	4.30%	4.65%	8.00%		6.00%				
GRAD Percentile (URM)	54%		54%								
URM Percentile Benchmark			50%		50%	0.5		0.5	50%	50%	50%

Research Expenditures
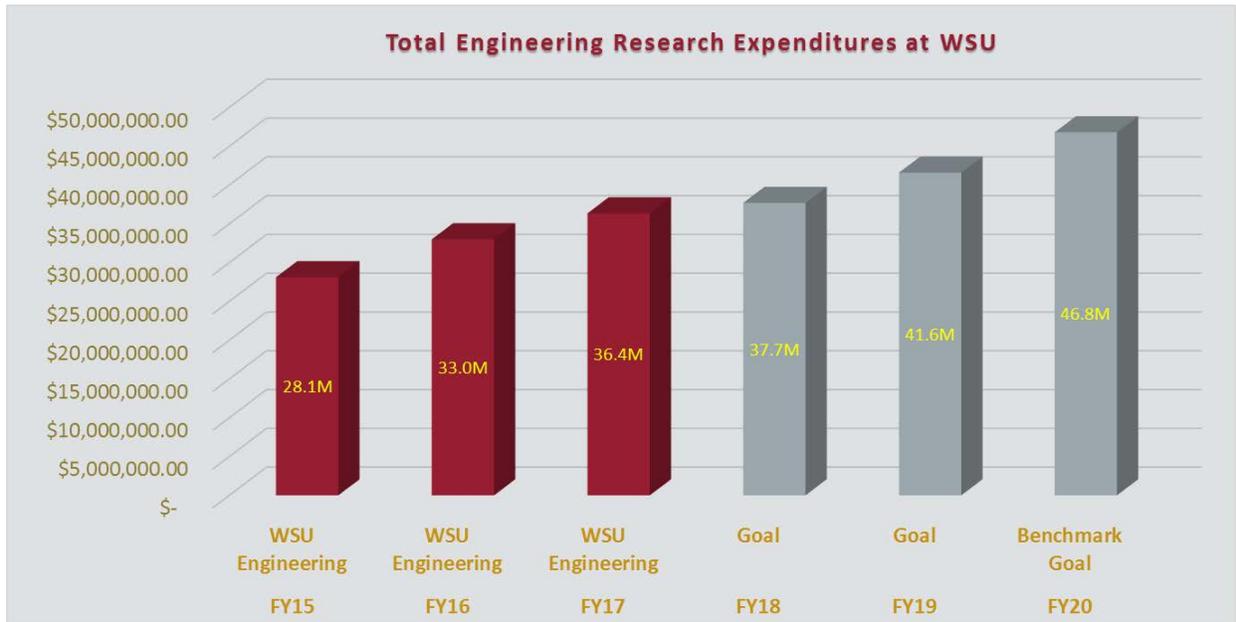
Research expenditures from engineering faculty at WSU continue to increase. The numbers above are those reported to ASEE and USNWR and include all engineering at WSU (including Ag. Engineering). The average VCEA expenditures per TTFTE in FY17 were $236K/TTFTE, up from $211.6K in FY16.

Enrollments

VCEA Enrollment (FT+PT)

Beginning in FY16, we have created a class of undergraduate students that we call "pre-engineering." There were 146 such students in FY16 and 152 in FY17. In spite of this change in the students counted, the undergraduate student enrollment has increased over the past 3 years. Graduate student enrollment has increased by about 1% over that period. Current numbers of undergraduate and graduate degrees conferred are ahead of schedule compared with goals set in 2015.

Degrees Conferred
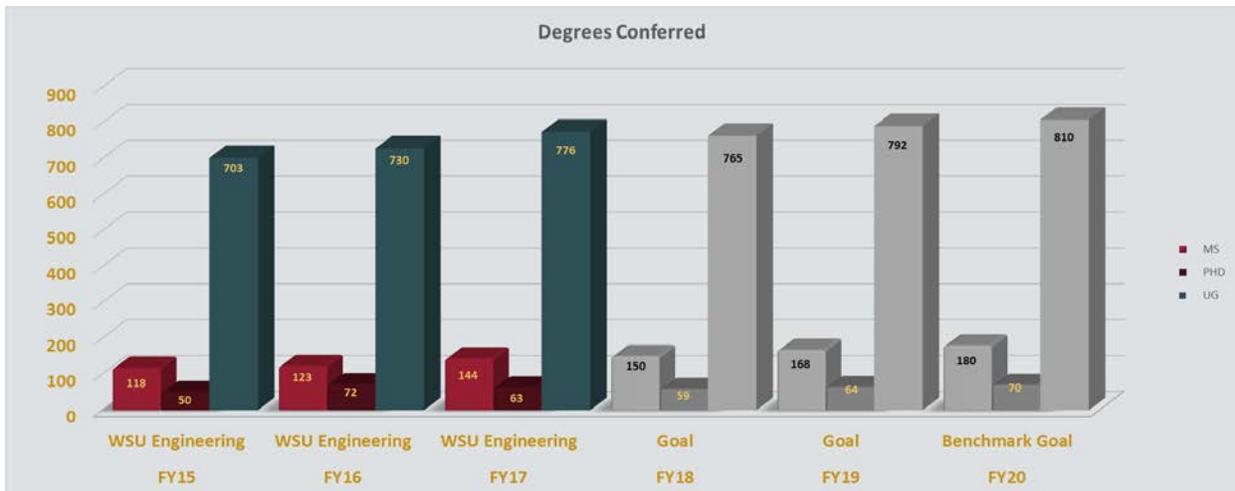
Female Enrollments (Chart shows WSU percentile among peer institutions)

Undergraduate female enrollment in VCEA is low compared with our peers but is relatively high for our graduate programs. The markers indicate the FY17 values and the shaded line regions are our goals for the next few years. Our current goal is to have VCEA undergraduate female student enrollment reach the 50th percentile of our peer institutions by 2020. We can achieve that with approximately 20% female enrollment. This will require a substantial increase in female enrollment over the next few years.

Tier 2 Metrics

1. Number of publications with students and post-docs
2. NSF, DOE, DOD CAREER awards
3. Prestigious faculty awards (from OGRD list)
4. Prestigious student awards
5. Royalty dollars from IP
6. Number of WAS and International Academy Members

Metric	FY14	FY15	FY16	FY17
# of Student & Postdoc Publications	-	-	-	-
NSF, DOE, DOD Early Career Awards	0	1 (Zhang)	1 (Gebremedhin)	3 (McEwen, Saunders, Kim)
Prestigious Faculty Awards	1 (Fulbright)	2 (1 FB, 1 AAAS Fellow)	3 (1 FB, 2 AAAS Fellow)	1 (Fulbright)
Prestigious Student Awards	2	2	5	3
Royalty Dollars from IP	$60,112	$148,669	$90,988	$67,396
# of WAS and Int Academy Members	WAS: 3 INTL: 2	WAS: 4 INTL: 2	WAS: 5 INTL: 2	WAS: 7 INTL: 2

Strategic Plan Metrics

The Tier 1 metrics are tracked and watched closely. The remaining metrics are tracked as possible for information on performance in each of the sub-goal areas. The numbers for FY14 - FY17 are given below:

	Subgoal	Metric	FY17	FY16	FY15	FY14 Numbers
		RE and % from Industry	$ 32,435,497.39	$ 28,306,935.22	$ 24,819,608.00	$ 24,672,949.50
	1.a	Cross-Discipline and Multi-institution grant awards	$ 5,143,814.00	$ 10,130,688.00	7,715,087	$ 2,630,348.00
		Research Funds Raised through Development Efforts				$ 295,944.00
	1.b	WA State and NAE members	WAS: 6 NAE: 1	WAS: 5 NAE: 1	NAE: 1 WAS: 4	NAE: 1, WAS: 3
		Prestigious Awards won by Faculty	1	3	2	1
		Professional Society Fellows	36		30	29
		CAREER awards or Presidential Awards	P: 1 C: 25		P: 2 C: 20	P: 1 C: 20
T		Externally Supported Research Centers	15		11	13
h	1.c	New/revamped sqft research space	4,170 sq ft (Albrook)	53,477 sq ft (PACCAR)		
e		Tech staff and Research Prof (Post Docs)			23*	23
m		Tech staff and Research Prof per TT-FTE				
e	1.d	Peer Review Number - Annual Report (???)			N/A	N/A
		RE from Signature Areas				
1		% RAs on external Funding				
	1.e	Student Publications			N/A	N/A
		Student Publications per GSE				
		% Students in Clubs				
		Pass-rate on FE Exam				
		Presigious Student Awards - Graduate Students	3	5	2	2
	2.a	Donations for UG programs and space				
		Percent of Honor College students	230, 6.3% (Pullman)	204, 5.7% (Pullman)	193, 5.7% (Pullman)	177, 5.1%
		Classes with less than 50 students			648/892, 72.6%	590/714, 82.6%
		UG Students working on UG Research			N/A	N/A
		UG presentations/posters at WSU events			N/A	N/A
		UG authors in refereed journals			N/A	N/A
		Students served by tutoring services	1073 tracking started in FY17			
		Under-represented minorities	UG: 1052 (includes two or m	UG: 989 (includes two or mo	UG: 880 (includes two or mo	Grad: 104 UG: 661
	2.b	Student/Advisor Ratio	SDC: 710/2 (355), ChEBE: 422/2 (211), CE: 514/2 (257), EECS: 959/3 (319.7), MME 886/3 (295.3)	Arch/CM: 463/2 (231.5), ChEBE: 462:1, CE: 507/2 (253.5), EECS: 939/2 (469.5), MME: 891/2 (445.5)	Arch/CM: 431/1, ChEBE: 454/1, CE: 525/2 (262.5), EECS: 980/2 (490.0), MME: 896/2 (448.0)	Arch/CM: 455/1, ChEBE: 437/1, CE: 558/2 (279.0), EECS: 976/3 (325.3), MME: 950/2.5 (380.0)
		Retained first-generation college students				
		Graduate Enrollment			FT: 466 PT: 185	FT: 396 PT: 181
		UG Enrollment	FT: 4467 PT: 399 (system wid	FT: 4297 PT: 404 (system wid	FT: 4053 PT: 336 (system wid	FT: 3474 PT: 226
		Job Placement Rates				
T	2.c	UG Students going to Graduate School				
h		Faculty participating in Professional Development				
e		Percent Student internship/co-op experience				
m		SAT/GRE scores	Grad GPA: 3.65	Grad GPA: 3.60	Grad GPA: 3.6	Grad GPA: 3.58
e	2.d			GRE Quant: 161	GRE Quant: 161	GRE Quant: 161
				GRE Analytical: 3.5	GRE Analytical: 3.5	GRE Analytical: 3.22
2		Retention				
		Enrollment/Retention for URM	UG: 1052 (includes two or m	UG: 989 (includes two or mo	includes two or more races)	
		Start-ups from VCEA	5	4	Faculty (2), Student (3)	Faculty (1), Student (1)
		Research and Development Expenditures from industry	$ 1,129,521.00	$ 901,043.00	$ 1,473,850.00	$ 1,964,072.00
	3.a	Patent Statistics	Issued: 23, Filed: Provisional (40), Non Provisional (22)	Issued: 23, Filed: Provisional (31), Non Provisional (25)	Issued: 11, Filed: Provisional (26), NonProvisional (11)	Issued: 0, Filed: Provisional (19), NonProvisional (19)
		Royalties and Revenue from Commercialization	$ 67,396.00	$ 90,988.00	$148,669.00	$60,112.00
		UG Enrollment (minority, 1st gen, low-income)	First-gen: 1704 (all campuse	First-gen: 1688 (all campuses)		
	3.b	Grad Enrollment (minority, 1st gen, low income)	98 Minorities	100 minorities	82 minorities	69 minorities
		Urban Campus Enrollment	UG: 973 (TC/Van)	UG: 913 (TC/Van)	UG: 816 (TC/Van)	
		Enrollment at Other sites	UG: 214 (Everett/Brem)	UG: 187 (Everett/Brem)	UG: 144 (Everett/Brem)	
	3.c	School/Dept Advisory Boards				
		Annual College Expenditures	$ 72,017,223.00	$ 66,609,953.00	$ 59,363,337.00	$ 51,268,372.00
		International UG Student Enrollment	351 (system wide)	341 (system wide)	351 (System Wide)	
	3.d	International Grad Student Enrollment	454	434	347	289
		Faculty participating in International Activities				
		Students in International Activities				
		Peer Assessment Rating - ASEE? (US News)	2.6	2.6	2.7	2.7
T			Twitter: 536,800 impressions, 1172 followers		Twitter: 117,754 impressions, 253 tweets, 791 followers	
h			Facebook: 67,679 total reach, 2156 page likes	Twitter: 280,800 impressions,	Facebook: 260 posts, 57,743 total reach, 1150 page likes	Twitter: 101,500 impressions; 185 tweets; 640 followers
e	3.e		website: 93,469 sessions	Facebook: unk	website: 74,886 visits	
m			E-postcard and E-newsletters: 21,054 views	website: 82,183 sessions	E-postcard and E-newsletters: 21,054 views	Facebook: 231 Posts; 32,860 total reach; 992 page likes
e			Press Releases: 60	E-postcard and E-newsletters: 21,054 views	Press Releases: 60	website: 71,984 visits
			9 research-themed PR	Press Releases: 60	9 research-themed PR	Press Releases: 30
3			15.4m views	9 research-themed PR	15.4m views	12 research-themes PR
		Media, social media, website analytics		15.4m views		5.8m views
T	4.a	Students and Faculty from Underrepresented Groups				
h						
e	4.b	Employee Engagement Survey indicators(EES)				
m						
e	4.c	Employee Satisfaction Rating				
4	4.f	VCEA Private Support	$ 24,781,069.00	$ 23,792,124.00	$ 30,205,457.00	$ 15,285,893.00