UNIVERSITY of ALASKA ANCHORAGE

Research, Creative Works, and Commercialization at UAA

FY15 through FY16 YTD

A Report for the UA Board of Regents

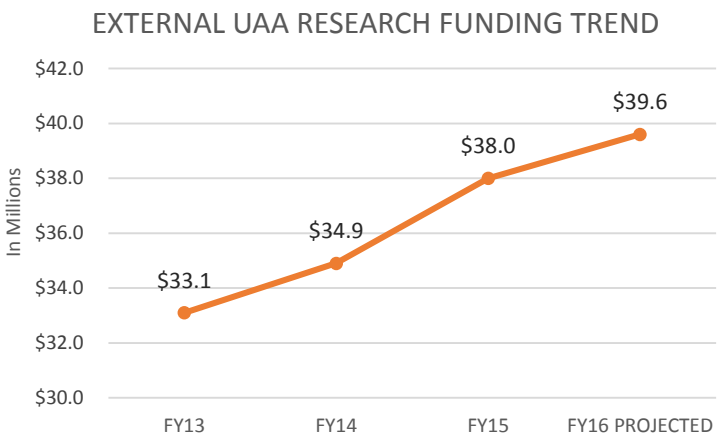
April 2016

Research and Commercialization Overview

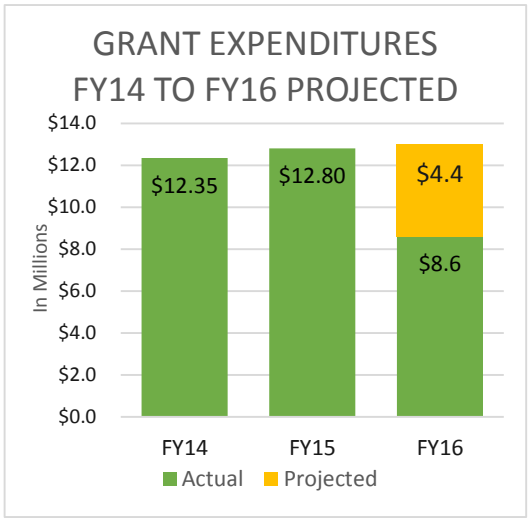
The UAA Research and Commercialization trend is upward. UAA is experiencing significant growth in research, creative works, and commercialization. We are pursuing a strategic approach to fostering, supporting, and expanding faculty and student research efforts and commercialization by creating a climate of innovation and collaboration.

Total grant awards have been increasing. In FY15 total grant awards were $38 million up 8.8% from FY14, and in FY14 they were $34.9 million up 5.5% from FY13. Projections for FY16 indicate that the trend will continue to be upward from FY15 (Ref Graph 1). Expenditures are also up (Ref Graph 2).

Graph 1



Graph 2



The Win rate for FY16 to date is 38%, which is significantly above the national average of 25% for the same federal agencies (Ref. Chart 1). In addition, the Innovate Awards have a 3:1 return on research investment with a Win rate in external funding of 49% which is 2.5 times above the national average for others applying to the same federal agencies listed (Ref. agencies in Chart 1).

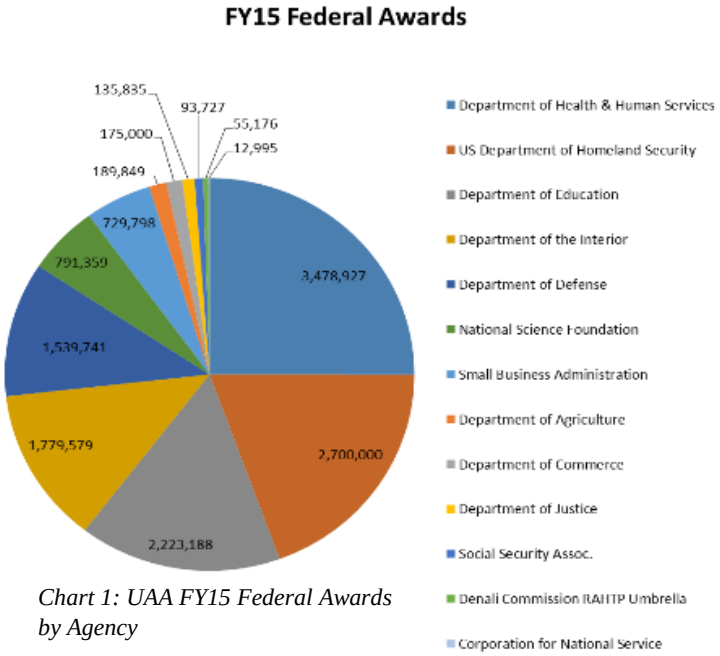


Chart 1: UAA FY15 Federal Awards by Agency

The Patent Portfolio is Experiencing Growth**.** Since FY11, the number of invention disclosures has increased to 39 up from 3 in FY11. To monetize the invention disclosures, UAA has increased the number of patent applications filed to 42, up from 1 in FY11 and 7 patents were issued, up from 0 in FY11. One of the patents issued was to an engineering student, and one patent pending is also from an engineering student. Faculty often include students on their patent applications.

UAA Institutes and Centers

UAA has several institutes and centers that sponsor research, training, public service and other activities related to Alaska and northern populations. These contribute to research that brings in external funding and many benefits to the state. The following are select examples.

Institute of Social and Economic Research (ISER) – The second Alaska Legislature established the Institute of Social and Economic Research (ISER), as part of the University of Alaska, on April 13, 1961 and it has been the first—and for a number of years, the only—public policy research organization in Alaska. ISER has a staff of about 35 and for more than 30 years has been at the University of Alaska Anchorage as part of the College of Business and Public Policy. IMPACT: ISER studies virtually all the major public policy issues Alaska faces. It helps Alaskans better understand the state's changing economy and population—and the challenges and opportunities that come with change. ISER's faculty and staff have studied every major public policy issue in Alaska since statehood, from the economic effects of the devastating 1964 earthquake in south-central Alaska to the huge role oil plays in Alaska's economy today. A critical part of its mission is making sure Alaskans benefits from ISER research. Recent examples of ISER's work include analyses of the state's fiscal crisis and alternative solutions; development and presentation of a fiscal game to help all Alaskans understand the dimensions of that crisis; analyses of teacher and state employee wage levels; research to inform fisheries management policy; investigation of the spread of invasive species; and creation of a comprehensive database of Alaska energy statistics. *Increasing its scope* - in 2011, the Center for Alaska Education Policy was established within ISER, expanding the Institute's capacity in education policy issues. In FY15, the Center for Behavioral Health Research and Services (CBHRS) merged with ISER, adding research capacity around substance abuse, fetal alcohol spectrum disorders, and other behavioral health challenges that are also Alaska policy challenges. *In FY15 ISER received $1,660,000 Unrestricted General Fund (UGF) and $3,172,289 in external grants and contracts for a 2:1 ROI.*

Alaska Center for Conservation Science (ACCS) – is a non-profit research organization within the College of Arts and Sciences at the University of Alaska Anchorage. studies conservation, ecological monitoring, and natural resource planning in Alaska. IMPACT: it *fosters research, education, and collaboration on biological conservation and natural resource management in Alaska and the Arctic and* provides the public, industry and agency partners with information to facilitate effective biological conservation and management of the state's natural resources. Included under this umbrella are the Alaska Natural Heritage Program, Kachemak Bay National Estuarine Research Reserve, and a set of smaller units. Funding to support ACCS is primarily achieved through grants from federal agencies, cooperative agreements with state and federal agencies, and donations. *This unit was allocated $344,836 in in UGF from the State in FY15, and acquired $1,528,546 in external funding for an ROI of 4:1.*

Environment and Natural Resources Institute (ENRI) – ENRI is a research institute at the University of Alaska Anchorage. IMPACT: ENRI works on applied and fundamental research in south-central Alaska. ENRI researchers' funding comes from a variety of sources: national agencies including the National Science Foundation (NSF), the National Institutes of Health (NIH), the US Fish and Wildlife Service and the National Park Service (NPS); state agencies such as the Alaska Department of Environmental Conservation (ADEC) and the Alaska Department of Fish and Game (ADFG); and the University of Alaska. *This unit received $293,007 in UGF in FY15, and acquired an additional $601,767 in external funding for a 2:1 ROI.*

The Justice Center was established in 1975 by the Alaska State Legislature. It serves as an academic, research and public education program serving the entire state of Alaska. It includes the Justice Information Center, and the Alaska Justice Statistical Analysis Center (SAC), a program funded in part by the Bureau of Justice Statistics, U.S. Department of Justice. IMPACT: The Justice Center and its units, provide statewide justice-related education, research and service. Areas of center research include crime and crime prevention, domestic violence, juvenile justice, substance abuse, violence against women, and policing.

The center provides services to government units, justice agencies, and community organizations. It presents studies and explores issues related to crime and the administration of justice with a focus on Alaska issues. *This unit was allocated $765,750 in UGF in FY15, and received $795,678 in external research funding for a 1.04:1 ROI.*

Institute for Circumpolar Health Studies (ICHS) – ICHS was created by the Alaska State Legislature in 1988 to develop new solutions to health problems in Alaska and the north. IMPACT: The Institute provides support and coordination for health research, information, and training. Working closely with faculty throughout the University of Alaska system, ICHS provides technical assistance and support to increase the capacity within the state to address the health needs of all Alaskans. The institute serves as a center for collection and exchange of medical and health sciences data related to circumpolar health issues and facilitates international cooperation among circumpolar nations. *This unit received $459,707 in UGF in FY15, and generated $471,097 in external funding and additional $149,000 in funding from the Alaska INBRE grant for a 1.34 to 1 ROI.*

The Arctic Domain Awareness Center (ADAC) a Department of Homeland Security Center of Excellence was established by DHS at UAA through a competitive award in FY15. The UAA Vice Provost for Research & Graduate Studies (VPRGS) led a team of internationally recognized researchers to win the award. IMPACT: ADAC develops and transitions technology solutions and innovative products to improve situational awareness and crisis response capabilities for maritime challenges in the dynamic Arctic environment. This is the first time that an institution in Alaska has been selected to lead a DHS center of excellence. This award is expected to bring $17.5 million. ADAC did not require any matching funds from the state, and has brought national and international recognition to the university and the state.

Select Research Highlights in FY15 through FY16 to Date

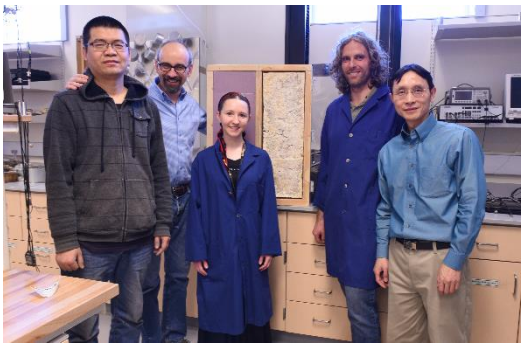
The following were selected to demonstrate the broad range of research areas that are being pursued at UAA.

- **Reprogramming Immunosuppressive Cells in Tumors by Targeted Delivery of All-Trans Retinoic Acid.** TEAM: Dr. Max Kullberg (WWAMI School of Medical Education) and Hui-Ching Kuo (Biological Sciences). IMPACT: The goal of this work is to overcome barriers in drug delivery for immunotherapy cancer treatments that fail to reduce tumor growth and metastasis. The team has an innovative approach to liposomal delivery systems that will improve T-cell activation leading to tumor regression.

- **Dissociating the roles of intestinal bacteria and learned anticipatory responses to sweet tastes in producing harmful effects of artificial sweeteners** *(will your diet drink make you fat?).* TEAM: PI Dr. Gwen Lupfer, Psychology, and Co-PI Dr. Khrys Duddleston, Biological Sciences. IMPACT: Obesity is one of the most serious health threats. As a result, artificial non-caloric sweeteners have permeated our food supply. However, research reveals that artificial sweeteners instead of preventing obesity can increase weight gain. This work will develop appropriate treatments for overweight humans who consume artificial sweeteners.

- **Bioengineering: an Interferon Bioassay for Cancer Therapy.** Dr. Eric Bortz, Biological Sciences. IMPACT: This project will contribute to the development of immunotherapy against cancer, where the body's own immune system targets and eliminates tumor cells. His work aims to reveal the susceptibility of these cancer cells to a novel RNA immunotherapy strategy where immune responses "believe" the cancer cells are infected with a virus, and eliminate them using antiviral defenses. Dr. Bortz received an Innovate Award for this work. In addition, he is also involved with additional endeavors and received $147,288 in external funding for his work on influenza research and surveillance.

- **A Biomimetic Alternative to High-End Fabricated Polymeric Foams: Feasibility Study of Native White-Rot Fungi-Based Insulation Material for Geoengineering Applications,** TEAM: Dr. Philippe Amstislavski, Department of Health Sciences, with Co-PI Dr. Joey Yang, Civil Engineering, and Maria White, Undergraduate Student. IMPACT: Currently, factory-produced foamed polystyrene, is used extensively for thermal insulation in the cold regions. This *interdisciplinary* project will develop a methodology to produce an Alaskan fungi-based composite that meets the key requirements for thermal insulation in the cold regions. This will lead to environmentally-friendly thermal insulation for infrastructure construction that can be easily produced locally.



The team (from left to right): Dr. Feng Zhang *(post doc),* Dr. Philippe Amstislavski, *Professor, Department of Health Sciences,* Ms. Maria White *(undergraduate student),* Mr. Benjamin Still *(graduate student) and Dr.* Joey Yang, *Professor Civil Engineering, pictured with their fungi based product for insulation (behind Maria).*

- **Water Remediation,** Dr. Aaron Dotson, College of Engineering**. IMPACT:** a new synergistic technology for water treatment that combines ultraviolet light and ceramic membrane filtration for challenging waters, *patent pending* #14/503 306. This research will provide a potential game changing technology to improve water treatment in small systems in applications from drinking water to industrial water. Extremely beneficial to rural Alaskan communities. Dr. Dotson received a $10,000 Innovate award in FY14 for this research. This award has led to external funding: $300,000 from USEPA and $900,000 from AK Department of Environmental Conservation providing a significant return on research investment.

- **Corrosion, materials testing, and failure analysis,** Dr. Matt Cullin, College of Engineering, Director of the Asset Integrity and Corrosion (AIC) Laboratory. IMPACT: to provide industry important to Alaska with technical services that are not available commercially in Alaska and to support applied research directly relevant to Alaska's economic interests. The AIC was established with a $1M gift from BP. A team lead by Dr. Cullin received $237,554 from the Conoco Phillips Endowment Fund for Arctic Science and Engineering for his corrosion under insulation (CUI) research. The CUI research is also supported with a multi-year cooperative agreement with the USDOT Pipeline Hazardous Materials Safety Administration.

Dr. Cullin in the AIC lab.

- ***Stalking the Boogeyman Project.*** **Multidisciplinary Team** - Department of Theater & Dance, Psychology and Art - Professors Dan Anteau, Rebecca Robinson, Claudia Lampman, Brian Cook, Jill Flanders-Crosby, Herminia Din. IMPACT: inspire social movement around the topic about Child Sexual Abuse in Alaska, and facilitate individual, family, and community empowerment. It uses the play "Stalking the Bogeyman" (STB) an original true story by Alaskan writer and journalist, David Holthouse at its core. *UAA has partnered with Stand Together Against Rape, Alaska Children's Trust, and Alaska Native Tribal Health Consortium.* This work was funded by a $21,000 Innovate Award in January, 2016 and has already received additional funds of $10,500 from the AK State Council on the Arts for a positive return on investment. An additional award application of $96,000 is currently being reviewed by the National Endowment for the Arts.

Major New External Research Awards, FY15 through FY16 to date (over $200,000)

Competitive Research Awards over $200,000. FY15 through FY16 to date.

PROJECT NAME	AWARD	AGENCY
Arctic Domain Awareness Center (ADAC)	$ 3,932,081	Department of Homeland Security
Wind Farm in Igiugig, Alaska	$ 1,379,939	Gordon and Betty Moore Foundation
Central Yukon Rapid Ecoregional Assessment (REA) - Phase 1	$ 1,099,721	Interior/Bureau of Land Management
Collaborative Research: Winter Snow depth as a driver of microbial activity, nutrient cycling, tree growth and treeline advance in the Arctic	$ 892,244	National Science Foundation
Protecting the Health of Future Generations: Assessing and Preventing Exposures to Endocrine-Disrupting Chemicals in Two Alaska Native Arctic Communities on St. Lawrence Island	$ 741,988	AK Community Action on Toxins
Corrosion Under Insulation (CUI): Innovative solutions to Cold Climate Corrosion Challenges	$ 214,321	Department of Transportation

Non-Competitive Research Awards over $200,000. FY15 through FY16 to date.

PROJECT NAME	AWARD	AGENCY
BLM North Slope Rapid Ecoregional Assessment Project, Alaska (Phase 1)	$ 1,046,000	Department of Interior/Bureau of Land Management
Pohakuloa Training Area Archaeological Survey (TO 0002)	$ 1,007,000	Department of Defense/Army Corps of Engineers
Phase 3 – Alaska Water and Sewer Challenge	$ 900,000	Alaska Department of Environmental Conservation
Kachemak Bay Nature Estuarine Research	$ 594,000	Department of Commerce/NOAA
Intergovernmental Personnel Act Assignment for Dr. Andre B. Rosay	$ 558,625	National Institute of Justice
PRSC Cultural Resources TO #11	$ 312,900	Department of Defense/Army Corps of Engineers
Intensive Archaeological Survey & Selected Testing at KTA TO #10	$ 216,500	Department of Defense/Army Corps of Engineers

Commercialization of Faculty and Student Research
Building a Knowledge Economy

The commercialization of faculty and student research, patents, licensing and startup companies contribute to economic growth and development in the region and the state by providing jobs, keeping graduates in state, retaining and attracting students and faculty. Therefore, UAA VPRGS established a commercialization infrastructure that together with the efforts of the Office of Research and Graduate Studies, and incentives from the Innovate Awards and the Patent Wall of Fame have resulted in a dramatic increase in intellectual property – invention disclosures, patent application filings and patents issued and the first three startup companies (Ref. Chart 2).

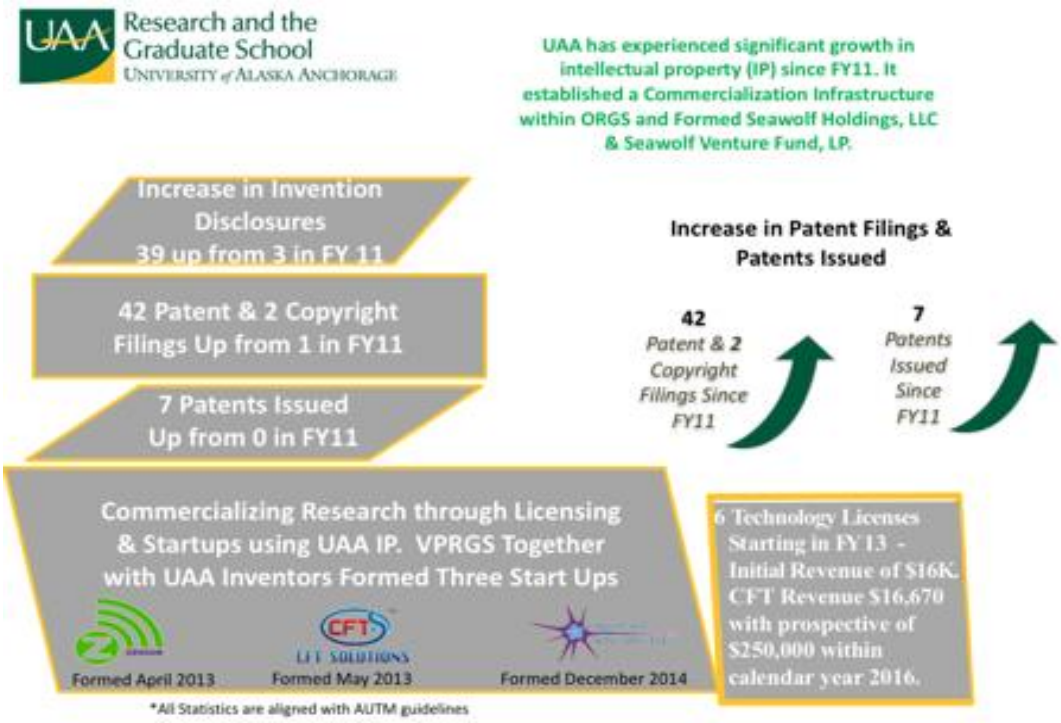


Chart 2 Newest patent issued Feb. 2016 – Zensor sensor

Startup Company Updates

The newest startup company is *Cogniceutic Solutions*. Cogniceutic has developed a therapeutic treatment which dramatically improves memory and reduces cognitive deficits of aging-associated dementia and neurodegeneration. Alzheimer's disease affects more than 5 million people over the age of 65 in the US, and 35.6 million people worldwide have dementia according to the World Health Organization. The memory health supplement market had sales of $1.5 billion worldwide in 2013, and it is expected to accelerate in the years to come. Cogniceutic's product was inspired by the Alaska bog blueberry. In tests with aged rats, the compound yielded statistically significant results in memory improvement, and tests on younger rats showed similar improvements. Human testing will be the next step. Dr. McGill, Chemistry and Dr. Murphy, Phycology are preparing a submission to the SBIR program at NIH which is increasing funding in this area. Patent pending #14/192,681 – Inventor Dr. Colin McGill, College of Arts and Sciences.

CFT Solutions *technology is now installed in front of the new UAA Engineering Building*. Picture 1 shows it keeping walkway free of ice and snow. *CFT's product* is an innovative approach to snow removal and deicing using carbon fiber tapes. Its efficient heating by carbon fiber tapes keeps a surface free of snow and ice, eliminating plowing and shoveling. Patent pending: US #14/024,152 – Inventor Dr. Yang, College of Engineering. *This year to date CFT has received revenues* of $16,670 which includes the Cook Inlet Housing Authority, with the prospect of $250,000 that includes senior housing, hospitals and high end subdivisions.

Picture 1: CFT Technology installed at UAA's new engineering building.

ZENSOR provides a new generation of improved wireless sensors for remote monitoring, system management, climate change, surveillance and security. Low cost, ultra-long lifespan sensors do not require batteries, collect, transmit and store data and can form ad-hoc networks. These sensors are being used to support various remote monitoring challenges in the Arctic for the DHS Center of Excellence at UAA- ADAC**.** *The sensor patent* – "Long Lifespan Wireless Sensors and Sensor Network," *was issued in February 2016* as U.S. Patent No. 9,257,036 – Inventors: Dr. Lund and Dr. Peterson, College of Engineering.

A fourth startup is being formed that will deal with effects of climate change affecting structures in Alaska due to permafrost melting. This startup will be important to offering solutions to current and emerging challenges in Alaskan native communities.

In addition, UAA has centers that were chartered to support the citizens and the enterprises of Alaska. *The following examples outline the importance of this support to economic growth in Alaska.*

Small Business Development Center (SBDC): UA's SBDC is housed and managed at UAA. It provides no-cost advising services and low cost educational programs to entrepreneurs looking to start or grow their small business. Since its inception in October 1986, the Alaska SBDC serves 65 communities across the state and has evolved into a network of statewide centers, including three additional specialized business assistance programs operating under the guidance of the State Director. While the Alaska SBDC is primarily funded by the U.S. Small Business Administration and by contributions from partner boroughs, cities, and other sponsors throughout the state, a commitment of state matching funds is required. *This unit is allocated $1,000,000 in GF matching funds and receives a ROI on UGF investment of 2.5 to 1 from additional funding.*

Business Enterprise Institute (BEI): BEI links economic development programs across the University of Alaska (UA) system and supports businesses and entrepreneurial capacities across Alaska. BEI is housed in the UAA College of Business and Public Policy. BEI provides a platform for high-level consultancy between industries and UAA. BEI provides a wide-range of programs and services including economic development-related research and technical assistance, high-level professional education, small business development services, and youth entrepreneurship programming. *This unit is allocated approximately $1.6 million in UGF and has received external funding of $2.2 million for an ROI of 1.5 to 1.*

Motivating Student and Faculty Research and Innovation

To inspire faculty research, creative works and innovation, the VPRGS established the Innovate Awards in December 2011. The awards have provided extraordinary vital support to new faculty and to experienced faculty pursuing new high risk/high pay-off research and commercialization directions complementing the scope of the highly competitive externally funded research at UAA. The Innovate Awards have brought in a 3:1 return on GF dollars invested by acquiring competitive external funding with a win rate that is twice the national average. Also, the research resulting from this award has resulted in publications in peer review journals, numerous presentations at international conferences; and it contributed to patent filings and one that was issued, and its research formed the foundation for the first three UAA startup companies.

Picture 2: Alex West

To inspire IP, the VPRGS established the *Patent Wall of Fame*. The inventor receives a plaque summarizing the patent issued and a duplicate plaque is put on the wall of fame that resides in the administration building. The first undergraduate student, Alex West (Picture 2), College of Engineering, was inducted in 2015 for her invention Hydro Powered Fish Carcass Grinder, US patent 8,833,682 B2.

Strategic Plan for Research, Creative Works and Commercialization (SPRCC)

UAA is successfully implementing its SPRCC. The major research focus areas leverage the expertise at UAA and are aligned with federal funding areas that are targeted to increase chances of success, as well as with UA's mission and goals. These areas include: health and biomedical sciences, climate change, energy, national security, public policy, social sciences, and technology commercialization.

Since UAA is Alaska's Health University a goal is to improve the health and well-being of Alaskans through translational and clinical research on resuscitation, infection/immunology and research that will lead to improved medical services, medical devices, and potential therapeutic pharmaceuticals (Ref. Cogniceutic Solutions – UAA startup). This plan is an interdisciplinary approach across the Colleges of Arts and Sciences, Engineering, Business and Public Policy, and Health, as well as Institutes such as the Institute for Circumpolar Health. UAA is ideally situated with three hospitals, the CDC, and blood bank and has established a collaborative group among investigators from UAA and these organizations.

To achieve the plan, UAA continues the following strategy. In FY 14 and FY 15 UAA targeted agencies with increases in budget, and ones that UAA had not historically received funding from such as DHS. This strategy paid off with increases in funding and achieving a goal of the plan to win externally funded centers of excellence: The Arctic Domain Awareness Center (ADAC) a DHS Center of Excellence was awarded in FY15. Consistent with the plan and the 2016 areas targeted by the Federal Agencies for funding, we are awaiting announcement of NIH funding for the "American Indian-Alaska Native Clinical and Translational Research Center" originated in Alaska WWAMI. When awarded, it will be a 5 year, $20 million partnered effort to address the unique problems Native communities face in health disparities.

Future Goals and Directions

In the next two years we will pursue the goals in the UAA Strategic Research Plan and those aligned with US's mission and goals by:

- Continuing to pursue additional externally funded centers of excellence;
- Targeting larger multidisciplinary grants that can involve partnerships with leading national and international institutions – universities and corporations. This will include submitting a proposal for the Multiple University Research Initiative.
- Building on our strength in commercialization to exploit the current financial climate: the agencies budget requests indicate that the increase of funding for development will grow at the rate of 6:1 compared to the increases of funding for pure research.
- Using the U-Med District Research Alliance (UMEDRA) collaborative group with investigators from UAA and these surrounding medical and research organizations called the to position for NIH funding.
- SBIRs for UAA's startup - Cogniceutic Solutions.
- We are positioning our proposal targets based on the opportunities presented in the FY16 presidential budget request for R&D aiming at the departments/institutes of strong increase see Chart 3.

UAA's approach is also aligned with the federal funding priorities that include:

- **Improving Americans' Health through Innovation in Life Sciences, Biology, and Neuroscience**
  - About **$31.6 billion** including **NIH $31.4 billion and NSF's $146 million** part of the **BRAIN initiative.**
- **STEM Education** (reorganization and coordination across agencies)
  - About **$3 billion**, shared between NSF, DOE, DoEd, NIH.
- **Promoting Advanced Manufacturing and Industries of the Future**
  - **$2.4 billion**: NSF, DOD, DOE, DOC, USDA.
  - The National Robotics Initiative, the Materials Genome Initiative.
- **Cleaner Energy**
  - About $2.1 billion spread between NSF, DOE, DOD, USDA
- **Observing our planet**
  - About $4.2 billion spread between NASA, NOAA, NSF (most of it is to support satellite programs)
- **Understanding and Responding to Global Climate Change and Its Impacts**
  - $2.7 requested actual appropriated funding still hard to estimate.

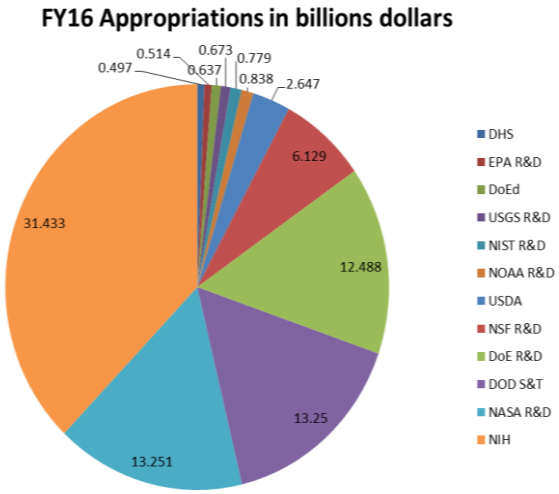


Chart 3

Potential Impact of Cuts

- **Unfulfilled Commitments –** Cuts will result in unfulfilled matching and forfeiture of revenue sources if commitments are not honored on negotiated contracts. One such example is the ACCS NOAA research award that receives $594K with a 40% match each year. Due to this funding, UAA has received $1M in additional grants, with another $600K pending. Without the state matching funds, the NOAA award would not exist and neither would any of the other related awards. Unfulfilled matching also affects awards in instructional research, for instance, a US Dept. of Education e-student learning grant impacting student learning will provide $2.25M over 5 years with a match of $1.65M.

- **Economic Development –**Without research funding, UAA's contribution to Anchorage's economy and its development will slow at a time when the private sector, and the development of new alternatives through the attraction of new industry is paramount. For example, the SBDC serves 65 communities across the state and leverages every dollar in state funding with a 2:1 return on GF investment. In 2015 they helped facilitate more than 100 businesses and created jobs. Cutting their funds would result in a loss of these important services.

  One of the UA President's priorities is moving to a "knowledge economy" by focusing on the commercialization of university research. UAA's IP – commercialization of research – has significantly grown since FY11 (ref. Chart 2). To monetize inventions, over 42 patent applications have been filed since FY11, 7 patents have been issued, and the first three UAA startups formed, with a fourth in process. Startups provide jobs, retain students and highly skilled graduates in state, attract investment from out of state, and provide other returns. The backbone of Alaska's new economic reality consists of entrepreneurs, innovators and engineers contributing to a much needed diversified economy. Research is the foundation of innovation and commercialization and creative works. Therefore, without support for research the "knowledge economy" will not be possible.

- **Public Service** – Budget cuts will reduce the University's ability to analyze policy and develop solutions for social and health challenges including outreach and training. Through ISER alone, hundreds of requests for information that help policymakers, public and private groups and individual Alaskans are met. More cuts in GF would impair ISER researchers' ability to respond to these requests. The ability to conduct studies and develop solutions is critical for the discovery and dissemination of new knowledge and the sharing of expertise in addressing the diverse and unique social and health care challenges of our communities. For instance, a much needed water and sewage remediation technology solution for rural Alaskan villages is being provided as a result of research in the College of Engineering that is being funded by the Alaska Department of Environmental Conservation and USEPA. Another example is Biological Sciences research which helped to protect the health of future Alaskan generations by assessing and preventing exposures to endocrine-disrupting chemicals in two Alaska Native Arctic communities.

- **Education** – Cuts in research will have significant impacts on UAA's ability to provide easily accessible higher education opportunities to all Alaskans, regardless of socio-economic background. The need to choose the most geographically preferred university offering all associated educational opportunities is key in growing culture and increasing levels of a higher educated population. Research is a key educational opportunity. Research enables faculty the opportunity to be relevant and at the cutting edge of their fields. Attracted to institutions capable of supporting their research, it will be virtually impossible for UAA to hire and retain high quality faculty without research on campus. The lack of quality faculty, able to attract students and provide high quality instruction through hands-on learning will result in deleterious effects on the culture, recruitment and retention of students. Further, since research, instruction, and commercialization are tightly integrated, graduates will not be prepared for globally competitive workplaces, nor for contribution to the Alaskan Workforce. For example, under the current structure, 80% to 90% of our nursing graduates stay in Alaska. That percent is higher for those who take their classes and clinical training in the distance sites. Another excellent example of an award that provides experiential learning through research and career preparedness is The Dept. of Homeland Security's Arctic Domain Awareness Center of Excellence award which was won by UAA in FY15. To date, this award has funded $3.9 million in expenditures which has included salaries for students. Supplemental to the main award, was an additional four year Career Development Grant of $250k, its purpose to provide tuition funding and stipends, internship opportunities and prepare students for DHS careers through hands-on research in the arctic. Without the base research, the grants would not have been possible.

- **Opportunity Cost –** Loss of ability to continue to leverage significant investments in UAA's research infrastructure, including scientific labs and programs, will reverse the consistent upward trend in IP, commercialization and awards (See Chart 1). Further it will cause these facilities to be under-utilized with no return on investment. Of concern is that industry leaders, such as Conoco Phillips, have put great faith by providing endowment funding to the University to support research on the UAA campus in benefit of Arctic engineering. The lack of the ability to honor industry intentions in historic endowments could jeopardize future partnerships with industries important to Alaska and further retard efforts at external fund raising and collaboration with employers.

In Summary – Universities play a critical role in economic growth and innovation. Research leads to innovation and intellectual property that leads to licensing, and startup companies that bring a revenue stream for the university, benefits economic development and growth for the state. Many successful states have invested in their universities enabling economic growth that also attracts investment, and corporations to the state.