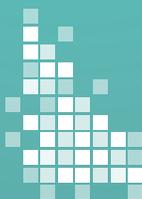


IDAHO GLOBAL ENTREPRENEURIAL MISSION
FY2017 ANNUAL REPORT



IGEM



The Idaho Global Entrepreneurial Mission (IGEM) is a unique program that invests in advanced university research and capacity building to further economic development initiatives for the state. The IGEM grant program uses a three-pronged approach to support a statewide entrepreneurial and commercialization pipeline to bring to market advances in agribusiness, computer science, medical and veterinary research, advanced energy initiatives, and other areas that are equally vital to the state's economy. In the first five

years of operation, IGEM has successfully advanced important research projects, funded strategic research capacity projects, and propelled innovations that position Idaho industries in new and profitable markets.

This annual report provides an update on the IGEM program, its funded projects, and successes over the past five years.

IGEM PROVIDES THREE DISTINCT FUNDING OPPORTUNITIES:

IGEM - COMMERCE **\$1 MILLION**

Managed by the Idaho Department of Commerce under the direction of the IGEM Council.

.....

Funds research ventures where industry and university partnerships work together to bring viable products and technologies to market.

IGEM - HERC **\$2 MILLION**

Managed by the State Board of Education (SBOE) and administered by the Higher Education Research Council (HERC).

.....

Invests funds to support infrastructure and advance key capacities at Idaho's research universities.

IGEM - CAES **\$2 MILLION**

Managed by the SBOE and administered by the Center for Advanced Energy Studies (CAES).

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Leverages the partnerships between Idaho's three public research universities, the University of Wyoming, and the Idaho National Laboratory to fund advanced energy projects and initiatives.

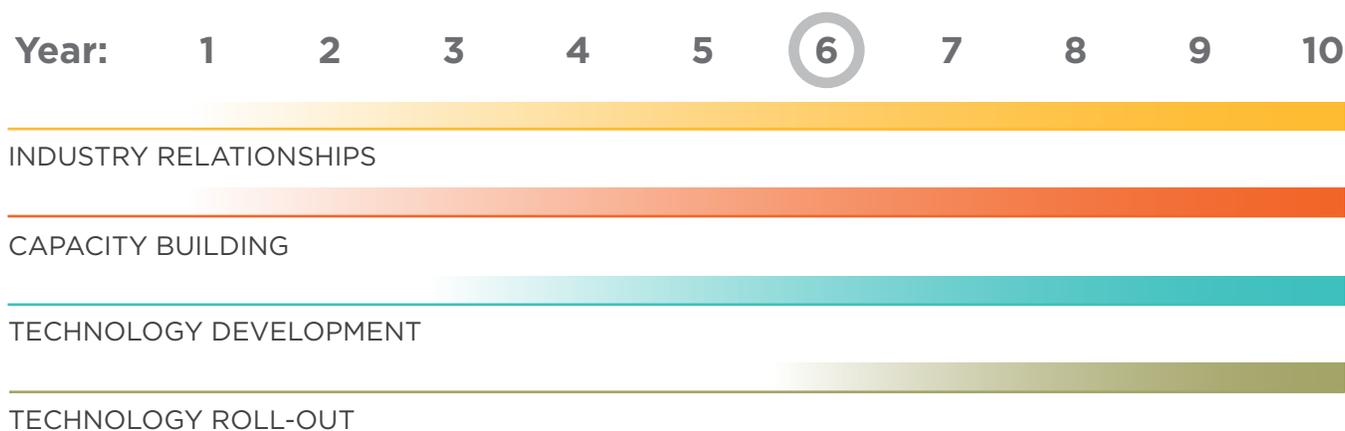


The IGEM-Commerce grant program funds research initiatives where university investigators and private sector business experts partner together to bring viable technologies to market. By funding university research that can advance private sector products and services produced in Idaho, IGEM commercialization grants are a powerful resource in the growth of Idaho's economy. Through its support of commercialization partnerships, IGEM makes an investment in developing new business ventures, creating new products and high-value jobs, while supporting the research capacity of Idaho's universities.

At the helm of the IGEM-Commerce program is the IGEM Council, a Governor-appointed body whose diverse experiential make-up consists of the brightest business, research, policy, strategy, and financial minds in the state. This 12 member Council thoroughly vets all IGEM applications to mitigate risk and maximize the return on investment for these publicly funded grants.

The IGEM Council's fiscal stewardship and strategic leadership advances IGEM's goals of commercializing cutting-edge research throughout the state, leading to high-end job creation, and an ever-advancing economy.

The chart below provides a broad overview of the IGEM program spectrum. It begins with building strong relations with Idaho industries and seeking opportunities where IGEM funded commercialization research is beneficial both for the industry partner and the university. It identifies the need to build capacity and internal infrastructure in order to advance new technologies and provide resources to meet industry needs across the state.



IGEM - COMMERCE COMMERCIALIZATION AWARDS

To date, IGEN-Commerce has funded 24 projects, resulting in over \$4.8 million invested in university and industry research partnerships.

FY2017: 4 projects = \$979,572

FY2016: 6 projects = \$1,104,830

FY2015: 3 projects = \$950,000

FY2014: 4 projects = \$972,371

FY2013: 7 projects = \$844,093

FY2017 GRANT AWARDS

HOPLITE SKATE ARMOR™ COMPARATIVE ANALYSIS

Idaho State University

Grant Amount: \$111,453

Idaho State University and its industry partner, Fi-Ber Sports, seek to gather performance and comparative test data for the HOPLite Skate Armor™. This product provides protection to hockey players' feet in game and practice environments where increasing shot velocities more regularly cause foot injuries. In order to gain market share in the ice hockey market, Fi-Ber Sports will use the results of ISU's tests comparing the performance of their product to that of competing products on the market. Because consumers are more likely to purchase a scientifically-verified piece of safety equipment, this proposed research and testing will provide independently-verified evidence of the superior performance of HOPLite Skate Armor™.

The proposed research will benefit the educational and research interests of ISU while also providing Fi-Ber Sports with beneficial data to promote a Made-In-Idaho product.

REMOTE SENSING OF ALFALFA CROP BLOOM

Boise State University

Grant Amount: \$194,000

This project utilizes Boise State University's Department of Geosciences' experience and expertise in remote sensing data collection and analysis to provide protocols and prediction models to further the suite of solutions their industry partner, Kairosys, is developing for their managed pollination system. Boise State is using imaging technology based on spectroscopy science for monitoring alfalfa as it progresses through its flowering cycle. Kairosys has developed prototypes of cloud-connected smartphone applications for alfalfa managed pollination. Kairosys has already established a partnership with an alfalfa seed company who will be a consumer of this solution in addition to being the sales channel for this product to the alfalfa growers.

TIME-OF-FLIGHT SPECTROSCOPIC REFLECTOMETER

Boise State University

Grant Amount: \$260,435

Boise State University will develop a new, standalone, time-of-flight spectroscopic reflectometer to assist the manufacturing and quality control process of a new, revolutionary system which will reduce or eliminate reflections from the end of an optical fiber. Developed by project industry partner, Fiberguide Industries, Inc., the RARe Motheye Fiber is a system to measure optical reflection from a fiber facet over a wide range of wavelengths from near UV to infrared. The reflectometer will be capable of measuring less than 0.1% reflectance and be insensitive to optical alignment, an important factor in the manufacturing environment. An instrument with such a broadband capability and high sensitivity does not exist in the current commercial market. Currently, the reflectometer has been assembled and tested in the lab. The next step is to perform field tests at the Fiberguide facility.

FLEXIBLE SENSORS ASSISTED MINIATURIZED AIR SCRUBBER FOR PROTECTING STORED POTATOES

Boise State University & Idaho State University

Grant Amount: \$413,681

This multi-institution project will develop an integrated miniaturized air scrubber and cloud-enabled wirelessly distributed sensor network to monitor and control the storage environment for potatoes. This integrated solution is designed to significantly reduce potato wastage in storage, and should enable Isaacs Hydropermutation Technologies, Inc., the industry partner, to increase their share of the potato storage market. While each component of the integrated system has unique capabilities, their integration marks an important advancement in agricultural technologies.

IGEM - COMMERCE PROJECTS IN PROGRESS

SMART RAISED PAVEMENT MARKINGS (RPM) INTEGRATION WITH TRAFFIC SIGNAL CONTROL SYSTEMS

University of Idaho

FY2016 Grant Amount: \$299,651

The University of Idaho and its National Institute for Advanced Transportation Technology (NIATT) have validated solar-powered, battery operated, LED illuminated, Smart Raised Pavement Marking (RPM) models and documented their safety benefits in different applications. Partnered with Evolutionary Markings Inc., an Idaho-based company, IGEN funding supported the development of real-time communication and data exchange between RPM devices and different traffic control systems, connected vehicles, and autonomous vehicles. A test installation of the technology was featured in the September edition of the journal for the Washington State Institute of Transportation Engineers. In addition, the project team has been assigned projects to address traffic challenges in Idaho.

SENSOR ADAPTER FOR MACHINE-TO-MACHINE (M2M) MARKET

Boise State University

FY2016 Grant Amount: \$211,098

Boise State University has developed a sensor device-protocol adapter to improve the collection, modification, and delivery of remotely-sensed GPS, vehicle diagnostics, and other related data. The sensor adapter fills a critical gap in the delivery of data from diverse sensors to the growing internet Platform as a Service (PaaS) marketplace, allowing sensor agnostic and carrier agnostic delivery of data to the cloud for use by a wide variety of applications. Marshall GIS, the industry partner, is currently in negotiations with Boise State University to license the technology.

EVALUATION OF THE ANKLE ROLL GUARD'S EFFECTIVENESS TO IMPROVE CLINICAL BENEFIT

Boise State University

FY2016 Grant Amount: \$148,927

IGEM funding has enabled research and evaluation on a new, innovative orthopedic product that prevents injury by limiting excessive inversion of the ankle. The Ankle Roll Guard™ is a patented technology that addresses the limitations of existing prophylactic devices in the market. IGEN funding is being used to quantify and compare the Ankle Roll Guard's™ effectiveness with existing orthopedic products. The quantitative data will better position this product and its design in penetrating the market.

6,000 WATT SPLIT PHASED GALLIUM NITRIDE HIGH FREQUENCY INVERTER

University of Idaho

FY2016 Grant Amount: \$178,178

The University of Idaho in collaboration with Inergy Solar, the industry partner, has engineered and manufactured a new 2,000 Watt Split Phased Gallium Nitride High Frequency Inverter. With the success of this development, researchers are closer to engineering a 6,000 watt capacity inverter. The development of these inverters augments Inergy Solar's current product offering by advancing development toward a complete



home solar solution. In addition to the gallium nitride focus, this project's research has also included emphasis on network cyber security protection for this off-grid energy source. The project is continuing to refine the design for increased power loads.

TECHNOLOGY DEVELOPMENT FOR EFFICIENT PROVISION OF UAS PRODUCTS

University of Idaho

FY2016 Grant Amount: \$161,524

The University of Idaho, along with assistance from Z Data Inc. has developed software tools to assist Empire Unmanned in handling enormous amounts of data acquired during unmanned aerial system (UAS) flights. The ability to process, visualize and disseminate large volumes of gathered data enables Empire Unmanned to expand its product offering.

DATA ANALYTICS FOR PRECISION AGRICULTURE

Boise State University

FY2015 Grant Amount: \$343,072

Boise State University is working with Simplot to develop a data analytics solution for agronomic decision making based on historic farm and crop yield data. The goal of this project is to leverage Simplot's existing data to give growers new tools and resources they need to optimize their yields. Researchers are automating the process of matching the multi-spectral photosynthetic images for Simplot so they can be used to produce predictive models for their network of growers. A collaborative research agreement between the University and Simplot has been executed with an affirmed first right to license the technology to Simplot.

IGEM - COMMERCE COMPLETED PROJECTS

COMMERCIALIZATION OF NEW AQUATIC ANIMAL HEALTH PRODUCT

University of Idaho

FY2016 Grant Amount: \$105,452

This project was an inaugural recipient of IGEM funding in FY13. Since the initial investment, this project has successfully progressed toward the commercialization of a fish vaccine to combat Cold Water Disease (CWD). Idaho is the national leader in trout production, accounting for over 70% of all commercial (food fish) rainbow trout. Commercial aquaculture production contributes over \$110 million to Idaho's economy. Due to this secondary round of funding, an exclusive license has been successfully negotiated and executed. Final Federal Drug Administration approval processes are currently underway.

EXPANDING PRECISION AGRICULTURE MARKET OPPORTUNITIES WITH UNMANNED AIRCRAFT SYSTEM SENSORS

Idaho State University

FY2015 Grant Amount: \$179,755

This project utilizes hyper-spectral imaging via Unmanned Aircraft Systems (UAS) to advance precision agriculture. ISU and Simplot worked together to advance remote sensing applications in the evaluation of multi-platform data collection using UAS. Researchers have discovered a detection methodology that identifies the Potato Virus Y (PVY). The detection of PVY is critical for potato growers. The project team has secured additional funding (\$167,000) through the Idaho Specialty Crop Grant to run field tests in the growing season of 2018 that will streamline the PVY detection workflow for quick turn-around. Five potential patent opportunities have been identified and the university will look to submit a patent application in the fall.

N-E-W TECH™: INNOVATION AT THE-NUTRIENT, ENERGY, WATER NEXUS

University of Idaho

FY2015 Grant Amount: \$427,173

This project validated and brought to scale a new reactive filtration water treatment platform. The new technology removes biological contaminants in the water using treated Biochar and a catalytic oxidation process that destroys most compounds of concern such as hormones and pharmaceuticals. N-E-W TECH™, now Nexom™, received the Phase One award in the \$10 Million Everglades Foundation George Barley Clean Water Science Prize in Miami in December 2016. The Lower Boise River Watershed Council has requested a proposal for a demonstration scale N-E-W TECH™ water treatment system to address the phosphorus pollution issues in the Treasure Valley.

2E-HEXENAL FUNGICIDE

University of Idaho

FY2014 Grant Amount: \$296,917

At the University of Idaho, researchers tested an organic compound called 2E-Hexenal as a fungicide for stored potatoes. Converted to and applied in a gaseous state, this new approach to eradicate fungi would be industry changing. U of I has partnered with Sun Rain LLC, Agri-Stor Inc., and AMVAC to study the effectiveness of this fungicide in post-harvest tubers. The project shifted from large-scale potato trials to smaller-scale trials, which incurred cost savings. Those savings were utilized to conduct additional research on the use of 2E-Hexenal in onion storage facilities which has successfully demonstrated a dramatic reduction in crop losses due to postharvest pathogens. The product is now patented and SunRain Varieties, LLC has been reimbursing the University for the patent expenses as they continue to work to roll out a commercial product.

CANINE HIP IMPLANT

Boise State University

FY2014 Grant Amount: \$110,454

A new implant, the Bionic Hip System™, has been developed by MWI to improve the standard of care for treating hip osteoarthritis by reducing cost, improving canine mobility and lowering complications. Boise State University characterized the mechanical performance of the implant. MWI has submitted a utility patent on

the technology and West Vet is ready to begin use of the bionic hip implants in canines. The Bionic Hip implant successfully completed over a million cycles of wear testing, and these findings have been accepted for publication in the Journal of Orthopaedic Research. The next step is to implant them in a small sample size of canines.

RISE ANALYTICS

Idaho State University

FY2014 Grant Amount: \$300,000

Idaho State University partnered with ON Semiconductor for analytical research in the development and improvement of semiconductor products. Following the acquisition of the Scanning Electron Microscopy and Energy Dispersive Spectroscopy (SEM/EDAX) equipment, the US Department of Energy has invested a significant amount in grants to Idaho State University. The equipment has fostered collaboration between ISU and Advanced Ceramic Fibers, ON Semiconductor, and the University of Notre Dame. This equipment has been used in ZnO growth research and various analytical tasks.

SURFACTANT SOLUTIONS

Boise State University

FY2014 Grant Amount: \$265,000

Boise State University partnered with BHS Specialty Chemical Products to create renewable chemicals by converting oils into surfactants for use in products marketed to industrial food processing, personal care, and petroleum industries. Researchers were successful in creating surfactants from pure oil feedstocks, as well as developing a method to make surfactants from high grade vegetable oil waste. Likewise, researchers were able to use low grade vegetable oils from food production facilities as feedstock for surfactant synthesis.

NANOFABRICATION INFRASTRUCTURE SUPPORT

Idaho State University

FY2013 Grant Amount: \$250,000

The project allowed for the acquisition of a Dualbeam-Nanomachine Center. The Dualbeam system provides both high resolution imaging and nano-machining capabilities in a single component. This tool enables the University to provide ultra-precise machining and

nanofabrication capabilities that meet the needs of their semiconductor industry partners. The accessibility to this machinery provides ISU students with hands-on cutting edge training, uniquely preparing them as they enter the workforce. To date, ISU has received over \$3.5 million in separate funding, resulting from this IGEM sponsored project.

COMMERCIALIZATION OF NEW AQUATIC ANIMAL HEALTH PRODUCT

University of Idaho

FY2013 Grant Amount: \$124,021

This project allowed for trials on a new fish vaccine and a probiotic feed additive aimed at reducing fish losses in aquaculture facilities due to Cold Water Disease (CWD). The iron limited vaccine yielded successful results. This formula work will be used for final regulatory approval with the FDA. Additional funding was awarded in FY16 to aid in the commercialization of this aquatic vaccine.

INNOVATIVE PESTICIDE APPLICATION TECHNOLOGY SYSTEM

University of Idaho

FY2013 Grant Amount: \$46,146

The project allowed for field tests to be conducted to quantify the effectiveness of a new pesticide spraying technology compared to conventional spraying. GenZ Technology, the industry partner, learned from field tests that the new spraying technology performed better than existing technology. This new pesticide application system has been used for strawberry and lettuce crops. This project has raised \$2 million in capital for the industry partner from angel funds and has also hired 8 new employees. GenZ Technology was also a Regional Winner of the 1776 Challenge Cup and invited to compete at the Global 1776 Challenge Cup competition.

AUTOMATED QUANTITATIVE DETECTION OF E.COLI O157:H7 AT BEEF PROCESSING FACILITIES

University of Idaho

FY2013 Grant Amount: \$78,076

The project examined if there was a better process to detect and determine the strains of E.coli within the beef processing system. While the project was successful in decreasing the detection time, the new process was not

sufficient for commercial use at a beef processing plant. The process did recognize six strains that are considered adulterants in fresh ground beef products. Additionally, beef trim contaminated with E.coli O157:H7 could be identified in approximately 18 hours, which is about 24 hours faster than other generic methods.

HIGH SPEED DIGITAL PACKAGE MEASUREMENT & MODELING FOR NEXT GENERATION MEMORY MODULES

University of Idaho

FY2013 Grant Amount: \$150,000

Partnered with Micron, this project allowed for speedier development and design on next generation memory modules with the acquisition of the Vector Network Analyzer. The acquisition of the Vector Network Analyzer not only helped Micron, but it also prepares U of I students with hands-on education on the latest industry equipment. Additionally, the Micron Foundation gifted \$1 million to U of I to fund an endowed professorship in microelectronics in the College of Engineering. This gift has helped U of I's efforts to better position itself as a leader in microelectronics education and research.

DETERMINE COMMERCIAL VIABILITY OF MICROBIAL INDUCED CALCITE PRECIPITATION (MICP)

University of Idaho

FY2013 Grant Amount: \$114,864

The project allowed an assessment to be made on the viability of MICP, a process that uses microorganisms already present in the soil to form calcite. A new Idaho company BioCement Technologies, Inc. has been created as a result of this new product and a license of this technology has been negotiated with the University of Idaho. In addition to receiving IGEM grant funds, this project has also received National Institute of Health (NIH) Small Business Investment Research (SBIR) funding.

The SBIR Phase 1 grant awarded \$53,968 for a 6 month study to reduce the mobility of lead (Pb) in soils at sites in and near Kellogg, Idaho. This technology has been patented in the US, New Zealand, Australia, and Canada. BioCement Technologies has 12 road stabilization pilot

projects resulting in company revenue. BioCement continues to market and test the technology in various locations, and for several use cases.

CONDUCT PRECLINICAL STUDIES ON POTENTIAL ANTICANCER AGENTS

Boise State University

FY2013 Grant Amount: \$80,986

The project focused on the analogs of doxorubicin and mitomycin C, two compounds that have an important role in the treatment of a variety of cancer types. Use of these two compounds has declined due to side effects, including myelosuppression and the onset of irreversible acute cardiotoxicity. Research efforts to gain knowledge on doxorubicin and mitomycin C's mechanism of toxicity have provided tangible results. Researchers discovered favorable results from one of the analogs, GPX-160. They found it to be a more stable analog and a patent has been submitted on GPX-160, with two initial manuscripts following 1) synthesis and anticancer activity and 2) mechanic studies. Gem Pharmaceuticals has contributed over \$100,000 in sponsored research toward this partnership.



IGEM - HERC

IGEM - HIGHER EDUCATION RESEARCH COUNCIL (HERC)

IGEM-HERC funds are used to support Idaho public institutions of higher education research and development of projects that foster expertise, products, and services resulting in state economic growth. Priority is granted to those proposals that can show a strong collaborative effort among institutions as well as the private sector or exhibit high potential for near term technology transfer to the private sector. IGEM-HERC funded projects may receive funding for up to three years, contingent on annual review and satisfactory progress toward approved performance measures.

The institutions report to HERC each year on the status of their projects, including progress toward key objectives, budget expenditures, economic impact and commercialization potential. The awards granted in FY2017 included the second year of a three-year award for the Boise State University Computer Science Program, the second year of a three-year award to Boise State for enhancing capabilities in nanotechnology and microfabrication, a new three-year award to the University of Idaho for development for security management of cyber physical control systems. HERC awards are granted through a competitive process that is open to each of the three research institutions. The process incorporates an independent review of proposals and an evaluation component for identifying the project success and economic benefit to the state.

University of Idaho: Security Management of Cyber Physical Control Systems (\$700,000)

Cyber-attacks and intrusions are nearly impossible to reliably prevent given the openness of today's networks

and the growing sophistication of advanced threats. Knowing the vulnerabilities is not adequate, as the evolving threat is advancing faster than traditional cyber solutions can counteract. Accordingly, the practice of cyber security should focus on ensuring that intrusion and compromise do not result in business damage or loss through more resilient solutions.

Through this project, the University of Idaho is creating a platform to facilitate and build complementary and multidisciplinary research and development (R & D) capabilities to address these pressing problems. The platform will incubate innovative products and services for safeguarding cyber physical control systems (CPCSs) that are ubiquitous and underpin key sectors of Idaho's economy.

Objective outcomes include:

1. Strengthen U of I's capacity by adding key faculty and enhancing laboratories to increase U of I's ability to deliver improved education and R&D products in CPCS to students and technical professionals in industries within the state that will accelerate economic development;
2. Strengthen collaboration with Idaho industry and other Idaho universities to synergize cybersecurity education, research, and deployment activities;
3. Foster technology transfer and commercialization through technology incubation;
4. Strengthen and expand the workforce by deploying cybersecurity expertise to Idaho industry and improving the talent pipeline with computer science and engineering graduates.

Boise State University: Computer Science at Boise State University - An Investment in Idaho's Future (\$700,000)

The focus of the Boise State University project is on accelerating the growth in the areas of Cyber Security and Big Data to expand research, industry collaboration, and teaching capacity. The Computer Science Department continues to increase its formal and informal connections with industries, and the IGEM-funded faculty are integral to growing partnerships with those industries. The strategic faculty hires that were made in the first round of HERC funding will be key in the progress of this project.

Boise State has made significant additional infrastructure enhancements to help support the faculty recruitment and retention, receiving a \$1 million grant from the Idaho Department of Labor along with \$280,000 in matching grants from eight industry partners. This grant and match allowed Boise State to hire three additional lecturers and support staff. These hires are focused in the areas of Big Data, Cyber Security, Human Computer Interaction, and Computer Science Education research, along with the capability to create a Big Data track in both the Masters and PhD programs.

Boise State University: Enhancing Capabilities in Nanotechnology and Microfabrication at Boise State (\$500,000)

Boise State's project is focused on upgrading the materials characterization and microelectronic processing capability in the Idaho Microfabrication Laboratory (IML) in support of technology development and economic growth needed in the State of Idaho. This project will expand expertise in the emerging research areas of flexible and printed electronics, thin-film and 2D materials, and neuromorphic computing.

Economic growth in this industry is enabled by innovative research and development using advanced processing techniques to create new materials, structures, and devices. These new products have broad impacts within industries as diverse as agriculture, medicine, transportation, and energy. This project will enhance the capabilities of the IML and nanotechnology fabrication at Boise State, which will in-turn educate the current and future workforce, offer programs that will

support local companies, and conduct leading edge research that attracts external funding. Idaho companies who are partnering with Boise State on this project are interested in a wide variety of capabilities. The results of this project would allow these companies to perform research and development activities that would otherwise be too costly. Partnering companies will also have the potential to expand their business by improving the performance or increasing yields of existing products in addition to developing completely new products.



IGEM - CAES

The Center for Advanced Energy Studies is a research and education consortium between the Idaho National Laboratory, Boise State University, Idaho State University, University of Idaho, and University of Wyoming.

CAES UPGRADES APPLIED VISUALIZATION LABORATORY

The Center for Advanced Energy Studies (CAES) has completed major upgrades to its Applied Visualization Laboratory (AVL). The new Computer-Assisted Virtual Environment (CAVE) uses rear digital projection to display computer graphics on three walls and the floor. Enhanced computing speed allows large data sets to be loaded quickly into 3-D representations. The AVL is moving forward on testing wireless internet (Wi-Fi) for up to seven Samsung Gear VR applications. Four interns studied in the AVL during the summer of 2017; two from Idaho State University, one from the University of Idaho, and one from the University of Wyoming.

CAES, INL STUDY RARE EARTH ELEMENTS IN OIL, GAS EXTRACTION

CAES and INL are in the middle of a three-year collaboration with the University of Wyoming's Carbon Management Institute and the U.S. Geological Survey, developing new methodologies to assess the occurrence of rare earth minerals and other critical materials that may be dissolved in high-temperature fluids associated with oil and gas extraction. A working group met June 26, 2017, to identify strategic goals, critical assets, existing expertise, knowledge gaps, and innovation opportunities. Rare earth elements (REEs) are used in everyday devices such as rechargeable batteries, cellphones, catalytic converters, magnets and fluorescent lighting. For strategic reasons, the United States has sought to explore where REEs can be extracted economically in North America.

TEAM FROM CAES LEADS UTAH FORGE MODELING

The INL/CAES team led by Rob Podgorney is aiding the University of Utah FORGE team, building the "earth model" and subsequent "reservoir models" for the enhanced geothermal pilot site near Milford, Utah. FORGE stands for Frontier Observatory for Research in Geothermal Energy, a U.S. Department of Energy project aimed at developing sites where hot subsurface rock can be fractured and water introduced to create steam to drive turbines and generate electricity. CAES interns Michael Janis (University of Oklahoma) and Andy Lau (Boise State University) are assembling the earth model and writing the code to transfer it into INL's FALCON program.

CAES WINS GRANT FROM VANDAL IDEAS PROJECT

The CAES Energy Efficiency Research Institute Industrial Assessment Center (CEERI-IAC) based out of Boise State University is a DOE-sponsored program that offers businesses in the Mountain West in-depth energy assessments of their plant sites. An IAC team of students from Boise State University, Idaho State University or the University of Idaho meets the company representatives and takes tours where they collect data and make observations on how energy might be saved, and therefore, energy costs reduced. On average, a visit by an IAC team will save a regional business more than \$55,000 per year and pay for itself within 12 to 18 months. To date, the center has helped approximately 60 companies become more energy efficient.

COLLABORATIVE PLANNING MEETINGS

CAES organized or hosted a number of meetings this year including Transient Kinetic Approach to Catalytic Materials for Energy-Efficient Routes to Ammonia, Ethylene and Related Chemicals; Waste Water Treatment/Recycling and Energy Research for the Food Processing Industry; Industry Water-Energy Workshop; Microstructure and in-pile sensors; Carbon Engineering; and Produced Water - Rare Earth Elements. Additional meetings include the EPI 2017 Energy Policy Research Conference; Nuclear Cyber Security; NSF Career Development for New Faculty; and Small Modular Reactors.

CAES BY THE NUMBERS

Investments:

- **\$3 million:** State of Idaho investment in CAES
- **\$625,024 :** Idaho National Laboratory's investment to support joint appointments with CAES affiliate universities

Outreach:

- **1,119** visitors who experienced the CAES Computer-Assisted Virtual Environment (CAVE) 3D data immersion research environment
- **33** workshops, seminars, and conferences hosted at the CAES facility in Idaho Falls

Student Impact:

- **77** students from the CAES partner universities interned at the Idaho National Laboratory

The IGEM Council is a twelve-member council appointed by the Governor as prescribed in Idaho Code section 67-4726.

Membership of the Council includes:

- Four (4) representatives from the private sector;
- One (1) representative from the State Board of Education;
- One (1) representative from Idaho National Laboratory (INL) or the Center for Advanced Energy Studies (CAES);
- One (1) representative each from Boise State University, Idaho State University, and the University of Idaho;
- One (1) representative from the Idaho State Senate;
- One (1) representative from the Idaho House of Representatives; and the
- Director of the Idaho Department of Commerce

This 12 member Council thoroughly vets IGEM grant proposals to mitigate risk and maximize the return on investment. The IGEM Council's fiscal stewardship and strategic direction advance IGEM's overall intended goal of economic prosperity through investments in technological advancements and innovation.

2017 Members:

Senator Kelly Anthon - Idaho State Senate

Dr. Noel Bakhtian - Center for Advanced Energy Studies (CAES)
(representing CAES/INL)

Bill Gilbert - Vice Chair, The CAPROCK Group

Von Hansen - AlertSense

Dr. David Hill - Chair, State Board of Education

Representative Luke Malek - Idaho State House of Representatives

Dr. Janet Nelson - University of Idaho

Megan Ronk - Idaho Department of Commerce

Dr. Mark Rudin - Boise State University

Rick Stott - Superior Farms

Dr. Neels Van der Schyf - Idaho State University

Mike Wilson - Consultant



IGEM - Commerce

Idaho Department of Commerce
700 W State Street
Boise, Idaho 83702
(208) 334-2470
igem.idaho.gov



IGEM - HERC

Idaho State Board of Education
650 W State Street 3rd Floor
Boise, Idaho 83702
(208) 334-2270
boardofed.idaho.gov



IGEM - CAES

Center for Advanced Energy Studies
995 University Blvd.
Idaho Falls, Idaho 83401
(208) 526-1784
caesenergy.org



Boise State University

Office of Sponsored Programs
1910 University Drive
Boise, Idaho 83725-135
(208) 426-4420 or
(208) 426-2953
research.boisestate.edu/osp



University of Idaho

Office of Sponsored Programs
875 Perimeter MS3020
Moscow, Idaho 83844-3020
(208) 885-6651
uidaho.edu/osp



Idaho State University

The Office for Research and
Economic Development
1651 Alvin Ricken Drive
Pocatello, Idaho 83201
Mail Stop 8046
(208) 282-2592
isu.edu/research/development



IGEM

800.842.5858 | commerce.idaho.gov