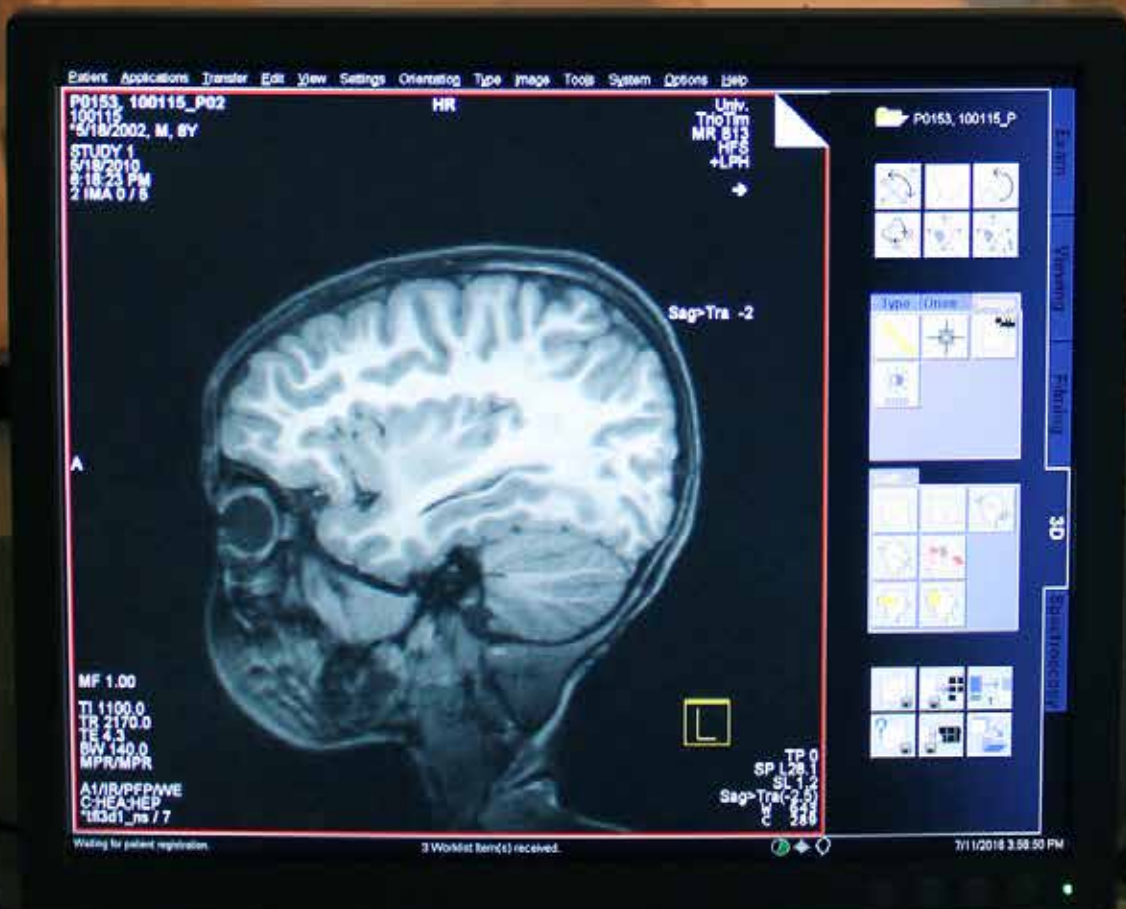University of Hawai'i System

A Vision for a New Innovation Ecosystem

RESEARCH AND INNOVATION LONG RANGE PLANNING ROADMAP

UNIVERSITY
of HAWAI'I®
SYSTEM

A magnetic resonance image of a child's brain at The Queen's Medical Center-University of Hawai'i MR Research Center. PHOTO: JABSOM

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Summary: The Broader Impact of UH Research

Research conducted by the University of Hawai'i (UH) impacts the quality of life in the islands and around the world. Because of Hawai'i's tremendous geographic diversity that encompass erupting volcanoes, frozen summits, tropical rain forests and the deep ocean, UH research is equally as diverse with its world-renowned research programs in astronomy, medicine, oceanography, genetics, biosciences and tropical agriculture. Cutting edge research facilities like the Daniel K. Inouye Center for Microbial Oceanography: Research & Education, Institute for Biogenesis Research, John A. Burns School of Medicine, UH Cancer Center, the soon-to-be constructed Daniel K. Inouye College of Pharmacy at the University of Hawai'i at Hilo and the Haleakalā-based Daniel K. Inouye Solar Telescope that is slated for completion in 2019 – provide UH researchers with the necessary tools to conduct competitive research in science, technology and innovation. University of Hawai'i researchers are actively engaged in leading roles in ocean acidification and coastal erosion mitigation, alternative energy studies, heart disease and bladder cancer therapy development, big data/data visualization enterprise development, cybersecurity workforce development, and food security and sustainable agriculture technologies.

The University of Hawai'i has taken on a greater role to help diversify the state's economy through the Hawai'i Innovation Initiative (HII). Through this bold and proactive effort, UH has partnered with the Hawai'i business community to help leverage its research to create and attract new companies, cultivate talent for a knowledge-based economy and to encourage the development of future technologies. The common goal is to build a thriving research enterprise that will be driven by the growth of new industries in Hawai'i – fueled by UH's plans to employ and develop top researchers in several focus areas over the next decade.

The future landscape of university research is evolving. In that future, the increasingly complex problems faced by the region, the nation and the planet will primarily be resolved by multi-disciplinary teams of researchers – some formed from within the UH System, while others will involve collaboration with other universities and institutions. University research, the innovative solutions derived from it and the ability to rapidly translate a good idea into purposeful products and services are key factors that will drive economic prosperity and support the quality of life here in Hawai'i and around the world.

Each UH campus should take an introspective look at its current research operations and use *A Vision for a New Innovation Ecosystem* as a roadmap to assist with their individual planning process to help advance the UH research enterprise for the future.

Planning Roadmap
Guiding Principles

- The UH System sets the overall vision for research and innovation and provides the tools, policies and processes for the campuses to achieve their missions.
- The individual campuses should be responsible for implementing actionable plans toward the strategic goals that are compatible with their unique strengths, capabilities, aspirations and metrics.
- The campuses should collaborate with each other, government, business and industry in implementing their plans for the betterment of Hawai'i, the nation and the world.

Core Elements

- Five priority innovation hubs to nurture prosperity and broaden social impact
- The innovation workforce
- A dynamic innovation and entrepreneurship ecosystem
- Strengthening the UH research enterprise

Priority Innovation Hubs

To utilize on its existing strengths and capabilities and to capitalize on emerging opportunities, UH should continue to explore new avenues to better leverage its location and existing talent in ocean sciences, astronomy, energy, sustainable agriculture, health sciences, digital/creative media, data intensive sciences and engineering. These areas were identified as national science and technology funding priorities in which the extramural funding growth is occurring. In some cases, strategic hires will be necessary to address critical gaps to participate in these areas.

Based on the rationale listed in the previous paragraph, below are five innovation hubs that the campuses should consider. In the future, additional hub areas may be identified as opportune in response to regional, national and/or international developments.

It should be noted that UH's focus on these hubs will not reduce its commitment to supporting faculty research in other disciplines – especially on research that address Hawai'i-related challenges, opportunities and needs. Such research will benefit from efforts to strengthen the research enterprise overall.

HUB: *Ocean and Climate Sciences*

As an island community that depends on its climate and environment for tourism, and the ocean for food and recreation, research and outreach on problems such as coral bleaching, coastal erosion, sea level rise, rainfall prediction, fisheries management and invasive species management will continue to be high priority areas. The University of Hawai'i will continue to enhance humankind's understanding of the issues and uncover possible solutions by:

- Studying relevant microbes and their role in the ecosystem process. Since microbes perform important functions such as producing and consuming greenhouse gases and composing the base of the marine food web, understanding how they work could provide insight on how to mitigate climate change and preserve the food chain.
- Utilizing inter-disciplinary collaboration and indigenous knowledge to advance conservation biology research on environmental stressors and how animals, plants and microbes adapt. This could provide future generations with the understanding necessary to effectively manage Hawai'i's fragile natural resources.
- Continuing efforts in management-driven research and outreach to tackle problems such as marine debris, marine resource usage and catastrophic event response.
- Expanding research in **climate change** issues of particular interest and immediacy to the Pacific Region.

PHOTO: Jaymi Nakashima

Daniel K. Inouye Solar Telescope (DKIST), Haleakalā   PHOTO: Joe McMullin

HUB: *Astronomy*

Hawaiʻi is an ideal site for astronomical research due to the high altitude and dryness of its observing sites and its unique geological features which make it ideal for planning manned and unmanned missions to the Moon, Mars and beyond. The University of Hawaiʻi will strive to elevate its standing in the astronomical community and bring benefits to the state and the world by expanding and strengthening research in:

- Solar astronomy, which is important in predicting and utilizing precautions to manage disruptions to power grids and communications caused by solar flares.
- Panoramic surveying, which is relevant to many different science areas such as asteroids and cosmology. It is as equally important in tracking near-earth objects and space debris whose deteriorating orbits could pose threats to life and property.
- Instrumentation/adaptive optics, which has application in a variety of disciplines or applications outside astronomy where remote monitoring and image stabilization/corrections are required.
- Stewardship by building relationships and coordinating with kūpuna, the local community, state agencies, and other key stakeholders to protect and maintain cultural, educational, environmental and recreational uses of the mountain summits.

HUB: *Health and Wellness*

Geographic isolation makes Hawaiʻi particularly sensitive to changes in the availability, as well as the quality, of healthcare. In addition, Hawaiʻi's popularity as a tourist destination and status as a key military asset make it a vector for infectious disease and other potential health issues.

The University of Hawaiʻi is committed to research and service toward the improvement of the health and wellness of the Hawaiʻi community – especially in Native Hawaiians, Pacific Islanders, the rural community and its diverse multi-ethnic population. The University of Hawaiʻi will advance healthcare research by:

- Utilizing knowledge of ethnic/racial differences in phenomena such as cancer incidence (e.g., higher rate of breast and colorectal cancer than the national average) to open avenues for Hawaiʻi's multi-ethnic population to gain benefits from clinical research such as clinical trials, new diagnostic tests and interventions. This advantage could also lead to participation in future therapies such as personalized precision medicine.
- Expanding and strengthening research into heart disease, diabetes and other health problems that affect the local community and the Pacific Region.
- Expanding research and knowledge of the unique socio-cultural factors in Hawaiʻi's multi-ethnic communities and families that promote well-being, good nutrition and health.
- Advancing natural products research into potential drugs for treating various diseases or afflictions such as heart disease or cancer.
- Advancing knowledge of infectious diseases, such as mosquito-borne viruses, and the means of mitigating their spread and vaccinating against them.

Bruce Shiramizu, MD, ECHO clinical trials Principal Investigator
PHOTO: JABSOM

Jason Leigh, Professor/Director, Laboratory for Advanced Visualization and Applications (LAVA), UH Mānoa

HUB: *Digital Economy and Civil Infrastructure Security*

The ability to process and move large quantities of data securely across global networks and to create, manipulate and present content will play a vital role in Hawai'i's economy and way of life. The University of Hawai'i can take the lead in many of these efforts, including:

- Utilizing data visualization to manage, manipulate and interpret large data sets in various scientific disciplines as well as towards simulation and game development.
- Engaging in cybersecurity research, training and workforce development to prevent and mitigate cyberattacks against critical systems in a variety of industries.
- Guiding the expansion of Hawai'i's computing capabilities and global connectivity through research in high performance computing.
- Engaging in research to improve the strength and resiliency of digital networks which prevent and mitigate disruption of critical communication and civil infrastructure systems.
- Expanding and coordinating programs in digital and creative media production, which could help diversify Hawai'i's economy by empowering its citizens to create, manipulate and present digital content.
- Continuing training and research in disaster preparedness, including better ways to track and minimize the impact of natural and man-made threats, as well as the handling of post-disaster recovery efforts.

U.S. Navy Wave Energy Test Site (WETS) off Kaneohe, Oʻahu   PHOTO: HNEI/U.S. NAVY

HUB: *Sustainable Ecosystems and Energy*

Food, water and energy security is very important to a geographically isolated island community like Hawaiʻi. The state relies heavily on imported food and oil and has a limited aquifer, so finding solutions to meet current and future needs is vital to the survival of its inhabitants.

The University of Hawaiʻi will seek to engage in research and development activities that will help achieve some form of sustainability and inform key decision makers and stakeholders on policies and practices on how it can be accomplished through:

- Utilizing Hawaiʻi's location and natural resources to conduct renewable energy research on various methods like solar power, wave energy, wind, hydrogen, etc.
- Utilizing inter-disciplinary research and indigenous knowledge to identify appropriate sustainable agriculture products to help increase local food production.
- Conducting research in grid optimization and energy storage, which are particularly vital for a place like Hawaiʻi that is thousands of miles away from an alternate power grid.
- Conducting research to fill critical gaps in knowledge about water supply.
- Enhancing the living environment of all Hawaiʻi's citizens by protecting the natural and managed ecosystems, and creating sustainable urban environments.

Innovation Workforce

To compete in the local and global workplace, Hawaiʻi's citizens need to be well-educated, well-prepared for work and well-equipped to solve problems. At the same time, they will also need to become more adept in life management skills to achieve the necessary balance and harmony of a healthy and productive member of the workforce.

The University of Hawaiʻi will apply new technologies and methods to improve, tailor, expand and increase access to its academic and vocational educational programs to better prepare its students and graduates to enter the workforce by:

- Utilizing surveys and data mining to become better informed about the workforce needs of government, business, industry and non-profits, as well as graduates to identify emerging

personnel needs and critical gaps in knowledge transfer for UH graduates to be work-ready in cybersecurity, energy, nursing and other emerging fields.

- Addressing the state's critical shortage of doctors and health care professionals by working with the federal and state government, hospitals, and other key stakeholders on increasing graduate medical education and funding for medical residency programs, especially in rural and neighbor island communities.
- Coordinating Science Technology Engineering and Math (STEM) curriculum and vocational education offerings to address workforce needs, enable graduates to enter the workforce at any stage, and assist displaced workers to enter new careers.
- Integrating innovation into educational programs so that UH graduates will gain new knowledge and learn skills to creatively solve problems collaboratively in their chosen field.
- Invigorating professional and vocational programs so that graduates have sound, practical and theoretical, industry-relevant know-how to meet key national or international qualifications in strategically important fields.
- Developing and offering life skills courses to prepare UH students with "real world" skills for thriving in college and beyond. Knowledge and skill development are essential for students to succeed in college and are also necessary to help graduates achieve work-life balance to thrive in the workplace and to sustain well-being in life.
- Developing and offering programs that prepare graduates to be resilient and able to adapt to rapid change in the workplace by acquiring the mindset that learning and acquiring new skills is a lifetime process.
- Expanding and strengthening programs to address underrepresented groups such as Native Hawaiians and Pacific Islanders in college and the innovation workforce.

Students and teachers at the 2016 GenCyber camp held at Honolulu Community College. PHOTO: HCC

## Dynamic Innovation and Entrepreneurial Ecosystem

In order to promote a culture of innovation and entrepreneurship and to better commercialize discoveries and inventions, UH will take a fresh, active role in addressing these issues which are critical to Hawai'i's economy and future by:

- Coordinating and integrating innovation and entrepreneurship throughout the UH educational experience (curricular, extra-curricular and co-curricular) to provide students, graduates and others the tools to create new businesses or innovate in their chosen field.
- Expanding proof-of-concept/accelerator programs to nurture new technologies and innovation in niche markets and to better inform graduates and others on what will actually sell.
- Engaging the local community, including Native Hawaiians, to access these services to pursue their own interests in innovation and entrepreneurship.
- Engaging with key stakeholders and subject matter experts to update UH intellectual property and commercialization policies and process with best practices that work for Hawai'i.
- Developing networks within the local community, abroad and within UH to collaborate on projects such as SBIR/STTR grants, or provide opportunities for UH to apply its expertise to help solve critical problems affecting government, business and industry.
- Utilizing the principles of innovation and entrepreneurship to stimulate the creation of social enterprises that will help address social issues and other critical problems to the community.
- Strengthening business community (e.g., Hawai'i Business Roundtable; Chamber of Commerce) and K-12 educational community engagement to more widely promote and permeate the culture of innovation and entrepreneurship in the state.

Keolani Noa, KCC Native Hawaiian coordinator; Stacy Clayton, Kamehameha Schools; and KCC STEM student Andrew Chang examine Native Hawaiian medicinal plants
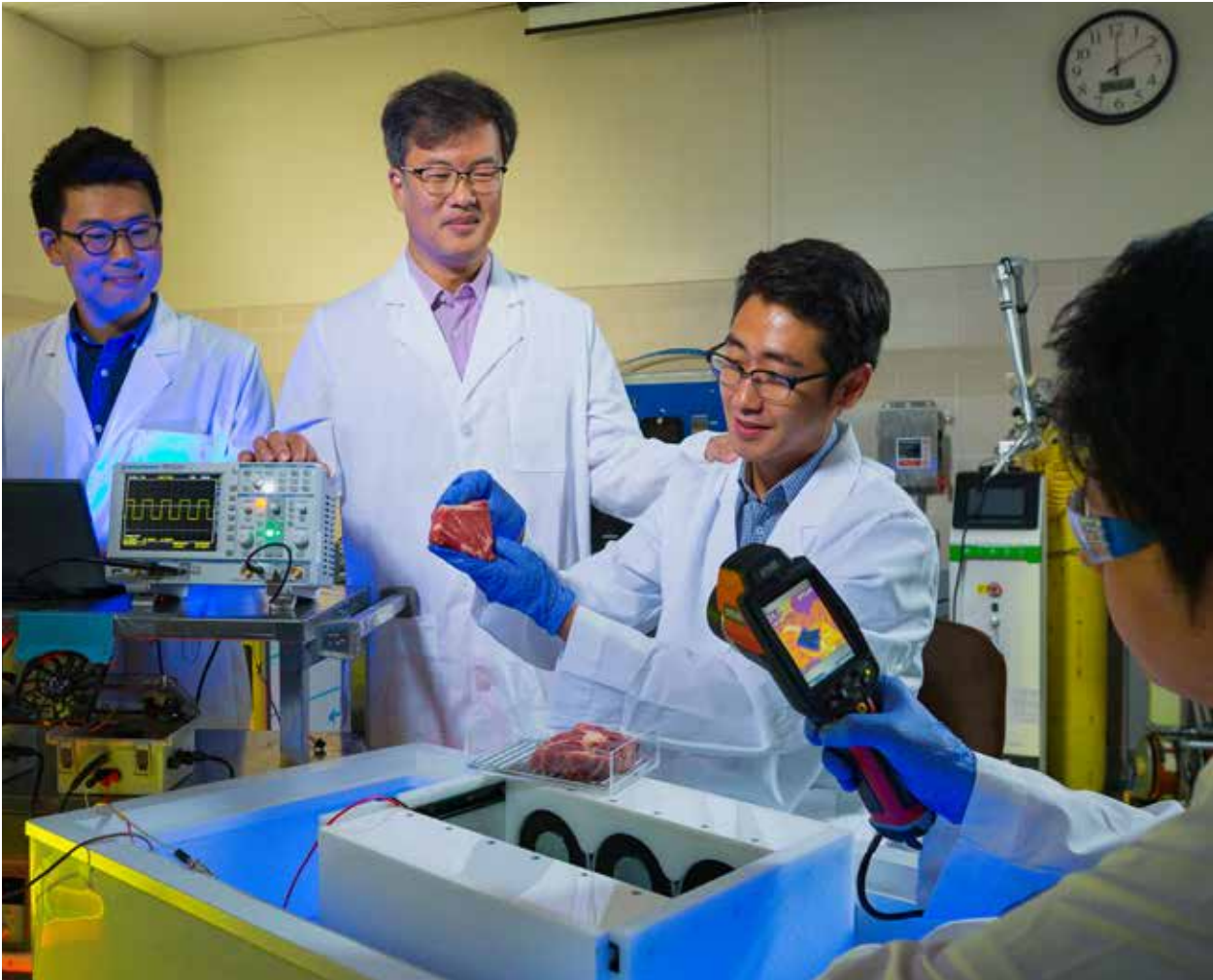
CTAHR Associate Professor Soojin Jun (left center) and researchers from his HNFAS lab working on their promising supercooling technology

Strengthening the UH Research Enterprise

The last ten years were marked by the expansion of research administrative and compliance services to better address critical needs and coverage in vital areas. The University of Hawaiʻi will continue its efforts to become more efficient and effective in handling the transactions that matter to its customers, managing resources wisely and mitigating regulatory and administrative burden by:

- Pursuing extramural funding that leverages expertise of seasoned faculty and staff that have a record in receiving and managing large awards to provide effective models for establishing grant development offices throughout the UH System.
- Engaging key stakeholders and subject matter experts to implement best practices to minimize administrative burden while meeting regulatory requirements.
- Monitoring key metrics on important transactions and to encourage process improvement where practicable.
- Initiating the dialogue and providing guidelines for addressing resource allocation issues such as positions, funds, core facilities, space and incentives.
- Addressing performance measurement and how to communicate the broader impact of research and innovation to key stakeholders.
- Restructuring research administration and services to relieve regulatory and compliance requirements by the federal government.

Implementation
Funding and Regulatory Environment

There is a general consensus that the federal-state-public research university partnership is misaligned. What began with the understandable premise that states benefit from federal investment in research and thus each state should bear its "fair share" of the costs of doing research – has resulted in a precarious situation. Decades of cost sharing requirements, facilities and administrative (F&A) recovery caps, salary caps, cost containment accounting changes, and unfunded mandates have saddled colleges and universities with a larger share of the financial burden of conducting research – even before the investments in physical plant and faculty recruitment necessary to remain competitive are applied.

For public universities, there are added pressures. Federal regulations were increased with the expectation that they would not result in additional costs and research costs were shifted toward the states. However, it didn't occur to the federal government that the states would push back and refuse to shoulder the financial burden associated with research.

Similar to the federal view that states with their tax bases could bear the costs, states are now viewing the federal government in the same light. Federal grants are viewed as being fungible and states are expecting public universities to use these grants to absorb research costs, such as faculty salaries. However, many state legislatures are not aware (or choose to ignore) that the majority of sponsoring agencies either cap the size of awards or have imposed arcane salary caps to limit costs to their agencies.

Federal agencies and state legislatures are now faced with choosing how to allocate stagnant or decreasing budgets. The American Academy of Arts & Sciences (AAAS) *Public Research Universities: Changes in State Funding* (2015) identified the major competitors for resources in state budgets: 1) Medicaid; 2) state and local government employee pensions; 3) primary and secondary education; and 4) infrastructure. In fact, within states, public universities are viewed as having greater flexibility in meeting financial challenges because they have more control over their budgets and revenue streams (e.g., tuition; endowments; grants) that can be modified or enhanced unlike the other competitors for resources in state budgets.

Although vigorously advocating for the restoration of federal and state budget cuts and cutting unnecessary administrative burden remain a necessity, public research universities can no longer expect the federal government or state legislature to be willing to provide funding.

Current Assessment

Due to its long history and status as the flagship research campus, an assessment of where the University of Hawai'i at Mānoa (UH Mānoa) currently stands in the five innovation hubs was done through the use of government funding data.

UH Mānoa was ranked 58th in total federally-financed research expenditures during the National Science Foundation's (NSF) Higher Education Research & Development expenditures survey (HERD) for the FY 2014 reporting period. This reflects its steady performance (91st percentile) as one of the top 100 institutions of higher education that perform federally funded research under this metric.

Table 1
UH Mānoa NSF Ranking for Federal R&D Expenditures

Fiscal Year	FY 10	FY 11	FY 12	FY 13	FY 14	Average
Ranking	62	64	67	57	58	62

Although the NSF HERD subfields do not exactly match the selected innovation hubs, NSF HERD subfields are associated with those hubs to estimate relative rankings: 1) astronomy with astronomy; 2) oceanography with ocean and climate sciences; and 3) medical sciences with health and wellness. Instead of a subfield, funding from the Department of Energy (DOE) will be used for energy. Cybersecurity is a relatively new field and the NSF Computer Sciences subfield is not sufficient to estimate a relative ranking.

Table 2
UH Mānoa NSF Ranking for Federal R&D Expenditures by Selected Subfields and Dept. of Energy

Subfield/Agency	FY 10	FY 11	FY 12	FY 13	FY 14	Average
Astronomy	7	6	9	7	7	7
Oceanography	5	5	5	5	5	5
Medical Sciences	66	67	62	68	69	66
Dept. of Energy	74	76	62	30	55	59

The data supports the idea that UH Mānoa is a leading astronomy (7 out of 115 – 94th percentile) and oceanography (5 out of 125 – 96th percentile) institution, in its ability to attract federal funding.

Although the medical sciences (69) and DOE (55) numbers are low in comparison to UH's strengths, the data are encouraging since the FY 2014 rank is out of 286 institutions (76th percentile) reporting medical sciences expenditures, and out of 380 institutions (81st percentile) reporting DOE expenditures.

Due to the current federal funding climate, UH strives to maintain its overall ranking and its rankings in astronomy and oceanography in terms of percentile. For the other subfields, UH strives to increase its percentiles by three points by 2020.

The Roy and Hilda Takeyama Foundation's $1 million gift in 2015 helped to support the Academy of Creative Media at UH West Oʻahu.   PHOTO: UH West Oʻahu

New Normal

Public universities and their faculty and staff are faced with three questions: 1) how does the university increase revenue, 2) how can it contain costs and 3) how can it improve efficiencies? Current trends indicate that the response to the revenue question is being addressed in three ways: 1) relying on out-of-state and foreign enrollments to increase tuition revenue; 2) seeking foundation or international funding to increase research revenue; and 3) engaging in fundraising campaigns to increase endowments. However, these approaches are not the proverbial "silver bullet" and come with their own set of challenges.

First, because of the public outcry about the high cost of education, there is much debate on how the tuition revenue will be used to help defray the costs for in-state students. Thus, efforts to reprogram some of the tuition revenue to support research could meet strong resistance unless public universities can demonstrate the connection between leading-edge research and education outcomes – especially via experiential learning through undergraduate research opportunities.

Second, every public university is seeking limited private, foundation or international funding. Substantially increasing revenue is unlikely due to increased competition. Also, the uses of these funds are restricted and come with additional administrative burden.

Finally, if a public university is one of the "have nots" with respect to endowments – it will be difficult to raise funds for research. Unless there is a concerted effort to make research one of the main thrusts of UH and the University of Hawaiʻi Foundation, it will become lost in a long line of other priorities, some of which may be served first (e.g., undergraduate instruction, athletics).

Since these trendy revenue-generating approaches come with certain caveats that most institutions may find difficult or impossible to overcome, the most feasible option that public universities have available is cost containment and/or improving efficiencies by the reallocation of resources.

High Performance Strategies

Intellectual Capital Profile

Oceanography and astronomy are two of UH's strongest research programs. However, they are considered sectors with low growth potential. Instead, the National Science Board recommends investing a larger share of the nation's research budget into other sectors such as data intensive science and engineering and cybersecurity.

If UH's goal is to substantially increase its extramural funding it must decide whether to pursue growth sectors like these and to make the necessary investments in infrastructure and faculty hires to fill gaps in its talent pool. However, it is just as important for UH to determine the proper allocation of funds and new faculty positions to maintain its established excellence and its world-renowned status in these two programs – while pursuing the recommended areas of growth. A careful evaluation to allocate vacant and new general funded positions will need to occur for each major research program and targeted growth area.

Strategic Investments

Research and training revolving funds (RTRF) are currently allocated so that 75 percent goes to the respective campus that recovered them. In the case of the UH Mānoa campus, 50 percent goes to the school or organized research unit. Although such an arrangement makes it easier to budget, the utilization of the funding may not be strategic and does not provide an incentive to investigators responsible for recovering the funds. It is also not clear whether metrics are used to guide or evaluate investments for the portion of RTRF that is utilized for start-up funds or seed grants.

The distribution formula may need to be revised to address some of these issues. For example, a "set aside" for incentives could be incorporated to reward consistently successful investigators. This might help reduce negativity about the use of RTRF for start-ups when there are perceived neglect of existing investigators.

For investments of RTRF in new faculty or projects, metrics that encompass more than just extramural award numbers and related facilities and administrative (F&A) cost recovery could be used to evaluate or guide investments. For short-term analysis, it would still be based on financial benefit as publications and impact on the discipline occur farther down the road and are more difficult to measure. For example, direct salary dollars brought in on an award might be viewed more favorably than an award where most of the budget is sub-awarded. This secondary analysis could also be used for an award where there is low to no F&A recovery.

PHOTO: UH Mānoa College of Engineering

Daniel K. Inouye C-MORE Hale, UH Mānoa

Facilities Optimization

Another area that needs attention is space allocation. The University of Hawai'i's physical plant woes are well known. However, what is not known is how well UH utilizes its existing space – in particular, whether laboratory space is underutilized with respect to extramural awards. Other universities are using extramural dollars and F&A recovery per square foot to evaluate space utilization. Some are also implementing measures to replace occupants with more productive occupants.

The University of Hawai'i should invest in efforts to determine how research space is currently utilized and how it can be best allocated to maximize usage. This could be more important for high-cost facilities such as wet labs. For example, increasing productive use of the lab could be tied to increasing the share of RTRF returned to subsidize facilities costs. It could also result in rethinking how new facilities are configured or designed. As an example, mixed-use buildings may no longer be viable. Instead, dedicated laboratory buildings with shared core facilities and temporary, long-term occupants may be the way of doing business in the future.

Organizational/Geographic Realignment

Periodically, UH should review whether the research interests and strengths of its departments, research units, centers, programs and institutes align properly. What worked a decade or more ago may not work today. To enhance productivity and gain efficiencies, it may be better to reorganize into new units.

For example, would it make more sense for information and computer sciences to be part of the College of Engineering rather than the College of Natural Sciences? In another example, should research programs in various schools or colleges studying various aspects of renewable energy be attached to the Hawai'i Natural Energy Institute or a successor unit?

If there is resistance to organizational change, another possibility is to geographically realign key programs around shared facilities to eliminate duplication where possible. This would allow units to retain their identity but gain access to labs and specialized equipment. This might also encourage multi-disciplinary collaborations due to their proximity.

Organized Research Units (ORU)

Another topic that should be revisited is the concept of an organized research unit (ORU). There is a perception that this designation brings special benefits, however, this may not always be the case.

Some institutions use the ORU designation for research programs that are intended to receive internal budget allocations for a short time frame during their formation (3 – 5 years). After that period is over, an ORU is supposed to be "self-sufficient" and operate primarily on extramural funding. Whether or not an ORU continues to receive allocations is at the host campus' discretion and is according to its budgetary process.

It appears that the current RP 12.206, *Establishment and Review of Organized Research Units,* was modeled after this concept since ORUs "are expected to generate significant grant and contract funding." On the other hand, RP 5.206, *Establishment and Review of Centers and Institutes,* recognizes that centers or institutes could "require significant current or future commitments of institutional financial, human or physical resources…." This implies that centers and institutes might never be "self-sufficient" and could continue to receive allocations.

The ORU designation might be used only for those very few units that are self-sufficient or willing to lobby its host campus for funds, while others should be designated as centers or institutes. Or maybe the ORU designation should be discontinued for certain units because the original intent is not being followed when new ORU designations are developed to focus on today's needs.

Dialogue and Cooperation

Because addressing these issues will have a wide and lasting impact on personnel and processes, the administration will need to work with faculty and staff focus groups, and/or task forces to assist in evaluating and recommending solutions that would work for UH. For example, faculty would be better suited to help establish a rubric to evaluate and prioritize research programs. Or a group including faculty representatives and central office staff from units such as the Environmental Health and Safety Office, facilities, space planning, Export Controls and Public Safety would be able to identify problems that could arise from attempting to consolidate laboratory space for what appears to be similar research.

In any scenario, it would be in the best interest of the administration, faculty and staff to work together in addressing these issues, develop solutions and facilitate the implementation of any changes.

sPACE, Schidler College of Business, UH Mānoa PHOTO: PACE

Moving Forward

With a large task ahead, key conversations should take place to set the foundation for achieving the research and innovation long range plan. To provide a way forward, the UH Office of the Vice President for Research and Innovation has identified five topics that the UH System and its 10 campuses can work on within the next 18 to 24 months.

Strategic Hiring – Position Management

In place of, or to supplement requests for additional positions, it would be prudent to set aside a portion of vacant positions that result from retirements or attrition toward strategic hiring needs, whether it is to strengthen/build capacity in research or in innovation and entrepreneurship. The campuses should determine what "set asides" will work for their respective situations. This would demonstrate to stakeholders, such as the Legislature, governor and the public that UH is serious about the research endeavor and is carefully and deliberately utilizing its resources.

Incentives – Strategic Investments

Similar to position management, UH should be investing part of the RTRF toward strategic development. Discussions should take place about the amount to set aside and how to invest the funds, such as partial salary coverage for strategic hires, start-up packages, bridge funding, rewards for engaging in collaborative research in the targeted areas, etc. The campuses should decide on the mix of strategic uses to achieve their priority goals as well as the methods in which funds are invested (e.g., competitive as opposed to formula based).

UH researchers experiment with infrared drones to study pollution discharge into the ocean

PHOTO: Jason Rushin, *Civil Beat*

UH i-Lab, UH Mānoa

Measurement – Determining Impact
Because there will be significant investment of positions and funds toward a goal, UH will need to demonstrate that the investments created results, whether good or bad. Aside from traditional metrics such as new extramural awards and increased F&A recovery, discussions should take place so that UH can offer a more balanced scorecard. Participating colleges and campuses could propose appropriate alternative metrics to demonstrate the impact in their disciplines. Another measure might be to monitor and report on changes. For example, UH might see an increase in the number of cybersecurity proposals as a result of efforts to actively pursue funding opportunities by matchmaking faculty and providing grant writing/proposal support services.

Innovation Space – Promoting a Culture of Innovation
If the UH i-Lab and sPACE on the UH Mānoa Campus prove to be successful, UH should expand use of these models by creating innovation spaces on at least four (4) more campuses to help nurture and promote a culture of innovation throughout the UH System. Discussions should take place on which campuses should be next and how to tailor the programs to meet the needs of the campuses and their communities. Although tailoring might be required to address local interests, effort should also be on building and coordinating the curriculum system-wide so that all students learn core skills and concepts.

Organizational Structure Review – Planning for the Future
Discussions should take place on assessing whether UH's current research programs are set up to prosper in the future. In addition to reviewing whether programs can continue to thrive in their current or future states, UH needs to seriously look at whether the way it utilizes space, equipment and other resources makes sense and is effective. This will inform the process of renovating existing space and building new spaces to minimize duplication, and sub-optimal usage, as well as policies and practices for allocating space.

PS1SC art montage by Karen Teramura. TELESCOPE PHOTO: Rob Ratkowski

From distant galaxies to the ocean depths …
and everywhere in between™

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