

PROMOTING INNOVATION AT THE UNIVERSITY OF HAWAI'I

John M. J. Madey,
Department of Physics and Astronomy, University of Hawai'i Manoa
14 September 2005

Planning for the future of Hawai'i requires that we focus on promoting the policies, opportunities and enterprises that can improve the quality of life and security of all who live here. While Hawai'i's natural beauty, climate and location and the intelligence and energy of its peoples provide a strong base for the efforts necessary to secure Hawai'i's future, there are also several fundamental challenges including competition from low cost producers in the new world economy for manufacturing and service jobs, and competition from the mainland for the talents and services of Hawai'i's brightest and most ambitious graduates.

Given its stunning beauty, mild climate and advantageous geographic location, Hawai'i is a preferred destination for tourists, and tourism will by virtue of these natural advantages remain Hawai'i's principal economic base for the foreseeable future. But not everyone can productively work in the tourism industry. And the very circumstances that have made Hawai'i a preferred tourist destination – particularly its splendid isolation in the middle of the Pacific – make many of the alternative foci of business activity impractical or uncompetitive, for example, due to the high transportation costs, extended delivery times, challenges to communicating across time zones, etc.

In addition, the cost advantages of Asian and Indian producers make it clear that the only business enterprises that can succeed in the long term here and on the mainland are those that possess special advantages or resources not available to our international competitors. This new paradigm for the American economy restricts Hawai'i's possibilities to one of three choices: (1) businesses that serve purely local requirements for which overseas competition is not an issue, (2) businesses based on special Government preferences or requirements, for example, supplies or services contracted to the United States military forces based in Hawai'i, or (3) businesses that exploit our culture's special talent for innovation to create high value products and services whose production and sale can be protected internationally by patents, copyrights, or the confidentiality of the required "know-how".

The University of Hawai'i and Hawai'i's private colleges and universities have as one of our highest priorities the support of those who create, organize and operate these businesses, most directly through the education and training of entrepreneurs, managers and workers who will create and staff those businesses. Although the effects of the training that we provide can take decades or more to modify the direction and capabilities of the State's businesses, failure to provide the appropriate classroom and laboratory training, mentorship, and opportunities for personal networking will likely have an equally long lasting adverse effect on our graduates and

on the State. We therefore very much need to make sure that we provide the best service that we can to our students with the resources available to us.

One of the fundamental issues for the University of Hawai'i at Manoa as it considers the proposal to create a University Affiliated Research Center (UARC) on the Manoa campus is therefore the question of how such a Center might benefit – or detract from – the training of the students who will determine Hawai'i's future. There is, at the outset, no question that such a Center could benefit those of UH's students whose careers will lead them to a life of service to the UARC's sponsors. But what of those students whose talents or aspirations lie in other directions, for example, the development of technologies oriented towards the civilian economy, or of technologies that might disrupt – rather than support – existing military technologies?

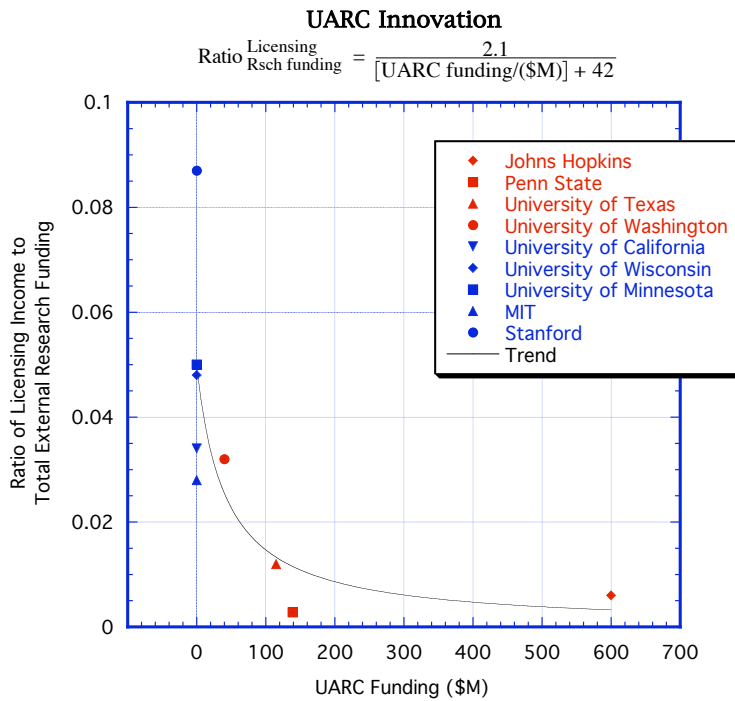
It must also be recognized at the outset when discussing these issues that institutions of higher learning such as UH have paradoxical and conflicting responsibilities to the communities that they serve, on the one hand, to secure and promote the evolution and application of the technologies most critical to the perpetuation of the status quo, and on the other hand, to promote as vigorously as possible the evolution of new approaches and technologies that will, by disrupting the status quo, transform our societies in ways that promote the general good and in ways that can extend the wholly unanticipated advances attributable to the development of the personal computer, the world wide web, fiber optic and wireless communications systems.

With respect to the proposed UARC, a number of prior publications have noted that the DoD's existing UARCs, by virtue of their objectives and management guidelines, have acted to retard the development of the kinds of innovation and transformational technologies that UH needs to promote (see attached reference list). Accordingly, while UH could very reasonably allocate a portion of its resources to promote the service-oriented objectives of the proposed UARC, it needs to take care to do so in a way that will not compromise its ability to make obsolete the kinds of technologies the staff of the proposed UARC might be working to support. Could Edison have brought the electric light to the point of practical application if his research had been financed by the utilities that dominated the gas lights then commonly used in American cities ???

It follows that UH needs to make sure that it does not find itself so beholden, by contract or otherwise, to the sponsors of the proposed UARC that UH's faculty or students might find themselves without the means or support to carry out research deemed to be of no interest to or in conflict with the objectives of the UARC's sponsors by (1) appropriately isolating the activities of the proposed UARC from UH's broader academic and research activities, and (2) pursuing whatever steps are realistically possible to insure that faculty and students working in fields not consistent with or supportive of the objectives of the proposed UARC have adequate facilities and support outside the UARC to insure the success of these students' basic and advanced training programs.

Even with such guarantees, the acceptance of funds for the "directed research" sponsored by UARCs has had a clear adverse impact on innovation by the institutions that have accepted these

funds. Data compiled by the Association of University Technology Managers clearly show that the licensing in-come per dollar of research funding at these universities falls as the level of UARC funding increases with those institutions receiving the greatest UARC funding generating innovative technologies at a rate less than 1/10th the rate of comparable institutions with no UARC funding.



In the long run, it is therefore the efforts of those dedicated to find improved, transformational – and perhaps disruptive – solutions to the challenges that face Hawai‘i, the nation and the world that are most critical to all of our futures, and thus both the most deserving of support and the most challenging to support. For such enterprises always involve a far higher degree of risk than support of the status quo and the high probability is that many such efforts may fail. But, however daunting the odds, our future truly depends on training students who can perceive the new and unsuspected opportunities embedded in the foundations of their disciplines, energetically explore those opportunities while recognizing that their necessarily incomplete knowledge may lead to failure as well as to success, and support with all of their energies the development of the new products or services made possible by their discoveries.

This is not a process that is foreign to Hawai‘i’s peoples, for all of us are here because we or our forefathers made the decision to come to Hawai‘i in hopes of better lives for ourselves and our children, but with no guaranty that those hopes would or could be fulfilled. And those of us who follow the careers of Hawai‘i’s best and brightest students in engineering and the applied sciences understand with great clarity that it is precisely the opportunity to pursue these technologies that persuade our students to leave their homes to join the communities of scientists, engineers, managers and technicians who now staff the centers of these entrepreneurial development on the mainland.

It is clearly also important to note that the priority we must give to the development of new, transformational and potentially disruptive technologies also lies at the core of the commitment we must make to insure national security and the effectiveness of our armed services. To quote General Leslie Groves, who led the effort to develop the atomic bomb during World War II:

“No one can predict exactly the scientific developments of the next decade or two, but it can be assumed that most of them will come from the minds of young men working untrammelled and undirected with full access to information, in an atmosphere of freedom. During the war just past, it was demonstrated most conclusively that America’s capacity to win a war with new weapons – of which the atomic bomb is by far the most distinguished – depends on the general scientific, technical and industrial strength of the country and not on secret researches in either private or government laboratories.” [Robert S. Norris, *Racing for the Bomb*, Steerforth Press, 2002, p. 435]

As General Groves has so eloquently observed, it is not directed research and secrecy that have underpinned national security, but the undirected efforts of individual scientists and engineers pursuing their visions of the future in an open – unclassified – environment dedicated to the commercial exploitation and development of new technologies.

For all these reasons, those individuals with responsibilities for the review of the proposed UH Manoa UARC must commit themselves to insure as their first priority that the establishment and operation of the proposed Center has no limiting effect either on the subjects of enquiry pursued by faculty and students working in UH’s existing academic and research units, no limiting effect of any kind on the support, facilities or resources available to those individuals, and no limiting effect of any kind on the private sector’s ability to support or participate in this research.

UH’s faculty and facilities compare favorably with the best the mainland has to offer in the fields in which we have specialized. We therefore already have the means needed to give our students the education and training they need to blaze Hawai‘i’s pathway to the future. The question for all of us now is how to organize and nurture those resources to best serve Hawai‘i’s peoples.

Those who wish to pursue these questions in further detail may wish to read one or more of the previously published documents and reports that touch on these issues. Possible references of interest include:

1. “DoD News Briefing” by Under Secretary of Defense for Acquisition and Technology Paul G. Kaminski, 5 February 1996
2. “University Affiliated Research Center (UARC) Management Plan”, Anita Jones, 13 May, 1996
3. “Sunk Costs Sink Innovation”, by Captain Terry C. Pierce, U. S. Navy, in the May, 2002, issue of Naval Institute Proceedings

4. “DARPA – Arsenal Ship Lessons Learned” by Captain Charles Hamilton, U. S. Navy, 31 December 1997
5. “Intellectual Property and Government R&D for Homeland Security”, Hearing before the SubCommittee on Technology and Procurement Policy of the Committee on Government Reform, House of Representatives, 107th Congress, 10 May 2002.