

RCUH

Research Corporation
of the University of Hawai'i

Pathways to Research Success: Lessons Learned



2022 FORUM REPORT

MAY 18, 2022



Forum report and recording
available online at www.rcuh.com

ABOUT THE FORUM

The COVID-19 pandemic persuaded many professionals to elect for an early retirement, including a large number of prominent and influential researchers at the University of Hawai'i. The objective of this Q&A event was to support the next generation of up-and-coming researchers by giving them the opportunity to hear from some of the most experienced and successful researchers at the University and learn from their experiences. Nearly 100 individuals participated in the webinar, which provided the ability to pose questions to panelists in real-time. Amber Imai-Hong, an Avionics Engineer and Program Manager with the Hawai'i Space Flight Laboratory, served as the moderator.

PANELISTS



DR. DAVID KARL

**UH School of Ocean and
Earth Science and Technology**

Dr. David Karl is a Professor of Oceanography and Co-Director of the Daniel K. Inouye Center for Microbial Oceanography: Research & Education, or C-MORE for short. He has spent over four decades at UH, teaching and conducting research. In 1988 he co-founded the Hawaii Ocean Time-series program that has conducted sustained physical, biogeochemical and microbial measurements and experiments at Station ALOHA for the past 25 years. Dr. Karl has made more than 70 major oceanographic expeditions across the globe, including more than 1,000 days conducting research at sea and 23 expeditions to Antarctica, and is a prolific author of over 470 published works.



DR. KARL KIM

**UH College of
Social Sciences**

Dr. Karl Kim is a Professor of Urban and Regional Planning and the Executive Director of the National Disaster Preparedness Training Center. He currently serves on several committees of the Transportation Research Board and previously served as Vice Chancellor for Academic Affairs at UH Mānoa. His research interests include risk assessment, risk management, disaster management and humanitarian assistance, transportation, traffic safety, and much more. He is also Editor-in-Chief of Transportation Research Interdisciplinary Perspectives (TRIP) and Associate Editor of Transportation Research Part D (Transport and Environment).



DR. MARJORIE MAU

**UH John A. Burns
School of Medicine**

Dr. Marjorie Mau, MD, MS, is Professor and Myron "Pinky" Thompson Endowed Chair for Native Hawaiian Health Research at the John A. Burns School of Medicine. As a Native Hawaiian clinician board-certified in Diabetes, Endocrinology and Metabolism, Dr. Mau has dedicated her academic career to advance health equity among Kanaka O'iwi through research, clinical services and teaching in collaboration with our Native Hawaiian, Pacific Islander and other priority populations in the Pacific. She is the first woman in Hawai'i and the first Native Hawaiian woman to be inducted as a "master physician" by the American College of Physicians.

Q&A SESSION

Responses below are slightly shortened compared to the original the panel discussion. To view the forum recording, [please click here](#).

Since the title of this forum is “Pathways to Research Success: Lessons Learned,” what is your definition of research success?

MM: I’m a practicing physician scientist so when I think about the definition of research success, I think about how fortunate I’ve been to come home and work in the space of Native Hawaiian health. Much of the research we have been successful in has really been based on the relationships, the pilina, with our Hawaiian, Native Hawaiian, and Kanaka ‘Oiwi communities. So when I think about the definition of success, it’s really the success of our communities to uplift their health and well-being.

I think as a research scientist in an academic institution, especially an institution like the University of Hawai‘i, it’s our responsibility, it’s our kuleana, to make Hawai‘i a better place. but in the field that I’ve been trained in, I feel it’s my kuleana to help Hawai‘i’s people become healthier through sustainable and holistic health.

DK: If you can take a step back and think about success, maybe think about the opposite, which is failure. I think it’s fair to say that at least in academia, the pathway to success often includes very challenging times, setbacks, or even failures, so it’s really a non-linear process. The point is that when you reach a failure or challenge in your academic

career, don’t be discouraged. You need to keep your eye on the ultimate prize, which is your own career. If you set goals in your career, whether they’re very aspirational goals or maybe even impossible goals, I think the measure of success is a personal one. Have you reached those goals? Have you done all that you can to promote the work you aspire to do? And so it’s really not a measure of how many publications or how many research grants one achieves in their career, but really how you feel about your own career and your contributions.

We all make contributions to science. It’s a foundational field, it builds on previous successes, so I think we don’t always all have to make some major discovery to call a career a success. There are many paths to success and one of them is just participating in the process. Science is a team sport. It’s a lot of fun quite frankly, for those just getting started. My lesson would be to work hard and to play hard, but make sure you work a little bit harder than you play.

KK: I think one of the things that is very important is to work on projects that you’re not just passionate about and interested in, but projects that can have an impact in the community, in the discipline, and beyond. So to me, the measures of success really relate to working on impactful projects, building strong teams, and working with great people because science, especially social science, is a team sport. The final thing that I think is so important is to connect this to place, to our community, to our state, to our region and our planet. And so it really is about the projects, the people, but also place that I think is important.

TECHNICAL ISSUES WITH FORUM RECORDING

Upon uploading the video of the virtual forum, RCUH discovered a few minor technical issues: the video resolution can appear blurry at times and the screen shrinks towards the ending of the recording. We apologize for the inconvenience and appreciate your understanding.



SCAN FOR VIDEO

Can each of you share how you first got involved in your respective field of research and what made you stay?

DK: I was born in Buffalo, New York out on a polluted Lake Erie, which is one of the Laurentian Great Lakes of our nation. The pollution really compelled me to seek a career in environmental sciences because I thought that we can't continue to assault our planet in this way. Buffalo was famous at that time for having rivers that started on fire because of all the hydrocarbon and industrial waste pollutants.

I was committed, even in high school, to do something in the environmental sciences. I wasn't quite sure what, but when I was 17 I had an epiphany. I actually saw the ocean for the first time on a family vacation to Maine. I saw the Atlantic Ocean and I knew right then I wanted to become an oceanographer. I spent the next decade of my life working quite hard to achieve that goal (of course I took some time off to go to Woodstock and other great things in life). I went to graduate school in Florida and California and in 1978 I was honored to get an offer for a faculty position here as an assistant professor of Oceanography in the College of Natural Sciences. This was before SOEST was even created.

I had already participated in some research expeditions as a graduate student, including two major trips to Antarctica, so I had plenty of laboratory and field experience behind me. I felt I could hit the road running and I did just that. My first grant that I ever submitted was successful, all of the \$4,000 for a two-year period. It is a very small number by today's standards, and maybe I should have stopped there battling 1.000, because over the next 45 years I've had about three times as many grants rejected as I've had funded. And this relates to the first question you posed to the panel about success. If you just look at those raw numbers, you'd say that Dr. Karl is a huge failure since he only gets one out of four grants accepted.

This is a challenging and competitive business and you have to keep trying, you can't get discouraged. Every time you write a grant you learn something new about your field as you prepare your proposal. Oftentimes failed proposals are fodder for writing introductions to scientific papers or public seminars for the community. Everything is worth doing and you have to keep trying in this field for everything that comes remotely your way. If a call for proposals comes out and you think that you might somehow be involved in that call, even if it's not in your direct area of research, propose something. Throw your hat in the ring and you'd be surprised how many times proposals get funded that are not strictly in line with the call for proposals. It's important to be resourceful and dedicated to the extent of being ambitious. Don't let any proposal opportunity go unanswered.

KK: I came here in 1984 as a visiting assistant professor as I was finishing my PhD at MIT. That year Hawai'i passed a mandatory seatbelt law so I started studying why people wear seatbelts. We do these observational studies throughout the state and it's an interesting topic about the effects of law enforcement, but I was really interested in the human behavior and the choices that people make, which led to other studies. We studied child safety seats, riding in the back of pickup trucks, talking on cell phones while you're driving, drunk driving and all kinds of research projects related to this.

It was really by accident that I started studying that particular topic, but it led into my first really large competitive grant, which was the CODES project. It was a Crash Outcome Data Evaluation System created for the State of Hawai'i, which linked accident data to EMS data to hospital data to insurance claims data. Because I had a big interest in GIS (geographic information systems) and spatial mapping, we mapped and linked this data to other big data sets: the driver's license file, the motor vehicle registration file, the traffic citation file, etc. As a result of this project I developed an expertise in terms of how to manage really diverse data systems and a lot of the work that I've been doing has focused on safety and the failures that occur—human failures, failures in vehicles, system failures and so

Q&A SESSION

forth. I think thinking about a problem that needs fixing is really important to the work I've been doing.

More recently, I've been focusing on disasters with the National Disaster Preparedness Training Center, a national congressionally-authorized center which develops and delivers training courses for first responders, emergency managers, and others involved in the safety and security of our nation. This is a national center that happens to be based here at the University of Hawai'i, but I think it is a topic that combines together the kind of interdisciplinary approaches that are important in terms of building resilient communities in safety and security for our community and beyond.

MM: In my circumstance, I believe research chose me. I don't believe that I ever aspired to be a researcher. In fact, I think after graduating high school and leaving Hawai'i, I don't think there were very high expectations of someone like myself. And I think because people said, "Well, you know, you can...yeah, you might go to college," it really inspired me to prove them wrong and work really hard.

What really hooked me to do biomedical research, was my fellowship training in Washington, D.C., in endocrinology, diabetes, and metabolism. I had a very supportive mentor, another clinician scientist, and he got an American Diabetes Association grant to fund me for an extra year of research. I was very productive that year, conducting two of my own studies, wrote and presented four clinical studies on a variety of different subjects related to endocrinology, and at that time I realized that the thrill of doing a study, coming up with an idea, collecting the data, analyzing it, presenting and publishing it in a major journal was really cool. It was really cool because I never really appreciated the fact that when that paper is in publication, people pick it up for all different kinds of reasons. They read it and they take the information that you published for one study and apply it to another. You have no idea where your idea is going to evolve into and in my own head, it was like having a child. Now, mind you I didn't have any children then so what do I know, but to me, it was like when you're planning to have a child. You nurture

it and then release it into the universe. You don't know what this person that you created is going to do in life, and you don't really know how it's going to turn out. That sense of adventure and enrichment of my life's work is what really hooked me and it's kind of surprising to me that it did because I don't think that anyone thought I could. I guess I proved them wrong.

What types of obstacles did you experience in your research career? How did you overcome those challenges?

KK: There's so many obstacles it's difficult to know where to begin, but one of the things that I would point to is that the work we often do involves both individual-level concerns and motivations, as well as collective ones. I think the biggest barrier results from the difficulty of straddling between individual perspectives, interests and motivations, and things that are more collective. Right now in society and in the world, we are moving away from collective actions and a lot of it has to do with the disparities that exist, the widening of gaps in terms of capabilities. But it also fundamentally has to do with the challenge of bringing together individuals in teams, whether it's in institutions, organizations or the broader society.

MM: There is never a shortage of people who will tell you you cannot do something. That happened to me over the course of my career and I'm sure it will happen, and will continue to for the foreseeable future. My best advice to overcome a personal challenge like that is really to never take the advice of your naysayers and instead use the opportunity to reflect on your own sense of what brings meaning to your career or your life. It's helpful to know who you are. If research is part of that life plan, then you need to seek out supporters. They don't often just show up on your doorstep, but this includes your family. Before I became really involved in research, I had to go back to my husband and my family and said, "You know what this means right?" and we talked

Q&A SESSION

that through. I think it's really important to have your family understand what that means, because research doesn't stop on a clock. You don't punch in at 9 and punch out at 5 or anything like that. It's really helpful to have a good sense and statement of purpose and the "why." Those are things that on a personal level are challenging, and you can do on your own if you're just starting out.

I think the institution we work in creates challenges for research to be done, and this is not unique to the University of Hawai'i and applies to a lot of research institutions of greater size and prestige, but I think that we could do better. When I say "we" it's not somebody else, it's all of our problems and so we need to roll up our sleeves and figure out how to help administrators understand what works well to put Hawai'i on the map. We did that with NIH and we're now on the map. People talk about the health research and health disparity research we're doing here in Hawai'i. There's a long list of institutional challenges, but I just want to focus more in terms of how we kākou to be part of the solution.

DK: I don't want to get too philosophical, but if you think about academia and challenges, it's no different than a subset of the obstacles everybody has in life. If you think about an obstacle course in physical education class, where all these things are thrown at you to keep you from moving forward, and if you place that obstacle course inside of a maze, that's kind of what we're dealing with in life, as well as in scientific research in an academic setting. To me the largest challenge I've faced in my career, and still face, in fact it only gets worse with career age, is that of multi-tasking and the expectation of doing so many things well at the same time with extreme deadlines. As the older one gets in their career, they take on additional community service responsibilities that oftentimes junior scientists don't burden themselves with, or shouldn't burden themselves with. It's meant to be for the senior/advanced members of the discipline.

As mentioned earlier, Karl serves on editorial boards for a couple of major journals, and that alone can be a full-time job, and I'm sure Marjorie is doing the same thing. The challenges that come

from the extremely high level of expectations placed on scientists in today's society, include our academic, social, and societal responsibilities. We are knowledgeable people, we have expertise, we should be lending that knowledge to the community at large, especially at the University of Hawai'i, which is a public-serving, publicly-funded institution. All members of the faculty and staff of the University of Hawai'i should give freely of their time to volunteer in the community, to get to know the community, to help move the community forward in terms of standard of living, in terms of environmental protection, and many other things.

With such different experiences across a wide spectrum of fields, what are your keys to success as a researcher?

MM: When I was thinking about this question, I decided to take a poll of some of the most experienced and successful researchers at the John A. Burns School of Medicine. This is a non-scientific poll where the n=5 so it's not that big of a study. But it was interesting to talk to my colleagues and I found out that all of them mentioned one key thing that's actually been mentioned here, which is perseverance. If you have an aspiration to be a researcher, you need perseverance. I think it goes to what I was saying earlier about naysayers and no shortage of people to tell you you can't do this or that. So you have to love it, you have to persevere, ho'omau is what we call it, and you know, the value of failure is immeasurable. I think what Dave said about failure is key and I think someone like Steve Jobs actually mentioned how he learned more from his failures than his successes. My suggestions for success would be to persevere and expect to fail, but not to stop there, to learn from that, and to pick yourself up from that.

DK: I recall David Packard who is the inventor, industrialist, and former philanthropist of the Packard Foundation. He started the whole Hewlett-Packard organization with Hewlett in their garage so he

Q&A SESSION

was a risk taker. This is something in addition to perseverance that we need to think about always: the element of risk-taking. Later in his career, Packard was interested in exploring the deep sea with remotely-operated vehicles and started a whole research program in this area. His mantra was "Go deep, stay long, and don't be afraid to fail." And the secondary part of that was, "but don't fail too often." It's the same thing that Marjorie was saying, "If you fail don't stop there, go back and try it again," and I think the key to success is partly longevity.

In the academic world you earn a certain amount of academic credits or reputational credits, if you will, for the number of publications you've published. Well, of course, the longer your career, the more publications you've published because they're not going to remove some at the very early part of your career. I hope to speak in a few minutes if we get around to this topic about when it's time to leave. One of the keys to success is knowing when to step back and let the next generation take over the project that you've created.

KK: I think that notion of transition is really important and something that we don't really think about enough. I think to the extent that I've had some success, a lot of it really has to do with the teams I've been able to build. And I'm still working at how to build better, more effective, functional teams. Some of that really involves having respect and showing respect for not just the other researchers, but also the staff members you're bringing together. I think building a climate of respect is really critical to effective teams. This is guided by ethics, in a sense of right and wrong, and some of it is following the rules, laws, and administrative procedures and recognizing that many of your staff members are trying to protect you and the institution and the work that we do.

I think it's really important to create this culture of respect and openness so that if people see something wrong or see something that doesn't make sense, that they can speak up and fix it. And that's part of the team. I have to say the most difficult aspects of the job involve working with people. If we're all just doing it on our own, figuring out an equation, figuring

out a model, getting a publication, that's easy. It's the stuff when there are conflicts, disagreements, and sometimes bad behavior. The hardest stuff is calling that out and saying, "Look, that's not appropriate. That's not ethical. That isn't the right thing to do."

What words of advice would you give to someone interested in starting their own research project? Where should they start?

DK: The beauty of science is that it is what's called "the endless frontier." This is the title of the kind of monumental treatise presented as the creation blueprint for the National Science Foundation (NSF). NSF is a publicly-funded grant organization that funds nearly all fields, including engineering and all STEM fields (excludes biomedical which is handled mostly by the National Institutes of Health). If you're incoming as a postdoc or finishing up as a graduate student and you're thinking about your next career move or starting your own research project, I would suggest that you should always build on your strengths. It's kind of like that old adage that if you go out and give a public talk, you should talk about something you know about. It's probably very good advice and I think the same thing is true for proposing new research projects. You should build on your strengths, on your knowledge base, on your skillsets, but you should always keep an open mind to new areas of research. The endless frontier is ever-expanding and maybe there's an opportunity for a unique combination, let's say mathematics and biology, which are two fields that aren't very often merged but maybe an individual has skillsets in both and can create a new research niche.

The second piece of advice is that you should pick a project that you're passionate about, and this has already been mentioned in the panel discussion. You don't want your research job to become a 9-to-5 or 10-to-3, you want it to be part of your entire lifestyle and your entire thinking. You go home and you're still thinking about what you can do to promote your

Q&A SESSION

career and your research. You need to build on passion. And the third thing I would say is that you should be doing something that's impactful because why do it if it's not impactful? You only have a finite number of years in career-building opportunities so you should take those years, take that time to develop something that is truly useful, not necessarily in an application sense, but useful knowledge for humankind. Whether it's a new mathematical proof, a new method, or a new understanding about the Earth and its biota, these are things that will have a lasting impact.

KK: There's so many different sources of funding, so many places to apply for research grants, that I think we need ways to sort of filter them down and better understand which ones we should apply for and which ones we should invest in. One of the things that I think is important to do and encourage my team to do is to make the connection with publications. You shouldn't be taking on projects that you can't see a publication, a journal article, or a scholarly contribution that can come from taking the project on. I would think in terms of someone starting out as a researcher, in addition to chasing the dollars, really think about the publications, the contribution—the peer-reviewed contribution—that can arise from the work that you're doing.

MM: I totally agree with these two gentlemen that just shared their pearls of wisdom. In the biomedical sciences, we often pursue research grants that are posted by the National Institutes of Health (NIH). The National Institutes of Health is a \$41 billion research enterprise and it's the largest health research institution in the world. Everybody in the world wants to get an NIH grant (an R01 preferably), but an NIH grant is a significant achievement in one's career.

When I think about advice on how to start your own research, I think that you should take notice of where you are. You're here in Hawai'i. Hawai'i is a really unique place in many, many ways, but on a scientific basis, I always think about what is our scientific niche? What is the unique thing that we can do better than the Harvards, the Stanfords, the Columbias, the other big research powerhouses on the continental

U.S.? Because I'm happy I'm not living in Boston. I'm happy I'm not living in New York. I want to be here. So how can we take what we have here, uniquely ours, and create a scientific niche and do it better than anybody else in the world? Because Stanford can't do this. They'll try to, but I feel that if you want to start your career off, you need to think about innovation. Innovation means that you need to think a little bit outside of book learning and challenge some of the pillars of knowledge you thought were unchangeable. Think about where you are. We have a lot of things in our favor.

I do think if you're starting out in your own research, you need to know how to write. If you are an artist or an actor, your skillset would be painting or acting, but our media is writing. So you do have to know how to write if you're starting your own research career because I know a lot of people hire research writers, but that's cheating in my opinion, so develop that skill. It's not like you're born with it, you have to learn it like everything else. As someone who really didn't have a lot of high expectations coming out of our public schools in Hawai'i, I believe it's totally possible to become successful here and create a scientific niche.

We've brushed up on the topic of funding. What really motivates you to continue writing grant after grant to support your research?

KK: The bulk of most of my funding has gone to students and faculty members, as well as researchers from other institutions, so I think there is this connection to learning and teaching and education, which is such a powerful force in society. It doesn't just happen in the classroom or in the laboratory or in the institution. A lot more of the learning happens on the job, in agencies, in corporations and businesses, and what we have to do is to help facilitate and promote learning. And I have to say that the thing that motivates me is the passion for education.

Q&A SESSION

MM: I must be an outlier...this might be an outlier thing to say. I agree with you that learning is an important motivator but here are two things about motivation and repeatedly writing grants. First thing is about my motivation, which actually comes from the communities we work with. I mentioned earlier that I work with Native Hawaiian communities and rural communities and we work in the area of public health and health disparities and health equity. The various challenges and problems that we need to solve motivates me because research at some fundamental level is about solving a problem.

I think the other thing about the motivation for writing grants is something that NIH actually adopted, which is what I term "subsistence research." Subsistence research to me means that you write proposals and compete for grants that you're competitive in, but you only take what you need. At one time, NIH realized that many of these senior scientists had 9-10 R01 grants and young scientists who were trying to develop their own career didn't have a chance. NIH actually took a step to offer opportunities for emerging scientists to have a type of funding just for them. They also limited the number of R01s a senior scientist can have at one time. Even the director of NIH at that time said, "Why does any scientist need 10 R01s?" What's the point? It really removes the science of diversity. The science of diversity is very powerful and enhances and grows research, so having different people of different disciplines working on the same problem is really important. So I believe in subsistence research. It's about only taking or competing for grants that you need and not overfishing or over-competing, which allow others to be part of that diversity and that's healthy.

DK: Thank you once again for inviting me to participate in this event, because I've actually learned something today. I recall my mother when I was growing up, when I'd come home from school she'd say, "What did you learn today?" I would always tell her every day something I learned. Today I learned of subsistence research and it's a very interesting concept. Thank you Dr. Mau. It's something I'd like to explore with you offline because it sounds like a very compelling program or aspect of doing basic research by including

as many people as possible and kind of leveling the research playing field. To get back to the direct question, "What motivates you to keep writing grant after grant after grant?" You know I agree with Karl Kim that in my case the motivating factor is creating and disseminating knowledge and it's done in my case through large research consortia, collaborators, and people who work together toward a common goal where the sum is greater than the individual parts. That's why you build teams so that there's something bigger and better that wouldn't be done if the individuals were doing their own research.

I'd also like to echo Dr. Kim's comment about scholarly achievement following research. This is the ultimate goal and the consummation of the work we do is to publish our work in peer-reviewed literature or open source literature so it's accessible to everybody immediately. That's how research works. You build disciplines upon previous contributions and if those contributions are never published or made available to the general public, then they're not true scientific contributions. I would urge the people tuning in on this event that publishing is an important thing. It's sometimes given too much importance in promotion and tenure cases or hiring cases, but it is important nevertheless and it's actually an obligation of a scientist to publish their work.

I'd like to circle back on one other thing that came up again by my colleague Dr. Mau about writing as the medium of science. You are absolutely right. So many people are poorly trained in writing and this is a skill that can be learned, should be learned, and absolutely needs to be learned if you want to be a successful scientist and it's never too late to learn. When I was growing up all the way through high school I hated to read and I hated to write. I would rather be out playing baseball and now all I do in my career is read and write. I just think, "Gee, how much more successful would I have been as a scientist if I had paid attention in high school and learned the very basic skillsets?" I collaborated in graduate school with a scientist who was born and raised in Pakistan. He came to the U.S. to do a postdoc and was actually a better writer in the English language than I was. It made me realize that because he was trained in English as a second language, he knew the language, he knew the grammar

and the spelling and I didn't so I was always behind in that. It's extremely good advice, thank you Marjorie, because it's absolutely necessary. You can't have ghostwriting in science, it just doesn't work.

How much of your time as PI is dedicated towards securing funding? How do you keep informed of grant opportunities?

MM: If you're interested in NIH-type research there is a listserv you can get on and it will update you every two weeks of new grant opportunities. There's also the NIH RePORTER (<https://reporter.nih.gov/>), which has information about who got funded, what's hot topics, and available grant opportunities.

The other part of the question about how much time is expended in administrative work versus actual working on the science, I would say that there is too much time spent, obviously, in non-scientific administrative work. But I'm not an outlier in that, I'm pretty sure my colleagues here would probably say the same thing because you can hear it all over the country. PIs tend to feel that they do too much of the paperwork and not enough of the science work, but I do believe that that's one of the institutional challenges we have. Perhaps we can have a conversation about how to maybe change the attitude about what successful PIs are? We are not just money bags, we're actually interested in the work that we are fortunate enough to get a grant for. The idea that the more grants you get, the more administrative work you get, is just counterproductive. There has to be some consideration for how that can be done better, where PIs and scientists, especially young scientists, are better supported. I believe we should work on that *kākou*, but the University has to be willing to consider the potential for not doing that. I think not supporting PIs is more of a danger than sort of sweeping this under the rug. I'm not sure if that was the correct question, but I interpreted it in terms of the administrative burden and that could be improved definitely.

DK: I'd say over my career I've tried to balance the teaching and research and community service, the triad of the academic life that we have here and everywhere else in academia. I've tried to split that roughly into thirds, even though the community service really comes on as a larger percentage of one's time later in your career. So I would say at the start of my career I spent half of my time teaching and half of my time doing research and that was congruent with my position at the University, which was 50% research and 50% instruction. I think it depends on the individual and what other obligations they have for their so-called day job. If you have an instructional position where you're teaching two or three courses a semester, it doesn't leave a lot of time for creative research and then it pushes your grant-writing time into the evenings and weekends.

It's a very difficult question, but I think a good guide should be that you should spend more time doing the research than seeking research support, otherwise it's a downward spiral. It just doesn't make any sense to build research just to bring in dollars to encumber you with more administrative burden and more obligation. The balance should always be on the side of actual research progress and the funding should come at 25-30%, and I should say the National Science Foundation is very strict about not using NSF grants to write your next grant. That's an illegal activity, but nobody is policing it, so that time comes out of either your University time or they have to do it in off-hours.

KK: Even though I've generated more than \$75 million in research and training grants, I'm an "I", an instructional faculty member, so I'm not quite sure how to reconcile some of these tough questions in terms of the percentage of the time that is spent on fundraising which is huge, it's massive. Using an even less scientific approach of an $n=1$, I would say 30-40% of my time goes into thinking about funding, raising funding, preparing applications, doing the training that you need to do in order to be compliant with the IRB requirements, the other requirements that we have, and it's ongoing because you have to renew these certifications. You have to keep current in terms of the rules and procedures, so the only way we can do this is with a team of people that you can

work with. I'm really fortunate to have really strong collaborators and people on my team. And I try to make sure that they get the training, that they go to NCURA, and other types of administrative places where they can share information and best practices in terms of how to apply for, manage, monitor, and report on grants.

The other thing I want to say as Dr. Karl mentioned, is that it doesn't follow a calendar. Sometimes you just have to get it done because there's a deadline or there's an error you have to fix. I wish it could be a 9-to-5 job. Probably as a planner too, I could do a better job of planning my time and expenditure of resources, but I think it's more complicated and more difficult. There are more barriers and naysayers and it's sometimes tempting or easy to just give up, but I think if you're doing important work and you're bringing people together, hopefully it's a collective sharing of the burden so it isn't as painful.

What is one improvement you'd like to see that will help researchers in the State of Hawai'i?

DK: I should start by saying there's always room for improvement. Nothing is perfect and I'm privileged to sit on the RCUH Board of Directors and in my brief time there I've seen the complex issues that have come up and the skill with which those issues have been dealt with by the RCUH Board and especially by the RCUH employees led by Lenny Gouveia. RCUH is the facilitator of the research enterprise of the University of Hawai'i System and they have been in existence for many years and have done a terrific job over those years, but the one thing that kind of falls in a crack between the PI writing the proposal, the Office of Research Services helping to submit that proposal, and RCUH helping to expend the funds and conduct the mission, is that I think we could use an office here that helps with proposal preparation from idea to submission. I'm not suggesting that somebody be hired to write proposals, but somebody

could be hired to help put the proposal together or somebody who is an expert in the science of proposal preparation and submission. There are such experts, for-profit groups that help, and UH has a group that has helped the implementation group put together large proposals over the years. This is especially true for calls for large multi-disciplinary proposals where you have different components (e.g., research, educational outreach) and different people, and you're expected to do everything.

I think help from a centralized office in the system, whether it's located in RCUH or UH, could really help promote research as an enterprise and it could also help us sustain and maintain our R1 research-intensive status within the Carnegie ranking of colleges and universities and maybe help propel us to the next level, which would be the AAU, which is the top 75 or so universities in the nation. We're almost there and I think with a little bit of help on the front end of proposal preparation, it could maybe catapult us up into the AAU category.

KK: This is a challenging topic or question in terms of what we can do in Hawai'i, given the size of our state, the competition for resources, and the many, many needs that we have in this state. I would fall back on stronger planning. Planning involves bringing people together and it identifies reaching agreement over broad goals as well as specific actions that we can measure and monitor and incentivize and report back on. Right now everything is so fragmented and so spread out across the Neighbor Islands and O'ahu. But I do believe that we're a state that has enough common aloha that we can bring people together; that the University, that the Research Corporation, that the other people working on important projects can come together and do things that are good for our faculty and researchers and students, but also good for the State.

MM: I agree with my colleagues 120%. Just a few things that I might add to that is that we could do better in breaking down silos. The future for solving complex problems in health, in the ocean, in other biological systems or human systems requires different disciplines and having tried to write a grant across

Q&A SESSION

a couple colleges, besides the medical school and other colleges here on the Mānoa campus, it was a nightmare—not with the faculty that I was proposing to work with, but with the leadership that had to sign off on their faculty working with someone else who wasn't in their college. I'm sure that my colleagues have also experienced the same issue and it really just took the wind out of our sails. To have leadership suggest that this was a turf battle and not about doing interdisciplinary, collaborative research...I think when we choose leadership in these colleges we need to think about, "Are these people that can work across disciplines?" That's a skill that is learned and practiced, so I think we could do better in breaking down silos. Since we are constantly or continually searching for leadership as people leave and others come on board, I think that's important.

I'd also like to emphasize what you mentioned about education. We're a teaching institution. We want to inspire lifelong learning. I think our institution, in terms of research, could elevate mentoring—teach mentoring, how to be a better mentor, and recognize it as a skill worthy of all of us because one of the recommendations was to have a supportive mentor. And just because you've been a successful researcher doesn't mean you're a good mentor. In fact, you might be pretty autocratic. I think we should elevate mentoring for our faculty as a skill worthy of recognition. It gets kind of second fiddle on promotion and tenure dossiers, but I think if we want to elevate our university as a great place to do research, we need to do that.

Lastly I want to also appreciate what Dr. Karl said about pre-submission support. It's kind of funny (not funny "ha ha," but funny "odd") that at the John A. Burns School of Medicine we actually have a pre-submission process to assist you with your grants. What we seem to lack is a post-awards management piece and I think that's where actually RCUH has been really a jewel in our University, but it could be more streamlined. I know more about research post-awards grants management than I ever cared to know, but if I wanted my grant to be on time and in order to meet specific AIMS, I personally had to do it myself. Colleagues have said, "No Marjorie, it's

better now," and I'm so grateful for that, but at the same time, we need both pre-and post-awards support.

What is one takeaway you'd like to impart to aspiring researchers?

KK: I don't think it's about the money. It really is about doing research that you would do anyway, that's interesting enough, important enough, and enjoyable enough that it's worthy to spend time on and invest in. Although the money and resources are important and needed, it really should be about stuff that you want to work on, that you would do for free.

MM: Two things. Work smarter, not harder. That's one of my team mantras on a weekly, daily basis. The second thing is Ma Ka Hana Ka 'Ike, which is to learn by doing and that goes to Dr. Kim's mention of learning and Dr. Karl's mention about doing. We write grants, yes, but we actually have to do them, so if we could learn by doing Ma Ka Hana Ka 'Ike.

DK: One of the giants of microbiology is Louis Pasteur, the French scientist from the mid-1800s who pioneered a lot of our modern techniques and concepts in microbiology. He had a quote that I use as my laboratory's mantra and that is "Scientific laboratories are the temples of humanity." And by that I would like to emphasize that what we're doing as a field, as a discipline, as individuals, is very important to humanity and we need more scientists in a technologically complex world. Every scientist, whether young or old, should be willing and anxious to share their expertise and knowledge with the public at large. This will help to educate the public and make them more intelligent voters on things related to science and technology. It can help preserve our fragile ecosystems and in general improve the standard of living for everybody. In closing, I'll call out the slogan of the early environmental movement and that is to "Think globally, but act locally." Volunteer as often as your schedule permits, always try to set goals for your career, and make the most of your limited time on Earth.

BONUS Q&A

When do you start the process of writing a proposal in response to a RFP? If you're the prime, what deadlines do you give other institutions submitting to you?

DK: As soon as a RFP is released, you should make an initial evaluation of whether it includes topics that you think you might be able to compete for. If the answer is yes, then you need to begin to build your "dream" research team—do not wait. These collaborations take time to assemble, and working with different universities, colleges, high schools, non-profit organizations, and industry takes more time than generally estimated. Give your collaborators a deadline that is 2-3 weeks earlier than your submission deadline since some time is needed to assemble the proposal package and to get institutional approvals from Department Chair, to Dean, to fiscal offices, to the UH Office of Research Services. Good luck!

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What are the major differences between state, federal, and private grants, and which tends to be more frustrating or which do you prefer working on?

KK: We have had experiences with state, local, federal and private grants; generally, government grants require more paperwork and compliance with policies and protocol for submission, reporting, accounting, and audit. As a state agency, sometimes state projects with UH are easier to implement. Private organizations and foundations may or may not have the level of experience doing research projects and tend to be more oriented to specific interests or regions of concern. I generally only take on projects with agencies for which there is opportunity to conduct and publish peer-reviewed research.

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How do I write a winning grant proposal? Do you have any tips for developing a strong Specific Aims section of an NIH grant application?

MM: The Ola Hawai'i grant holds grant training, writing and boot camp seminars throughout the year. You might want to try there first. If your question is about how to set yourself up to be competitive...I would say that it's not just about the writing but also the innovation of the science you are proposing. Most competitive grants come from individuals who have preliminary data that is in the form of a published paper or papers and this establishes them as someone with expertise to execute the aims. From that experience comes more competitive specific aims. Also "practice makes perfect"—having people review your aims and revise it with a critical eye is important.

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What resources are available for postdocs who would like to pursue K99/R00 or F32 opportunities? Are there internal grants which can fund postdocs at least through the application process?

MM: There are multiple infrastructure grants at JABSOM that are structured to support individuals to be mentored and receive either pilot or junior investigator funding to become an independent investigator (usually means an RPG grant, R01, K99/R00, etc.) as a PI. An F32 grant usually comes from a PI who writes it in collaboration with the applicant and it describes a development plan again for you to become an independent PI. Each of the infrastructure grants has a scientific theme—there is currently one on DM-COBRE, Reproductive-COBRE, Aging-COBRE. Other infrastructure grants include the Ola Hawai'i grant, which is focused on "health disparities" across the spectrum of populations. They may also be able to offer grant writing assistance if you are looking more on the writing and administration of a grant.

BONUS Q&A

What type of funding support is available for faculty who present outside of Hawaii?

KK: Most large grants allow for presentation at national meetings and conferences. Typically, funders want to support dissemination at large meetings which are part of national organizations.

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How can the process of submitting external grant proposals be less cumbersome?

MM: This is a question I have been working on for quite some time. It has to do with investment of training individuals (usually staff or administrators) at UH or RCUH to be assigned to be constantly educated on all the latest research funding opportunities and processes. In other words have them become specialized in grants admin as it relates to UH's system to make it work so it is "investigator friendly." They constantly change over time. Indirect costs should help build a pre-award and post-award office to carry out this function (in my opinion).

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How can we expedite the contracting process? How do you handle funds when contracts are not approved well into the grant time period?

MM: Again, this could be managed by a post-award grants office and they would focus on how to improve post-award processes. There should be metrics and constant quality improvement to improve efficiency. At the moment, I do not see enough being put back into the system to improve it. I think that's where successful researchers and leadership need to work together on it to make this happen more for the benefit of future faculty and/or researchers.

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What are your keys to building and maintaining a strong team? How do you create continuity and sustainability amongst your team?

DK: First and foremost, you need to spend time to interview prospective candidates to make sure that an individual is a good fit for the team. This interview process should involve current members of your team—not just the PI. Once you hire a new team member, you need to provide support at all levels, and you need to be sure that the new member is integrating into the team. This is especially true for people unfamiliar with Hawai'i, and even more so for foreign employees. It is important to value and acknowledge the contributions of each team member so they understand that they are an integral and invaluable member of the team.

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How do you develop research consortiums like C-MORE?

DK: Some fields of study, like oceanography, are inherently interdisciplinary and progress in research relies largely on meaningful collaborations of scientists working towards a common goal. So, in many ways, these functional research consortia self-assemble, usually around a particular challenge or common mission. The most successful consortia have an effective leader to prepare the grant proposal, to sustain the focus and momentum, and to make sure that the whole is greater than the sum of the individual parts. Throughout my entire career, I have benefitted from team science. As a graduate student, I was trained by a team of seven PIs, including one very effective leader. This unique collaborative experience had a lasting impression on me and, for the past four decades, I have been involved in more than 10 different research consortia including HOT, C-MORE and SCOPE, that I founded and led.

BONUS Q&A

How can students or recent graduates with little experience in research convince organizations to offer them grants?

KK: Developing a portfolio of class projects, papers, journal articles but also demonstrating impacts and outcomes associated with research may help.

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How do you balance maintaining continuity of grant funding and staffing with not getting overburdened by too many overlapping grants?

KK: Not well. The key is having strong staff and administrative teams who work well with researchers and building a climate of mutual respect, trust, and cooperation. Strong communications along with clear messaging as to both overall collective goals and directions as well as support of individual initiative is key to managing multiple people, projects, and endeavors. Emphasize continuous learning and growth.

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What are the best resources for successful tenure applications?

DK: Most colleges and universities have well-established and succinct criteria/expectations for the award of academic tenure, including UH. Pre-tenure faculty are encouraged to attend information sessions where these criteria are discussed, and questions from candidates are answered. Tenure is granted to individuals who demonstrate scholarship and quantifiable outstanding achievement in teaching, research, and community service. At Carnegie R-1 (Research Intensive) universities like UHM, documented excellence in research is generally required for a successful tenure application.

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In academia, how can an individual in a soft-money position (in other words not on a tenure track), succeed in doing research?

MM: I believe that it is totally possible to be successful as an independent research scientist at UH—whether you have a tenure track position or not. Many emerging scientists across the country are able to achieve independent research success and most do not have tenure, or if they do it is really only partial tenure. I think what is more necessary is the institutional support to do the kind of research you are interested in. Most biomedical researchers see tenure as a way to provide them time and salary support to pursue their scientific idea. I am thinking that tenure has become more a measure of having succeeded rather than an enticement to become successful.

With this in mind...I would suggest that if your goal is to be in academia and to become tenured you should look into what you need to do that...at UH teaching as well as research awards and \$\$ are the critical elements. The tenure model at UH is also not very accommodating to emerging faculty. If this is primary for you, you might want to look at other institutions that have a better tenure model or process.