# Health and Human Science Matters Season 3, Episode 11: Alan Rudolph

Dr. Alan Rudolph:

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Avery Martin:

Welcome to Health and Human Science Matters, a podcast by Colorado State University's College of Health and Human Sciences. I'm your co-host and digital media strategist, Avery Martin.

Matt Hickey:

And I'm Matt Hickey, associate dean for research and graduate studies. In our college, we make at our mission to optimize human health and wellbeing through discovery and innovation. Don't just take our word for it. Each episode we sit down with people who fulfill that mission, our college faculty and staff.

Avery Martin:

And this interview was recorded in October 2022. In January 2023, Dr. Alan Rudolph announced he will transition from his role as CSU'S vice president for research. We hope you enjoy his reflections on a decade of service and leadership.

Matt Hickey:

Today, we're really happy to have Dr. Alan Rudolph, the vice president for research at Colorado State University, joining us. So Alan, welcome and thank you on behalf of the college. We're tickled to have you.

Dr. Alan Rudolph:

Yeah. My pleasure. Thanks for inviting me.

Matt Hickey:

So we want to spend some time getting to know you and your perspective. You sit in a unique position, and so today we'll be talking much more about the institution at large and the broader vision, but we also want to get to know you, and I think our listeners, and in fact many of our colleagues, I suspect, are going to find this quite interesting. So we ask all of our guests about their educational journey, the how did you get here questions, and these have often ranged... In fact, we had one talking about a second grade teacher as an influence, right? You don't have to go all the way back to second grade, but we'd be really keen to hear. We hope that our listeners are a range of folks, but including undergrads who are thinking, "I'm not sure I can do this grad school thing," and may be moved by your story. So talk to us about the pre-college days and where did you go as an undergrad, what prompted that move, what did you study? These sorts of things.

Dr. Alan Rudolph:

Yeah, no. Thanks. And thanks again for inviting me. It's a great opportunity just to get to know you and, as you say, share a little bit more about me as well. So I'm a zoologist by training, and I think that's been a very interesting career for me. Where I went with that is really quite unusual because this is my first academic job. I've not been in a university before. But it started for me, like with many in science, I was curious as a kid and really just excited about nature. And I think one of my early influences, which will show my age, was Jacques Cousteau, a marine biologist. And we had a rule in our house that there was no TV when there was school the next day but for Jacques Cousteau. So yeah, so marine biology actually was my first foray into the natural world. And anybody who's dove under into a coral reef will appreciate all that has to offer in terms of teaching us about the diversity of life, but also the ecosystem and the dynamics.

So very early on, I actually spent my summers at marine biology camps in the Keys. In fact, the first marine biology camp was University of Miami's on Pigeon Key. It was a six acre island that I lived on for two summers for about two and a half months. It was phenomenal. And so as a young kid, my father was a physician, my mother was actually a professor in social work, so I have some affinity to social work here in the college. And so they were scholars. They were lifelong learners. And for me, that was instilled very early as a kid that the world around you is a fascinating place to study. And so I did the usual things as a kid, but I also had this nerdy side. And I kept marine tanks in upstate New York far from the ocean, which meant that many of the things in those tanks went belly up. But those kinds of hobbies also force you to understand, "Oh, I got to maintain the pH in this tank." And so early on I was introduced to the wonders of nature.

I went to undergraduate in Michigan, University of Michigan, and I didn't know what I wanted to do with that sort of excitement and ambition. And I had a family full of doctors, so I was thinking, "Oh, well, I'll be in pre-med. Go to medical school, take my dad's practice." And I spent the summers in Ann Arbor in addition to doing field work in ecology on the brown bullhead catfish, which I'll come back to in a minute. I take a job in the university hospital, and decided then that I wanted to really focus in research rather than in clinical work. So it was an opportunity to take forks in the road. I really had opportunities as a zoologist to take some very unusual positions after that through my grad school. So I did get a graduate degree of PhD in zoology. And I was early on also exposed to one of these kinds of scientific questions that's still not answered, is a plant seed alive? Whereas a tardigrade that dries up in the soil and goes into a dormant state, is it alive? Because you can rehydrate it and it goes back to normal metabolism.

But that whole dormant state is still a real active scientific question. What is the evolutionary process allowed life to adapt to life without water? Apropos for drought in Colorado. But that was my first foray into hypothesis driven science was to take on a really fascinating question that still is among us. And also that experience as an undergraduate, and I really love what CSU is doing in this regard, was highly interdisciplinary. So I was doing biophysics in a zoology department, and studying, well, if this organism dries up, what does it mean for the molecules? And I was interested in biological membranes. So a lot of physical techniques applied to a life science problem. So I was trained early on in interdisciplinary approaches to science and never looked back. I mean, for every job I took in every different life government industry, now academia, that training allowed options to take place in my career, but also an appreciation for the diversity of disciplines in how you approach problem solving.

Matt Hickey:

Oh, well said. I want to probe a couple of these, and I'm going to straddle both the life and academia. We have some shared history. So I was born and raised in upstate New York, and I wonder if you ever had a chance to do any lake diving in Lake Champlain or Lake George?

Dr. Alan Rudolph:

Oh yeah.

Matt Hickey:

A different animal than off the Keys, right? Just tell us a little bit more about that contrast, and maybe if you have any wow moments from your diving days, I'd love to hear those.

Dr. Alan Rudolph:

Well, the wow moments were definitely in the Keys avoiding large-

Matt Hickey:

Carnivorous.

Dr. Alan Rudolph:

Being eaten. Yeah, exactly. Just avoid being eaten by that barracuda. But yeah, that lake diving. And especially it's cold, it's dark, and you begin to appreciate adaptation in a whole different level. And I think, like you, most people in upstate eventually leave to go find the sun. So at 18, although I went to Michigan but my did my PhD at Davis, California, so I finally got to the sun, but then came back to Washington for many years. But yeah, upstate New York is still a phenomenal place and holds many memories.

Matt Hickey:

I still have family there.

Dr. Alan Rudolph:

Yeah, me too.

Matt Hickey:

I look forward to going back, but I don't stay long. I have to confess. So I think I'm hooked on Colorado for sure. I want to just follow up on the academic end of the spectrum. As an undergrad, did you have a moment or a mentor that opened your eyes to the PhD thing, or was it always part of your plan, "I just know I want to do this?"

Dr. Alan Rudolph:

For me, it was always part of my plan. I mean, when you go to University of Michigan, it's a very big school. So there were mentors, but frankly the classes were so big unfortunately you don't remember all those. My inspirations came before that to drive into science. Now, in my PhD program, the mentors I had were already leaders in what was then not a very blossomed field of interdisciplinary work, right? So that had both good and bad sides, because you're publishing and you're trying to convince the reviewers who aren't interdisciplinary. But yeah, the inspiration for me in science as a PhD student came from my mentors in the PhD, which were also a married couple, which if you've ever worked for a married couple in a research lab, that has a set of interesting dynamics as well.

Matt Hickey:

I suspect it does.

Avery Martin:

I'm sure.

Matt Hickey:

So tell us what your dissertation focused on. Again, we've got grad students listening.

Dr. Alan Rudolph:

Yeah, so it focused on soil invertebrates that completely dried out, and we discovered a new sugar trehalulose, which is a disaccharide that has unusual properties. It essentially allows you to replace water, and it fits in as a sugar and bonds to surfaces where water normally bonds. So what happens when things dry out is membranes fall apart, and of course membranes are the barrier that keeps life intact, the cell, right? In the absence of water, those membranes fall apart, but in the presence of trehalulose and other sugars, that organism's small, survive complete dehydration. I mean, you can take these organisms and you can't measure any water at all. But you add water back and they resume life. And one of the more startling demonstrations during my PhD was we put some of the... I was working on soil dwelling nematodes, which are small worms. You could put them into an electron microscope, which is a very harsh environment, it's got an x-ray beam and low vacuum, take them out of the microscope and rehydrate them, and they would come back to life.

So there's always these interesting theories still.Did these come from the cosmos, right? In other words, they're able to survive cosmos-like. So that was my PhD, was life without water. How did biology adapt to life without water? Plant seeds are like that too. But yeah, so that was a really fascinating start to science, because there's so many aspects of things you can answer around that question.

Matt Hickey:

I have to ask you a contemporary question. We think life without water and we think manned missions to Mars and what have you, right? Things come and... Not that it ever went away, but it's front and center almost, right? And so are there lessons from your dissertation just a couple years ago that we might be able to translate into-

Dr. Alan Rudolph:

Well, it's funny. When I left my dissertation, I actually took the lessons learned and set out on a translational career with those principles. So I left my PhD, became a national research council postdoc, and I was assigned to the Naval Research Lab, which is the first national lab in the United States founded by Thomas Edison in 1916. And they hired me to freeze dry blood. Because working for the Department of Defense, especially on the medical side, obviously blood is one of the things that they use a lot. And if you think about it, blood is an interesting substance. We still collect it from each other. We can't even make it in the lab yet. But we can't store it for more than a month in the fridge before we have to toss it out, and platelets, which are things that stop bleeding even less. So I was hired there to take the principles of trehalulose and from nature and apply them to a labile system, in this case a membrane called the liposome that encapsulated hemoglobin, which is the protein that carries oxygen.

So a simple system, but modeled essentially on how nature survived dehydration. And that began a whole career that I would still reflect on today in even in my current role of being inspired by evolution in nature and design principles from zoology and put them into practice, scale them. And that usually involves engineering of some kind, but the bio-inspired engineering bug came early from that kind of work.

Matt Hickey:

Yeah. It seems to me there's this central element of how systems or organisms adapt to environmental extremes. It's always been an interesting question to me, and relates back to your diving days. And if we get somebody planted on Mars, they're going to have those very same questions, obviously. So you had an interesting pathway. I'll remind you and disclose to others, I was on the search committee when Alan was hired, and so I've appreciated I got to look at his CV before I met him, these sorts of things. Talk to us a little bit about, we have the pathway that's still DOD related, the DARPA work, but you have an entrepreneurial spirit as well and I'm interested in hearing a little bit about both.

Dr. Alan Rudolph:

Yeah. So I got an MBA mid-career. Actually the Navy, the Thomas Edison program, sent me on to get an MBA. So the Navy funded my MBA. And actually I was motivated to get that degree because I had worked on this blood project for almost a decade I was at the Naval Research Lab, and they wanted a product. They wanted to scale this thing. So I was interested and started down the path of how we get this into human clinical trials, right? And so we did all the preclinical work, wrote the applications for human clinical studies, and the Navy decided to shelve the project for the Army's solution, which was cross-linked hemoglobin. So instead of putting it inside of a cellular envelope, like nature does in a red blood cell, the other alternative. And this is late '80s, early '90s, so we're dealing with HIV. There was a real motivation to get a blood substitute out there, a stable one maybe that could be freeze-dried. They were cross-linking hemoglobin.

So I lost a race to get something developed, and so that further motivated me to understand, well, was it because I didn't articulate the business plan well enough? So went off to business school. In the meantime, I was recruited by DARPA. So I had a seven or eight year intermittent path, which there's some very interesting stories in there I'll come back to. But to answer your question about entrepreneurial, I left DARPA in 2003 and started a company that is freeze drying platelets that is still in Rockville, Maryland called Cellphire, and it's now in phase two clinical trials. So it's 20 years since that company started, showing you how long it takes to get something... After getting my MBA in '96, I was just going to DARPA, and so I went to DARPA. That was really a valuable experience, because with DARPA I was actually able to seed new ideas, but also new companies. So I got to observe how do you do this? I had least the title MBA that said, "You should know how to do this." But yeah, in 2003, started that company, went out and raised venture capital.

Matt Hickey:

For our listeners, because I often take for granted our acronyms that are so common to us, tell our listeners what DARPA stands for.

Dr. Alan Rudolph:

Oh yeah. DARPA stands for the Defense Advanced Research Projects Agency. It was an agency started in 1958 when Sputnik went up, which was the Russians' first space flight into orbit. And frankly, we were surprised, technologically. No cell phones. All we knew, all of a sudden the Russians are up in space. So Eisenhower started an agency whose mission today is still the mission it was then, avoid technological surprise. And so I was the first zoologist they ever hired. In fact, they didn't really know what this was. We had directors that would get up in audiences, and sometimes important people were there, and say, "We even have a zookeeper." But that experience of taking an interdisciplinary life sciences experience into an agency like that, avoiding technological surprise, there are some amazing things that went on during that time, and it was really a valuable part of my career.

So yeah, went from this government lab into a government agency, and that transition also was a big one in my life because I left the bench after 10 years, a hundred papers, 15 patents. I'd really led a very large research group for a decade or more, and then decided I really was going to cross that line, leave the bench, and start to manage and invest in science, ideas, and people.

Matt Hickey:

Great. Now, one of the entrepreneurial pieces, if I'm remembering right, was linked to World Cup exercises, right? And so tell us more about this, because I thought that was pretty darn cool.

Dr. Alan Rudolph:

Well, yeah, when I got here, it was at the tail end of a era. So one of the programs that I started at DARPA just at the turn of the century was called brain-machine interfaces. The program really was based on a series of investments I started making for the government at DARPA in increasing the interface between the living and the non-living system, so could we collect more data at that interface? And neurons are a great place to do that, because 10 to the 11th neurons in the brain, and they're firing at millahertz frequencies. So tons and tons of data. But, as you may know, the ability to get that data, the Nobel Prize was given in the '90s around something called patch clamp, which is you take a single electrode and you stick it into a neuron and you measure the signals coming off of that. And in fact, many of the antidepressants are developed based on patch clamp measurements changed in a single neuron. And so we started investing in multi-electrode interfaces where you could now sample thousands, if not hundreds of thousands, of neurons.

You're still way off from 10 to the 11th, but you can then get interregions where there's codes. So we were very interested in the cortical region of the brain, which is very active in things like movement. And so we developed brain-machine interfaces with multi-electrode arrays, first demonstrating in animals that lost the ability to use their limbs that they could use cortical thought to drive peripheral devices like prosthetics. So we did this in rats and we did this in non-human primates, and then the World Cup was the first demonstration, although we didn't do it with an implant, we did it with an EEG, at a very visible site, obviously Sao Paulo, Brazil 2014 at the opening ceremony where we had a paraplegic kick the opening ball out onto the pitch to open the World Games strictly by using brain signals to send that signal down to a prosthetic set of legs, which kicked the ball out onto the field. So now this has grown, this field of brain-machine interfaces into other peripheral devices, like for blind people with glasses and on the retinal.

And so yeah, that was a great example of taking your skills of your training, applying them into a new area, which DARPA allows you to do. They bring people in and they ask you to go after a really hard problem and do it in ways that normally you're not able to do when you're at the bench. So we were able to invest in this and a few other areas that really were transformational.

Matt Hickey:

Now, I want to just take a moment to remind our listeners about the range of the imaginative work that we've talked about in the last 20 minutes, right? So we're talking about PhD work on soil-borne nematodes, carbohydrates that play the role of water in some ways to help organisms survive the absence of water, now to brain-machine interfaces that allow individuals who could not normally walk under their own control to control exoskeletons. So the most basic, in some ways, questions to some of the most important applied questions. But that's phenomenal. That range of work is really quite interesting, and I applaud you.

Dr. Alan Rudolph:

Yeah. You look back at some of this and you just say I was fortunate to be in that place at the right time and have the opportunity. When they bring a zookeeper into an agency like that, they turn a certain tune of lows, crazy things can happen. It really is gratifying to be involved in that mission oriented and science as well. I mean, I love the discovery stuff at the PhD side, but part of my 17 years with the DOD was protecting the lives of these people who quite frankly were taking their own life at risk for the benefits of the freedom that we often take for granted. So that was a compelling mission, and I think that's a very attractive thing that brought me to CSU as a land grant. I think mission oriented science is a very compelling thing to really drive people into.

Matt Hickey:

You've anticipated my next question. So I want to talk about this transition. How did the VPR job here get on your radar screen? What brought it to your attention? What appealed to you about the possibility to come to Fort Collins? If you knew about the climate, maybe that had something to do with it, but talk to us about the transition here.

Dr. Alan Rudolph:

Well the first thing I'd mention is my first trip to Fort Collins was in the '60s when I visited Will Schwartz, whose bust is over in Griffin Hall. Will Schwartz was on the faculty here for 55 years, I think. Maybe 58.

Matt Hickey:

That is remarkable.

Dr. Alan Rudolph:

And he was one of my favorite uncles. So Will was a violinist. He came out here from New York, a Long Island trained boy. And I think in 1949 you didn't come fly out for interviews, so I wonder whether he just got on the train and said, "Take me to Fort Collins." So I knew the community. Now, I also knew my own interests were always strongly based in rigorous science and rigorous discovery. Everything I've done has been based on an appreciation, if not a participation, in that. And so I knew at some point in my career I would be back touching that in newer ways. We're an interesting generation, right? Our parents had one job. And I think students today, they say the average student coming out of a campus will have 10 to 15 different jobs over the course of their career. I've had maybe five or six, but even those transitions were interesting and people were like, "Hm. What is he doing now?" So, knowing that I was going to be back in some way near science, the idea of coming back to the academy was very attractive.

I didn't know when I was going to do it, and in fact, the timing wasn't my choice, because I had 27 years in DC and that was long enough. Because I had great experiences there, but... And then this is also, I think, worth noting is that sometimes I was of that ilk to take jobs that probably in hindsight I probably shouldn't have taken. So I was elevated to running large agencies with lots of people management, and I discovered that either this wasn't for me or wasn't the right time, because frankly the last job I had was to run the country's biodefense program to prevent pandemics in 2013. And I've seen PowerPoint presentations of what we've lived through for the last three years for 25 years. And so those of us who have been working in this field, and many others, knew this was possible, but also from knowing what bad people were also thinking about in the Department of Defense, adversarially, that either was going to come through Mother Nature, and we still don't know about COVID, or was going to come through bad people doing bad things or accidents in labs.

But it was frustrating, because the country at that time wasn't prepared to proactively invest, and so I decided I'd had enough of big government. And so it was time for me and I started looking around. I think I got called up from CSU to say, "Would you be interested in applying for this job?"

Matt Hickey:

Was that Hank?

Dr. Alan Rudolph:

Yeah.

Matt Hickey:

Yeah? Okay.

Dr. Alan Rudolph:

It was Hank Gardner.

Matt Hickey:

So mutual friend Hank Gardner. He used to be in VPR office.

Dr. Alan Rudolph:

And Hank worked with me at DARPA when was a major up at the Army lab that he ran. So I knew Hank, and he said, "Would you be interested in this job?" I said, "I know Fort Collins. I'll throw my name in the hat." And the next thing you know, here I am.

Matt Hickey:

So you've been here for seven, eight-

Dr. Alan Rudolph:

Nine.

Matt Hickey:

Nine. Woof. Man. Time flies when you're having fun, huh?

Avery Martin:

Yes it does.

Matt Hickey:

Are there particular problems that you think CSU is well positioned to address as an institution in terms of our broad research agenda? I'm interested in your...

Dr. Alan Rudolph:

I absolutely do, and the more I time I've been here, the more you actually see that potential. It's driven at the heart by the culture, which is highly collaborative. And resource constrained environments often are that way. I mean, you put that kind of resource constraint over people and they will naturally come together, so there's a bit of that culture here. But the thing that CSU has been at for a long time that others don't appreciate is the interconnectedness of things in this world. Yes, we have narrow disciplines that we study and they're in colleges, but I think now there's a greater appreciation that you change one thing and there's a lot of other things that are going to happen. That ecosystem or system's view of the world is, I think, inherent in this culture, thinking about that. Not only because it's a mission-oriented practice, get the knowledge out into the community, make the community better, but that understanding of what the community is now isn't just about the people in their houses and the buildings. It's about the green space. It's about the nature around it, what's happening in the climate.

And so I really think that CSU is uniquely positioned in that ecosystem view of the world, and as such is uniquely positioned to present system solutions. There is no one thing that's going to solve the ills of our society. It's going to be a multi-dimensional approach, and people understand that system approach. And I think CSU is so well positioned for that.

Matt Hickey:

I agree. We can riff a little bit on Sue VandeWoude's visit in the spring. This one health perspective, I think it's one of those things you think, "Why weren't we always doing this in some ways," because, as you point out, we are nested within communities and environments that are impacted by presence or absence of water. We've gone through massive wildfires out here that don't just burn trees or people's homes. There's a long lasting knock on impact of those sorts of things, right? And so we have some neat opportunities. And we push the One Health from talking about it, which is important into translating it into action. I'm curious if you see from your perspective two areas where collaborative opportunities are not yet fully tapped. We can all get siloed and not realize that, hey, there's somebody in this college that's doing very similar things and if we could move the chess pieces and introduce some folks... It's always better organic, as we always know, but sometimes it's just the introduction and then get it out of the way. The jet fuel takes place and you got a new collaborative team going. I'm curious about your perspective.

Dr. Alan Rudolph:

No, I think are. The one that comes to mind is the mental health initiative that has risen as the silent pandemic behind the more overt pandemic. It's hard to tell. I think this has always been upon us. I think there's more visibility and talk about it. And it's in the backdrop of tragedy so close to home. And saying what I said before about the backdrop of fundamental discovery, the next decade between neuroscience and behavior, the convergence, is going to be phenomenal. So there's already an emerging field of social neuroscience. I mean, the work we do here, for example, between equine therapy or companion animal therapy, we already know there's a link-up of EEG signals between a human and an animal in that kind of relationship. So there are very fundamental things about mental health of an individual and social support groups that we are going to understand on an entirely different level in the next decade. I mean, I think it comes down to biomarkers, signals. It's going to be an interesting both soft and hard science journey.

And that really opens up some opportunities for us to come together and change what has been really hard to change. And what's interesting about my background is the Defense Department of 18 to 25 year olds enlisted has a very similar problem to the campuses across America because of the demographic, and to some extent the stresses of that demographic at a time where their brain's developing. So I really think that's a great example of something in front of us that if we got ourselves together, it touches every one of us in different ways, whether it's your personal family experience or knowing that on this campus in any one year there will be suicides that we have not prevented.

Matt Hickey:

Yeah, it's heartbreaking, isn't it? How can we be better upfront to that curve as opposed to being reactionary, right? We use the term resilience a lot, and I think the last three years I suspect taught more of us about moving that from the abstract to the very tangible, this notion of resilience, trying to get through life when we are circumscribed. We can't do the things we want to do. Travel was a problem, or maybe forced to work from home. I can, of course, recall our pandemic preparedness team, right? So getting together not in person, unfortunately, to do things like consider applications by PIs about can I go back into my lab? Right? I mean, just things we never would've anticipated in a million years. I'm wondering again if you have some perspective about what can we take about the lessons from our response to the pandemic, good things, but also we learned that we don't want to do that again, to inform our non-pandemic approach to the discovery process.

Dr. Alan Rudolph:

One thing I'd say about that, and I'm curious what your reaction is, in the response to the pandemic, do you think we moved faster?

Matt Hickey:

It's interesting you say that, because that's where I often go first. And I've talked to the other research associate deans about this that it seems to me that one of the lessons we learned is that we can be more nimble than we thought we were. And it's a large institution, let's be honest with one another. That is like trying to do a U-turn on the Queen Mary in some ways, right? But I think we prove that not to be universally the case. And so that flexibility, that nimbleness is something I hope we can perpetuate.

Dr. Alan Rudolph:

Yeah, me too. We were responsible for the initial response, because nobody knew anything. At least I had a lot of experience of what to do. So when I first said, "We're going to climb down 17 manholes and take wastewater three times a day," you can imagine what the administrations said. But to your point, we mobilized opening campus when we didn't have vaccines on the first year of COVID. We did 10,000 PCR tests in the week of opening campus, and we stood all that up in about a month. We had to, right? We had the virus gone to our head. But you wonder, if we got our resolve together to do something, we could make major lifts in short periods of time if we have the resolve.

Matt Hickey:

Indeed. And to do in a proactive way would be handy. I have to take a moment to call out Mark Zabel, of course, because he's a buddy. Mark was spearheading that effort to ramp up the saliva tests. And so Mark, if you're listening, we love you and thank you for a lot of hard work. I want ask your perspective on how we might think about pursuing non-traditional sources of support for our scholarship, not that we want to forget about the biggies, the NIHs, the NSFs, USDA, of course, and others. But I'm interested in your perspective on how PI's teams, et cetera, might broaden our scope for possible sources of support. This can be foundations, it can be philanthropy, et cetera. I'm interested in the VPR perspective on that.

Dr. Alan Rudolph:

So six years ago, in 2016, when Brett Anderson was the head of advancement, he and I established a new group to fundraise thematically around interdisciplinary themes. There were four people, we've had some attrition, but that fundraising group on a per person basis has come in second to CVMBS. Why? First of all, they're fundraising around some of the thematic institutes: Energy Institute, Infectious Disease Research Center. But they're thematic and they brought, as Energy Institute does or Infectious Disease, they bring multiple faculty across different departments in. So that opened our eyes to thematic fundraising. And this is a continual drum that we beat and believe that this is a route to non-traditional funding. Not only for those themes, but in areas that we haven't traditionally fundraised in those channels, like graduate fellowships. Because most of our advancement work has been on the undergraduate scholarship side. But as an example, because of the great work our faculty and staff students have done during COVID, we were able to go to the Onshoots Foundation and raise an equivalent gift to what Flint Cancer had been enjoying for the last few years in the translational medicine space.

And a good portion of that, I think 30 or 40% of that, went into graduate school scholarships. So the experiment of that interdisciplinary thematic fundraising group, and we're just now rehiring into it after attrition from COVID, taught me that there are some of these paths. Now, the challenge, of course, is a bit of a headwind to the way advancement proceeds on this campus, because it's within the colleges, and appropriately so, because a lot of it's through alumni of those colleges. I mean, the relationships, industries and those colleges, are built at the college level. And this is an area I think of opportunity for us to come together around themes and say, "There's more than one college doing this. Can we all come together?" And does that ask become different or bigger as a result of that?

Matt Hickey:

Yeah. And we'll continue the themes discussion, because of course the RFP for the new TUNEs program is thematic units of excellence. And would you talk a little bit about that? And I'm interested, because these PRSCs have been around for a long time, and when we say, "How do people respond to change," there's all kinds of cliches that follow immediately. But we've shifted from these programs of research and scholarly excellence to a new VPR funded initiative on thematic units of excellence. And again, I would be interested in your thoughts on that.

Dr. Alan Rudolph:

Yeah, so PRSC stands for Programmers of Research and Scholarly Excellence. It was a program launched in 1991. So 31 years later we're finally making a change. But it was a program launched-

Matt Hickey:

So much for our nimbleness, right?

Dr. Alan Rudolph:

A program launched by the state to the R1s across Colorado, so Mines and Boulder as well. They sunsetted the program soon after. I think five or six years after it was launched. And we retained it. So the new program, the Thematic Units of Excellence, after looking with many faculty, many open forum, is really an attempt, again, to recognize excellence. So Tune has the E in it for excellence. And it attempts to, I think, aggregate much into the thematic vein of are there themes, maybe fewer of them, three or four, that maybe multiple PRSCs will come into and form around. We've just gone through a very significant era of strategic planning on this campus where some of those themes emerged: climate mental health, sustainability. So we thought this was a natural convergence of time to say, "We've been waiting to sunset this program. The campus is talking about themes. Why not invest in a fewer number of these themes with more resources to elevate this excellence?"

And so another change that we brought is that excellence is not only us telling ourselves what we think we're good in, but what others tell us externally. So there will be external inputs into the proposals that come in around thematic units of excellence. But we're excited. I mean, I think it's an opportunity for us to come together and collaborate, much like we said we're good at, and see if we can identify two or these three of these things in the first cycle, and we'll do this every two or three years. Instead of having 25 PRSCs that are getting $20,000 each, we'll probably have three or four that are getting 400,000. And so we'll try that for a while. But with any change, it's influenced by environmental factors, so we'll have more open houses to explain the program, take some more feedback. The timeline on this is long enough that I think you're allowing for that adaptation. So proposals aren't due until the end of January, decisions won't be made until March, announced in April.

So we're going to take our time and we're going to listen and hopefully get some really good proposals and take turns, which is I think another thing hard to do in a constrained environment. Everybody's trying to get to the front to get their ask in place in a constrained environment. Coming together in these themes may allow us to go after some of those non-traditional sources of money.

Matt Hickey:

Yeah, or position teams for these larger center grants from NSF or NIH. It's funny to think of $400,000 as seed money, but in many ways it's meant to seed ongoing work and not be taken as a gift in perpetuity in some ways, right? Go and grow. And then we give other people an opportunity to do that. That's great. So I want to talk for a couple moments about what Alan does when he's not got his VPR hat on. So what do you enjoy, pursuits? And one of these we were just talking about as we walked over here, of course. Alan and I both like things with two wheels on them, right?

Dr. Alan Rudolph:

Yeah. One of the attractions of this area is a great cycling area. I am a big cyclist. I was fortunate. In one of those transitions between jobs I cycled across the country, and that was also a great experience, if anyone gets a chance to do that. It took me a month and a half, but yeah. I really find cycling to be very meditative, and I don't tend to dress in bright clothes and get in packs like Pelotons, but I'm more of the Forrest Gumpian type rider who's out there, "Better turnaround now." And then music. My roots here in Fort Collins started with music, and I took back up music when I got here, and that's another great salve. I live down in Loveland, and I purposely pick that area so it's about 20 miles from campus. So if there's enough sunlight, I can usually commute up here. Sometimes I come the back way in the morning and do the hills up the back of Horsetooth. And then, after a full day, I'm usually on the flats the way home.

Matt Hickey:

Get me home.

Dr. Alan Rudolph:

Exactly. With the wind behind me, hopefully.

Matt Hickey:

So I'm interested in your music. Do you play?

Dr. Alan Rudolph:

Yeah, I picked up guitar about six, seven years ago. Yeah, it's been a lot of fun. Will was a violinist and he had a violin built for me, but it became clear I wasn't going to... In fact, my violin teachers thought I should take up the clarinet.

Matt Hickey:

"I suggest you-"

Dr. Alan Rudolph:

And I fooled around a lot with stringed instruments. But yeah, no, I picked it back up when I got out here. It's a lot of fun.

Matt Hickey:

Good for you. So I'm going to flash back now to you're walking the hallowed halls of the University of Michigan Ann Arbor. Did you ever, in your wildest dreams, imagine doing what you're doing now?

Dr. Alan Rudolph:

No. And again, having been in the three stools of innovation, the academy, now having been in government and started my own companies and run a company for eight years, I'm extremely grateful for the experiences I've had. I think the interdisciplinarity around where I started was the key that allowed many of these doors to open.

Matt Hickey:

Yeah, interdisciplinary. Again, we talk about it can be a cliche, but it can be meaningful when it's actualized. So if you were able to go back in time and talk to Alan as an undergraduate in Ann Arbor, what advice would you give him?

Dr. Alan Rudolph:

Don't fear math.

Matt Hickey:

That's good advice.

Avery Martin:

That's great advice.

Dr. Alan Rudolph:

Yeah. Well, because I was a biologist and the biologists are far from the mathematicians in the grand scheme of science. But yeah, I think we're a data-driven society much more than when I started, and it was hard to see that then. I mean, literally. You and I started when the Apple II book came out, right? So I think that's the advice that I would've given myself. And that's why it's so gratifying to see data sciences blossoming on campuses like ours. These are really important skills. No matter what you do, you have to be able to understand how to store, manage, and analyze data.

Matt Hickey:

Make meaning of it, right? That's so important.

Avery Martin:

I'm curious as well, in the same vein of Matt's question, when thinking about science and research, say that there's a student or even someone who is approaching their second act who is completely intimidated by math and science. What would you tell them, and where would you advise them to start if they're inspired by your journey, which I certainly am? Where would you start?

Dr. Alan Rudolph:

The support around science is so multi-dimensional. It's not just students, but staff. And I'm thinking back in your question to my DARPA days, because managing science is an opportunity where I've seen many who don't want to do science, or have some fear of that process of taking an hypothesis, "Does it work? Will it fail," and getting involved with the production of science. I mean, science is a process. Yes, there is a scientist and the intellectual drive, but there are a lot of other things that have to happen for discoveries to make sense and make impact. There have to be good writers and there has to be people who understand how to move money and track money, so there's a financial underpinning to science. You don't get what you don't pay for, in some ways. So there are many ways to engage in and around science that allows you to absorb the more intellectual drive of, "Oh, I have to be the one who asks the important the scientific question." There are a lot of other things that contribute to the answer, and I think that's a door opening that students should know more about.

And they're actually now programs, masters in management of science and technology, and I think those are interesting skill sets, because I think it's underappreciated. Most PIs you'll talk to will think that they are the ones driving the enterprise. They're a big part of it, but there's a lot of other things that have to happen for success and for the excitement of science to be spread amongst people. And they can participate in many ways. And then there are some really fascinating things to pick up, like the VR initiative we started here was an opportunity to bring in people who particularly didn't care about the processor or what was in the headset or the actual responses of humans, which are now part of research in VR, but were, quite frankly, just artists or wanting to represent ideas in science in creative ways. And digital arts is a great example of that. I think there's crossover areas where science and humanities are now much better engaged, and I think that will draw on people who are afraid of the test tube but are more interested in the people who are pouring stuff into it.

Matt Hickey:

Another critical need is this public communication of science, right? We saw that certainly in the pandemic in terms of misinformation, misapprehension of what's going on. And that that's not new. It's a long-standing problem. If we can get people who are gifted communicators, may have no interest in a lab code or PPE on a regular basis or pipettes or whatever it might be... It's because it's so critical that we communicate not merely to our peers in technical journals, but to the public about the import of what we're doing, why does it matter, how might it impact you, why should we as taxpayers invest in it, these sorts of things. I think it's really essential.

Avery Martin:

Yeah. Summed up the mission of our podcast.

Matt Hickey:

Well said. But we're not done.

Avery Martin:

No we're not.

Matt Hickey:

I want to close with just one more question, and you've already alluded to this, so I'm really going to ask you just unpack some thoughts. We have this really unique opportunity to work together as faculty administrators at a land grant institution. One of the things I've loved about CSU for 25 years is that's not just lip service, right? That mission is front and center. So give us your perspective on the opportunity to work together at a land grant.

Dr. Alan Rudolph:

I couldn't agree more. I mean, my 17 years of civil service and the land grant mission are so close, right? I mean, this is almost like an extension of that part of my career. It is so mission oriented. I think that passion is more palpable here than in many other land grant institutions I've been in, and I think that's what we all appreciate. And so yeah, I really love that part of CSU. What's interesting about that is we have this thing called extension, which is also 106 years old or something like that, and that's such an interesting asset for us and yet it's an asset that's evolving constantly. And I think that's an opportunity. I think the intent of that asset is spot on. Get the knowledge out there, engage with your community, be listening to their problem so you can bring the problem back to solve, not always thinking you know their problems. How that works has been, I think, a really interesting part of my journey in a land grant institute.

I didn't know the extension system when I got here, and I'm not sure I know it really well now, because it's still a bit of a work in progress, things like role initiatives that we're doing. But I love the concept, and I think it's a concept that's going to hold in time just for that reason. And it's ours to pick up as part of this unique mission and say, "How do we do it better?" I mean, I know our faculty research staff, students love to publish papers. Many people in the community don't read those papers. The scientists read those papers, and that's an important thing for us. It's important accolades and recognition of excellence. But it's that community engaged piece, that extra step that I think our researchers take to say, "It's great. I published a paper, but what's going on in rural Colorado that makes a difference in my world?" And I think it's that mentality plus the asset of having a structure like extension and engagement and the passion that comes with a land grant institution that's so unique. And I think we'll stand the test of time.

Matt Hickey:

There are these county nodes of communication all over the state that we can, I think, take better advantage of to disseminate our work. That's great. Well, Alan, on behalf of the college, again, thanks so much for taking some time with us. Really enjoyed it. And not surprisingly, it was a blast, really. I had a lot of fun, so thank you.

Dr. Alan Rudolph:

My pleasure, and thanks for hosting me and having me. And thanks for doing this. I think it's a great asset for your college.

Avery Martin:

A lot of fun. Thanks for being here.

Dr. Alan Rudolph:

Sure.

Matt Hickey:

Another great interview is in the books. Thank you for listening to this episode of Health and Human Science Matters.

Avery Martin:

Stay tuned for the next episode. It's on the way. In the meantime, go listen to our episodes from seasons one and two. And if you want to learn more about our College of Health and Human Sciences at CSU, go to www.chhs.colostate.edu.