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Speaker 2: You're listening to Further Together, the ORAU podcast. Join Michael Holtz and his guests for conversations about all things ORAU. They'll talk about ORAU story history, our impact on an ever-changing world, our innovative scientific and technical solutions for our customers, and our commitment to the communities where we do business. Welcome to Further Together, the ORAU Podcast.

Michael Holtz: Happy Wednesday and welcome to another episode of Further Together, the ORAU podcast. My name is Michael Holtz, your host. And I am really excited today to be talking about one of our ORAU directed research and development program projects, that's ODRD for folks who've listened for a while. ODRD is our investment program that provides a path for funding, innovative research based approaches to solutions that capitalize on our core capabilities and the research interests of our member universities. And today, I have with me my friend, Julie Crumley, who has been on to talk about preparedness and other issues several times since we launched the podcast and her research partner, Dr. Tom Berg from the University of Tennessee. And we're going to talk about disaster planning and all of that fun stuff. I'm going to let Julie and Tom introduce themselves and then we'll get into the meat and the specifics of the project that we're working on. So Julie, if you'll go first, tell us a little bit about who you're.

Julie Crumley: Okay. So I'm Julie Crumley with ORAU and work within the public health and healthcare program area. I conduct different research and evaluation activities. And one of the areas that I conduct those activities in is in preparedness and response, public health preparedness and response specifically, and have been fortunate to work with Dr. Berg and collaborate on this new ODRD.

Michael Holtz: Awesome. Thanks Julie and Dr. Berg.

Tom Berg: Well, I want to say hello to everyone. My name is Tom Berg, and I'm at the University of Tennessee as Julie has said. And I have a long sorted history. Been at the university for a little over two years now. And I'm on the faculty in the College of Nursing and have a joint appointment in the College of Engineering and Industrial and Systems Engineering. As Julie was saying, we're working on this computer simulation project, which is a mashup of several different things that looks at disaster of preparedness and rural health. And that fits into sorts of things that I do. So my modeling and simulation background which is one of the things I do looks at complex high consequence environments, and seeing if you can actually build a computer model of that so you can do your planning and understand what the effects are and bring all kinds of data in. And so when Julie says, I don't know if that's right, we can go in and see. Well, what is right? What should it be? So that's a little bit about me.

Michael Holtz: Okay, excellent. And the work that you're doing together actually focuses on developing computer simulations to improve disaster planning in rural communities, which I have to assume is a tremendous need and sounds as a topic extremely interesting to me. So if you could talk about the work that you're doing, and I guess where you are in the process at this point. And I know that's a big open ended question, but just an overview of what's going on.

Tom Berg: So Michael you're absolutely right. Julie and I started talking about this, gosh, well, over a year ago. And one of the things that we were thinking about is, exactly as you are saying, Michael, disaster preparedness of course, is always an important area and very challenging. And rural health also, you stop to think about it and 20% of the US population lives in rural America, covers 97% of the land mass. So there's a bunch of people living in wide open spaces and it's very hard to plan for rural health and disaster preparedness because of the unique characteristics of that population in that environment. So we all been in rural America, right? So there's frontier America, which has fast open spaces, and very little population, and challenging infrastructure. We've all been in rural Tennessee maybe and see very similar things but different, right? And we've probably all heard of challenges with healthcare in rural America, hospital closures, and socioeconomic and psychodynamic challenges of some areas of rural America, funding issues.

 And so what we were thinking is God, wouldn't it be great to do a mashup at those two things and see if we can really understand, can we build a computer surrogate, a computer simulation that looks at the two of those things, so we can better understand what the relationships are and do better planning, as Julie said.

Michael Holtz: Gotcha. That makes sense. So basically that's the question that we're trying to answer is, can we create a computer simulation that makes disaster planning better, improves disaster planning for rural America?

Tom Berg: Yeah. And what the effects are. So there's this loop, right? Can you do planning? What's a planning effect on the response of the healthcare system in rural area? And then use that to inform what the plan would be to see if it goes back. And the approach that we're using is, so we spent a lot of time between Julie and folks working with Julie and the folks working at UT is exploring what's already existed because we don't want to recreate anything.

Michael Holtz: Sure.

Tom Berg: So the bad news is not a lot of work's been done in this area. The good news is it's very ripe for a lot of work in this area. Some people have looked at certain portions of it, but one of the interesting challenges are how do you actually build this model? What is draft zero? What does draft zero look like? And it can be very well intentioned and want to make this model do everything, but I'll long be retired by the time that happens. And Julie's got a longer career than I do. She might even be retired by the time that happens.

Julie Crumley: Yes. Definitely.

Michael Holtz: So it sounds like there's definitely a long view at toward looking at how to make the improvements, how to fix the loop, so to speak in terms of what are the results, how does the infrastructure get improved, et cetera, et cetera.

Tom Berg: Yeah. So Julie is really good at helping us do this. So we're looking at all about implementation and what are the various phases. Because at the end of this project, we want to be able to demonstrate, can you in fact do this? And that's the open research question. Can you really do this? Can you build even a... I'll call it relatively simple model, which is we were working on it just a few seconds ago. Relatively simple model and get it to represent what you think it's going to do, and then start building more granularity into that.

Michael Holtz: Okay.

Tom Berg: So when we actually say, the resources change, what resources are we talking about? And as we get more sophistication actually identify specific resources, maybe unique to an environment in North Tennessee or rural Florida, or the Montana and someplace, they're all very different, right?

Michael Holtz: Right.

Tom Berg: And so how can you make it so that it actually fits all those areas? Big challenge, big challenges is there.

Michael Holtz: So I guess in terms of answering that question, what have you learned at this point? Was there an answer or is it still to be determined?

Tom Berg: So my view is that there's definitely an answer. A big part of the challenge is, what are the inputs to the model and what are the values of those inputs? So if you think of an equation, right? In equation, you have a bunch of variables in there. And up to this point, a lot of time asking ourselves, what are those things that decide whether or not you're prepared in deciding and that you can use to measure the response of a healthcare system. And you'll be interested in Julie's view on this. So it doesn't seem to be any one cohesive answer to that. There's a lot of information out there that's qualitative. Computer models don't like qualitative very much. They like numbers. So when you think of a spreadsheet or when you're doing turbo tax, the government doesn't ask you, so how do you feel about your income this year?

 It says, what was your income this year? Give us the numbers. So the model needs to do the same sort of thing. So where Julie and her guys have been really helpful is for us computer geeky people to translate that qualitative sort of thing into a... This is what that really means. And so when we let's just say that we increase communication on the disaster preparedness side, this is what the impact will be in terms of the response on the healthcare side. And it's, say that we have low, medium, high, and it's a factor of one, two or three, so that you put into your equation. And so there's a lot of subject matter expert input at this point, which is what ORAU is good at, that's helping inform the model in its various incarnations that it's taking.

Michael Holtz: Right. So Julie, to bring that question to you, I guess, how is it looking to have an answer and identify things? I mean, and I know just from our previous conversations, urban disaster planning and world disaster planning are far different in terms of the inputs that are available, in terms of resources in an urban setting versus rural. So, obviously a lot of that placed into it.

Julie Crumley: Yes. I'd say, an answer is still to be determined somewhat. I mean, we know that it is going to be a very... It's a complex issue with many different sectors involved who all bring their own experiences in history and operations to the table. So putting that together and demonstrating that using like a rural case example is a very thoughtful, thoughtful process. But I think we're trying to utilize a real live scenario, like a real case scenario example of area to test it out and do some more additional fine tuning. But I do think that this is totally doable. We are seeing some early good progress, I think. And it's just, you see things on the news around models predicting things and gaps existing here and there, and issues that may apply more to rural areas that aren't applying to urban areas and how that impacts people's health.

 And so, the intent is really to further down the road, improve outcomes, those outcomes. And every community does something different, so we think that narrowing it down to the rural area as well will be a useful way or is a thoughtful way to provide more value to the rural communities who have a very different experiences and like you said, resources.

Michael Holtz: Gotcha. I guess, not to put either of you on the spot, but is there a timeline? Is this research that you both see ongoing? I mean, I know, ODRD funding is sort of time being, but it sounds like this might be a research that's going to take a bit of time.

Julie Crumley: That's correct.

Tom Berg: Yeah. I agree totally with Julie. So the biggest problem I have working with Julie and Freddy is that they know too much. And there's just a lot of information. And the intent of a model is you try to keep it simple. This is not a simple problem.

Michael Holtz: Sure.

Tom Berg: And there's a lot of dynamics, a lot of things changing and going on that I think our initial attempt is going to take being approached to summarize some of that and generalize some of that. But I think, the real benefit is as we go forward towards more and more implementation and final utilization, it's going to take a while to take all that information and approaches and to condense that into a model.

Michael Holtz: And you want it to be a workable and working model so that is realistic, but also real. So you also can't rush the process, right?

Tom Berg: Yeah. Yeah. I mean the only benefit, well, I shouldn't say the only benefit. The benefit of this model is that, it's somebody can use it. And so you want the interface to be something that's structured enough. You don't have to have been a part of the research project for X number of years to understand what it's going to do.

Michael Holtz: Right.

Tom Berg: And so that's going to be part of the rubric for constructing this.

Michael Holtz: Okay.

Tom Berg: And makes it even more complicated, right? Because this is a complex problem and you're trying to make it simple for end users. So put that in error quotes. I think I use the word straightforward, straightforward for us users to understand. And Julie did a good job of it explaining different sorts of application areas. So playing in one area, they were going to have different things they're going to want to input versus another area. And how do we do that as part of the structure and make sure that the model is equally as accurate for those kinds of different applications?

Michael Holtz: Right. And wherever it's being implemented, right?

Tom Berg: Yeah.

Michael Holtz: So you talked a little bit about this, but how did you both come to be working on this project? I guess what's the background in terms of the partnership in working on this project?

Tom Berg: I know that because of my prior interactions with ORAU or you had the ODRD program. And I can't remember who reached out to who, but it was a while ago and we spent some time figuring out what the lightning rod would be that we'd be working on together.

Julie Crumley: It was sometime in like 2020, early fall or maybe summer, we have worked on this for a little bit prior to putting in together the proposal.

Michael Holtz: Okay.

Julie Crumley: Yeah. And honestly, whoever is responsible for this, I would like to thank. And because it has been fantastic working with Tom and his team. He is a great guy to work with, so knowledgeable and-

Tom Berg: So I'd like to get that bit, if I could record it and share it with my 19 year old daughter. Thank you for saying it. And I got to say, I love working with Julie. And I mentioned before, I think one of the funnest things is we're on these video calls and you ask a question, you make a statement, and she'll sit there and percolate on that. And you can see that she's thinking just based on her facial expressions. So it's a lot of fun. Everyone at ORAU has been very gracious, and understanding, and helpful. And also, like I said, tremendous insights it's that there's a wealth of information that goes on, that I hope we can capture some part of in this part of our interactions.

Michael Holtz: Awesome. That sounds great. It sounds like a perfect match, as we might say. And Tom, we can work on getting that little...

Tom Berg: Oh, thank you.

Michael Holtz: That little soundbite. You could put it as your ringtone on your phone.

Tom Berg: Yeah, there you go. That's a good idea.

Michael Holtz: So, I guess what happens next? Is there... I mean, obviously this is going to continue for a while. Is there publication, presentation, finding more funding to keep things going, all of the above?

Julie Crumley: Yes, yes, yes, yes.

Michael Holtz: Okay.

Julie Crumley: We are going to present the oral presentation, paper presentation, whatever you call that depending on your field at the Preparedness Summit in April, so in a couple months, to present where we are, and within the context of this is a whole of a system view, and taking that into account and seeing what happens there, and then certainly drafting manuscript to submit for publication, and as well as the drafting and seeking additional funding to get this model further down the road where we know that it needs to go but is not possible within a 12 month time period.

Michael Holtz: Gotcha. Okay, that makes perfect sense. Is there anything I haven't asked you that you want to make sure that folks understand about your research in this particular project?

Julie Crumley: Tom, I wanted to ask if you wanted to talk about the lab at all, but if not, it does not matter.

Tom Berg: No, no. Like I said, I started here a little over two years ago and one of the things that we're able to do is set up a, it's called the ASL, Advanced Systems Lab. And the name is descriptive, so it's about 2,500 square feet of computer lab space and data visualization. We have what we call the war room, which is just this bunch of whiteboards and computer or monitors, where you can sit down and bring in folks like Julie and Freddy and brainstorm about what's going on. And then the data visualization room is this big touch screen. And I need touch screens with a bunch of other monitors where you can do data visualizations, which is a big part of modeling. So it's one thing to look at the numbers fly by. It's another thing to actually do a visual representation of it.

 And then, part of what the labs intend to do is to use augmented reality and virtual reality, which is another way to do interaction. I don't know that it's directly applicable to the sorts of things we're doing right now, but when you get grad students and postdocs involved, they have a tendency to come up a really creative ways to do sorts of things.

Michael Holtz: Yeah.

Tom Berg: So that's the lab and it's intended to be an anchor point for doing this kind of work. So fortunately, ORAU is the inaugural project that we're working with, right?

Michael Holtz: Absolutely.

Tom Berg: So they're really the first ones that are really testing this out. So the only problem is with the current pandemic, it's been problematic to get all of us together down here-

Michael Holtz: Sure.

Tom Berg: ... between the restrictions of travel and interacting with each other. So hopefully sometimes soon, we'll actually be able to have a project party here.

Michael Holtz: Nice. I'm hearing that Bo and I need to make a field trip to the ASL and have someone.

Tom Berg: Absolutely. Yeah, especially if there's a UT game that we can pull in on satellite, seeing it on six different monitors would be nice.

Michael Holtz: I bet. Well, that sounds amazing.

Tom Berg: Not that we could do that thing using a project fund.

Michael Holtz: A university equipment. Right. Right. Right.

Tom Berg: Yeah, hypothetically speaking.

Michael Holtz: That's right. Exactly. It's possible.

Tom Berg: Yeah.

Michael Holtz: Well, thank you both so much. The lab sounds like an amazing place. And truly, I think at some point, we may need to follow Julie and come down and visit.

Tom Berg: We have a spare office for you all if you ever want to get offsite and not be bothered by the hassles of day to day work in your normal work environment.

Michael Holtz: That's sounds like a good plan. Thanks so much. Dr. Tom Berg, Dr. Julie Crumley, thank you so much for your time today and for talking to us about your great ODRD project. And I look forward to hearing what comes next with this project, and maybe we'll have you back.

Julie Crumley: Thank you.

Tom Berg: Thank you. I appreciate the opportunity.

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