Oklahoma Innovations Radio Show

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Guests: **Kelvin Droegemeir**, **John Snow**, **Shari Veil**, **Mark Leidner** – OU Weather Enterprise

[Music]

>> From the OCAST Radio Network, this is *Oklahoma Innovations*, a weekly science and technology radio magazine brought to you as a service of OCAST, the Oklahoma Center for the Advancement of Science and Technology. OCAST is the state's only agency whose sole focus is technology, its development, transfer, and commercialization. OCAST mission is to identify and fund promising research in technologies that allow Oklahoma to compete in a global market economy from our own backyard. This program features some of the state's most gifted and talented scientists, inventors, entrepreneurs, manufacturers, and business leaders who all have one common goal, developing technology-based economic growth for all Oklahomans. Now here are your hosts, Gary Owen and Steve Paris.

>> **Gary:** We are on the road this week and one of our favorite places to visit in Norman, Oklahoma and the National Weather Center, Steve.

>> **Steve:** Gosh, I like this place. It is a wonderful place and I tell you what if you have not been here, you need to find some excuse to come here to the National Weather Center. They have an observation deck, which we are not in today. We were going to be in that, but we will do that another time. But at any rate, this is one of those places where it is done right and we have got?

>> **Gary:** It is.

>> **Steve:** And we have a couple gentlemen we are going to introduce here in just a second, Kelvin Droegemeir is associate vice president for research, a Regent's professor of meteorology and he has got a lot of other titles. I am going to let him talk about those in just a minute. He also is involved in a company called Weather Decisions Technology Inc. located in Norman, Oklahoma and if we came to the Weather Center and didn't talk to Dean John Snow, we would just miss out, wouldn't we Dean Snow. With a name like that and you deal in weather, snow is not the main issue around here, around here it is usually spring time weather, although you are busy year around, but you have some things you are working on that we are going to hear about in just a minute. But before we go there, I think it is time for us to kind of get an overview of the National Weather Center and Kelvin, you have been involved in this pretty much since day one, have you not?

>> **Kelvin:** Well I have been here for almost 25 years actually and the program itself dates back to roughly 1960, so it is almost 50 years old and we are gearing up to celebrate our 50th anniversary and the program actually began here in the university with a program in the physics department actually, a meteorology program and then a couple years after that a major program, the federal government moved here and became what is called now the National Severe Storms laboratory and it has been onward and upward since then, huge growth over the years and we are a very large program now.

>> **Steve:** You know I think most Oklahomans have an understanding. They may not understand what is here, but they understand that this is a major center for dealing with weather issues, but

to bring it more kind of into the play where everybody understands just who you are, give us some of your background. What brought you here to Norman? What brought you into this field of endeavor and just tell us everything there is to know about Kelvin Droegemeir.

>> **Kelvin:** Well that would take about two minutes.

>> **Steve:** I don't think so.

>> **Kelvin:** All that is interesting, but actually I came here as an undergraduate student in the mid-70s from Kansas and at that time I knew the University of Oklahoma had a very strong and growing weather program and I actually came back on a faculty here in 1985. I was very privileged to have a faculty position and because this program clearly was on the move, it was a program that was growing and as you said the focus here in Oklahoma is largely around severe weather, but we do a lot of work actually in local climate change?

>> **Steve:** Sure.

>> **Kelvin:** even in urban meteorology now, but I came here because this was clearly the center of action and what has happened in the last 25 years that I have had the privilege to be here is that we have really grown all three legs of the stool, you might say. The academic program has grown, the federal government program has grown and now we have a very large grouping of private companies here on our research campus and that continues to grow as well.

>> **Steve:** And we are going to hear from one of those private sector companies in a later segment, so you have got a pretty interesting background coming from Kansas of all places. You know, I guess they have weather in Kansas.

>> **Kelvin:** They have some weather in Kansas occasionally.

>> **Steve:** Very good. Well let's introduce Dean John Snow. Dr. Snow you have been involved with this pretty much from the beginning too. Tell us a little bit about how you came to be involved in this you know you never really know quite, there are so many things involved here. I am going to call it the Weather Center. How is that?

>> **John:** The Weather Center is fine.

>> **Steve:** Okay. Tell us about your involvement.

>> **John:** I came here just about 16 years ago. Prior to that, I was a faculty member at Purdue University for just about 20 years. So I made a mid-career change to come to Oklahoma in large part because I saw a real opportunity here in the state to make a difference and I have not in the least been disappointed. There has just been, as Kelvin mentioned, real growth progress here. We have had, it has been a fortunate time in that we have had really great people to work with, President Boren at the University administration has been the right man at the right place, at the right time and has been very supportive of the weather enterprise here in Oklahoma. We have had remarkable students come, some of whom have stayed and as Kelvin mentioned helped start new companies here. So my 16 years here have been really a pleasure. I am the academic dean here, so once and awhile I have to have somebody on the carpet to discuss behavioral problems if you will, but by and large the challenges have been getting the National Weather Center built and growing the programs here.

>> **Steve:** You know there is so much that both of you gentleman have left out and we don't have time to talk about every bit of it, but if you look at the resumes or the vitas, you are looking

at several pages of directorships, of continued education. Dean Snow, something I would like to point out and this is a point of interest, you are a retired lieutenant colonel of the United States Army Reserve and you were involved in the first Gulf War, as we refer to it.

>> **John:** That is correct.

>> **Steve:** You did some things regarding weather over there, didn't you?

>> **John:** I certainly experienced a lot of it.

>> **Steve:** Okay [laughs]

>> **John:** Yes, I was commissioned when I got my undergraduate degree in 1968 and most Veteran's remember how long they were in. I was in 28 years, 1 month and 8 days before they retired me. As I got a little too old for the army, but no I did spend some time, about a year in the first Gulf War and experienced firsthand life in the desert, makes life in Oklahoma look really good.

>> **Steve:** Yes, I guess your involvement with the military didn't really involve weather as far as your education.

>> **John:** Yes and no, the Army actually is what made me a meteorologist. I was trained to be an electrical engineer and as I was finishing the officer basic course long ago, they decided to send me to Alaska to be responsible for weather radars.

>> **Steve:** Oh wow, that is fun.

>> **John:** And I wound up really enjoying that, so after I put in the first five years on active duty, I actually went back to school and got a Ph.D. in atmospheric science and have been doing that ever since.

>> **Steve:** What parts of Alaska?

>> **John:** A little place called Fort Greely, which is about 125 miles of gravel road outside of Fairbanks.

>> **Steve:** Okay. I note that here you have a professional interest in earth system science, the integration of the best available knowledge from the earth and life sciences to provide a holistic picture of how the world works. Talk a little bit about that.

>> **John:** Well earth system science is a concept that began forming in the late 1980s, we have come to know an awful lot about the parts of the world, but it has become clear that many of the problems that we face in trying to build a sustainable society, we have to integrate a lot of this knowledge to get a complete, as we say holistic picture, because traditional disciplines don't always address the questions of the day. We have to bring in geology. We have to bring in oceanography. We have to bring in atmospheric science. We have to bring in the life sciences to understand what is really going on and make wise decisions.

>> **Steve:** Very good. Kelvin, let's talk a little bit more about you, I gave you the little brief description of some of the things that you have done and been recognized for. The weather news chair and applied meteorology, the Roger and Sheri Tagen, Presidential Professor. You are a director of the Suzaki [assumed spelling] Institute, the University of Oklahoma. Wow, where does it end?

>> **Kelvin:** I wear a lot of hats, but let me tell you there is a lot of opportunity around here, as Dean Snow said President Boren has been supportive of our weather programs and really what we try to do is be as creative as we can to attack some of these problems that are of great societal relevance, predicting storms, predicting tornados, trying to reduce the loss of life associated with things like hurricanes. So it is one of those things you get up every day and you say boy I am getting paid to go to work, this really doesn't seem fair.

>> **Steve:** This is fun.

>> **Kelvin:** It is a lot of fun, but it is also very rewarding. At the end of the day, you feel that you are really making a difference in the world.

>> **Steve:** Well you mentioned hurricanes, we don't really have hurricanes in Oklahoma, at least only the remnants of them. But I think that kind of explains the purpose of this center, it is not just tornados, because we are in Oklahoma. It is all types of meteorological events.

>> **Kelvin:** That's right, in fact hurricanes are something that of course, they are a challenge to predict, especially the intensity and how they change intensity very quickly and some of the work we are doing here for severe thunderstorms in the Midwest actually is very applicable to hurricanes. In fact, we have been working on proposals to develop very large national centers for hurricanes in collaboration with some of our colleagues at the University of Miami and other places along the coastline.

>> **Steve:** Very good, so all roads lead to Oklahoma. I happen to occasionally on the national news, I hear this location referred to, not often, but on occasion as it relates to weather. Give us a kind of a feel for your take on what the rest of the world things about, is this where it all happens right here? I know it happens other places.

>> **Kelvin:** I think it is fair to say there are a lot of other centers of excellence in the US and around the world, but I think the thing that really sets Oklahoma apart and I am trying to do this with suited humility here is the fact that we have a very, very large academic program, one of the largest actually in the country. We also have a very substantial presence of private sector companies here that really there is no place like it in the country that has that amalgamation of about 12 different companies on our campus. And then we have a fairly large governmental presence which actually has some of the most elite forecasting facilities in the world. The National Storm Prediction Center that issues all the nation's tornado watches and severe thunder storm watches. Severe Storms laboratory, we were the first University in the entire country that had an operational National Weather Service office on our campus, so in many respects the pioneering spirit of Oklahoma is alive and well and we try to do things that are new and valuable.

>> **Steve:** Yes. I take it because of our central location when we are talking about issuing a, an alert or whatever in another part of the country, we are getting that information not from here, but from there, right.

>> **Kelvin:** Well we actually have sensors in space, ground based sensors, aircraft, airborne sensors that provide data basically 24 hours a day.

>> **Steve:** Really?

>> **Kelvin:** But the interesting thing is the severe storm prediction center here that is located in the National Weather Center building, it has a national jurisdiction, so a lot of people come to

know about Oklahoma and Norman, Oklahoma as the center of weather by hearing on the watches that are issued, the severe storm forecast center in Norman, Oklahoma has?

>> **Steve:** That's right.

>> **Kelvin:** So it is one of the best PR prospects we actually have and it is tremendous.

>> **Steve:** And that is what I was referring to earlier, I hear that on occasion and of course you know being in Oklahoma, it does make you somewhat proud of the fact that happens here. You mentioned private sector companies and we are going to interview a gentleman here in a little bit about that, but you mentioned 12, I believe you did, private sector companies. Let's talk just very briefly about how did the private sector get involved and this is mostly government funded, university funded and of course there is the private sector involved that is kind of, let's talk about that.

>> **Kelvin:** Right, ultimately at the end of the day, what we do in research and meteorology is actually to try to bring benefit to the public and of course the federal government has the responsibility for protecting lives and property, but it turns out that our economy in this country is highly exposed to damage and destruction due to weather and climate. It has been estimated between 20 and 40 percent of our ten trillion dollar economy is vulnerable. So a lot of the actual provisional information happens through the private sector and it is not just companies that do weather forecasting, it is actually trucking companies. It is federal express. It is even the commodities trading companies and markets that are weather sensitive. There is a huge amount of weather that plays into those and the private sector actually provides that information as well.

>> **Gary:** We are coming to you from the University of Oklahoma and the National Weather Center. We are talking about enterprise and weather and we have a lot more to discuss with more guests when we come back on the Science Radio Magazine *Oklahoma Innovations*. Don't go away.

[Music]

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>> **Gary:** Steve and I are coming to you from one of our favorite places to visit and that is the National Weather Center on the campus of the University of Oklahoma and of course we have been talking about the very facets of the weather center and one of the things we are going to talk

about this segment is enterprises in weather and we are going to be talking in just a moment with the weather center's involvement in Croatia, but Steve go ahead.

>> **Steve:** Before we do that Gary, I would like to ask both Calvin and Dean Snow about radar. We talk about radar all the time, most of us are familiar with it, at least from the level where we see it on television. We talk about Doppler radar and the different kinds of radar. I don't think many of us understand very well what it is, I am sure you gentlemen do. What is new in weather radar? Where are we going?

>> **Kelvin:** Weather radio as you say is really a premiere tool in terms of understanding the structure of storms and being at able to provide timely warnings and so on and here in Oklahoma we are really kind of at the center of the universe at the next generation radar systems that are being developed. We have got to primary projects under way. One is to be the successor of the so called Next Red program, which is 150 some radars around the country that really provide their National Weather Service radars and also the Air force. They provide all the key information, but there is another project that we have going here that is looking at developing very, very small radars to kind of fill the gaps where next read doesn't see. So those two big projects really are sort of multi-decadal projects that have tremendous implications for public sector enterprise, growth in the economic sectors of Oklahoma and we actually just put in commercial weather radar on our research campus.

>> **Steve:** Oh really.

>> **Kelvin:** Just off of highway 9, you drive by the weather center building and a lot of people see.

>> **Steve:** People see it.

>> **Kelvin:** People will see it. It has an OU logo on it, which we are very proud of.

>> **John:** That is right, the OU prime radar is what we call it.

>> **Steve:** Okay.

>> **John:** It is a state of the art radar manufactured by the Enterprise Electronics Corporation and it is part of a larger deal with EEC. We actually have an arrangement with them to do research and development work and this radar was designed primarily as an R&D tool. It is not an operational tool, like we would use for severe weather warning.

>> **Steve:** Sure.

>> **John:** But it will let us take apart and put more equipment in it, try out new ideas, as well as explore some of the clouds around here in great detail, because you are going to hear new words. You talked about Doppler radar.

>> **Steve:** It is kind of old technology.

>> **John:** it is kind of old technology. The new one is dual polarization.

>> **Steve:** Oh dual polarization.

>> **John:** So you are going to have dual polarization radars here for very long and they will tell us a lot more about rainfall.

>> **Steve:** I am going to drop that one on the coffee shop class here.

>> **John:** That is a perfectly good place to use that.

>> **Steve:** Where have you heard of that before. One quick thing and either one of you gentlemen or both may want to address this, I told you I wouldn't throw you any curves today. I am going to ask you something that is not on any, I keep hearing these wind generators, these wind farms that we have in Oklahoma and Texas and Kansas and different places and they are having an impact on our radar, ability to effectively use radar for weather.

>> **John:** Right.

>> **Steve:** What do you know about that?

>> **John:** That is a problem, the wind turbine and the blades, because they are moving, present a moving target and it confuses the technology that is in the radar to extract the weather signal. If you watch carefully sometimes, you can see places that are right over these wind farms that look like rain showers, because the radar is trying to interpret what is getting out of this and that is a very active area of research of trying to figure out what we call clutter filtering. In the past, we have just had to worry about tall objects like radio towers, which stay in one place.

>> **Steve:** They don't move around much.

>> **John:** But windmills inherently are a moving target and present a big engineering challenge. That is one of the things we are working with the federal government is ways of figuring out how to remove these sort of moving targets, because wind generators are going to be with us.

>> **Steve:** We are going to have those.

>> **John:** So we have to live with what is coming.

>> **Gary:** And is it because you have so many blades in one cluster like that, is that the problem?

>> **John:** Well it makes a bigger target, but just one will show up as a problem.

>> **Kelvin:** The fact that the part of the radar beam actually hits the blades and so it generates a signal and actually there is an implication of this for Homeland Security. There is a lot of concern that airplanes that are flying very low where people want to do bad things and dump bad stuff out of an airplane could actually fly underneath in this clutter region and actually be undetected by the traditional FAA radar. So the Department of Homeland Security is very, very interested in solving this problem.

>> **Steve:** We need to solve that technology fast.

>> **Kelvin:** Absolutely.

>> **Steve:** Okay, very good. I want to shift gears just a minute here. Dean Snow, you have involved with the nation of Croatia. And it involves weather and we are sitting here in Norman, Oklahoma and we are thinking what in the world is going on, half way around the world, maybe it is a third of the way.

>> **John:** A third of the way.

>> **Steve:** And you have been over there, talk to us about the project.

>> **John:** Part of the dean job these days is economic development and as Kelvin has pointed out, we have had quite a bit of local economic growth, but our horizons are actually international and we were very pleased about 18 months ago to be approached by the government of the

public of Croatia to help them develop a plan for modernizing their weather service. Now Croatia is a company about the size of Oklahoma, although it is a very different shape. They have their own weather problems. They have identified us as a leading center which had the expertise to help them develop a plan for modernization. The US Trade and Development Administration actually paid for the study, we had probably 15 people at OU at various times from July of 2008 to July of 2009 go and visit Croatia, very hard duty by the way to work with them. And then we submitted a plan at the end of July of this year for modernizing their weather service over the next five years. It will make them, assuming they are able to carry out that plan, the premier weather service in that part of the world. >Steve: Wow.

>> **John:** They have some really good people, a very nice country to work in and some real opportunity to move ahead.

>> **Steve:** Now this sounds like a model that is scalable that you can use to take to other maybe other countries.

>> **John:** That is exactly right, now every country is different and has different challenges, but we have actually had discussions with Vietnam. We are working now with Korea, South Korea. We have had discussions with Indonesia and most recently with Guatemala, all of whom are looking at trying to modernize their national environmental monitoring systems.

>> **Steve:** In the case of all roads lead to Norman, Oklahoma.

>> **John:** All roads lead to Rome, all roads lead to Norman.

>> **Gary:** Guys, we need to take a little break here. When we come back, we are going to be talking with the coordinator director, the coordinating director of the Center for Risk and Crisis Management of the University of Oklahoma, when we return on your science radio magazine, *Oklahoma Innovations*.

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[Music]

>> **Gary:** Steve and I are coming to you from the University of Oklahoma. We are visiting the weather center here this week and we have a guest this segment that you may ask well what does this have to do with weather. Well if you think about a crisis when it comes to tornados, hurricanes and those kinds of things, our guest is Shari Veil. She is the coordinating director for the Center for Risk and Crisis Management at the University of Oklahoma and she basically teaches crisis communication and public relations. And now I think you quickly got that connection Steve.

>> **Steve:** That is right, Dr. Veil has a good background in journalism and she has her students involved in separate projects, but also projects here at the weather center. And you are sitting out there listening, the Center for Risk and Crisis Management, what in the world is that all about and I bet you can tell us?

>> **Shari:** The Center for Risk and Crisis Management was developed to bridge research, bridge education across different disciplines to be able to better understand risk and crisis. They aren't located in one area if you think of even weather risks. Well yes, weather is of course involved in meteorology, it is involved, but you also have the social impacts of weather. That is the political science ramifications, what happens as far as communicating warning systems to other individuals, geographically located risks, how does that change our perception of risk, how does that change how we respond to risk. So the idea behind the risk center was to bridge all of these different areas of research, so that we could tackle risks from multiple disciplines at one time.

>> **Steve:** Very good, one has got to look at the Katrina situation in New Orleans to understand just how things can go awry very quickly. Things become somewhat unmanageable at times, because of natural prices and we have on a much smaller scale, I guess we have that happen in Oklahoma, the picture tornado. And we could probably list scores of tornados in Oklahoma over the years that have created a crisis that needs to be managed for the people's sake for safety and other reasons. How difficult is it to train students to understand that?

>> **Shari:** Actually, it is not as difficult as you would think.

>> **Steve:** Really.

>> **Shari:** Especially the students that are coming up right now, they are in that generation. They have seen 9/11 has always been a part of their strong memories. You have Hurricane Katrina that has become a part of their memory system. They have been involved in multiple wars as far as what they have in their memory. So they always felt this little bit of insecurity, so the idea of risk and crisis is pretty common to what they see every day and even on the news, the 24 hour news that we have now. We were talking a moment ago about social media, everything is everywhere.

So you are bombarded with all of these messages of organizational crises, natural disasters, not only within your local community to around the world. So they know a lot about it.

>> **Gary:** And part of your conditioning with these students, don't you do some scenarios where you put the students in those kinds of situations and have them like re-enact it, right?

>> **Shari:** I do, I teach both crisis communication and public relations classes and they will work with clients throughout the semester on the public relations side and then they also come in and they are given a scenario at the end of the class period one day and they come back the next day and they walk into the classroom and they don't know it and I don't know how they don't know it, because everyone has gone through this class before them, but it is this little kept secret, but they walk in the door and the journalism students are waiting for them with cameras blazing and microphones in their faces, so that they have to respond to the crisis right then.

>> **Gary:** That is great.

>> **Steve:** It is the ambush.

>> **Shari:** That is exactly it.

>> **Steve:** We think about this and we say well that doesn't really matter to me. It really does, because maybe you have relatives in a location that has been hit by a tornado or have relatives in a place that has been hit by a hurricane. And you know if you don't have communications, you can go for days and weeks, maybe even months and not know where these people are and that is just one aspect of it. We need to know what is going on, so that we can properly respond with accurate information.

>> **Shari:** And you also have the communication that goes out before a crisis when you are dealing with a risk situation. A project we are working on right now is trying to communicate preparedness. Chris Fugate from FEMA testified before Congress saying the number one failure with FEMA has been not promoting preparedness within communities. So whether or not you have an emergency preparedness kit in your home that includes enough food, water, clothing, cash, basic essentials to get you through at least 72 hours if the response system isn't in place because of a major disaster. And we aren't prepared and campaigns go out and we are looking at risk assessment, how do you understand risk, what is your perception of the risk that you face every day and how many people actually have a kit, I believe it was less than 40 percent of Americans have any kind of basic essentials that could last them through at least three days.

>> **Steve:** What if your ATM is shut down, because a storm took it out. Where are you going to get your money to go buy your food, if you haven't prepared already. Now the students that you are training, they go through this program, what kind of jobs can they expect to get?

>> **Shari:** The students that I have in the classroom right now are mostly public relation students, the undergrad students. I also have Masters and Ph.D. students that are looking at research opportunities in academia as well, but we also have another program that will actually be launched here, we are looking at probably in the spring. And this is a graduate certificate in Risk and Crisis Management. It is designed for individuals who are already working full time and that is the biggest concern that the majority of the individuals who are now in charge of risk and crisis management within their organization.

>> **Steve:** Haven't been trained?

>> **Shari:** Do not have training. It hasn't been part of the educational system, so they don't have the background. They don't have the training. It is just suddenly a part of their job. So we actually built this program around individuals who would be working full time.

>> **Steve:** You said a certificate, is that a degree program?

>> **Shari:** It is a graduate certificate, so it is past their undergrad, but it is not a Master's degree. One thing with the graduate certificate, it is a very nice add on to a graduate degree, so you can get an MBA and a graduate certificate in Risk and Crisis Management. You could get a Masters in Education and a graduate certificate in Risk and Crisis Management.

>> **Steve:** You know something we mentioned here, the Center for Risk and Crisis Management is a research center, can you talk about that?

>> **Shari:** Definitely, what I was just mentioning with preparedness is what is going on right now, finding out who is prepared, how do you determine how to communicate preparedness with individuals, how assailant are these different risks to individuals and then how do you get them to actually act. There has to be research behind all of these different elements and I am definitely not alone on the center. I am coordinating director, but we also have individuals like I said from political science. We have an individual that works here at the National Severe Storms laboratory. We have a meteorology faculty member, geography is involved as well, so there is research going on in all different areas, not just related to weather. So nuclear power I know is one of the areas that the political scientist, Hank Jenkins Smith is involved in.

>> **Steve:** Interesting, I assume the crisis would be like Three Mile Island or something like that and teach people how to deal with situations.

>> **Shari:** Definitely and just communicating the risks that are inherent to those different areas.

>> **Steve:** Let me ask everyone to get a pencil and paper handy or pen and paper, we have some contact information here for you. And Shari is saying what is he talking about, well this graduate certificate in Risk and Crisis Management, it is an accelerated program. 15 hours, it hasn't started yet, but possibly spring of 2010.

>> **Shari:** Yes, we are actually putting together the list right now of the first cohort that would go through, the first class is Risk Assessment and that is going through figuring out your business process analysis, impact analysis, crisis communication, a lot of what I discussed already and then risk and crisis management. You can tailor it to your background.

>> **Steve:** Now if you are interested in this program, they need to contact you.

>> **Shari:** Yes.

>> **Steve:** What would be the best way, the telephone number or email?

>> **Shari:** Email.

>> **Steve:** Email address, I am going to give it to you. It is Shari, s-h-a-r-i, dot Veil, that is v-e-i-l at OU.edu. shari.veil@OU.edu and if you are interested in starting possibly in the spring on this new program, this new certificate that is being made available, you can contact Shari at that email address and the future will be yours, right?

>> **Shari:** Yes.

>> **Steve:** You know one of the things we didn't do when we first brought you on is we didn't ask you so much about your background, what brought you to this field of endeavor, home town, those kind of things?

>> **Shari:** Alright, I am originally from North Dakota. Actually, I got my Ph.D. at North Dakota State University and my research there was funded by the National Center for Food Protection and Defense, which is a Homeland Security Center of Excellence and my dissertation was fully funded through them and another grant through the Department of Agriculture, so I came in looking at risk and crisis communication from the area of food safety.

>> **Steve:** That is important.

>> **Shari:** And when I came here to Oklahoma, I looked at the opportunities that are available and of course, weather is a major risk and a major opportunity as well, here on campus.

>> **Steve:** You have weather in North Dakota, don't you?

>> **Shari:** Actually that was very interesting this last year with the flood and looking at again Hurricane Mountain, who was involved sand bagging and who was told to stop and evacuate and the city manager said no.

>> **Steve:** How can that be?

>> **Shari:** The volunteers came out, they said there wouldn't be anyone left to save the city if people were gone, so they stayed on, they sandbagged and they?

>> **Steve:** So was the decision the right one?

>> **Shari:** In this case, it was, they were able to, there was one break I believe that took out some homes, but for the most part they were able to save everything within the city.

>> **Steve:** Yes, I wouldn't want to play poker with that City Manager. That guy is into risk that is amazing. It was a wonderful story.

>> **Shari:** It is a different aspect though, just the culture if you get it done, everyone comes out to help. It doesn't matter who you are. Some of the research that was coming out of there was looking at a neurosurgeon right beside a homeless individual that were sandbagging on the exact same line.

>> **Steve:** Very good.

>> **Shari:** We all come together in communities.

>> **Gary:** We have to take a break, Shari thank you so much for enlightening us on your program here at OU. When we come back, we are going to be talking about atmospheric and environmental research on *Oklahoma Innovations*.

[Music]

>> This is *Oklahoma Innovations* on the OCAST Radio Network.

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[Music]

>> **Gary:** When you think about weather, you don't usually think about enterprise and private sector, most people think about, most people if you are here in Oklahoma, particularly you worry about what is the weather going to do. We don't think about the integration between business and weather and that is what we are going to talk about this segment. Our guest is Mike Leidner. He is a staff scientist in the Data Services and Atmospheric and Environmental Research.

>> **Steve:** How about our friend Mark Leidner.

>> **Gary:** What did I say Mike? It came out Mike, sorry I meant Mark, anyway.

>> **Steve:** We all know Mark, he is staff scientist, Atmospheric and Environmental Research Inc and he is a native of Pennsylvania, but he is here in Oklahoma now. You know Mark, you have a unique perspective of weather and business and what it means for us, but before we get into that, we need to know who you are. How you came to be in this field, some of your background, tell us about that.

>> **Mark:** I began at M Life as an engineer in metallurgy, but then I decided a career with another M which is meteorology and I went back to grad school and got a degree in meteorology from Penn State and I have been working at AER since. I am in my 14th year there.

>> **Steve:** Okay you got started on the ground floor it sounds like.

>> **Mark:** Pretty much.

>> **Steve:** Now your duties as a staff scientist, what all is involved there?

>> **Mark:** I support a variety of projects inside of AER. AER is about 120 people, heavily loaded with science degrees, Master's degrees, Ph.D.'s in physics and chemistry and meteorology. And my role is to support the various projects in the company, these support private sector companies. They support the military. They support international projects of various sorts, but our goal is really to provide the very best of meteorological research to solve practical problems in the real world.

>> **Steve:** Very good, now it is real easy to say okay, you have a collaboration going on here with a private sector company, your company with the University of Oklahoma and all that that involves, but I think all of us can have that concept, but we really don't know what it means. Talk to us about the interaction between you and the weather center here and how that came to be and how it works.

>> **Mark:** The interaction between AER and the weather center here really had its genesis in 2004 when AER decided it would be good to have a strategic kind of alignment with a big university that has a meteorology program and so the search was on and Oklahoma won out in the end and in early 2006, I came here with my family to be that liaison between the research and the government programs that go on here at the University of Oklahoma and AER's research

portfolio and the idea is to put these two organizations next to each other and say where are their complimentary areas of expertise. What are projects that we could work on together and go out and win together and work on together as a team? So that was the genesis of the idea and here I am.

>> **Steve:** I know coming from the private sector, there are challenges as you deal with the government involvement with this and the university involvement in it, but it seems to be working well. What kind of challenges did you have when you first got involved with it?

>> **Mark:** Yes, there are certainly ongoing challenges in fact. Some of it centers around who owns the information when you are done having a partnership.

>> **Steve:** Oh yeah.

>> **Mark:** Right.

>> **Steve:** There you go.

>> **Mark:** What is mine, what is yours? How do we share it?

>> **Steve:** How is that determined, with lawyers?

>> **Mark:** Yes.

>> **Steve:** I knew they would get involved at some point.

>> **Mark:** They get involved in that part of it yes and part of it is another challenge is lining up strategic visions, you know. We would like to go in one direction and the university or government lab might be looking at another direction and how do you find a common focal point for both of you to work towards, so those are some of the challenges that we really run into.

>> **Steve:** So you have touched on this a little bit, but let's go a little deeper into it. Atmospheric and Environmental Research, AER, Inc, you know if I were a customer, I guess maybe what would I look like as a customer of AER. Describe some of the customers, maybe without naming them, because that is probably proprietary, but give us an idea of the kind of services you provide.

>> **Mark:** Sure, for example, the Air Force actually has been a long time customer of ours. AER is 33 years old.

>> **Steve:** You can name them.

>> **Mark:** Oh I can name them.

>> **Steve:** [Laughs] They are ours.

>> **Mark:** The Air Force is one of our long term customers and we support them on many levels through research programs all the way through actual operational programs. For example, we provide a flight simulation for F15 pilots that allows them to fly their mission and see exactly what their sensors will be showing them before they go and fly it.

>> **Steve:** Really?

>> **Mark:** And we provide the infrared sensor technology and then replicate that and turn that into a heads up display that they can view before they fly their mission. Other customers, we do quite a bit of work with NASA and the National Science Foundation doing basic research on

earth system science, oceans, atmosphere, space, weather. And then we have a number of private company clients as well, who look to us for our expertise in satellite remote sensing.

>> **Steve:** Sure. I don't want to get into the argument of global warming, because there is so many different views on that, but are you all as you go about your business serving your customers, are you detecting any types of differences that are a little abnormal, without being specific, because I know that is proprietary too, but are the oceans getting warmer, are they getting colder or does it not matter?

>> **Mark:** Sure there are trends that indicate a warming world and in fact we have had a number of clients who have come to us to find an unbiased voice. There are voices in the scientific community that give off one view of global warming and then there are those in other communities, who say it is a hoax and there is no way it is happening.

>> **Steve:** Sure.

>> **Mark:** So we in fact have gathered quite a bit of information and have looked at that very question and there is a preponderance of evidence that the world is warming, is warmer than it has been, but as to its exact causes and the consequences downstream, there is a real lively debate about that.

>> **Gary:** Sure that is pretty much the core argument, what is causing it?

>> **Mark:** Yes that is right that is the core argument.

>> **Steve:** Whether it is occurring naturally or is manmade or whatever and of course on *Oklahoma Innovations* we have no opinion on that.

>> **Gary:** That's right.

>> **Steve:** Be aware of that and give us an example as you deal with your customers, I am looking at a list here, all kinds of issues come out of the [inaudible], risk transferred as relates to hurricanes and insurers and re-insurers. Okay you think ,why would insurance? Well obviously, if they have all of this property covered with insurance, there is an impact there. They need to know. They need to know what they need to do as far as adapting to that and then you have space, weather as you mentioned, the retail supply. It just covers everything, doesn't it?

>> **Mark:** Yes, Kelvin earlier quoted the amount of US economy that is impacted by weather and it is in the tens of billions of dollars.

>> **Steve:** Exactly.

>> **Mark:** Annually. One of the examples of ways that we support our customers, we have a line of products that give weather forecasts all the way from tomorrow and the next day out to 9 months ahead.

>> **Steve:** Oh okay.

>> **Mark:** And we have customers who use that daily to try to position themselves, let's say someone is a natural gas trader and they need to decide if a given heat wave is going to be landing on the east coast. Do they need to buy their natural gas today to help run the generators to make the electricity to keep everybody in a non-browned out condition.

>> **Steve:** Keep everybody cool.

>> **Mark:** Keep everybody cool and comfy or should they wait on that purchase and so the weather really has to do with timing issues for these various customers we have.

>> **Steve:** So you do have customers in the natural gas business and of course that is a major industry in Oklahoma. And gas is pretty cheap right now.

>> **Mark:** It is falling a lot, it has rebounded in the last six months, but it is still very cheap historically.

>> **Steve:** You bet, okay. Where do you see your business going down the road, I mean obviously this is going to be costly changing due to technology, increased technology and increased knowledge. Give us an idea of where you think your company is going to be five, ten years down the road. And this is not a small company, right?

>> **Mark:** No, this is 120 people and we have been around for 30 years.

>> **Steve:** And that is AER total?

>> **Mark:** AER total, so as far as the future, I would say climates risk assessment is really very high on our list as it is high on many businesses list, you know. What does a sea level rise of two feet mean?

>> **Steve:** Oh my.

>> **Mark:** Globally over the next 40 years. Also assessment of weather risk in real time, in other words, how likely is it that the temperature is going to crest 100 degrees tomorrow, give me some kind of the probability of that. Don't just tell me 100 degrees, give me some measure of the risk if I bet on that or don't bet on that. So the core of where we want to go is still accessing risk and uncertainty with regard to weather and climate. We have a big underpinning of basic research that keeps AER's science at the leading edge, but it really is about assessing the risk and uncertainty.

>> **Steve:** So you are one of those companies that operates under the theory that knowledge is power, right?

>> **Mark:** Knowledge is absolutely power.

>> **Steve:** You bet and that is your stock and trade and why other companies come to you for information.

>> **Mark:** Yes.

>> **Steve:** The product you sell, how would you describe it, information?

>> **Mark:** Yes, it is an information tool, it helps you assess the weather risk to any number of businesses.

>> **Steve:** Well Gary, I am always fascinated.

>> **Gary:** This whole show has been fascinating. How all weather relates to all these connections is amazing. We are out of time guys. Mark, thank you so much for being our guest on this last segment and we have had a good time here at the weather center. We will talk to you next week on your science radio magazine, *Oklahoma Innovations*. Have a good week.

[Music]

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