

Oklahoma Innovations Radio Show

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Guests: Peter Bale, Association for Unmanned Vehicle Systems International (AUVSI); James Grimsley, Design Intelligence Incorporated (DII); Lindsay Voss, AUVSI; Al Brunner, Federal Aviation Administration

[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 focus is technology, its development, transfer, and commercialization. OCAST's mission is to locate and fund promising technologies and 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 and 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 Owen:** Coming to you this week we're on the road at the Meridian Technology Center in Stillwater, Oklahoma, and the Unmanned Aerial Systems summit. And you've probably heard that term abbreviated as UAS and we'll be hearing that term a lot on this week's program. Steve, we had this event last year but this year we've got some interesting keynotes and guest speakers at this event.

>> **Steve Paris:** Absolutely Gary. We have with us Peter Bale, who's Chairman of the Board of the AUVSI. Now what does that stand for? Well Gary, or Peter, let me just say; that's the Association for Unmanned Vehicle Systems International and you'll notice that Peter has a little bit of an accent. Of course he thinks we have one too, him being from Australia originally. And he's very much involved in, and gave a very interesting presentation this morning. Want to do a little advance information here and when you talk about the Unmanned Vehicle Systems, we're talking about the things that you see about on television. When you have news agencies talk about the war in Afghanistan or the war in Iraq or any other place around the country, were using Unmanned Aerial Vehicles to help our war fighters. And so you've heard a lot about that.

>> **Gary:** Pilots. Pilots are on the ground.

>> **Steve:** Pilots are on the ground. These vehicles are unmanned. That doesn't mean they're not piloted by people but they're, the pilots are on the ground. Sometimes they're located in places like Missouri and they're operating unmanned vehicles that are halfway around the world. Now, I say that to say this; Oklahoma is making a very strong attempt to establish itself as a place where research on Unmanned Aerial Systems is done. So we're trying, and with the Governor's help, trying to create a new industry in Oklahoma. And that's the reason we're having this summit. And that brings in Mr. Bale here. Peter, who is, has a specific role to play. He's involved with an organization, the Association for Unmanned Vehicle Systems International. With that I welcome Peter to *Oklahoma Innovations*. How are you doing?

>> **Peter Bale:** Good. Good morning Steve. Thanks for the invite.

>> **Steve:** Well, let's get right to it. You're from Australia. You've had experience in I guess the Australian Navy, is that right?

>> **Peter:** That is correct.

>> **Steve:** And you have a brother who's involved in a conflict area. He serves with the Australian Army,

>> **Peter:** That is correct.

>> **Steve:** And, so you have a vital interest in making it safer for your war fighters, our war fighters. I guess we will call them the Allies, along with several other countries. Talk to us about how you got involved in this.

>> **Peter:** So it started a whole bunch of years ago for me as a young child. In Australia my father encouraged me to take up a hobby of remote control aircraft, and one of the things that really fascinated me was how I'd be able to get imagery of what that aircraft could see. So he actually encouraged me to strap a small disposable, well in those days, you know the late 1980's, the mid 1980's, it was a big....

>> **Steve:** It was pretty heavy wasn't it!

>> **Peter:** It was a big old heavy thing and I strapped it to my remote control plane and you know, he helped me do some things there which really lit the fire for me for later on in life. And so that was the start of it, and my passion grew. My main interest in the start of this industry was the civil commercial applications; how we could use this particular, you know, or these particular products, to assist with farming, agriculture, search and rescue. You know, our first responders all about those particular events. So I've had a particular interest in that realm and that's a passion of mine to this day.

>> **Steve:** Would it be safe to say that your interest is in data collection. Collecting information that can be used in different ways, for instance in agriculture as you mentioned. Probably also in law enforcement.

>> **Peter:** Absolutely. So I've seen so many different applications. It's just amazing what the products can be used for.

>> **Gary:** Let's talk about this. In your presentation earlier at the conference, you talked about something that most people don't think about when they think about unmanned vehicles. Obviously they look at military applications. But you talked about monitoring, detecting, exploring, helping, surveying and mining. So kind of go over some of those if you will because that's fascinating. I was not aware that UAVs were used that way.

>> **Peter:** Yes, so we've had some particular successes with various products out there over the years. A classic example is the ability to use these particular, you know, UAs, the Unmanned Aircraft for, you know, the sexy part of the equation to do fire monitoring etc. So you would have seen in my presentation, you know, some fire monitoring activity.

>> **Steve:** Oh yeah, so they can make a determination of which part of a wildfire they can attack first. Which is most advantageous, is that right?

>> **Peter:** Yeah, absolutely. And using the equipment at night, you know, tend to alleviate a lot of the stresses of air space integration. Some other interesting, you know, facets of this that our industry is, is that we were used extensively, you know with our underwater vehicles, for the BP

issues that occurred in the Gulf. So you know, the technology is broad spectrum and its applications in helping you know, civil commercial, are I think, you know, the untapped part of this market.

>> **Gary:** Now you have some applications you talked about in the Antarctica. Can you talk about that? Was that right? Did I see that right?

>> **Peter:** Yes, there were particular you know, ice mapping, explorations that were occurring you know, with the National Science Foundation being interested in ice melt, sea ice flow. You know, taking air samples etcetera up there to see what was actually occurring in that cap. So we've used particular devices, UAS, you know the Unmanned Aircraft Systems, up there for a number of years. And they continue to do, you know, wonderful, you know, exploratory, you know, remote operations at the leading edge of ice caps etcetera.

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

>> **Peter:** So, yeah

>> **Gary:** Steve, you know, Dr. Steve McKeever was talking, former Secretary of Science and Technology, when he opened, was talking about the growth in the last year in Oklahoma. A lot of focus being put on commercialization and education. So those are some interesting topics that have kind of evolved in the last couple of years.

>> **Steve:** Absolutely, and that's what your organization is looking at, is the different uses, how to promote those uses. I'll let you explain that instead of me trying to explain it. But talk to us about the AUVSI and exactly what that does.

>> **Peter:** So AUVSI, we have a niche, you know, in the industry. In the robotics industry. We pride ourselves in being an advocacy and portal for the companies out there wanting to, you know, investigate and find out what the latest situations are with legislative inquiries, with access to airspace, frequency allocation etcetera. So we see ourselves as a unique, you know user tool for the robotics community out there, and a great networking tool to actually bring together collective technologies, you know to advanced products that are out there and working together collaboratively.

>> **Gary:** And what about from the education standpoint, you talk about getting young people involved from engineering, and research,

>> **Steve:** Even the Boy Scouts of America.

>> **Peter:** Yeah, yeah, exactly so our foundation does a wonderful job. We have, we've been fostering, you know, that development so they're heavily involved in the STEM you know, outreach

>> **Steve:** Science, Technology, Engineering and Math, right?

>> **Peter:** Correct, so focusing on the K through 12, you know. Encouraging and lighting the fire in our young folks about how to be involved in this exciting technology. And you know, anecdotal evidence is; you know I told my son that you can now fly a UAV from an iPhone, so, you know, there's some different ways of encouraging this type of activity. So the foundation, we sponsor; or the foundation sponsors a lot of competition. It is a fire that we're hoping that, you know, will spread and encourage young folks to get involved in this remarkable industry.

>> **Steve:** I have to ask this question. You've been in the United States, living here, since 2004, so about 7 years now. And you got your interest; it began and peaked when you were in Australia, back in your home country. How does it shake out between the United States, not in competition, but as far as interest in UASs, Unmanned Aerial Systems, in Australia, compared to the United States?

>> **Peter:** So, the thing that interests, interested me here on the UAS side and specifically is, the sheer volume of opportunity that, you know, that the U.S. presents. And no one can deny that 80% of the market space is here and predominantly in the U.S.A. at the moment. We look at other operations in Australia, you know, internationally, and we see that, you know, a lot of local content is being used, a lot of new technologies, you know. But the hub of this particular industry at the moment, and I stress the word at the moment, is here in the U.S. We face some challenges with export regulatory you know, environments, and other things so you know, we have some hurdles against, you know, growing the industry off shore at the moment.

>> **Gary:** What do you see as challenges in that, in your industry?

>> **Peter:** So the ability for some of the [inaudible] export requirements. So, it's something that's flagged at an AUVSI national level. We have a lot of interest from our membership on how they are being, U.S. companies can navigate their way through the export, you know, requirements that are out there. But I pride myself being an export requirements, or export you know, experts. You know I won't pass comment on that. But it is, it is something that we are focused on as an organization; to help, you know, move the ball forward.

>> **Steve:** I mean this is a global market for the products that you're talking about here. Back to Australia for just a moment. You, correct me if I'm wrong, but I see Australia as a place with vast areas of open space for flying UAVs, for testing them, for and for putting them in practical application. I mean I assume there's quite a bit of mining that goes on in Australia, is there not?

>> **Peter:** Yeah absolutely. The industry is at the forefront of its growth. They are using particular robotics technologies and advancing themselves very very quickly in that. But in saying, let's have a look at where I came from yesterday. Landed in Oklahoma City and drove for 1.5 hours to Stillwater, here, to be with you today. And you have a lot of open space that we could do a lot of stuff to.

>> **Steve:** Absolutely, so...

>> **Gary:** So it makes us a great target state for testing, and progressing along.

>> **Steve:** Well, I just thought of something. I bet somebody's thought of this already. I know along the Great Barrier Reef, you know there's a lot of interest about watching for sharks, keep people safe and everything. Wouldn't Unmanned Aerial Vehicles have an application there?

>> **Peter:** Yes, so there was a particular operation around 2 months ago, off the east coast of Australia, with a product flying and actually monitoring humpback whale migration. So we can see, you know, we can see that that is coming. And it was a collective 3 agency approach with a particular commercial entity behind funding, you know, a lot of that interaction. So it was a wonderful response. The scientific community was rapt; they were able to follow this pod for days and work out what was actually going on with its migratory plans.

>> **Gary:** Outstanding.

>> **Peter:** So it's technology, it's fun, it's exciting, and I'd encourage parents out there listening; get your kids involved because this is the future.

>> **Gary:** Back with more from the Unmanned Aerial Systems Summit on *Oklahoma Innovations*.

[Music]

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>> Now in its sixteenth year, this is *Oklahoma Innovations* on the OCAST radio network.

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>> **Gary:** Coming to you from Stillwater Oklahoma this week at Meridian Technology Center, who's hosting the Unmanned Aerial Systems Summit. And right now we're going to talk with James Grimsley. He's president of the Unmanned Systems Alliance of Oklahoma. And, James can kind of give us more of an Oklahoma perspective of what UAS means to us.

>> **James Grimsley:** Yes I can. But before we, we get away from this,

>> **Steve:** He is also President and CEO of Design Intelligence Incorporated LLC. And I'll say this. Anytime you talk about Unmanned Aerial Systems, Unmanned Aerial Vehicles in the state of Oklahoma, James Grimsley's name pops up somewhere. How he's been involved in it and has been for years and so James, the floor is yours. Talk to us about this.

>> **James:** Appreciate the kind words there. This has been really exciting. This is our third summit that we've had in the state for UAS. The first one shocked us. We didn't anticipate the size. We didn't anticipate the interest. This really came out of some very small discussions we had about 4 years ago. A small group of us actually started it at lunch one day. And started talking about you know, well my company is working in UAS; well, you know, there's some university work going on. We thought, you know this is interesting. As we started talking we found out there's more and more work going on. So we decided, maybe a good idea would be to have a summit. Let's see if we can have a state-wide summit; invite anyone that's interested or working in this industry to come and tell us, and share with us what they're doing. We anticipated 20 or 30 people. And we planned facilities for 20 or 30 people. We had somewhere around 120 or 130 show up the first year, and I don't remember the exact numbers but it literally shocked us. For one thing not only the amount of work that was already happening in Oklahoma, but also the interest. There was very strong interest in this. And it was across the board from our state government, from our congressional delegation, our industry, our universities, our career techs. All across the board there was interest. So we looked at that and we started figuring out what do we need to do. At the same time that we had done that, there was a state aerospace strategy report that was underway that was commissioned by the state of Oklahoma, to look at

what we need to do. What do we need to do to protect our major aerospace industry that we already have. What do we need to do to find those next big things to invest in? What do we need to do to grow and continue to maintain our edge? And one of the focus areas that came out of that was Unmanned Aerial Systems because it was recognized by that group that we'd had the summit at about that time. They noticed it and they pulled together a focus group. Of a lot of the people that participated in the summit, had been in discussions at that point. I believe they were very impressed because they saw a group come together with really no mandate; no one had legislated this; no one had directed this. This came together on its own. And they saw an industry that was enthusiastic, very interested, very positive forward looking group come together. So they laid out some things. They said this has a lot of potential. This is something that could really impact the state of Oklahoma in a lot of different ways. And they said if you really want to get serious and continue and go to this next level, one of the things that you need to do is establish a State Chapter for AUVSI, which is the Association for Unmanned Vehicles International. We had loosely created this group that's called the Unmanned Systems Alliance of Oklahoma. Really a volunteer group, no funding, really no mandate to do anything. We just really started to pull together, kind of on a volunteer basis. We worked and created the bylaws, went through the process and converted that over to the State Chapter for AUVSI. So that's where we're at today. We've had 2 summits prior to this one. This is our third summit. Interest continues to grow. We have people from outside of the state here today. It was a very big deal for us to get Peter Bale, AUVSI Board of Directors. Oklahoma is on the national, basically sort of the national scene now for UAS and even in some ways in the international scene. So we're getting the right kind of attention. We're getting the right kind of enthusiasm, and I'm really excited over the next 2 to 3 years of the things that I see and things that I hear about that are in the works, to bring us to the next level for UAS.

>> **Steve:** Well, there's somebody we don't want to leave out. You've also got a tremendous advocate in Governor Mary Fallin.

>> **James:** Exactly. She...

>> **Steve:** Go ahead. Talk about it.

>> **James:** Yeah, Governor Fallin had just been absolutely amazing in her support. Her experience in aerospace goes back many, many years. She's been very active in promoting Oklahoma aerospace and we can attribute a lot of things to her. A lot of the successes, a lot of the growth, a lot of the, being able to keep it on everyone's minds and understand how important it is. I'd say she's been very active there, and in all of the different capacities that she served. She picked up UAS as one of the areas that she really wants to focus on early in her, just immediately when she took office. She's created the Unmanned Aerial Systems Council which is a group of appointees that report to her on the vision; help develop the road map; help advise, what we need to do; what investments do we need to make. She participated with us in the AUVSI North America Summit, or Expo, in Washington D.C., where there was around 7,000 people showed up. We had the only, we were the only state with our governor there. She came and visited our booth and spent time, networked and represented us very very well. She's very knowledgeable about this area and has immersed herself in it to become educated and is just a wonderful representative for the state of Oklahoma.

>> **Gary:** Well she obviously recognizes the state's potential and growth in this industry. So, that's powerful.

>> **Steve:** You know, Dr. Steven McKeever who's the Secretary of Science and Technology, proponent for Governor Fallin. He, he presented the group this morning and he showed them a map of all the UAS activity that's going on around the state. And I sat there. I looked at that and thought; I had no idea it was that widespread. Talk to us a little bit about that. James: It's really interesting because over the many many decades, Oklahoma had made a considerable investment in aerospace. In a lot of different ways. We have a lot of airports, we have a lot of facilities, a lot of current, active military installations, former military installations. And what we're finding is that we're able to really capitalize on the investment that's already been made. We're reusing a lot of the existing facilities, a lot of the existing assets and resources. The map we saw today is just a start. And we saw a huge part of the state of Oklahoma represented in that particular map. It's about to expand considerably. There's a lot of things happening right now, especially in terms of our airspace, how we hope to use that; reusing other facilities; more alliances within the state with other types of organizations. So we're going to see that map increase quite a bit.

>> **Gary:** Yeah, they look at test and training centers and so forth. Also it was mentioned that, from an educational standpoint, that, was Oklahoma the one that has implemented a, that they received a graduate degree program in this?

>> **James:** One of the first in the country was OSU's Unmanned option for their Aerospace Engineering Program at the graduate level. And that's a Masters and Ph. D level. The response was just overwhelming.

>> **Gary:** I'll bet.

>> **James:** They had quite a few students immediately and had applications from all over the place. So that's getting us. You know in the past we always worried about the brain drain in Oklahoma. We're not only have we eliminated I think, in aerospace engineering, we've eliminated the brain drain. We're now experiencing a brain gain. And that's a very welcome reversal in our fortunes here in the state of Oklahoma.

>> **Gary:** That's very exciting.

>> **Steve:** Wow!

>> **Gary:** Steve and I are coming to you from the Unmanned Aerial Systems Summit being held at the Meridian Technology Center in Stillwater, Oklahoma and learning a lot more about Oklahoma's growth and their partnerships in the UAS program. Back in a moment, on *Oklahoma Innovations*.

[Music]

>> Stay tuned. Gary and Steve will be right back with more *Oklahoma Innovations* on the OCAST radio network.

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>> **Gary:** Thank you for joining us on this week's edition of *Oklahoma Innovations*. Those of you who just joined us after the break, we're coming to you from the Meridian Technology Center and the Unmanned Aerial Systems Summit. Steve, you know, during the break, we had a great guest James Grimsley who was on a previous segment. He mentioned during the break that based on the Unmanned Aerial Systems activity going on in Oklahoma, that apparently there's now been about one thousand jobs created in the state.

>> **Steve:** This is becoming an industry in the state. Of course, as we mentioned, we talked about Governor Mary Fallin taking on this project and giving it a lot of support. She was the only governor who went to a recent meeting of about seven thousand people in Washington, D.C. And she was the only State Governor there and she went there to support our Unmanned Aerial Systems efforts here in the state of Oklahoma. We have with us today Lindsay Voss who is a senior analyst with the Association for Unmanned Vehicle Systems International. She's headquartered in San Antonio, Texas. However, we won't hold that against you...

>> **Gary:** No

>> **Steve:** Because we know that you're a native Oklahoman.

>> **Gary:** Let's mention Peter Bale was our first guest on the program and he was Chairman of this organization, on the Board of Directors and she's actually on staff.

>> **Steve:** yeah, and Lindsay Voss is a cowgirl.

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

>> **Steve:** Graduated from Oklahoma State University and is a strong supporter and a native of Oklahoma. Lindsay....

>> **Gary:** Ah, she lives in San Antonio

>> **Steve:** Yeah, tell us how you came to be involved with the Association for Unmanned Vehicle Systems International?

>> **Lindsay Voss:** Well, I graduated from Oklahoma State University as you mentioned, in 2002. I, immediately after graduating, joined the United States Air Force where I worked in the Intel community. I was stationed down at Lackland Air Force Base which is where I did my job. And once I got out of the Air Force, after a 4 year enlistment, I joined a company called Frost and Sullivan which does Aerospace and Defense market research. And while I was working there I headed up their Unmanned Systems Research, and through all of my work conducting that type of activity for Frost and Sullivan, I had the opportunity to get involved with AUVSI. And I had the opportunity to go out and speak in 2009 at their national convention. AUVSI, Unmanned Systems North America, in Washington D.C., and from there I was able to take an opportunity on staff. And I've been with AUVSI since January 2010.

>> **Steve:** Well now I've got to ask this question. It's not why you're here, but a young lady from [inaudible] Oklahoma, kind of a wheat producing area in the state, right in the middle of the wheat belt. What got you involved in serving in the Air Force and getting involved with Unmanned Aerial Systems?

>> **Lindsay:** Well, you know in [inaudible] Oklahoma you're right. Lots of wheat. My dad actually was a wheat farmer pretty much all of his life. My brother's out there working the farm now. I got the opportunity to see aviation from an agricultural perspective when I was growing up on the farm. And then I, you know, saw opportunities in the Air Force. I think Vance Air Force Base in Enid probably had...

>> **Steve:** Real close by

>> **Lindsay:** had a little bit to do with that. And I thought the Air Force was going to be a great opportunity and while I was there working in the Air Force doing Intel, obviously Unmanned Aircraft are a big part of our intelligence producing technologies right now overseas. I got to learn a lot about that. It wasn't specific to my job that I did. But I had the opportunity to learn a lot about it. And from there I moved on doing more of the market related research which incorporated some of the business things I was interested in,

>> **Steve:** Yeah

>> **Lindsay:** And, now I'm at AUVSI, so..

>> **Gary:** Lindsay, one of the things I've noticed as we talk about Unmanned Aerial Systems and Unmanned Aerial Vehicles; I think there are a lot of folks, and I used to be one of those who thought that, okay, that's coming, that's into the future, we don't have that yet. But it's actually in place right now, is it not?

>> **Lindsay:** Oh absolutely. Unmanned aircraft are being used 24-7; Iraq, Afghanistan, Pakistan, Yemen, Somalia. All over the world actually, unmanned aircraft are being used for primarily surveillance activities. And here at home we're also seeing them being used by law enforcement, public safety; a lot of government agencies are looking at unmanned aircraft to do a variety of things including research. The opportunities are endless and it's happening right now.

>> **Steve:** Gathering data...

>> **Lindsay:** Sure

>> **Steve:** on crops, things like that. Lots of uses. And we're learning that at this summit. That there's lots of uses now that, probably to laymen, and I'll include myself in that category, doesn't always think about until you hear somebody mention it, like we hear at summits like this. You have a little bit of a national, maybe an international perspective on Unmanned Aerial Systems. And we were urged by some folks who've come before you in this show, they say ask Lindsay, what is; talk about the future. Where do you see this going?

>> **Lindsay:** Well the future for Unmanned Systems; I think you would talk to most people in this industry, they will tell you that this is a bright spot. It's a bright spot in defense. It's a really bright spot when you start looking at commercial opportunities, both financially and from a jobs standpoint. You know right now there's a lot of focus on job creation, and the Unmanned Systems industry as a whole, that's air, ground, maritime; this is an emerging industry that's got a lot of potential. We're looking at an industry right now that's roughly estimated in 2010 globally at about 6 billion, 6.5 billion dollars, growing anywhere from 5 to 7 percent over the next 10 years. A lot of that will be driven by unmanned aircraft. And when you start to look at that primarily being a defense military application driven market. When you start to look at all the other potential applications,

>> **Steve:** Yeah

>> **Lindsay:** There's a lot of potential for growth.

>> **Steve:** Absolutely.

>> **Gary:** And you know one of the things we talked about in another part of the program is, you being a young person, not that long ago being in college and so forth; we were talking about the educational aspects. Like in Oklahoma right now, of course we mentioned in an earlier part of the program that the state just received the first federal grant for an educational program, I guess, a graduate program, is that right, for, I think it was in January, I think was when it was announced. What's your take on that? I mean, you being a relatively young person trying to see a direction where you want to go with your career. Now we're talking about, even on the high school level I see them getting into robotics and so forth. Talk about that. That's got to be an exciting opportunity for young people to get into this industry.

>> **Lindsay:** It has really just been awesome. I have to say, just in the last 4 or 5 years since I've been actually looking at this industry, the amount of interest from the collegiate level of students to get involved with unmanned aircraft, is tremendous. We're seeing the schools really pick up on that. They understand that unmanned aircraft is the next step for the aviation industry and they want to be able to offer degree programs, certification programs, that type of education to their students. And the students are responding very very well. Every year you're hearing about new universities who are starting some type of UAS program, be it a certification or be it an actual degree, where they can get their students involved. And Oklahoma State, having the first graduate degree program, is just tremendous. I was so excited when I read about that coming out, at the beginning of the year, because this is a great opportunity for Oklahoma and aviation students here. And it's not going away. This is going to be something that you're going to see more and more colleges and universities offering, offering programs. And it's trickling down to the high school level. AUVSI and the AUVSI foundation, we're very involved with student competitions, and there's a tremendous, tremendous impact that these students get from being

involved with the technologies and taking part in these competitions. And it's important, because the further down the road we get, it's going to be crucial for students to have an interest in science, technology, engineering and math. So the core STEM focus points in education. And robotics, the STEM pieces of that are instrumental and critical. So getting the students involved at a lower level, when they're in elementary and even junior high school, and keeping them involved up to the collegiate level is going to be critical in ensuring that we've got the right skill sets in the Unmanned Systems industries so that we can keep the United States thriving in this particular industry.

>> **Gary:** And there's a diverse career opportunity from piloting the vehicles, to manufacturing and design, to starting up startup businesses; I mean there's just a lot of great opportunities for everybody.

>> **Steve:** And we haven't even talked about payloads yet and what they do, which is kind of the reason for having those unmanned aerial vehicles, right?

>> **Lindsay:** Oh absolutely. You hit on it perfectly. What a lot of people don't understand about an unmanned aircraft system; they see the aircraft and that's the part that's really cool, right?

>> **Steve:** Absolutely.

>> **Lindsay:** It's the airplane, it's what people gravitate towards. But what you have to understand is there are communications systems, there are sensors, there's computing equipment, there's the ground station, there's all this software.

>> **Steve:** Surveillance

>> **Lindsay:** Yeah, the surveillance, payloads. All of these are what actually makes the Unmanned Aircraft System a system and not just an aircraft. And all of those components require skill sets and folks are going to come in to build these technologies, to maintain these technologies

>> **Steve:** Maintenance, that's right

>> **Lindsay:** It's just really huge when you start to think about all the little pieces that make the greater system.

>> **Steve:** You were in the Air Force, so I'm sure you encountered pilots. A time, maybe you were one, I don't know. But you know I hear some of them are a little nervous about, you know, Unmanned Aerial Systems because they're afraid it's going to take them out of the sky. Have you heard that argument yet?

>> **Lindsay:** It's interesting. At Unmanned Systems North America 2012 this August in D.C., we had a couple of pilots come and talk about their experiences operating the Predator. They actually work out of Holloman Air Force Base

>> **Steve:** In Missouri. New Mexico?

>> **Lindsay:** In New Mexico. The sixteenth training squadron I believe. And they talk about how, you know, how interesting it is, how they can appreciate the fact that they go to work and then that they're able to come home and spend times with their families rather than [inaudible]

>> **Gary:** I've got to take a break here. We'll come back and talk more from the Unmanned Aerial Systems Summit in Stillwater, Oklahoma.

[Music]

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[Music]

>> **Gary:** It's called AUVSI. That's what we've been saying throughout the program. The Association for Unmanned Vehicle Systems International. And they're here for the Unmanned Aerial Systems Summit. We've talked to a variety of individuals involved in this summit and have been keynotes throughout the event. And now Steve, we have someone who's representing the FAA.

>> **Steve:** Absolutely. We have Mr. Al Brunner, who's the Aviation Safety Inspector, an Aviation Safety Inspector, with the Federal Aviation Administration. He's here today talking with the folks here at the Summit about Unmanned Aerial Systems and how we can keep it safe, and all the issues that are involved there. And when you do that, Al, we're talking a lot about air space and how it's used and how you're allowed to use it, are we not?

>> **Al Brunner:** Yes. Not only just the air space; the operations in which it's taken and, as well as the pilots that are involved, all of their certifications and medical requirements. There's a host of things that are involved in UAs.

>> **Steve:** Absolutely, and that's all because aviation is very much interested in safety because, well, that's just the way it has to be. And the FAA heads that effort up. So,

>> **Al:** Correct.

>> **Steve:** I want to hear a little bit about Al Brunner. You're a native of Texas,

>> **Al:** Yes sir,

>> **Steve:** From Galveston, and you're in Fort Worth now. But you've been with the FAA you said for just about a year.

>> **Al:** Yes sir.

>> **Steve:** What were you doing before that?

>> **Al:** Well, before that I was in the Air Force for 26 years and one of my jobs as an Unmanned Aircraft Specialist was the Chief of Safety for the Weapons Evaluation Group. Running their

safety programs for target drones and weapons involved in deploying those target drones. So I have a pretty good idea of how they operate...

>> **Gary:** Well I guess so

>> **Steve:** Just a little bit of experience there!

>> **Al:** Little bit of experience, yes. And so consequently I was in industry for a year after the Air Force. And then, FAA was certainly needing this expertise in the regions outside of Washington, which is why they're hiring, had hired, regional experts throughout all the regions in the flight standards of the FAA.

>> **Gary:** So I guess we could assume to say that during your Air Force career, you got to see this technology evolve.

>> **Al:** To a degree yes. I mean the technology is, in its rudimentary form, has been there for a number of years. I mean let's face it...

>> **Gary:** But you got to see a lot of the transitions in the technology, right?

>> **Al:** To a degree yes. To a degree, that is very true.

>> **Steve:** Let's talk about your being here and the message that you have for the folks at the Summit, because as you, as we said earlier, aviation safety is a very important part of this. And whether or not a pilot is sitting in the vehicle, or is operating it from a remote location, safety has to be of utmost concern.

>> **Al:** Absolutely, I mean that's part of our charter, needless to say in the FAA is to promote the national air space system and the safety of national air space.

>> **Steve:** Talk about some of those issues that we've come across as we've gotten more into Unmanned Aerial Systems.

>> **Al:** Well, there's a host of issues. First, a lot of which deals with just the aircraft themselves. A lot of these aircraft are home built, or manufacture built, but many different styles and types and all of that, and the manufacturing processes are varied. And one of the things just from the aircraft standpoint alone let alone the other sides of it, that we're looking at, is just those kinds of certifications and standardization type issues. That's one of the levels of safety that we provide. All of the airlines certainly have certified maintenance technicians. Is a man educated and certified to perform this maintenance function? Is the part that he's working on a certified tested, knows the mean time between failures? Does he know all of those kinds of things? In the UA world this is all still fairly new, and those kinds of things have not yet been addressed. Then there's, they're computer operated. Has the computer been certified? Has the software been certified?

>> **Steve:** Wow...

>> **Al:** What about the electromagnetic spectrum across which these commands are sent? Is that sanitized, is it squared away? Are those kinds of issues set so you can guarantee a safe operation?

>> **Steve:** And some of the concerns, and this is over simplifying I'm sure, is to make sure that some of these unmanned vehicles don't get out of control and wind up on your dining room table.

>> **Al:** Exactly..

>> **Steve:** Or wind up at the nose of an aircraft where you're an occupant.

>> **Al:** Correct

>> **Steve:** And those are all issues; and I don't know that that's happened anywhere, at any time. Maybe it has. But we want to make sure it doesn't happen, right?

>> **Al:** That's correct.

>> **Steve:** Okay, talk to us about air space. There's different kinds of air space in our national system. And around the world. Obviously military air space is usually restricted. And so...

>> **Al:** There's lots of different air spaces. They come in different classes. There's class A, B, C, D, E and G as well. And you have special use airspace as you referred to, with military usually having restricted air space. And consequently as restricted air space it's very, as its name implies, restricted. Only certain people can use that air space. Nobody else is allowed in that air space. And only that operation is contained within that air space. So currently that is why a lot of UA operations occur in restricted air space. Because it is sequestered from the rest of the public and can safely conduct their operations.

>> **Steve:** Absolutely. Keep them separate from other types of aircraft where danger may result.

>> **Al:** Correct.

>> **Steve:** When you talk about this type of air space, give us an idea; here in Oklahoma we have several military bases.

>> **Al:** Correct

>> **Steve:** We have 3 Air Force bases, we have a pretty large Army installation at Fort Sill. We have a facility down in McAlester; it's an Army ammunition depot. You know, we've got reasons for keeping people away from that air space. We've got reasons for allowing certain people into those spaces. Talk to us about, how Oklahoma kind of stacks up as far as wide open spaces and the ability to conduct Unmanned Aerial Operations.

>> **Al:** I would say that, yeah, I would say that Oklahoma has a fair amount of good air space in which to operate. They have a certain amount right now of restricted air space. There's still quite a bit of air space in New Mexico and Texas, and so trying to develop and foster where we can use, air space is going to be an issue. Because we're not making any more of it. You know?

>> **Steve:** That's all there is.

>> **Gary:** When you think about the metropolitan areas, Tulsa and Oklahoma City. Well if you take Oklahoma City as an example, and you've got Tinker Air Force Base here, you've got Will Rogers World Airport and then you've got all the small airport entities around. So, when you look at, and a lot of these manufacturers are in the Oklahoma City or Tulsa area. So they have some unique challenges when it comes to getting, I guess, air space access.

>> **Al:** Right. It becomes a real challenge and that's why we don't allow any class B air space operations. Those are the big airports with lots of air traffic, such as Dallas-Fort Worth or New Orleans, Washington D.C. so forth and so on.

>> **Steve:** Yeah, you've got to keep that separation.

>> **Al:** Well, it helps. It really helps. But there's also the persons on the ground you have to consider as well.

>> **Steve:** Absolutely.

>> **Al:** So sparsely populated areas is definitely better currently.

>> **Steve:** Now I would guess, and correct me if I'm wrong, but I would guess that most of the folks who are involved in Unmanned Aerial Operations as it relates to doing research and testing; that they kind of bought into this and they understand, I would hope, that what you guys are doing at the FAA is trying to keep them out of trouble, right?

>> **Al:** You could say that. I would certainly hope that and that's part of why we are in a collaborative environment, or like to think that. And hopefully we're not in an adversarial one because that's not where we want to be certainly.

>> **Steve:** Education. You have an education curve here where [inaudible]

>> **Al:** Well, there's the education curve. There's just a lot of issues involved with that as well. But the bottom line is that we've got to figure out ways to allow them to do it because they have a right to the air space....

>> **Steve:** Oh sure...

>> **Al:** But so does the other person who wants to fly his ultra-light in the middle of the night just because he can. Well, he can't really do it at night. It's supposed to be day only [inaudible]. But you understand my, my thinking...

>> **Steve:** Sure, sure

>> **Al:** Is that other people have rights to the air space as well, not to the exclusivity of just the UAs or vice-versa.

>> **Steve:** Yeah, but again, correct me if I'm wrong, but the FAA kind of looks on this not necessarily as a right but as a privilege, does it not? Or is it a right?

>> **Al:** Well, you can, we'll let civil libertarians argue as to what's rights and what's privileges. And that, we're still just an arm of the federal government and we're there to enforce the laws of Congress. And if Congress says go do this, then we're obligated to go do that. And our charter at the present moment is to provide access to the public and to provide it in an effective and safe manner.

>> **Steve:** Now let's talk about all-weather operations.

>> **Al:** Okay.

>> **Steve:** That's a part of your mission and part of, what you're over. Talk about how that relates to Unmanned Aerial Vehicles.

>> **Al:** Not as much as you might think of just in terms of the all-weather officer type stuff. The all-weather officer does things other than just the Unmanned Aircraft. That type of thing, I got specialized in and they didn't know where exactly to stick us initially.

>> **Steve:** Oh, okay

>> **Al:** And they kind of stuck us with all the other cats and dogs. Along with that they're....

>> **Steve:** Well let me ask this; do you see Unmanned Aerial Vehicles, since that's our subject today, do you see that as being conducted, those tests being conducted in all weather conditions?

>> **Al:** Well eventually that's where it's going to go because we certainly have, for example right now, Unmanned Aircraft flying in class A air space, which is the highest level and most restrictive air space that's IFR-VFR, instrument flight rules or visual flight rules. And so they exist there. So it's going to fly, the UA's that is, in all types of weather. So we've got to plan for that and I think we are looking toward that too.

>> **Steve:** Okay. Are you involved, yourself personally, are you involved in establishing the parameters of how that's going to be applied?

>> **Al:** No, I do not personally do that. They have not made me king yet. But I have an input. When certainly because as we're developing policy and we're trying to look at better ways to skin a cat so to speak, I have a voice in saying this is my expert opinion on this particular topic. But I'm just one of many. So in a collaborative environment we work toward a good end to try to make it the best we can, possibly can.

>> **Gary:** Al Brunner is our guest this segment. He's an Aviation Safety Inspector with, of course as you've heard, he's involved in all kinds of applications at the FAA when it comes to UAS as we've described them as Unmanned Aerial Systems. We've got to get out of here. From Stillwater, Oklahoma at the Unmanned Aerial Systems Summit, and talk to you next week, Steve. On another edition of *Oklahoma Innovations*. Have a good week everyone.

[Music]

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