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THE DISRUPTER SERIES: THE FAST-EVOLVING USES AND ECONOMIC IMPACTS OF DRONES

THURSDAY, NOVEMBER 19, 2015,

House of Representatives,

Subcommittee on Commerce, Manufacturing,

and Trade,

Committee on Energy and Commerce,

Washington, D.C.

The subcommittee met, pursuant to call, at 10:15 a.m., in Room 2123 Rayburn House Office Building, Hon. Michael Burgess [chairman of the subcommittee] presiding.

Members present: Representatives Burgess, Lance, Blackburn, Harper, Bilirakis, Brooks, Mullin, Schakowsky, Welch, and Pallone (ex officio).

Staff present: Leighton Brown, Press Assistant; Rebecca

Card, Assistant Press Secretary; James Decker, Policy Coordinator, Commerce, Manufacturing, and Trade; Andy Duberstein, Deputy Press Secretary; Graham Dufault, Counsel, Commerce, Manufacturing, and Trade; Melissa Froelich, Counsel, Commerce, Manufacturing, and Trade; Paul Nagle, Chief Counsel, Commerce, Manufacturing, and Trade; Dan Schneider, Press Secretary; Olivia Trusty, Professional Staff, Commerce, Manufacturing, and Trade; Dylan Vorbach, Legislative Clerk, Commerce, Manufacturing, and Trade; Michelle Ash, Minority Chief Counsel, Commerce, Manufacturing, and Trade; Christine Brennan, Minority Press Secretary; Jeff Carroll, Minority Staff Director; Lisa Goldman, Minority Counsel, Commerce, Manufacturing, and Trade; and Diana Rudd, Minority Legal Fellow.

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Mr. Burgess. The Subcommittee on Commerce, Manufacturing and Trade will now come to order and the chair recognizes himself for 5 minutes for an opening statement and, again, good morning to all and welcome to our hearing on examining unmanned aerial systems, or drones.

These are poised to up-end the status quo in many sectors across the country.

This hearing is the latest installment of our Disrupter Series covering a variety of disruptive technologies that are literally redefining our lives and improving our economic condition.

This hearing is timely. Tomorrow, the National Telecommunications and Information Administration will hold an important gathering in its series of multi stakeholder meetings to develop privacy best practices for drones, and the Federal Aviation Authority has also set tomorrow as the deadline for recommendations from the Drone Registry Task Force.

Drones promise to make life easier, make life safer, make life less costly for workers in a wide variety of industries. The American Farm Bureau has forecast that farmers will be using drone services to monitor their crops and could see significant return on investment. The technology now exists for telecommunications and utility employees to send up drones up to inspect telephone

poles and monitor their findings from the truck.

Insurance adjusters sent out to inspect a claimant=s home for hail damage could use a drone to conduct the examination without needing a ladder to walk around on the roof. And everyone from movie studios to broadcasters have interests. With nearly a million units expected to be sold, consumer drones are predicted to be the next wave in holiday purchases in just a few weeks.

I'=m sure many of us here today have noticed that trend as we start our holiday shopping. Check your gutters or a leak on your roof without leaving the ground, no problem.

The sector-specific benefits of drones add up to a massive economic impact. According to one study by the Association for Unmanned Vehicles Systems International -- one of our witnesses today -- drones will produce about $82 billion in growth during the next 10 years as they are integrated into our National Airspace System.

The study also predicts the addition of 100,000 jobs over those 10 years, which encompasses drone makers, software engineers, suppliers, researchers and other workers that would support expanded drone production and use.

To realize these benefits, the Federal Aviation Administration is working with stakeholders to safely integrate drones into the American airspace.

Simultaneously, the National Telecommunications and Information Administration is holding multi stakeholder meetings with the goal of producing industry best practices.

There are important questions around privacy laws and safety and United States companies like Intel are working to develop solutions that would enhance safety automatically, which no regulator could produce.

In fact, I would be more worried that overregulation on safety could prevent the investment, testing and research needed to develop market-driven solutions.

With the advent of drones, many have expressed concerns that they present novel privacy issues. Certainly, drones can go where people can't.

A neighbor can fly a drone over your fence and pester you and invade your privacy, and there have been disputes ending in drones being shot out of the air by an annoyed citizen.

There are interesting questions around whether how and when and under what circumstances a drone owner can be identified and held to account for his or her behavior.

Those questions are now being addressed at the FAA as part of the development of its registry. I should note that I share the concerns of many with requiring small recreational drones to be registered with the federal government.

Such an approach would involve casual users in a major government bureaucracy with seemingly little benefit. As regulators prepare to integrate drones into the airspace, it is clear that safety has to be the number-one priority.

But cutting-edge drone testing and evaluation is occurring overseas because the current process to approve commercial drone use is both restrictive and cumbersome in the United States.

I do want to thank our witnesses for being here this morning. I'm going to yield the balance of my time to Mr. Lance.

Mr. Lance. Thank you, Chairman Burgess, for holding this hearing and welcome to the distinguished panel.

Earlier this week, a drone crashed into a car while flying over an oil refinery in Linden, New Jersey. I used to represent a portion of Linden before the reconfiguration of the congressional districts. Linden is one of the major refining locations in the United States.

The FBI is currently investigating whether or not this was an accident and is tracking down the operator who fled the scene. This is the second time in two months that a drone has crashed in Linden, which is located 10 minutes from Newark Liberty International Airport, one of the three major airports serving the New York metropolitan region.

While so far there is no evidence of ill intent in either

case, these incidents bring up important concerns regarding the safety of recreational drones and the possibility for bad actors to repurpose them to cause harm to others.

I look forward to discussing these concerns and possible solutions as well as the potential benefits of UAVs with this distinguished panel.

Thank you, Mr. Chairman.

Mr. Burgess. The chair thanks the gentleman.

The chair recognizes the subcommittee ranking member, Jan Schakowsky, for 5 minutes for an opening statement, please.

Ms. Schakowsky. I thank you, Mr. Chairman, for holding today's hearing on the evolution and the future of drones. I look forward to delving into this important issue.

Drones are increasingly common in our communities and it is predicted that 1 million drones will be given as gifts over this holiday and drone usage will, clearly, rise in 2016.

It is important to understand that these -- what this technology can do and how we can adequately ensure their safe and ethical usage.

As the subcommittee of jurisdiction over the Consumer Product Safety Commission and the Federal Trade Commission, I am particularly interested today in the impacts of drone usage and public safety and privacy -- the two issues that the chairman

raised as well.

The FAA has received over 1,000 reports of unsafe drone activity by pilots already this year, double the number of such reports from 2014. With their capacity to reach protected and secure areas including the White House lawn, which happened earlier this year, drones can pose a serious national security threat as well.

We must ensure that drones are adequately regulated to maintain safety both for the public and for the country. The other important area for us to consider, as mentioned, is the privacy implications of the increased use of drones.

Drones can and have been equipped with invasive technologies including cameras, infrared devices, even high-powered microphones.

This new method of collecting information does not entitle individuals, corporations or government entities to violate privacy rights and we must ensure that our laws and regulations reflect that fact.

So I look forward to hearing from our witnesses to gain from their perspectives this emerging technology and I yield back my time.

Mr. Burgess. The gentlelady yields back. The chair thanks the gentlelady.

The chair recognizes the vice chairwoman of the full committee, Mrs. Blackburn from Tennessee, for an opening statement for 5 minutes.

Mrs. Blackburn. Thank you, Mr. Chairman, and I want to thank each of you for being here before us today and for the information that you're going to share with us and work with us.

I appreciate this series that the chairman has put in place, the Disruptor Series, because we do live in a time when you're going to see the Internet of things, if you will, begin to move forward and become more enmeshed with our daily lives -- how we do business, how our military protects ourselves, how consumers use a product in recreation.

All of those are components that we are going to be tasked with dealing with the issues and the implications.

Now, you know, we're looking at privacy. We're looking at safety, the utilizations and also we want to look at the mechanism -- the drone itself -- and then what you put on the drone, which is where you get into the privacy concerns and utilization of technology that can be a little bit invasive, if you will.

But we do know that there is an enormous curiosity about these and such a desire to have a drone and play with a drone. I say I have a family full of big kids ranging from age 60 on down to age 6, all male, by the way.

And they love all of these gadgets and toys and the next new thing and they so like -- yes, I hear you all chuckling. I do think that my husband is still a big kid and but there is such a fascination with this and the policy implications of that come to us -- how do you encourage that curiosity, how do you allow consumer use, how do you allow commercial use and still look at the safety and security. And, of course, as we have found out with our airplanes and with air travel make certain that we are securing that space.

So thank you for your information and your wisdom. We appreciate having you here. Yield back.

Mr. Burgess. The gentlelady yields back.

The chair recognizes the ranking member of the full committee, Mr. Pallone of New Jersey, 5 minutes for an opening statement, please.

Mr. Pallone. Thank you, Mr. Chairman.

As part of our ongoing Disruptor Series today we have the opportunity to discuss one of our fastest growing and most exciting industries.

It seems there are drones for just about everything. Photographers can attach powerful cameras to drones to get shots from high in the air. Nature lovers can take footage of wildlife in hard to reach places.

Surveyors use them to create more accurate maps. Both children and adults fly drones just for the fun of making something fly.

If you want, you can buy a drone shaped like the Millennium Falcon from Star Wars and you could say that drones are the next generation of kites if kites were Bluetooth capable and had a thousand possible uses and companies are looking into how drones can improve business.

Retail giants are exploring delivery by drone, which will get orders to consumers faster than ever. Farms use drones to oversee crop conditions and dozens of small startup companies are innovating new ways to use drones to protect the environment.

One company has designed a drone that can sense water pollution from the air. Commercial and consumer drones are attracting a huge amount of interest in investment.

The Federal Aviation Administration estimates that a million drones will be given out as gifts this holiday season, and according to one industry report investments in drone technology from January to May 2015 totaled $172 million, more than in the previous 5 years combined.

These investments are not limited to one industry or source. They come from government, venture capitalists, environmental groups and huge technology firms, among many others.

So it's exciting when technology leaps forward the way it has with drones. But as the industry develops, so do the risks. As more drones take to the air, safety becomes more of a concern. Pilots have raised concerns about sharing airspace with drones.

Drones have been seen in sports arenas and pilot sightings of drones doubled since last year, and there has also been an increase in the number of safety accidents including a man who was killed after losing control of his drone.

Also, many people are concerned that drones could enable new invasions of personal privacy. Drones can be equipped with cameras and recording devices and can be flown into people's back yards or next to their bedroom windows.

States are beginning to pass laws to restrict drone use. Many of these laws are focused on protecting personal privacy. But some people are taking matters into their own hands by shooting down drones hovering over their homes.

Innovation and growth are vital to the American economy but that innovation must also come with basic protections no matter which disruptor we're talking about.

So consumer protections are needed for those who use drones and for those who come into contact with them. By addressing these issues, businesses and consumers can have the certainty they need to continue growing and enjoying this exciting new space.

I am confident that we can encourage innovation in the drone industry and ensure that there are strong protections in place for consumers and I look forward to hearing from our witnesses how we can do just that.

I don't know if Mr. -- would you like some time? Fine. I yield back, Mr. Chairman.

Mr. Burgess. The gentleman yields back. The chair thanks the gentleman and this does conclude member opening statements. The chair would remind members that pursuant to committee rules all members' opening statements will be made part of the record.

We do want to thank our witnesses for being here today, for taking the time to testify before the subcommittee. Our witness panel for today's hearing will include Mr. Joshua Walden, the senior vice president and general manager of the New Technology Group at Intel; Mr. John Villasenor, professor of public policy, electrical engineering and management at UCLA's Luskin School of Public Affairs; Ms. Margot Kaminski, assistant professor at the Moritz School of Law at Ohio State University; and Mr. Brian Wynne, president and CEO of the Association for Unmanned Vehicle Systems International.

We appreciate all of you being here today. We are going to begin the panel with Mr. Walden. Just an editorial note -- we are going to have votes on the floor soon. So I would ask that

you each adhere to the 5 minutes for your opening statement. You will see the lights down below.

Again, we appreciate all of you being here. We will begin with you, Mr. Walden. You are recognized for 5 minutes for an opening statement.

We have technical assistance on the way. You know, you would think in the major congressional committee that deals with technology we wouldn't have wires running all over the place. We'd have a series of drones picking up every hiccup and cough from the witness table.

Mr. Walden, I am going to blame the press for probably dislodging a cable as they were taking pictures of your aircraft, and our apologies.

Are we there yet? I don't think any of the microphones are working. Mr. Wynne, does your microphone appear to be on?

Mr. Wynne. Testing. There we go.

Mr. Burgess. Whoever's is working please proceed 5 minutes.

STATEMENTS OF JOSHUA M. WALDEN, SENIOR VICE PRESIDENT, GENERAL MANAGER, NEW TECHNOLOGY GROUP, INTEL CORPORATION; JOHN VILLASENOR, PROFESSOR OF PUBLIC POLICY, ELECTRICAL ENGINEERING AND MANAGEMENT, LUSKIN SCHOOL OF PUBLIC AFFAIRS, UNIVERSITY OF CALIFORNIA, LOS ANGELES; BRIAN WYNNE, PRESIDENT AND CEO, ASSOCIATION FOR UNMANNED VEHICLE SYSTEMS INTERNATIONAL; MARGOT KAMINSKI, ASSISTANT PROFESSOR, MORITZ SCHOOL OF LAW, OHIO STATE UNIVERSITY

STATEMENT OF JOSHUA M. WALDEN

Mr. Walden. Chairman Burgess, Ranking Member Schakowsky and distinguished members of the subcommittee, thank you for the opportunity to testify on behalf of Intel Corporation.

We appreciate the invitation to appear before the subcommittee to discuss the continuously and rapidly evolving uses of unmanned aerial vehicles, UAVs or drones, and the vast economic potential of this growing industry.

Innovation has been at the heart of Intel's business since we were founded close to half a century ago. To quote our co-founder, Robert Noyce, innovation is everything.

While we are a recognized leader with 80 percent of sales coming from outside the United States, Intel is viewed as a leading American technology company for good reason. We conduct

approximately three-quarters of our advanced manufacturing in research and development in the United States at facilities located throughout the country.

We invest billions of dollars annually in research and development and employ more than 50,000 people nationwide. Intel's declared mission is to utilize the power of Moore's Law to bring smart and connective devices to every person on the planet.

With the help of Moore's Law, we have driven computing innovation to the highest performing servers that speed discoveries in science and medicine to low-powered computing sensors that are always on and connected that make devices, homes and cities smarter.

It has become increasingly clear to us that UAVs like cars and watches are a computing platform of the future. Applications and services by this new connected UAV ecosystem will spur significant economic growth and will be driven by innovations in UAV technology.

From infrastructure inspection to delivery of goods, millions of Americans are on the cusp and enjoying the benefits of this continually developing technology.

UAVs are being used to inspect bridges safely and efficiently, allow for real time repairs. Mobile carriers aim

to keep workers on the ground by using UAVs for cell tower inspection, an application with potential lifesaving ramifications. From 2004 to 2013, there were 95 fatalities associated with cell tower inspections.

Another up and coming usage will be having multiple drones working in conjunction with a single operator used for either surveillance, safety, agriculture and even entertainment.

Computing technology is what will help drive and manage this capability with more precision, safety and accuracy than manual control.

Technology can and will improve drone safety. We are actively creating silicon architecture and computing power that will create onboard drone platforms that will have outstanding speed, performance and functionality.

And our most important contribution to date involves critical safety technology that will address real concerns expressed by regulators and consumers alike. Real Sense is an onboard sensor application that represents a key ingredient for best in class collision avoidance.

It features several attributes for collision avoidance with real-time onboard computing. It is intuitive, self-aware, adaptable and self-guided. It will provide real-time depth-sensing capability for a flying drone and complying with

GPS, altitude and other on-board sensors can also avoid no-fly areas and comply within regulatory limits.

I'd like to demonstrate the capability, if we could, please. So what you see ~~Yong~~ Jan doing is he's no longer utilizing the controller and what the 3D Real Sense camera technology is doing is essentially sensing using infrared and moving and making sure that nobody can run into the drone. So this is real-time collision avoidance utilizing 360 degrees of freedom. Thank you, ~~Yong~~Jan.

So I think we're going to demonstrate the sense and avoid of what the drone is actually seeing. If you could please look to the video screens, hopefully. There we go.

So what you're seeing is the ring sense, or the IR picture, of what the drone is seeing. Note this is not being seen by the pilot. None of these images are saved, from a privacy perspective.

This is an IR image the drone is seeing and if someone gets closer to the camera you'll actually see the image get darker and as they move away get lighter.

So this is actually the depth that you're seeing of what the drone is seeing which enables it to avoid people and objects.

Thank you.

Society, consumers, businesses and overall worldwide economies stand to benefit in profound ways if the nascent drone

ecosystem can develop safely, quickly and in a manner where governments and private sector work cooperatively and expeditiously across a range of statutory, regulatory and policy matters.

We believe that it is critical for the United States to develop a regulatory framework for UAVs that role models innovation for the rest of the world. This framework should allow U.S. companies not only to compete in the global market but also lead and drive global UAV innovation.

It is possible to both improve safety and promote American innovation involving advances in drone technology. However, a federal government approach that is overly prescriptive regarding the deployment of new hardware and software will deter the private sector's ability to invent and compete in the marketplace.

In addition, privacy is of paramount importance for the public's acceptance in understanding the widespread UAV operations in all environments.

Protection of privacy has always been built into the fabric of Intel. Intel has embraced the Fair Information Practices Principles, FIPPs, as the Global Foundation for Privacy Protection to foster technology innovation. With respect to drones, the FIPPs can be applied to the drone platform in the collection, usage and distribution of data.

As Intel and others innovate and then integrate those innovations into UAV platforms it will be critical to have a seamless and effective regulatory structure in place that supports such innovation.

Approval processes that can stretch close to a year should be dramatically streamlined. Many commercial uses of small UAVs should be allowed without filing requirements just as hobbyists' use is permitted today.

Without the right regulatory balance, we risk delaying the social and societal benefits and U.S. economic opportunities. A recent study estimates over a 10-year span UAV integration with national airspace will count for $82 billion in job creation and growth.

Thank you for conducting this hearing and for giving Intel the opportunity to testify in this exciting field of drone technology which, with modern regulations in place, will transform our society into a safe and responsible fashion.

Thank you very much.

[The Statement of Mr. Walden follows:]

**********INSERT**********

Mr. Burgess. Chair thanks the gentleman.

Professor Villasenor, your 5 minutes, please.

STATEMENT OF JOHN VILLASENOR

Mr. Villasenor. Good morning, Chairman Burgess, Ranking Member Schakowsky and members of the subcommittee. I thank you very much for the opportunity to testify today.

The views I'm expressing here are my own and do not necessarily represent those of any of the organizations I am affiliated with.

Today, an unmanned aircraft can refer to everything from a small toy helicopter that might cost only $10 to a jet-powered Global Hawk which can weigh 15,000 pounds and cost over $100 million.

There are solar-powered unmanned aircraft that can stay aloft in the stratosphere for weeks at a time and hobbyist quad copters that may only weigh only a pound or two and have flight durations measured in minutes.

The Nano Hummingbird, developed by California-based AeroVironment under DARPA funding, weighs only two-thirds of an ounce including an onboard video camera, and that is technology that is now almost half a decade old.

In 2013, a team of Harvard researchers reported the successful flight of the RoboBee, a robotic insect that weighs less than one-three-hundredth of an ounce.

These examples underscore the incredible variety in unmanned aircraft and the near impossibility of predicting how this technology will evolve in the future.

An additional complicating factor is the same unmanned aircraft platform can play many different roles. For example, a small quad copter weighing one or two pounds in the hands of a professional videographer would be considered a professional platform.

That same unmanned aircraft in the hands of a hobbyist is a hobbyist platform and that same platform in the hands of a 10-year-old child might be considered a toy.

Another issue and one that falls squarely under the jurisdiction of this committee is that far more than in the past unmanned aircraft are becoming consumer products.

In the event of a defect creating a safety hazard, this creates some complex potential overlaps between agencies such as the FAA on the one hand and the Consumer Products Safety Commission on the other hand.

For unmanned aircraft that are marketed as consumer products there is certainly a role for consumer protection. I believe the Consumer Products Safety Commission recognizes this. In fact, a search of recalls on the CPSC website shows that they have been very active in issuing recalls related to consumer unmanned

aircraft products.

Of course, no one would suggest the CPSC should have jurisdiction over a Global Hawk or that they should be involved in developing regulations governing flight operations.

But precedent makes it clear that with respect to product safety the CPSC will be in the mix and in fact has already been in the mix for quite a few years when it comes to consumer unmanned aircraft.

As consumer unmanned aircraft offerings continue to grow, there will be an increased need for coordination between the CPSC and the FAA.

For example, there will be some UAS products that serve both consumer and nonconsumer markets. The safety issue with one of those products might be initially reported to the FAA and not the CPSC or vice versa.

The good news is that the CPSC has proven adept at addressing an extremely broad range of products in the past and there is every reason to believe it will be capable of addressing the growing number of consumer unmanned aircraft product offerings that fall within its jurisdiction.

In closing, I would like to express my appreciation to the subcommittee for holding this series of hearings on disruptive technologies including the unmanned aircraft being discussed

today.

With rapidly changing technologies there can sometimes be a tendency to over regulate and in doing so to inadvertently stifle innovation, impede future growth or infringe civil liberties.

To ensure a balanced approach when contemplating new policy solutions addressing these technologies, I think it is important to take a full accounting of existing frameworks, some of which can be more applicable than might initially be apparent.

Integrating unmanned aircraft into the national airspace system will open up a host of socially and economically beneficial applications.

In addition, that integration will help ensure continued American leadership not only in aviation but also in related sectors such as robotics.

I am confident that with the proper mix of education, self regulation and government oversight the overs helming majority of commercial and hobbyist unmanned aircraft operators will fly safely and in a manner respectful of privacy and property rights.

Thank you again for the opportunity to testify on this important topic.

[The Statement of Mr. Villasenor follows:]

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Mr. Burgess. The chair thanks the gentleman.

Professor Kaminski, you are recognized for 5 minutes for the purpose of an opening statement.

STATEMENT OF MARGOT KAMINSKI

Ms. Kaminski. Good morning, Chairman Burgess, Ranking Member Schakowsky~~i~~ and distinguished members of the subcommittee. Thank you very much for the opportunity to testify today on unmanned aircraft systems, or drones.

I am a professor of law at the Ohio State University Moritz College of Law and an affiliated fellow of the Information Society Project at Yale Law School.

However, as a fellow panelist, the views I am expressing today are my own. In my testimony I am going to focus primarily on the impact of drones on privacy, which is a crucial aspect, as many members recognize, of consumer protection.

For drones to be publically accepted and fulfill their economic potential, citizens must be able to trust that the surveillance powers drones have will not be abused.

Drones will be used for a wide variety of economically and socially beneficial activities ranging from infrastructure inspection to precision agriculture. In the best scenarios, drones will reduce risks to human actors and enable important information gathering at a low cost.

But it is precisely these beneficial aspects of drones that they enable low cost low risk information gathering that also

raise the spectre of privacy harms.

While many uses of drones will have little to no impact on human populations, a wide variety of commercial applications will take place in residential environments where citizens' expectations of privacy have been recognized to be at their highest.

AUVSI, in its analysis of the first 1,000 commercial UAS exemptions granted by the FAA noted that over half of the exemptions were granted for general aerial photography, real estate uses, which quintessentially impact residential areas, followed with a third of the exemption, 350 exemptions.

Drones do raise privacy concerns on a spectrum with other technologies. Like smart phones, they make surveillance more pervasive by lowering its cost and raising the rate of social adoption.

Like GPS, they make surveillance more persistent -- that is, able to follow individuals over longer periods of time. And like helicopters, they enable surveillance from disruptive vantage points.

Drones thus raise privacy problems both because of what they carry and where they carry it. Where a person used to be able to rely on a privacy fence, remote location or building height to manage their social accessibility, drones disrupt the use of

these environmental management tactics that we all rely on.

These disruptions have real social costs. Not only may citizens fear drones or even shoot them down but they will alter their behavior in ways that can be truly socially harmful. Surveillance has been shown to cause conformity, and conformity has costs to both democracy and the economy.

Multiple states have, as a consequence, recently enacted privacy laws governing drones operated by nongovernmental actors.

These laws are often but not always technology specific, addressing drones but not other kinds of surveillance, and ~~they typically gather --~~ they typically govern the moment of actually surveillance when information is collected, not data privacy practices after the information has been gathered.

The content of these laws range widely. At this point, I counted nine or ten states that have enacted them. They range from protecting from the moment of gathering in any location to protecting only gathering information on private property, which is a limited value when you consider where drones can fly.

Privacy protection is crucially important but governing drones also implicates First Amendment interests. Drone journalism is a budding field. News gatherers will be able to and will use drones to gather information about droughts, land management and government actions, all information that enables

democratic self-governance and raises significant First Amendment concerns.

A number of courts of appeals have now recognized a limited First Amendment right to record. The scope of that right is still very much up for question. And for this reason, I actually caution the federal government against enacting legislation that governs information gathering by drones by private actors.

Courts will need time to unravel the tension between the state privacy laws and countervailing First Amendment interests. In the meantime, federal energy can better be turned towards the data privacy issues that drones and similar new technology like the Internet of things raise.

Drone surveillance implicates not just information gathering but data privacy. State drone privacy laws do not attempt to govern this data and this, I believe, is the place for federal action.

The information privacy harms raised by drones sit, again, on a spectrum with other familiar technologies. It shares features with online surveillance. Information privacy harms will largely arise when large amounts of information are correlated, used out of context or used in a discriminatory fashion.

Drone surveillance crucially differs, however, from online surveillance in that the surveillance subject will not be the

person who clicks through a user agreement.

Like the Internet of things, drones raise the question of how to govern information privacy when then surveillance subject has no relationship to the product manufacturer or service provider.

Our current data privacy regime based on requiring companies primarily to comply with their own privacy policies is ill equipped to address issues raised by the Internet of other people's things.

A federal data privacy regime based instead on the Fair Information Practice Principles, or FIPPs, embraced internationally would protect the privacy of citizens who are not subject to user agreements, would bolster FTC authority in this area and would provide a backdrop of encouraging industries to establish best practices even when they have few incentives based on consumer relationships.

To close, I support and have been participating in the Department of Commerce's efforts through the National Telecommunications Infrastructure Agency to establish and recommend best practices governing drone use and privacy.

In the absence of federal data privacy law, however, industry is unlikely to agree to meaningful protection for third parties and in the absence of meaningful privacy protections drones will

not get off the ground.

Thank you very much for your time and attention and the opportunity to testify today.

[The Statement of Ms. Kaminski follows:]

**********INSERT**********

Mr. Burgess. The chair thanks the gentlelady.

Mr. Wynne recognized for 5 minutes for an opening statement, please.

STATEMENT OF BRIAN WYNNE

Mr. Wynne. Thank you, Chairman Burgess, Ranking Member Schakowsky. Thank you very much, members of the subcommittee for the opportunity to participate in today's hearing on unmanned aircraft systems.

I am speaking on behalf of the Association for Unmanned Vehicle Systems International, the world's largest nonprofit organization devoted exclusively to advancing unmanned systems and robotics.

UAS have a significant impact on our society and economy already and will continue to do so in the future. From inspecting oil pipelines and filming television shows and movies to providing farmers with aerial views of their crops, the applications of UAS are virtually endless and they enable researchers, public entities and businesses to do things safer and more cost effectively.

UAS industry is poised to be one of the fastest growing in American history. The AUVSI numbers have already been referenced by several of the speakers.

There is no question that under the right regulatory environment that these numbers could actually go higher. However, we are disappointed that the FAA missed the September 30th, 2015

congressionally mandated deadline for UAS integration and it still has yet to finalize a small UAS rule for commercial operations.

As we wait, American businesses and innovators are left sitting on the sidelines or are operating under a restrictive exemption process. Let me explain.

Under the small UAS rule, until the small UAS rule is finalized the primary way commercial operators may fly is through an exemption process.

In May 2014, the FAA announced it would consider granting exemptions for low-risk commercial UAS applications under Section 333 of the 2012 FAA Modernization and Reform Act.

Currently, the FAA has more than 2,400 pending requests and has granted more than 2,200 exemptions to businesses. According to AUVSI's report on the first 1,000 exemptions businesses in more than 25 industries representing more than 600,000 jobs are now using UAS.

These companies contributed about $500 billion to the U.S. economy in 2014 and provide essential services to citizens across the nation.

For example, Texas businesses have received 82 approvals to fly commercially. More than a third of these companies are real estate businesses such as Austin-based Boyd & Boyd Properties.

The Associated General Contractors of America represents 26,000 member companies in the construction industry. Some are using UAS to improve project planning and execution.

These are only a couple of examples but it is easy to see the far reaching benefits UAS will add. But while some businesses are flying, the current system of case by case approvals isn't a long-term solution.

Meanwhile, some of the requirements under the exemption process are more onerous than those contemplated in the draft's small UAS rule.

For example, the exemptions typically require UAS operators to hold at least a sport pilot certificate. The draft's small UAS rule, however, would require commercial operators to pass an aeronautical knowledge test every two years.

In addition to helping the UAS industry thrive, putting the small UAS rules in place will provide the necessary tools and training to create a culture of safety around the use of UAS.

As more commercial operators are certified or certificated, they will join the long standing aviation community, which I have been part of for more than 20 years as an instrument rated general aviation pilot.

They will foster the aviation community's principles of airmanship and self-policing to promote safety and help thwart

careless and reckless operations. And because safety is essential for all users, AUVSI, in partnership with the Academy of Model Aeronautics and the FAA, last year developed the UAS safety campaign Know Before You Fly to educate newcomers to UAS, many of whom have no aviation experience about where they should and shouldn't fly.

AUVSI also serves on the Department of Transportation's Task Force on Registration. This collaborative effort to develop an efficient process for UAS registration should lead to increased accountability across the entire aviation community.

Under the FAA's draft small UAS rule, commercial operators would be required to register their platforms. Extending this to consumer UAS users will help promote responsibility and safety.

UAS technology is at an exciting and pivotal stage. It is developing rapidly with new applications being introduced nearly every day and at a rate much faster than it takes to develop the necessary regulations.

We need to ensure that the FAA adopts the proper framework to keep up with the rapid development of U.S. technology and to maintain the safety of our airspace.

Thank you again for the opportunity to speak today.

[The Statement of Mr. Wynne follows:]

This is a preliminary, unedited transcript. The statements within may be inaccurate, incomplete, or misattributed to the speaker. A link to the final, official transcript will be posted on the Committee's website as soon as it is available.

**********INSERT**********

Mr. Burgess. The chair thanks the gentleman and there are votes on the floor.

I am happy that we made it through all the openings statements. We will take a recess until the conclusion of this vote series. So until then the subcommittee stands in recess subject to the call of the chair.

[Whereupon, the above-entitled matter went off the record at 10:56 a.m. and resumed at 11:43 a.m.]

Mr. Burgess. I call the subcommittee back to order and once again thank you all for your testimony. Thank you for being patient with us.

We have moved into the question and answer portion of the hearing and I want to begin that by recognizing Mr. Harper from Mississippi five minutes for your questions, please.

Mr. Harper. Thank you, Mr. Chairman.

Thank you to each of you witnesses that are here. This is such an important topic. Unmanned aerial systems, often called UAS, remotely piloted aircraft or drones or whatever the name, have certainly benefited the U.S. military immensely through surveillance, reconnaissance and combat missions.

As has been the case throughout history, technologies developed for the Department of Defense have tremendous potential for commercial and civilian applications as well.

However, to do so it will be essential that we safely integrate these systems into the national airspace, which is not an easy task, as you each know.

While UAS has applicability in almost all areas which require the collection of data, I believe that there are really three areas which justify specific mention. Specifically, these are support for critical transportation and logistics infrastructure, emergency response such as search and rescue and wildfires.

Finally, one area which is already showing I think possibly the greatest potential is precision agriculture. These are the applications.

With the use of the technology within these applications is staggering and each should be a reminder to us that the safe integration of UAS into the national airspace should be our highest priority.

I am pleased that the Federal Aviation Administration has chosen Mississippi State University, which is in my district, as the lead for its center of excellence for unmanned aerial systems relying on Mississippi State University and its 21 collaborating academic institutions along with over 100 industry partners to provide the research necessary for this integration.

It is critical that we move quickly to execute this research so that we can address such critical issues as sense and avoid

technologies, airworthiness, remote sensing, beyond line of sight operations, cyber security and low altitude operations to enable this industry to thrive.

Following in that theme, I would like to focus my questions on FAA's role as we move forward and I will start with you, Mr. Wynne, if I may, and ask you do you believe that the FAA has adequately defined the roadmap for UAS integration.

Mr. Wynne. Yes, sir. I think there is a good roadmap available and actually a tremendous amount of work that has been done in the unmanned aircraft systems, ARC, Aviation Rulemaking Committee.

So we know what the work is that needs to be done. I don't that it is properly funded today. I think the center of excellence is doing excellent work.

We have test sites as well that are out there -- not very well funded, not funded at all, indeed, by the federal government. I think it is going to be really important to move forward on that roadmap to identify equivalent level of safety.

There is going to be research and development that needs to be done. The center of excellence will do some of that through its partners. We are participating in that as well.

The test sites were essentially stood up for that purpose. But the FAA has to direct that. They have to -- and in some

instances they need to be able to fund some of that with, of course, appropriate industry resources as well.

Mr. Harper. Great. Mr. Wynne, there are clearly research priorities that can enhance the safe integration of UAS into the national airspace.

What do you believe are the highest priorities in that regard that should be addressed?

Mr. Wynne. Well, the two that come to mind immediately, of course, are sense and avoid. If I am not on the aircraft and I can't see it I need to miss it.

So the question is ~~what kind of ---~~what kind of technologies can we use for that and, you know, there is on board radar for things that are flying at the flight levels and the military has been utilizing very successfully to keep manned and unmanned aircraft separated from one another for quite some time now in theater.

But we need to be able to develop those technologies. There are some great technologies that are coming along for sense and avoid at the lower levels for smaller aircraft that are less energy intensive and less costly.

C2 communications also very important. Lost link procedures -- these are the kinds of things that we need to work on first and are being worked on.

Mr. Harper. Thank you very much, Mr. Wynne.

Mr. Villasenor, the FAA must define requirements for UAS integration into the national airspace without being so prescriptive as to stifle innovation. How might it do so?

Mr. Villasenor. Well, I think it is -- first of all, I think it is an extremely hard task so I have a lot of respect for the work that the FAA is doing.

I think it is important to take full account of the innovation in the ways of using unmanned aircraft that are going on not only in the commercial community but also in the hobbyist community as well because that is traditionally and I'm sure in the future where so much of our innovation comes from and it is important not to impede that community in terms of their innovation.

Mr. Harper. Thank you very much, and my time is expired almost, Mr. Chairman, so I yield back.

Mr. Burgess. The gentleman yields back. Chair thanks the gentleman. The chair recognizes the Gentlelady from Illinois, Ms. Schakowsky, 5 minutes for questions please.

Ms. Schakowsky. Thank you.

Professor Kaminski, I wanted to ask you something. We are always trying to balance, for example, national security and privacy issues.

You also raised First Amendment versus privacy issues and

you believe that there is a federal role for us to play. You did list, I think, four states in your written statement that have some laws that are technology specific, et cetera.

So if you could elaborate a bit on what are the arenas in which the federal government ought to consider regulating drones?

Ms. Kaminski. Absolutely. Thank you, Congresswoman.

So the state laws that are being put into place primarily govern the capture of information with the drone, best described as drone photography or drone videography, and that is the moment at which the information is recorded.

On the federal level, it would be useful to have in place a data privacy regime meaning a regime that deals with information that has already been recorded and addresses things along the lines of use specification, making sure that data that has been gathered for one use is not used for another purpose, trying to ensure transparency for consumers, trying to ensure some kind of auditing mechanism so the data is not taken out of context or used in a discriminatory manner.

So the place for federal government, I believe, is in the general purpose nontechnology specific data privacy regime that complies with the Fair Information Practice Principles, or FIPPs.

Ms. Schakowsky. Mr. Walden, in the demonstration you showed the safety feature so that they don't bump. But you also said

and it isn't saved.

But certainly that kind of thing in fact could be saved, right? And so we could have even better photographs of who is avoiding the drone and, I mean, how -- what assurances do you think there are that that information isn't saved?

Mr. Walden. No, I think it's an absolutely -- it's a great question.

The way that we designed this technology is really for, again, detection and avoidance for an operator that is flying a drone and so right now the technology is actually built specifically with a circuit that only does that three-depth mapping and does not save it.

So you'd actually have to go in and completely modify not only the camera but the interface that we provide for that.

Now, that said, drones clearly could have a camera that is attached to it that isn't part of the sense and avoid circuitry or technology. And so clearly, you know, we as a company continue to advocate and support privacy.

I am quite proud of the IUs that Intel has amongst both privacy, security as well as safety.

And so we have a very strict regimen~~t~~ of how we create, design and actually productize these things that have to go through a third party review board internal to Intel to ensure that we don't

break any of those.

Ms. Schakowsky. A third party within Intel?

Mr. Walden. Correct.

Ms. Schakowsky. So, again, Professor Kaminski, is that a real concern?

Ms. Kaminski. I appreciate Intel's forthrightness on the programs that they have instituted and from conversation with them appreciate the amount to which they have taken privacy considerations to heart internally.

However, effective auditing mechanisms usually involve a third party outside of the company as opposed to a third party within a company.

Ms. Schakowsky. So that issue of -- I guess it is immediate. When does that erasing happen? It is automatic?

Mr. Walden. It is actually not captured. It has a buffer in there. So it only lasts for a few seconds, essentially. So it doesn't even store that with regards to this camera, again.

And I do agree and we do utilize, by the way, third parties to come in and audit to ensure that we are doing safe practices and following that. So I absolutely agree with Professor Kaminski there.

Ms. Schakowsky. But some sort of a legislative regime, and I heard you, Professor, you are saying we want to be cautious or

maybe that is not the right word even. We want to do the right -- strike the right balance. I wondered if you wanted to comment on that.

Mr. Villasenor. Yes. I am fully appreciative of and share many of the concerns that have been raised about potential abuses of not only this technology but many others with respect to privacy. ~~My only -- w~~What I am adding is that I think that in addressing those we need to be careful not to inadvertently impede uses that have absolutely no privacy consequences at all inadvertently. So I think it is important to be aware of unintended consequences.

Ms. Schakowsky. What would that be?

Mr. Villasenor. Well, for example, if there is a state law that prohibits photography of private property, does that mean if I am, you know, 3,000 feet up and I want to just take a picture out of an airplane as it is coming in for landing at an airport, I am sitting in a commercial plane I can certainly do that and no one has a problem with that.

If that same pictures is acquired by an unmanned aircraft it would seem inconsistent for that to be unlawful. In fact, it is probably First Amendment violation to make that unlawful. So those are some of the examples of some of the constraints I worry about.

Ms. Schakowsky. Okay. This is a really interesting area that we have to navigate to get it right. Thank you very much.

Mr. Burgess. Gentlelady yields back to chair.

Thanks to the gentlelady. The chair recognizes the gentleman from New Jersey, Mr. Lance, 5 minutes for questions.

Mr. Lance. Thank you. Good morning to the panel.

To the law professors, are there state laws currently on the books regarding all of this?

Ms. Kaminski. There have been -- I listed it in my written testimony. Four states -- I believe there have been 9 or 10 states that have enacted privacy laws regarding private actor use of drones but they vary greatly depending on which state you are in.

Mr. Lance. And to the distinguished law professors, do you believe that we should take action here and should that action supersede state law or should there be a regimen where there is both state law and some law here at the federal level?

Ms. Kaminski. I believe that on the information gathering front, the moment at which information is captured, that is appropriate for states to experiment with legislation in large part because it is similar to areas in which states have legislated in the past such as the privacy torts or related torts or misdemeanor such as the peeping tom torts.

When you are talking about privacy governance, however,

that's an appropriate place for the federal government to step in and those two regimes could absolutely be complementary to each other rather than preemptive.

Mr. Lance. I was taught tort law by John Wade, who was the reporter for the restatement and he is deceased. I think what would he have done in this situation. It just shows the advancing nature of American society, world society and how a new tort might actually come into play.

Professor?

Mr. Villasenor. Yes, and just to make sure the record is straight, my primary affiliation is actually not in the law school at UCLA and I think there is ~~-- you know, there is~~ express federal preemption in Title 49 that says that the air space of the United States is under the exclusive control of the United States.

Mr. Lance. Of the United States, yes.

Mr. Villasenor. Right. And so I do have some concerns to the extent that state laws, in some cases, would purport to create a bit of a conflict there.

One of the most important and interesting questions, and it relates very directly to the privacy question, is this tension in some sense between where a property owner's control over the space enveloping his or her property -- where that stops and then where the control of the federal government starts.

I don't really think there is much of a role for state airspace in there. I think it is really between the property and the federal government.

But the complexity is the trespassing and the invasion of privacy torts and common law of the torts and the criminal and civil statutes are, of course, at the state level and that would be where you worry about things like, you know, right on your property.

So it's a complex mix of federal, state and laws.

Mr. Lance. Thank you. Does the panel have any recommendations regarding what I mentioned in my opening statement, that there were recently violations near sensitive sites, oil refineries and one of the major airports in this country?

And of course there have been violations as has been mentioned by the ranking member here in Washington including at the White House? Does the panel have any recommendations for us in that regard?

Mr. Walden. So let me start.

Mr. Lance. Mr. Walden, yes.

Mr. Walden. Absolutely. I think that technology, as it continues to progress and you utilize that such as geofencing, which enables you to use altitude GPS as well as other sensors,

you can actually create no-fly zones and implement them into drones or into other --

Mr. Lance. That can be built into the technology?

Mr. Walden. Correct. And it exists today in some drones.

Mr. Lance. Very good. And then I guess it does not exist in the drone that is here on the table?

Mr. Walden. Actually, it does because what you do is you program out certain areas. So, for example, in Santa Clara where we are we happen to be located in a -- within the San Jose Airport --

Mr. Lance. I see.

Mr. Walden. -- space. I cannot fly a drone. It won't allow me to start the drone.

Mr. Lance. I see. So that drone could not fly over the White House?

Mr. Walden. This particular drone is a prototype so this one isn't even for sale. But as far as the commercial drones that we --

Mr. Lance. I was going to ask my wife to buy me that for Christmas.

Mr. Walden. Sorry. Not available yet.

Mr. Lance. Not available.

Mr. Walden. There may be other ones.

Mr. Lance. I see. Anyone else? Mr. Wynne.

Mr. Wynne. Yes, thank you.

I am a big fan of technology and but I don't think it takes the place of airmanship which I mentioned in my testimony and I think we have a big challenge right now. I am not fond of the distinction but, you know, there is a big challenge between hobbyists, producers, consumers and commercial operators.

~~We don't --~~ I represent predominantly the commercial operators here and right now we are restricted from flying except by exemption. So we want to change that in a big hurry.

My point simply is the sooner we have certificated operators up and running, much like in all of aviation it's a self-policing community.

If my ticket is at stake because someone who is doing something that is putting the use of UAS at risk because of being careless or reckless, I am going to want to say something about that and the FAA will never have enough enforcement personnel to be everywhere nor do they need to be for general aviation or for commercial aviation.

We are a self-policing community.

Mr. Lance. My time has expired. Thank you very much to the entire panel.

Mr. Burgess. Chair thanks the gentleman. The gentleman

yields back.

Chair recognizes the gentleman from Oklahoma 5 minutes for questions, please.

Mr. Mullin. Thank you, Mr. Chairman, and I may be going at this a little bit different than most because the thought of more regulations just hurts my head.

But at the same time what is the point of more regulations if you can't enforce it. And sir, you just made a point of that -- it's self-regulated almost.

But there is got to be something done. I mean, the technology -- Mr. Walden, I hear what you say that it is built in but any technology that can be programmed in can also be programmed out. And unfortunately that not may be that particular unit but you can get online. I can Google right now online and get a kit to build myself.

I couldn't build it but there's a lot of people out there that could. So how do we actually enforce it? How do we actually police it? Because in our communities, and I come from very rural communities, they are useful.

I mean, we can check pastures. We can check cattle. We can check fires. We can check areas that we couldn't even normally get to. We'd have to horseback into it and we can -- we can go into. And so they are very useful, but at the same time very

dangerous.

And so I guess my first question would be how would you guys propose even looking into legislation that would be reasonable to enforce?

Mr. Wynne. Well, just for clarification I was arguing in favor of regulation.

Mr. Mullin. Well, I know what you're saying but it doesn't do any good to be -- to just self-police. All that does -- a guy isn't or a gal isn't born a robber and it's an opportunity that creates them to be a thief, right. And the first time you break the rule you'll break the second one too. The hardest lie is the first lie.

Mr. Wynne. I agree with you and there is no technology that can be devised, you know, for mal-actors.

So I think my point simply is that there has to be consequences to flying recklessly and carelessly and right now there -- up until now, until very recently when we started talking about registering hobbyists, all drones essentially below or above a certain cut line that we would call toys, which is what's currently being contemplated and worked on by a very good task force, there was no consequence essentially to flying other than carelessly and recklessly. And it is very difficult for the FAA to enforce that.

What I am arguing is that as a community we stand for safe and responsible flying ~~and we need --~~but we need rules under which --

Mr. Mullin. I get that. So from the community what do you propose? I mean, if the lawmakers get involved in this, come on, we're going to screw this up.

None of us are experts in the field. What we're wanting is outside information. What the chairman is doing here is holding a hearing to find out information for us to build safely and reasonably an act, some type of regulation to be proactive and not reactive.

We're asking the community -- we're asking professionals like you to come in and help us find this out so we don't pick winners and losers because that's what we do.

Mr. Wynne. The first thing is we need the small UAS rule finalized and implemented as quickly as possible. That is the lowest risk possible flying imaginable.

Under 500 feet away from people, away from airports, within visual line of sight by a certificated operator. There is no reason why we can't get that done soon and we need to get it done --

Mr. Mullin. So how would that be enforced?

Mr. Wynne. I am arguing that basically people will, that

are certificated, will be economically incentivize to enforce their own rules and as is currently the case with -- you know, we are not going to be doing things that essentially put our livelihood at risk.

Mr. Mullin. Yes, but not everybody works with them. They are a toy. I mean --

Mr. Wynne. I am talking about commercial operations.

Mr. Mullin. I understand that. But I am talking about the commercial operator is going to be affected by the few bad apples that is going to be in it.

And is there technology that exists? Is there even a way to create the technology to self-monitor that? Professor?

Ms. Kaminski. Yes. So technology is not my area of expertise but I have talked to a number of technologists working on this issue including at my own university and I think that the geofencing technology that was raised by Intel is something that is a potential solution for good actors.

There are concerns that geofencing, if applied too broadly, is going to end up restricting use of technology that would be beneficial. So keep that in mind.

When you are talking about bad actors, however, then the kind of technological solutions you're going to look for are going to have to do with traceability on the one hand to try to identify

the actor who is operating the drone.

There are a variety of possible technical solutions for traceable -- making drones traceable and writing of their side of a drone with a sharpie is not a technological solution.

And the other point I'd make is that I believe there is significant of money going into counter drone technology that is supposed to try to stop bad actors safely when we're talking about those that don't integrate geofencing or traceability into their own operations.

Mr. Mullin. Thank you. My time has expired.

Mr. Chairman, I yield back.

Mr. Burgess. Chair thanks the gentleman. Gentleman yields back.

I will now recognize myself for 5 minutes for questions. And Mr. Walden, just very briefly, do you at Intel have cyber security solutions to prevent unauthorized users from controlling your device?

Mr. Walden. Yes, we do, and we actually -- once again, security is another area where we hold that very highly as part of our values together with privacy.

And so ~~-- I'm sorry --~~ from a cyber security perspective it's connected technology such as UAVs, clearly, will be subject to cyber tax and we know that is going to happen and we just need

to be one step ahead and continue innovating.

We haven't implemented a security development life cycle which is subject to technologies to industry best practice testing.

It is important that UAVs are subject and then tested alike and we are committed to doing that and working with agencies and others to help move that forward.

Mr. Burgess. Well, thank you for that. I would remind you I try to stay one step ahead of very clever and very nimble people who have no end of great ideas on how to thwart things that we think are good safeguards to put in place.

Mr. Walden. Yes, sir.

Mr. Burgess. Mr. Wynne, I just wanted to ask you, like you I am -- I am no longer current but I am a licensed general aviation pilot, instrument rated.

I appreciate your comments about -- in the some type of certification and knowledge of airspace maps. And I guess if I'm understanding some of the other testimony it's possible to program one of these drone devices so that it could not enter, say, Class B airspace.

And where I live in Lewisville, Texas, the southern part of the city of Lewisville, is in the area that is regulated from the surface to 10,000 feet around DFW Airport. So do I understand

that concept correctly?

Mr. Wynne. Yes, sir. And prohibited airspace and restricted airspace and there was an announcement yesterday of one of the solutions that would do that literally real time with the drone.

Mr. Burgess. Now, part of -- when you first start flying you fly under visual flight rules, see and avoid and what Mr. Walden has shown us this morning is kind of a new -- a new take on that.

I mean, there is see and avoid technology that they have built into this, something that looks enormously helpful and beneficial if I'm understanding it correctly. Would that be your take also?

Mr. Wynne. Absolutely, sir. To the extent that we can perfect sense and avoid, detect and avoid technology I don't know why we wouldn't deploy that on all aircraft.

Mr. Burgess. I wondered the same thing.

And then Professor Kaminski and Mr. Walden, a question for both of you. We do spend a lot of time up here talking about privacy and it is important but in this situation in particular comes to mind whose privacy is it.

Professor Kaminski, you referenced a First Amendment right to record. Did I hear that correctly?

Ms. Kaminski. Yes.

Mr. Burgess. So you have a right to record, and I understand that has been challenged sometimes. People have gotten into some difficulty recording just with an Iphone on the street recording an altercation or police activity. But there is that right to record.

Ms. Kaminski. It's a developing right. A number of circuits have recognized it in a restricted way. So generally it's been recognized as a right to record matters of public interest or public officials, yes.

Mr. Burgess. So then this pushes the boundary of public access, I guess. You fly a drone over your neighbor's back yard and take a picture of their barbecue to see who's there, perhaps a political figure, perhaps whoever, criminal figure, and who has the right of privacy in that instance? Is it the backyard owner or is it the drone owner?

Ms. Kaminski. Right. So I'm going to actually add in the right to privacy for the drone owner is implicated by a registration system, right, so the national registration system that the FAA is putting in place ostensibly makes it hard to operate a drone in private, right.

So the -- in the scenario that you gave California has an anti-paparazzi law that creates a constructive invasion of privacy.

When you look into an area you previously could not have accessed but for physical trespass. So there are these attempts at the state level to define privacy in those scenarios that it will stand up against any assertive First Amendment right to record.

Mr. Burgess. Because that -- I mean, that actually has happened with recording celebrity wedding and then that type of things.

So Mr. Walden, are you looking at technology that would fit with that paradigm or is it just -- that just too hard and we'll have to leave that up to the local sheriffs and enforcers?

Mr. Walden. I'd say that we don't have the answer. We are developing our technologies in ways to protect consumer privacy.

We are working with the NTIA on privacy best practices. We do agree that it's an issue and we don't have the answer right now but we absolutely are open to working together in finding a technological solution.

Mr. Burgess. Unlike anything else, the technology is proceeding much more rapidly than this humble subcommittee. But we do welcome the opportunity to hear from all of you.

We want to keep this communication, this conversation going because this is not a -- obviously, not a completed product.

Are there any other members that wish any additional time

for questions?

Seeing that there are no further members wishing to ask questions, I do want to thank each of our participants.

Yes. Absolutely. The gentleman is recognized.

Mr. Mullin. I just want to follow up real quick. Maybe not follow up, kind of change directions just a second.

First of all, I got to brag a little bit on our state. University of Oklahoma -- actually, I'm sorry, Oklahoma State University -- I apologize. That's where I went to school. I should have got that right. There's a big -- little bit of a game coming up in a few weeks.

Anyways, we -- you know, they have been the leader in this for quite some time. In fact, they offered the first graduate degree for UAS and we're proud of that.

I also, at the University of Tulsa, which -- give me a second here, I got to brag on my nephew, he plays football for them, Kyle McLaughlin -- they have an advanced study going in right now -- and Mr. Walden, this is for you -- that at the University of Tulsa they are in the process of looking at cyber security space.

Is there a concern with cyber security? I know they have been looking into vehicles lately. But now they switched it to the UAS and I am concerned about it from some of the briefings that we've received.

Have you have any reason to raise concerns on this yet?

Mr. Walden. So we are actually working with multiple universities in cyber security. We actually have sponsored the chair at University of Florida where they have set up a cyber security --

Mr. Mullin. Why Florida? Why not Oklahoma?

Mr. Walden. Pardon? We might be working with Oklahoma. I'm embarrassed to say I'm not sure.

But yes, I think that, you know, we have recognized years ago that cyber security is an area where you need to continually stay ahead and, as I think Mr. Burgess mentioned, the bad guys are going to continue trying to go fast than we are and we are looking to universities and partnering with them on ways of preventing cyber security attacks.

Mr. Mullin. Good.

Mr. Villasenor. I was just going to add that, one, cyber security is an extremely important theme and one that is applicable to the Internet of things in its entirety and what I often say is that connectivity has outpaced security.

So in the rush to create things that are highly connected sometimes we find that there are unintended linkages that -- no one intentionally left these holes there but they're there nonetheless and they are always found and they are always

exploited.

So it's an incredibly important thought and one that we should do our best to stay in front of. But even then it's going to be impossible to get 100 percent correct.

Mr. Mullin. Okay. That's it. I yield back. Thank you.

Mr. Burgess. The chair thanks the gentleman.

Oh, gentleman from Vermont recognized for 5 minutes.

Mr. Welch. Thanks very much, Mr. Chairman.

Thanks for that flight, by the way. After the committee is over let's have a little fun -- get those things revved up.

Thanks so much for coming in. One of the things that we had recently was an incredible natural disaster in Vermont -- tropical storm Irene, nearly a billion dollars worth of damage. A lot of folks stranded.

And it just seems -- I'm sorry, I missed some of the hearing but it seems obvious that drones could be very useful in an emergency situation getting some information that's really relevant to first responders to families.

And I wonder if -- I'll start with you, Mr. Walden, if you want to comment on how you see drones as being a useful tool in the wake of catastrophic events.

Mr. Walden. I agree 100 percent, and not only for catastrophic events but also the ability for a single operator

to fly multiple drones in a safe manner to also help. Otherwise, you're going to have lots and lots of people doing it.

So I think back to -- we need to, you know, with the regulatory committees in enabling single operators to fly multiple drones as well as line of sight -- out of line of sight because in the case of natural disasters you're going to need that technological capability.

Mr. Welch. Okay. Professor, how do I say -- Villanor? No, no, I'd like to do it right.

Mr. Villasenor. Villasenor.

Mr. Welch. Villasenor. Thank you.

Professor Villasenor, are there any legal impediments to being able to exploit the drone technology in the situation of the catastrophic --

Mr. Villasenor. Well, certainly, there is regulatory impediments. For example, beyond line of sight, autonomous flight is something which is nowhere near being -- you know, there is not a regulatory framework for doing that any time that I can see in the immediate future.

And that is, as Mr. Walden pointed out, that is going to be essential, for example, to deploy a set of unmanned aircraft to sweep through an area that might be miles away from the people controlling it. So that's an important area.

Mr. Welch. All right. Is that something that would -- I guess we can talk about that after. Thank you.

You know, in addition a lot of folks like the recreational use of drones but they can be, as you pointed out I think, benefits to consumers in many contexts such as real estate surveying, property maintenance, farming, insurance claims management. They could -- the drones could minimize potentially the time and cost for consumers and businesses in all of those sectors.

Has anyone of you studied the economic benefit of drones to consumers? Mr. Wynne.

Mr. Wynne. It's difficult to actually capture it. The forecast that we're operating with today, which is currently being updated, of $82 billion in economic impact over the first 10 years, once we have integration into the national air space system, does not contemplate those -- the value added to consumers specifically.

That is just specifically in our community. So the value to the agricultural sector to existing business models, whether it's insurance or utilities or construction, et cetera, that's on top of that economic forecast.

If I might, sir, I'd also thank you for your question about disaster relief. We currently have Global Hawks flying off the east coast of Africa collecting data for hurricanes and doing

hurricane hunting that, you know, a little bit safer and a little bit more comfortable to be on the ground and actually penetrate --

Mr. Welch. Thank you. I've got one more minute so thank you very much for that. I thought I'd ask Professor Kaminski a question.

You know, there is great commercial and consumer interest in drones. That interest has surged. There's a number of questions that have come up about what the limits are, what the regulations need to be.

Do you have any opinion as to whether it makes sense for the GAO to study current and potential commercial benefits of drones?

Ms. Kaminski. I think that would be useful, especially if there is some way of categorizing what the different kinds of uses are and how the uses impact or don't impact human populations.

Mr. Welch. I thank you all. I thank you, Mr. Chairman, and yield back.

Mr. Burgess. Chair thanks the gentleman. Gentleman yields back.

Seeing no other members wishing to ask questions, again, I want to thank each of you on the panel for participating in today's hearing.

This is a preliminary, unedited transcript. The statements within may be inaccurate, incomplete, or misattributed to the speaker. A link to the final, official transcript will be posted on the Committee's website as soon as it is available.

Before we conclude, I would like to include the following documents to be submitted for the record by unanimous consent -- a statement for the record from the Motion Picture Association of America. Without objection, so ordered.

[The information follows:]

**********INSERT**********

Mr. Burgess. Pursuant to committee rules, I remind members that they have 10 business days to submit additional questions for the record and I ask the witnesses to submit their responses within 10 business days upon receipt of the questions.

Without objection, the subcommittee is adjourned.

[Whereupon, at 12:18 p.m., the subcommittee was adjourned.]