

A world map with a blue and white color scheme, showing continents and oceans. The map is centered on the Atlantic Ocean and serves as a background for the top half of the slide.

Kansas UAS Conference

**Unmanned Aircraft Systems
Roadmap to the Future**

Michael Toscano

President & CEO

Association for Unmanned Vehicle Systems
International (AUVSI)

Discussion Topics

- About AUVSI
- UAS Industry Outlook
- Current Legislative Landscape

About AUVSI

AUVSI's mission is to advance the unmanned systems and robotics community through education, advocacy and leadership.

AUVSI's vision is to improve humanity by enabling the global use of robotic technology in everyday lives.

- In its 41st year, AUVSI is the ***world's largest non-profit association*** devoted exclusively to unmanned systems and robotics
 - Air, Ground and Maritime
 - Defense, Civil and Commercial
- AUVSI represents more than ***7,500 members***, including ***more than 600 corporate members*** from more than ***60 allied countries***
 - We add a new corporate member every 3.2 days
- ***Diverse membership*** from industry, government and academia

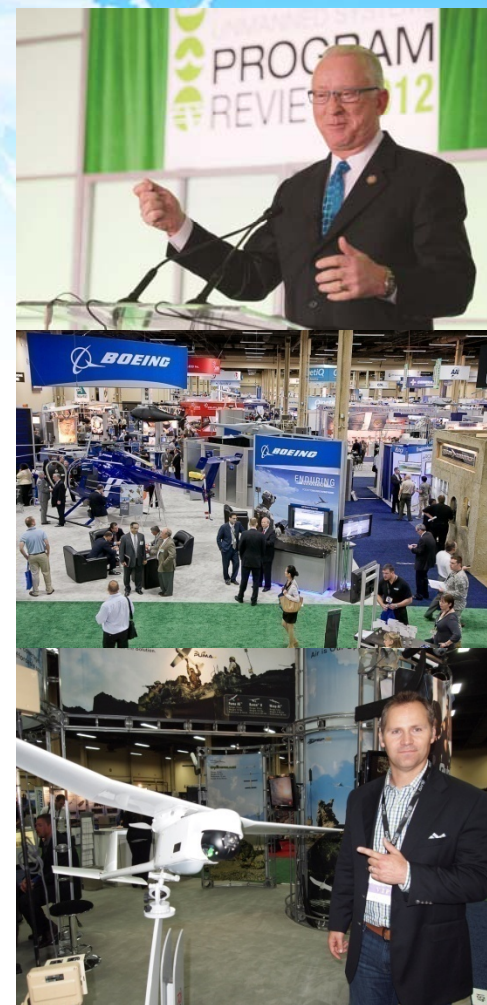
AUVSI Events

- **AUVSI's Unmanned Systems Symposium and Exhibition (Orlando, FL, 12-15 May 2014)**
 - The World's Largest Unmanned Systems and Robotics Event
 - 8,000 Delegates and 600 Exhibitors from more than 40 Countries
 - Renowned keynote speakers from industry and government
 - 100+ other presentations, panels, workshops and posters
 - Air, Ground and Maritime system demos
 - International pavilions
- **AUVSI's Unmanned Systems Program Review (Washington, DC, 4-6 November 2014)**
 - Military and Civilian Government Agency Updates on Unmanned Systems Programs



AUVSI Events Cont.

- **AUVSI Hill Day: National Robotics Week (Capitol Hill, 2nd Week April)**
 - Meetings and Reception with Members of Congress and Staff
- **AUVSI's Driverless Car Summit**
 - Dedicated to understanding and working to solve the core challenges impacting driverless vehicle integration onto tomorrow's roadways.
- **AUVSI's Unmanned Systems Europe Conference (Köln, Germany, 15-16 October)**
 - Brings international UAS leaders from Europe together to address the most important trends, advancements and information impacting the UAS industry in Europe.
- **Global Reach and Participation in Events** in Australia, Canada, Europe, Asia, South America, the Middle East and the United States
- **Webinars, Roundtables, Workshops and more**



AUVSI Advocacy



- AUVSI advocates for the interests of the entire unmanned systems community with Members of Congress, the FAA, and other stakeholders

- **House Unmanned Systems Caucus**, Co-chaired by Reps. McKeon (R-CA) and Cuellar (D-TX) which has more than 50 members.

- **Senate Unmanned Aerial System Caucus**, Co-chaired by Senators Inhofe (R-OK) and Manchin (D-WV), which already has 7 members.

- Testifying at Congressional hearings

- AUVSI hold numerous events on Capitol Hill every year to educate Members of Congress and their staff

- AUVSI works with other US federal agencies (DHS, DOJ, DOD, NASA, USGS...)



www.auvsi.org

AUVSI Products and Services

■ Publications

- *Unmanned Systems Magazine* – readership of 18,000
- *Mission Critical* – more than 250,000 individual page views
- eBrief – distributed to more than 40,000 individuals

■ Communications

- Media Outreach
- Public Awareness and Education Campaign
 - www.increasinghumanpotential.org
- Social Media
 - LinkedIn Group – 8,700 members
 - Twitter – more than 3,800 followers
 - Facebook – 2,300 followers

■ Knowledge Resources

- Knowledge Vault
- Market Reports
 - US Jobs Report
- Unmanned Systems & Robotics Directory
 - More than 3,800 platforms



UAS Industry Outlook

www.auvsi.org



What is an Unmanned Aircraft System (UAS)

- **There is nothing unmanned about an unmanned system!**
- What are they called:
 - Unmanned Aircraft System (UAS)
 - FAA and Congress
 - Unmanned Aerial Vehicle (UAV)
 - Remotely Piloted Aircraft Sys (RPAS)
 - ICAO and Air Force
- Public perception is somewhat skewed:
 - Drones
 - Military
 - Hostile
 - Weaponized
 - Autonomy



Unmanned Systems Potential Applications



Border Security

Arctic Research

Firefighting

Flood Monitoring

Crop Dusting

Mining

Farming

Aerial Photography

Real-estate

Communications

Industrial Logistics

Pollution Monitoring

Storm Research

HAZMAT Detection

Asset Monitoring

Event Security

Port Security

Construction

Cargo

Broadcasting

Search & Rescue

Volcanic Research

Pipeline Monitoring

Filmmaking

Crowd Control

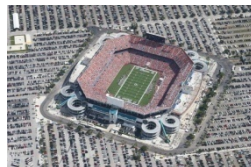
Aerial News Coverage

Wildlife Monitoring

Forensic Photography

Power line Surveying

Damage Assessment

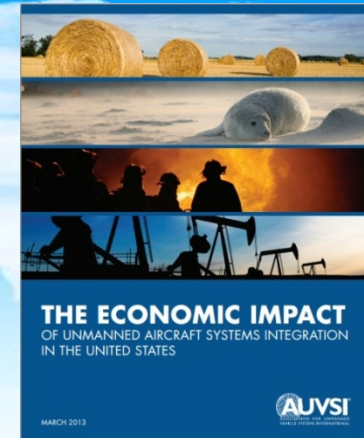


UAS Economic Potential

- AUVSI's 2013 Economic Report:

- www.auvsi.org/econreport

- The UAS global market is currently **\$11.3 billion**
 - Over the next 10 years, the UAS global market will total **\$140 billion**
 - The economic impact of US airspace integration will total over **\$13.6 billion** in the first three years and will grow sustainably for the foreseeable future, cumulating to more than **\$82.1 billion** between 2015 and 2025
 - Every year that airspace integration is delayed will cost the U.S. over **\$10 billion** in lost potential economic impact, which translates to **\$27 million** per day



UAS Industry on the Rise

AUVSI Economic Impact Study of UAS Integration

- **Nationally:**
 - >70,000 jobs in the first three years following integration
 - >100,000 jobs after 11 years
- **Kansas**
 - First three years following integration:
 - 2,515 jobs
 - \$489 million in economic impact
 - In the 11 years following integration:
 - 3,716 jobs
 - \$2.94 billion in economic impact



Additional economic benefit will be seen through tax revenue to Kansas, which will total more than \$29 million, in the first 11 years following the integration..

UAS Job Potential

- US airspace integration will create **more than 34,000 manufacturing jobs** and **more than 70,000 new jobs** in the first three years
- By 2025, total job creation is estimated at **103,000**.
- The manufacturing jobs created will be high paying and require technical degrees.

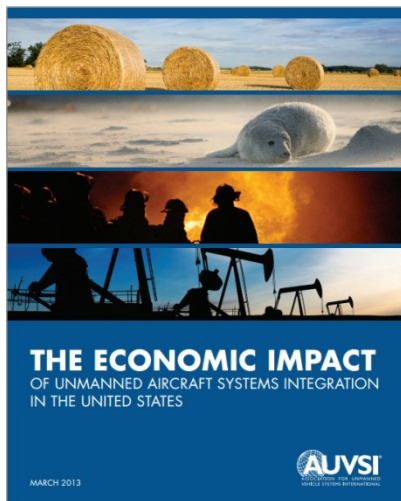
UAS Job Salary Information	
Position	Annual Salary Range
UAS Pilot	\$85,000–\$115,000
Systems Engineer	\$72,350–\$127,000
Instructor/Training Specialist	\$74,500–\$93,000
Intel/Imagery Analyst	\$57,350–\$84,600
Maintenance Specialist	\$59,500–\$67,500
Sensor/Payload Operator	\$69,300–\$89,450
Manufacturing	\$45,700–\$67,890
Consultant	\$70,500–\$145,000

UAS Industry on the Rise

Precision agriculture totals approximately **80%** of the potential commercial market for UAS

- Drought management
- Disease detection
- Watering
- Spraying pesticides

UAS in agriculture has the potential to have an **\$11 billion** economic impact in the first three years following integration. Almost **\$66 billion** over 11 years.

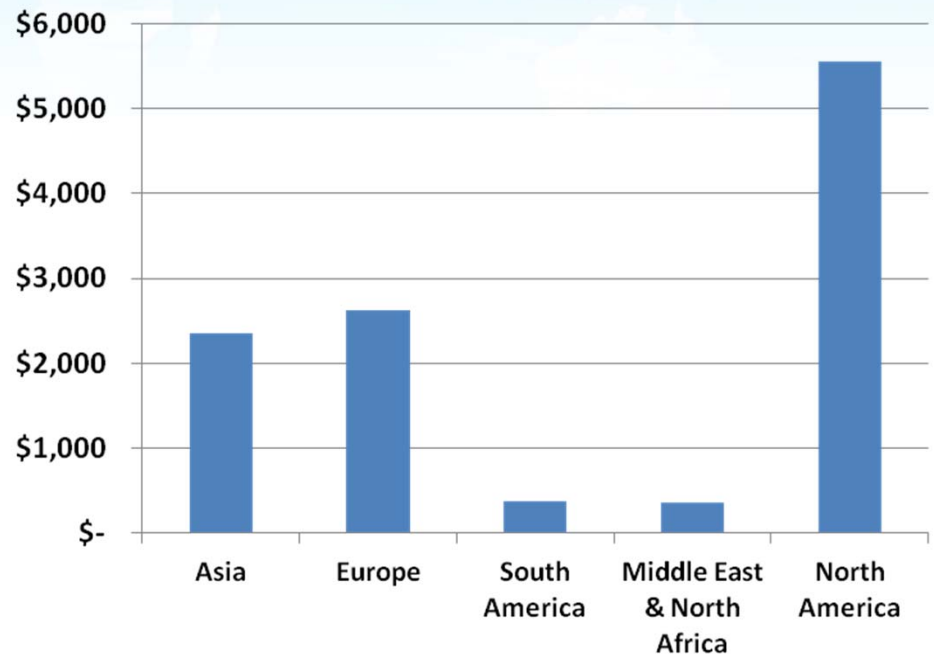


“Precision application, a practice especially useful for crop farmers and horticulturists, utilizes effective and efficient spray techniques to more selectively cover plants and fields. This allows farmers to provide only the needed pesticide or nutrient to each plant, reducing the total amount sprayed, and thus saving money and reducing environmental impacts.”

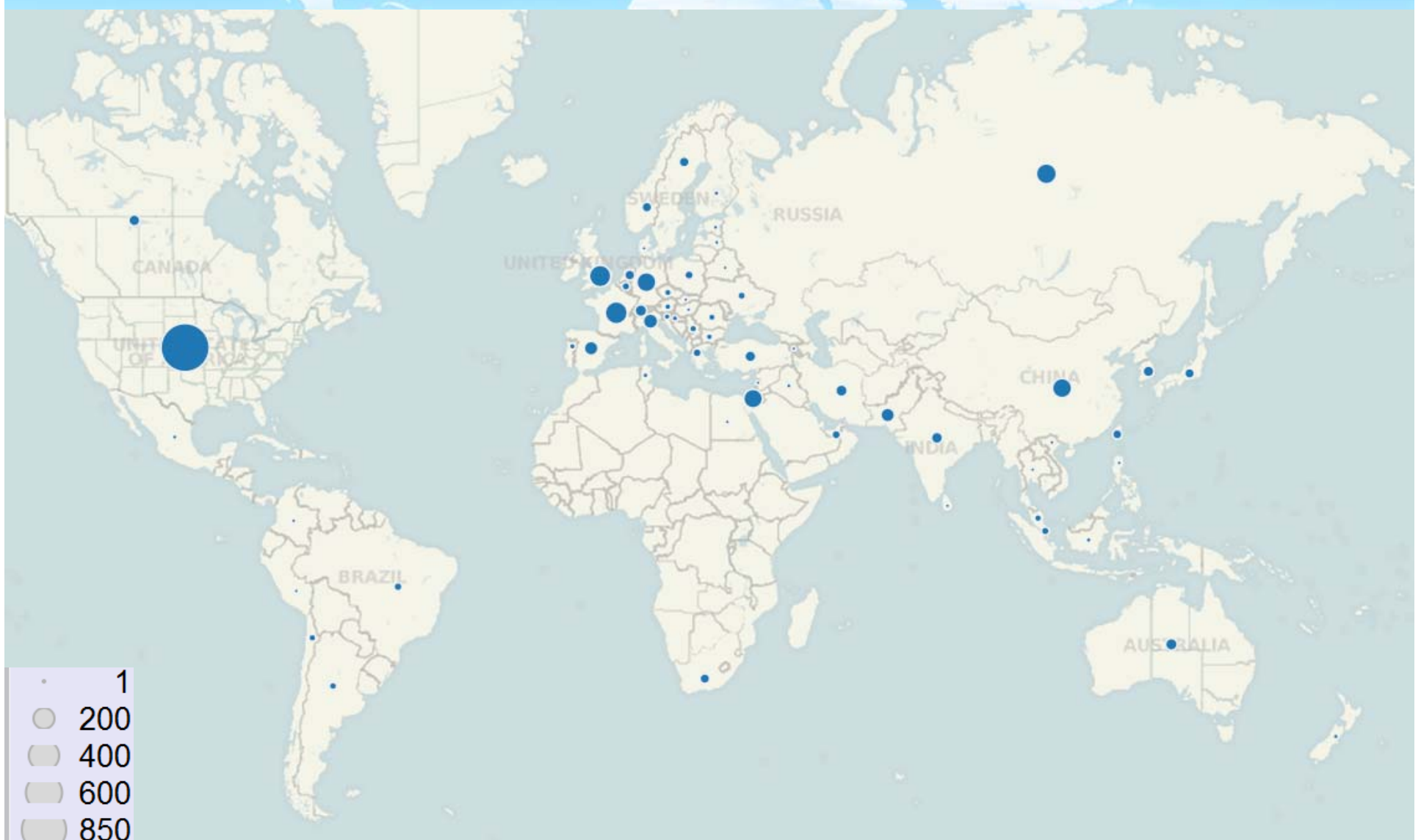
AUVSI UAS 2013 Forecast

- **UAS global defense spending** is expected to be **\$11.3 billion** in 2013
- Defense spending will not grow as it has in the last 10 years
 - Likely to stagnate over next several years
 - Defense spending will increase in 5-10 years as commercial systems drive capability, reliability, and price points
- As legislation barriers lessen over next several years, commercial spending will exceed defense spending
 - Current commercial UAS use vary greatly between countries, limited by legislation
 - Countries that delay airspace integration will lag in technology development and manufacturing, relying on imports to gain UAS benefits
- Over the next 10 years, **total UAS spending will reach \$140 billion**
www.auvsi.org

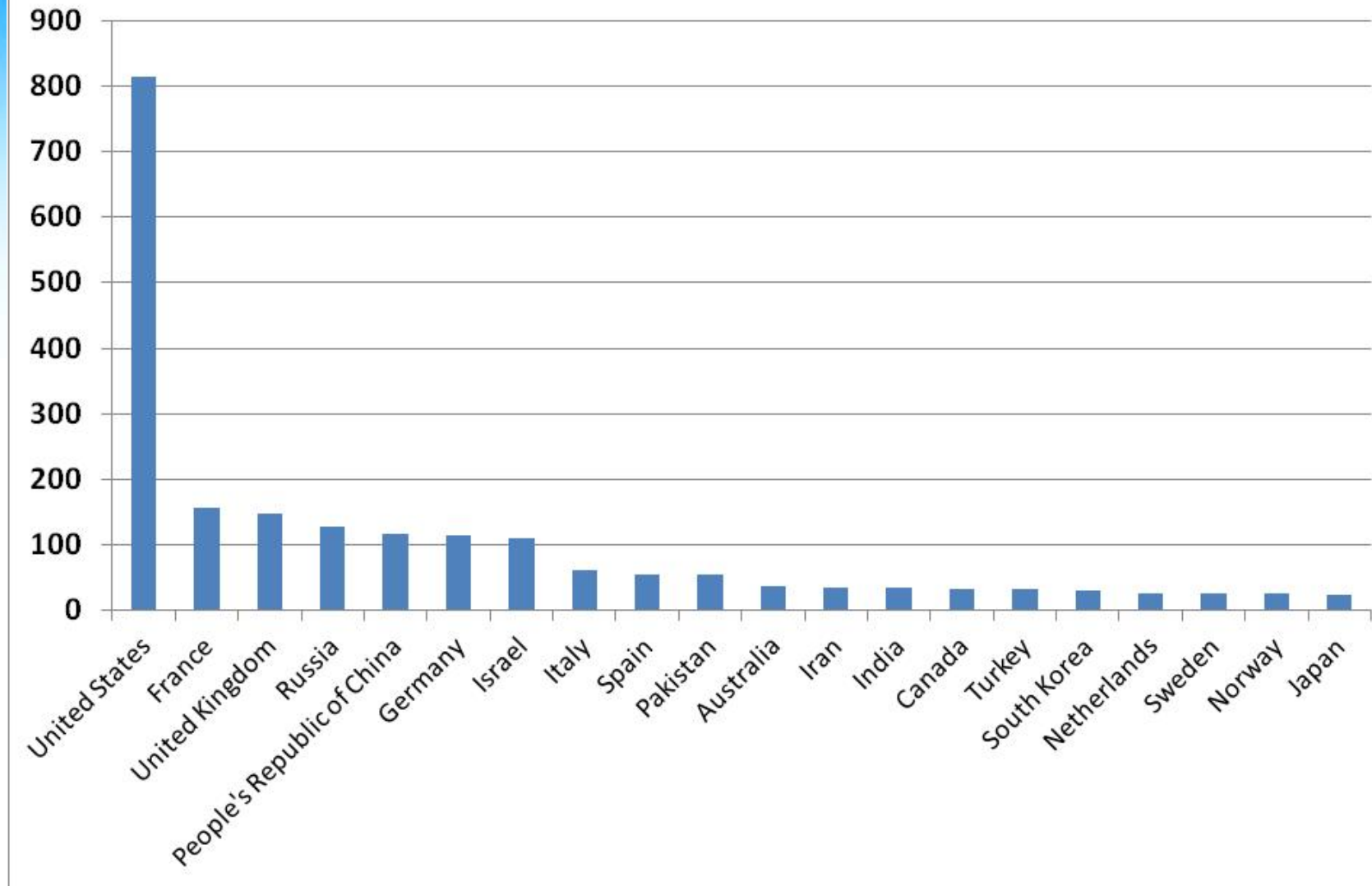
2013 UAS Defense Spending (\$M)



Unmanned Air Platforms – Geographic Distribution



Top 20 Countries Developing UAS: Total Platforms



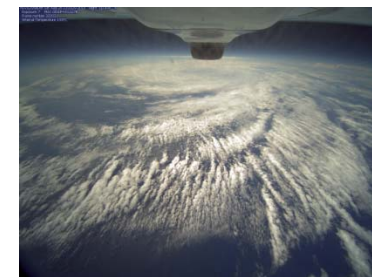
Recent Examples of UAS Use

- UAS credited with first live save in **vehicle rollover** in **Canada**
- **Japan** is using unmanned helicopters for **spraying crops** for pest control
- Predator B aircraft provided aerial surveillance for **Yosemite National Park** wildfire
- **CBP** Predator surveyed **flood waters** in the upper Midwest
- **USGS** used small UAS to monitor Sandhill cranes, Pygmy rabbits and several other **wildlife species**
- **NOAA** using UAS to **monitor ice** and **weather conditions** in the U.S. Arctic, in addition to **wildlife monitoring**
- **Police** using small UAS for **public safety**



Recent Examples of UAS Use

- Aurora Flight Sciences is using the Skate UAS to study **archeological sites** in **Peru**
- **Nepal, Russia, South Africa, Thailand** testing UAS to save **endangered animals** from **poachers**
- **Nicholls State University** testing UAS to **map coastline**
- **Colorado State University, Univ. of Oklahoma** testing UAS to fly into **tornados**
- **NASA** launched three UAS into smoke plume of Turrialba volcano in Costa Rica
- **Kansas State University, Virginia Tech University** using UAS for **agriculture research**
- **New Caledonia** using UAS for **nickel ore mine mapping surveys**



Emerging Commercial UAV Uses

Agriculture

- UAV use for crop-dusting minimizes possibility of fatalities
- Manned crop-dusting costs up to \$8.00 per acre, compared to UAV crop-dusting for just \$2.00 per acre



News Media


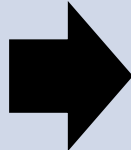
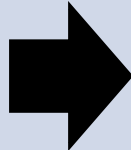
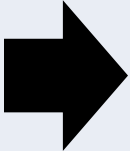

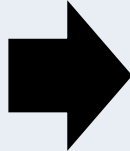
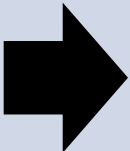
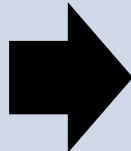

- Over \$200 million spent in media helicopter gasoline every year
- 2007: two news helicopters collide in Phoenix, Arizona; four passengers killed

Wildlife Monitoring

- 2011: 25-year veteran pilot dies in crash while conducting wildlife survey
- Flights can cost upwards of \$200,000 every year
- UAVs well equipped to monitor wildlife



Finding Opportunity

Cost	Service	Risk
		
		
		

Federal Legislation in 2013

H.R.972: Preserving Freedom from Unwarranted Surveillance Act of 2013
Sponsor: **Rep Scott, Austin [GA-8]** (introduced 3/5/2013) Cosponsors (None)

H.R.637: Preserving American Privacy Act of 2013
Sponsor: **Rep Poe, Ted [Texas-2]** (introduced 2/13/2013) Cosponsors (11)

H.R.1083: No Armed Drones Act (NADA) of 2013
Sponsor: **Rep Burgess, Michael C. [Texas-26]** (introduced 3/12/2013) Cosponsors (1)

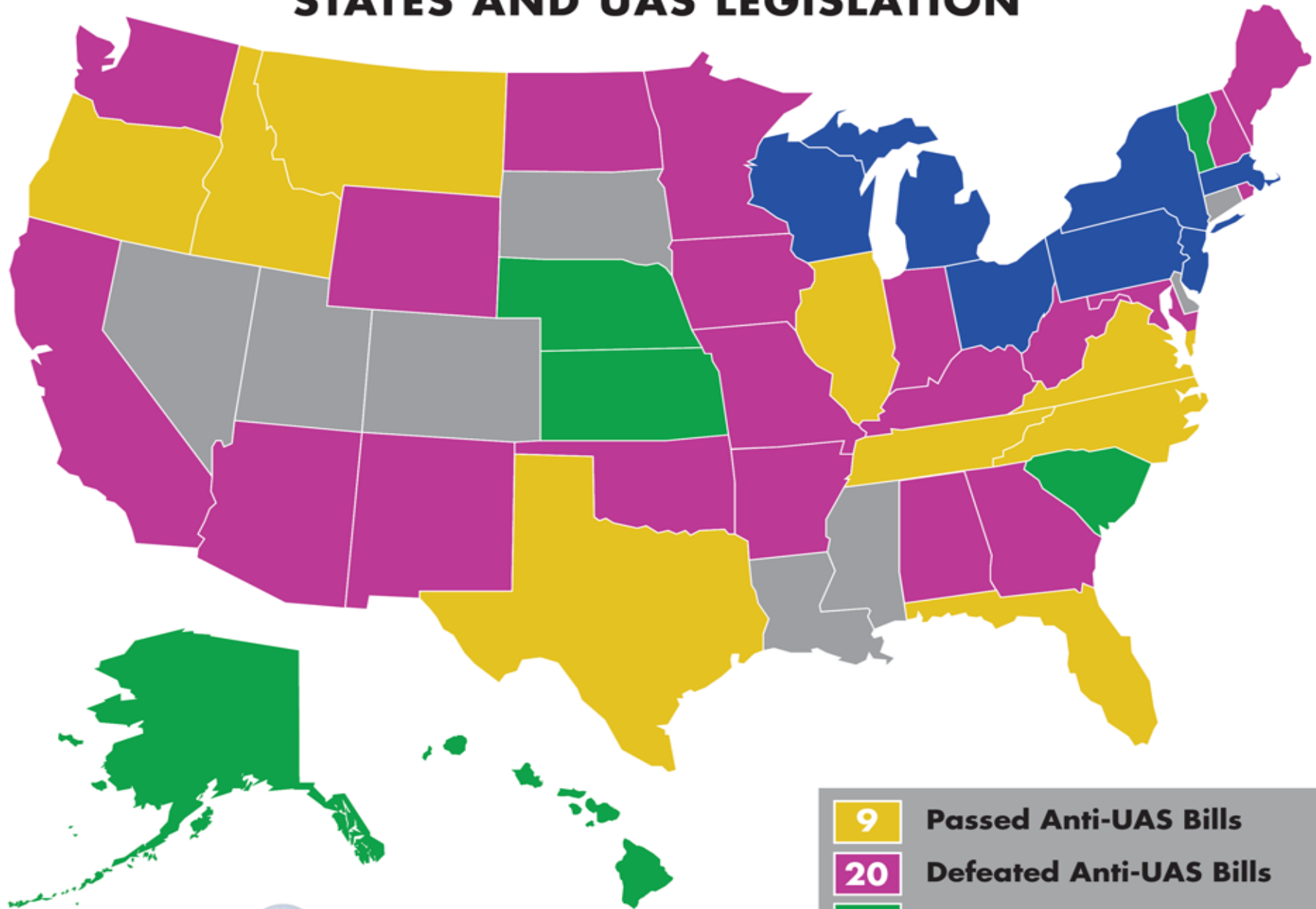
H.R.1242: To prohibit the use of drones to kill citizens of the United States within the United States.
Sponsor: **Rep Ribble, Reid J. [Wis.-8]** (introduced 3/18/2013) Cosponsors (2)

S.505: A bill to prohibit the use of drones to kill citizens of the United States within the United States.
Sponsor: **Sen Cruz, Ted [Texas]** (introduced 3/7/2013) Cosponsors (3)

H.R.1262: To amend the FAA Modernization and Reform Act of 2012 to provide guidance and limitations regarding the integration of unmanned aircraft systems into United States airspace, and for other purposes.
Sponsor: **Rep Markey, Edward J. [Mass.-5]** (introduced 3/19/2013) Cosponsors (None)

H.R.637: Preserving American Privacy Act of 2013
Sponsor: **Rep Poe, Ted [Texas-2]** (introduced 2/13/2013) Cosponsors (11)

STATES AND UAS LEGISLATION



9	Passed Anti-UAS Bills
20	Defeated Anti-UAS Bills
6	Resume Activity Jan. 2014
7	Legislation Still In Play

UAS Test Sites

- Establish a program for **Six UAS test sites**
 - On 14 Feb (the one year anniversary of the FAA bill) the FAA released it's Request for Proposals
- **25 Applicants from 24 Different States**
- Each applicant must file seven (7) documents on different deadlines, which will be scored, outlining:
 - Safety Plan
 - Experience
 - Risk Mitigation
 - Existing ground infrastructure
 - Airspace design
 - Economic impact assessment
 - Privacy plan
- The FAA is expected to pick the winners by December 31, 2013
- **The FAA will lower scores for states that have passed restrictive UAS legislation**

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AUVSI's Position on UAS Privacy

All stakeholders can work together to advance UAS technology, while protecting Americans' safety, as well as their rights. AUVSI supports:

- **Transparency Measures**

- Register unmanned aircraft and pilots with the Federal Aviation Administration (FAA)

- **Prohibiting Weaponization**

- The FAA already prohibits the deployment of weapons on civil aircraft

- **Data Retention Policies**

- Governing the collection, use, storage, sharing, and deletion of data
- Policies should be available for public review and comment
- Policies should outline strict accountability
- AUVSI supports the International Association of Chiefs of Police model guidelines

- **Accountability**

- The Fourth Amendment already protects against unreasonable searches
- People should be prosecuted for violating privacy laws

- **Technology Neutral Laws**

- Any new laws or regulations should focus on whether the government can collect and use data, not how it is collected

Questions?

Michael Toscano
President & CEO
AUVSI

toscano@auvsi.org
www.auvsi.org



Back up Slides

AUVSI: Strongly Supporting Privacy

- AUVSI believes we can expand the use of unmanned systems safely and responsibly without infringing Americans' Constitutional rights
- AUVSI encourages an open dialogue with ALL stakeholders
 - Met with more than a **dozen privacy groups**
 - Met with over **200 Congressional offices**
- Privacy Panel at conferences
- Testified at a Congressional hearing on privacy
- Given more than 400 media interviews
- Working with numerous law enforcement agencies
 - IACP, NSA, ALEA, NTOA, DOJ, DHS
- **Privacy is NOT the FAA's responsibility**



AUVSI Code of Conduct

- In July 2012, AUVSI released the industry's first ever **"Code of Conduct"** which emphasizes
 - Safety
 - Professionalism
 - Respect
- The Code of Conduct explicitly supports individual privacy
 - "We will respect the privacy of individuals."
 - "We will respect the concerns of the public as they relate to unmanned aircraft operations."
 - "We will support improving public awareness and education of the operation of UAS."

"I think it's really important that they're paying attention to privacy. That's to their credit."

- Chris Calabrese, American Civil Liberties Union, 7/2/12

Emerging Application Snapshot: Agriculture

Applications for Unmanned Aircraft in Agriculture

Aerial Application/Crop Dusting	Remote Aerial Surveying
Disease Detection and Mitigation	Crop Harvesting
Parasite Monitoring	Yield Estimation
Moisture Monitoring	Weed Infestation Monitoring
Crop Growth Monitoring	Asset tracking & Management
Livestock Tracking	Crop Inventory Tracking
Disease outbreak tracking	Harvest Optimization
Fertilizer Management	Soil Erosion Monitoring



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