Unmanned Aircraft Systems: Issues and Opportunities

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AUVSI Twin Cities Chapter
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 42\textsuperscript{nd} year, AUVSI is the \textit{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 \textit{7,500 members}, including \textit{more than 600 corporate members} from more than \textit{60 allied countries}
  - \textit{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 55 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

www.auvsi.org
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 Automated Vehicle Symposium 2014**  
  (15-17 July, San Francisco)  
  • Dedicated to understanding and working to solve the core challenges impacting driverless vehicle integration onto tomorrow's roadways.

- **AUVSI’s Unmanned Systems Europe Conference**  
  (Brussels, 3-5 March 2015)  
  • 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**

www.auvsi.org
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...)
AUVSI Advocacy

- **567** Media Interviews in 2013
  - Up from **276** in 2012
- **650** Media Mentions in 2013
  - Up from **364** in 2012
- UAS Roadshow
- Oklahoma, DHS RAPS program
- Kansas, Precision Agriculture
- Washington, NOAA wildlife monitoring
- California, NASA Dryden
- More planned….  

- [www.IncreasingHumanPotential.org](http://www.IncreasingHumanPotential.org)

- Meeting with Decision Makers
- AUVSI’ s Day on Capitol Hill
- 30 AUVSI Chapters Outreach
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 45,000 individuals

- Communications
  - Media Outreach
  - Public Awareness and Education Campaign
    - [www.increasinghumanpotential.org](http://www.increasinghumanpotential.org)
  - Social Media
    - LinkedIn Group – 9,800 members
    - Twitter – more than 5,000 followers
    - Facebook – 2,900 followers

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

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UAS Economic Potential

- AUVSI’s 2013 Economic Report:
  - 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
  - In **Minnesota**, the report found integration would lead to over **$142 million** in first three years and **730 jobs** growing to more than **$853 million** and **1,078 jobs**.
  - 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
Domestic UAS Integration Economic Impact

Total Spending and Economic Impact in the U.S. from 2015 - 2025

Total Employment Impact in the U.S. from 2015 through 2025
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."

www.auvsi.org
A 2013 market study by the Teal Group estimates worldwide UAS spending will double over the next decade from current $5.2 billion annually to $11.6 billion annually.

- Defense spending will not grow as it has in past decade
  - 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 decade, **total UAS spending will reach $140 billion**
Unmanned Air Platforms – Geographic Distribution
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
- 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
Growing Commercial Interest

- There’s enormous demand for UAS but, currently, there’s very limited circumstances under which UAS may be flown in the National Airspace System
- Several industries have voiced interest in using UAS, from Hollywood filmmakers to oil and gas companies to real estate developers
- Amazon recently announced plans to launch a ‘Prime Air’ delivery system once the regulatory framework is in place
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
Federal Legislation in 2013


3) H.R.1083 – Rep. Michael Burgess (R-TX): No Armed Drones Act (NADA)

4) H.R.1242 – Rep. Reid Ribble (R-WI): To prohibit the use of drones to kill citizens of the United States within the United States.

5) S.505 – Ted Cruz (R-TX): A bill to prohibit the use of drones to kill citizens of the United States within the United States.

6) S.1639 – Sen. Edward Markey (D-MA) Drone Aircraft Privacy and Transparency Act


12) H.R. 2217: 2014 Homeland Security Appropriations Act. Requires DHS Privacy Officer to review UAS operations to ensure they comply with existing law and all applicable privacy and civil liberty standards


Emerging Commercial Uses

- UAS hold tremendous potential to change the way that industries operate

- UAS already utilized commercially in other countries:
  - In Germany, Deutsche Post has used UAS to deliver prescription drugs
  - A Shanghai company uses them to convey cakes
  - Australian textbook-rental company, Zookal, plans to deliver books using UAS
  - Used to film scenes in "Skyfall," the latest James Bond film, as well as the Harry Potter and "Mission Impossible" films, but production had to take place overseas because of the U.S. regulations
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State Support

- State leaders continue to recognize the benefits of unmanned systems
  - "Unmanned Aerial Systems will play a large role in the future economy of Southwest Ohio… I look forward to continuing to advocate for the development and research of UAS in our region." – Rep. Mike Turner (R-Ohio)
  - "Lots of economic activity, lots of jobs, lots of national attention -- leading the way forward not just for the country but for the world in aviation." – Sen. John Hoeven (R-N.D.)
  - “It's clear to me that the tremendous potential of this technology to create jobs…cannot be overstated.” – Sen. Al Franken (D-Minn.)
  - "Within [the aerospace] industry, unmanned aircraft systems represent the fastest growing part of the aerospace sector. For that reason, Oklahoma is committed to becoming the number one place for UAS operations, research, experimentation, design and testing in the country.“ – Gov. Mary Fallin (R-Okla.)
Legislative Hearings

- **Congressional Hearings**
  - **Senate Judiciary Committee**
    - “The Future of Drones in America”
      - AUVSI testified
  - **House Judiciary Committee**
    - “Eyes in the Sky: The Domestic Use of Unmanned Aerial Systems”
      - AUVSI Suggested Witnesses
  - **House Science, Space and Technology Committee**
  - **House Transportation and Infrastructure Committee**
    - “Maritime Domain Awareness”
      - Steve Morrow (CEO of Insitu) testified on AUVSI’s behalf
      - FAA Modernization and Reform Act: One Year Later
  - **Senate Commerce, Science, and Transportation Committee**
    - Commercial UAS (Ag, Arctic, Amazon?) – January 2014
    - **House Homeland Security Committee** – January 2014

- **State Hearings**
  - Alaska, Colorado, Michigan, Kentucky, Maryland

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2013 FAA Accomplishments

- The FAA has taken some important steps to advance the integration process:
  - Commercial Arctic UAS operations -- UAS Civil Certifications
  - Common Strategy for Law Enforcement
  - RTCA SC-228 (C2, DAA) -- ASTM F38
  - ARC Implementation Plan
  - 5 Year Roadmap
  - JPDO Comprehensive Integration Plan
  - Privacy Policy for Test Sites
  - Night Operations COA for the Grand Forks, ND, Sheriff’s Dept
  - World Radio Conference Spectrum Agenda Item
  - Congressional Unmanned Systems Caucus
  - Six UAS Test Sites
UAS Test Sites

- On December 30, 2013 FAA announced the selection of six test sites:
  - University of Alaska
  - State of Nevada
  - New York's Griffiss International Airport
  - North Dakota Department of Commerce
  - Texas A&M University - Corpus Christi
  - Virginia Polytechnic Institute and State University (Virginia Tech)

- 24 states submitted applications to become an FAA test site
- FAA is working with six sites to determine operational capability and data management
- UAS Center of Excellence

**The New York Times**

*F.A.A. Picks Diverse Sites to Carry Out Drone Tests*

*U.S. cracks open skies to testing, use of aerial drones*
The industry must work to support the FAA to ensure integration occurs on schedule.

Small UAS NPRM has been delayed for more than 4 years.

Need for a regulatory framework became evident on 6 March, when NTSB Judge ruled that FAA has no authority to regulate model aircraft or UAS because the FAA has not yet adopted regulations through formal rulemaking.

Background on FAA v. Raphael Pirker:
- Swiss Citizen, Flew 5 lbs “model” aircraft doing a video for UVA in 2011
- FAA $10k fine for flying “careless and reckless”
- 27 Sept, Pirker filed a Motion to Dismiss
- 1 Nov, FAA response to Pirker’s Motion
  - “The FAA unquestionably has the authority to regulate aircraft…”
  - “Respondent appears to think that if he vigorously criticizes the FAA’s efforts to address UAS operations over time is will excuse that his operation was careless or reckless…”
  - FAA mandate is safety which isn’t just confined to “Navigable airspace”
Questions?

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