CONNECTING GLOBALLY
North Central Texas Regional General Aviation and Heliport System Plan

Unmanned Aircraft Systems Report

December 2011

UNMANNED AIRCRAFT SYSTEMS REPORT

TABLE OF CONTENTS

EXHIBITS

APPENDICES

A. GLOSSARY

Term	Description
AGL	Above Ground Level
AF	Aerospace Forecast
05-01	AFS-400 Policy Memo 05-01
APD	Arlington Police Department
AUVSI	Association of Unmanned Vehicle Systems International
ADS-B	Automatic Dependent Surveillance Broadcast
COA	Certificate of Authorization
CBP	Customs and Border Patrol
OAM	Customs and Border Patrol Office of Air and Marine
DOD	Department of Defense
DHS	Department of Homeland Security
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
MAV	Micro Air Vehicle
NAS	National Airspace System
NSF	National Science Foundation
NextGen	Next Generation Air Transportation System
NATO	North Atlantic Treaty Organization
OEAAA	Obstruction Evaluation Airports Airspace Analysis
OAM	Office of Air and Marine
RC	Remote Controlled
RPV	Remotely Piloted Vehicle
R&D	Research and Development
sUAS	Small Unmanned Aircraft System
USCG	United States Coast Guard
CBP	United States Customs and Border Patrol
UND	University of North Dakota
UAV	Unmanned Aerial Vehicle
UCAS	Unmanned Aircraft Combat System
UAS	Unmanned Aircraft System
VTOL	Vertical Takeoff and Land
VFR	Visual Flight Rules

B. PURPOSE

This report serves to provide insight into recent attention centered on future growth and use of unmanned aircraft systems (UAS) and their technology. An increasing level of national and regional interest from various entities and groups to utilize UAS, for military, civilian and commercial purposes, has prompted widespread support and criticism. Numerous commercial UAS applications exist and their use is on the rise internationally as organizations report increasing work efficiency and lower operating costs while at times reducing the risk to human life. For example, utility companies patrol pipelines and inspect oil rigs using UAS as opposed to manned aircraft. On the other hand, concerns over invasion of privacy have surfaced as local law enforcement agencies integrate this new technology into their daily operations. With the future use of UAS expected to beome more prominent, planning effectively to establish operational policies and procedures for its presence in the aviation industry is a necessity.

In this report the Federal Aviation Administration's (FAA) projected forecast of UAS and associated policies and procedures to date will be discussed in addition to an overview of UAS design categories and their respective uses. As the UAS industry breaches the civilian market, claims for potential benefits economically and environmentally – through reduced air quality emissions and noise impacts, have surfaced as well as speculation surrounding the integration of UAS into the national airspace system (NAS). The report will highlights examples of each and the potential legal and policy issues concerning UAS operations in the NAS.

Historically, North Central Texas has taken the lead in growth and development of aviation technology through examples such as the:

- F-35 Joint Strike Fighter at the Fort Worth based Lockheed Martin assembly plant
- AgustaWestland's AW-609 tilt rotorcraft at Arlington Municipal Airport
- Airport Surface Detection Equipment Model X (ASDE-X) and Airports GIS (AGIS) in support of FAA initiatives at Dallas/Fort Worth International Airport

This trend continues as regional agencies, organizations and businesses work to research UASs' capabilities to enhance operational efficiencies and capacity. Currently local and federal authorities anticipate investigating the use of, or increasing, their utilization of UAS in the region and details of each will also be covered within the report.

C. BACKGROUND

It is well known the United States has used UAS for years in combat environments requiring surveillance and reconnaissance to assist the federal government and Department of Defense in fulfilling their respective roles but the investments and the technological advances in UAS's made by military organizations have generated a growing interest in their potential use for civil, government, scientific research, and commercial applications.

Generally, UAS appeal to three major market segments: military, civilian and commercial. In response to pressing demand to certify the use of UAS technology for the latter two markets, agencies, such as the FAA, are drafting or have instituted policies and procedures dictating acceptable operational requirements. While the driving needs of each market to use UAS are substantially different, the general goal remains the same – performing airborne duties at lower operational costs while reducing risks to human life.

Currently the use of UAS in the NAS is primarily under public and civil use organizations. See examples listed in Exhibit 1.

Exhibit 1: Example UAS Operators in the NAS	
Service Aircraft with Certificates of Authorization	*Civil Aircraft with Special Airworthiness Certificates*
Department of Agriculture	Raytheon
Department of Commerce	AAI Corporation
Department of Defense	General Atomics
Department of Energy	Boeing
Department of Homeland Security	
Department of Interior	
Department of Justice	
NASA	
State Universities	
State and Local Law Enforcement	
	Source: Federal Aviation Administration

POTENTIAL ECONOMIC IMPACT OF UAS

In the past, introduction of new forms of technology has provided an opportunity for economic growth and an increase in quality of life. Personal computers, cellular phones and handheld GPS devices have greatly enhanced many facets of life while generating demand for various levels of professionals from software and electrical engineers to manufacturing specialists.

Similarly the UAS industry, and its anticipated growth, has served as an economic catalyst on national and international fronts. According to a 2011 Teal Group market study current worldwide unmanned aerial vehicle (UAV) expenditures are at $5.9 billion annually with projections over the next decade totaling $94 billion - reaching over $11 billion annually by 2021.

A specific example of the potential economic impact development of UAS technology can have on local jobs and income can be seen from data reported by the North Dakota Department of Commerce in Exhibit 2.

Exhibit 2: North Dakota UAS Economic Impact	
Benefit	*2011-2020 Aggregate*
Direct Jobs Created	142
Indirect Jobs Created	301
Total Jobs Created	**443**
Economic Activity Generated	$766,930,000
Personal Income Generated	$179,016,000
State Tax Revenue Generated	$38,090,000
	Source: North Dakota Department of Commerce

Job growth projections from the Association of Unmanned Vehicle Systems International (AUVSI) suggest integration of UAS into the NAS would create more than 23,000 jobs from 2010-2025. By comparison to other aerospace industries, the economic impact of the UAS market will have an effect on other industries such as:

- Simple and complex navigation systems
- Aircraft engines
- Software
- Imagery and camera technology
- Radar systems
- Aircraft Composites
- Sensors

Although extensive compensation data for UAS jobs is not currently available, Exhibit 3 displays a range of salaries for various positions related to UAS and its technology. As UAS are continuously integrated into the NAS' operations and airspace more demand for these types of professionals can be expected.

Exhibit 3: UAS Job Salary Information	
Position	*Annual Salary Range (USD)*
UAS Pilot	85,000-115,000
Systems Engineer	72,350-127,000
Instructor/Training Specialist	74,500-93,000
Intel/Imagery Specialist	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
	Sources: AUVSI, Department of Labor Statistics

Sagetech XPS-TR Transponder

A key example of the UAS market impacting other sectors is Kansas State University's UAS program utilizing the XPS-TR transponder, developed by Sagetech Corporation. This transponder weighs less than a cell phone, with a size comparable to a business card. In addition to being a Mode S transponder, the XPS-TR transponder includes both automatic dependent surveillance-broadcast (ADS-B) in and out capability – providing the UAS accurate detection of aircraft operating within its vicinity. The university is conducting research with their UAS, utilizing various sizes of payloads, and Sagetech's research and development (R&D) engineered a transponder meeting current and future demand within the UAS industry – reduced weight of an aircraft's component compatible with integration into FAA's Next Generation Air Transportation System (NextGen).

Dependent on determinations from the FAA's notice of proposed rulemaking, set for release early in 2012, future growth and economic impact data of UAS civilian and commercial operations will remain unclear.

D. DESIGN AND USES

The term UAS encompasses an entire system of components (see Exhibit 4). The FAA makes use of the acronym to encompass all of the complex systems including ground stations and other elements besides the actual air vehicles. Since the capabilities of UAS are inherently contingent upon onboard equipment and payloads, UAS can vary greatly in terms of size and shape.

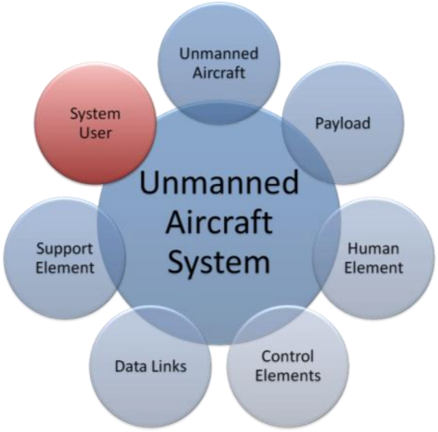


Exhibit 4: UAS Components

Of great concern to many stakeholders in the aviation community is the impact UAS may have on navigable airspace and the potential risks unmanned aircraft pose to land side infrastructure and in the sharing of airspace with manned aircraft.

A common misconception is that UAS are simple devices similar in design and function to that of remote controlled (RC) planes used by aviation enthusiasts and hobbyists. A more accurate description of UAS would identify their design as complex and sophisticated aircraft comprised of multiple components. It is important to draw a clear distinction between RC planes, and the simplicity of their platforms, compared to that of UASs.

A common link between RC planes and UAS is the fact there is no pilot on-board to navigate the aircraft. On the other hand, the technology managing the flight operations of the two types of aircraft differ greatly.

Most RC planes are restricted to flights conducted via line-of-sight whereas many UAS aircraft are engineered with the ability to fly autonomously, via way points using geographic positioning systems' (GPS), flying intentional, predetermined flight routes set by a trained UAS pilot and any assisting personnel. Furthermore, many UAS platforms can be equipped so that if the signal linking the UAS pilot and ground control station is lost the aircraft will automatically return to its departure point.

For example, the Leptron Avenger is a manufactured UAS capable of being equipped with the ability of returning to a set point, and landing safely, if it loses its contact signal with the ground control station for more than ten seconds. Another comparison worth noting is that UAS differ from missiles and other forms of weaponry through their ability to conduct sustained levels of controlled and powered flight by a piston, jet or reciprocating engine.

MILITARY

Consequently specific categorical uses of UAS exist for a variety of DOD missions including:

- Target and decoy – providing ground and aerial gunnery a target that simulates an enemy aircraft or missile
- Reconnaissance – providing battlefield intelligence
- Combat – providing attack capability for high-risk missions (see Unmanned Combat Air Vehicle)
- Research and development – used to further develop UAV technologies to be integrated into field deployed UAV aircraft

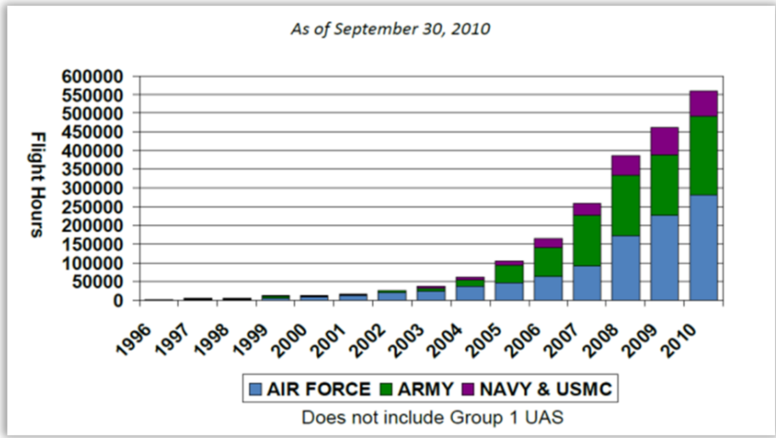
The Department of Defense (DOD) further organizes UAS categories into five groups based upon maximum takeoff weight, normal operating altitude and speed (knots indicated airspeed), as seen in Exhibit 5, in line with the evolving mission capabilities of UAS.

<table>
<tr><th colspan="5">Exhibit 5: Department of Defense UAS Categories</th></tr>
<tr><th>UAS Category</th><th>Max. Gross Takeoff Weight (lbs.)</th><th>Normal Operating Altitude</th><th>Speed (KIAS)</th><th>Example Aircraft</th></tr>
<tr><td>Group 1</td><td>0-20</td><td>< 1,200 AGL</td><td>< 100</td><td>Puma, Wasp, RQ-11 Raven</td></tr>
<tr><td>Group 2</td><td>21-55</td><td>< 3,500 AGL</td><td>< 250</td><td>RQ-21A ScanEagle</td></tr>
<tr><td>Group 3</td><td>< 1320</td><td rowspan="2">< 18,000 MSL</td><td>< 250</td><td>STUAS, RQ-7 Shadow, MQ-5 Hunter</td></tr>
<tr><td>Group 4</td><td rowspan="2">> 1320</td><td rowspan="2">Any</td><td>A160T Hummingbird, MQ-8B Fire Scout, MQ-1C Grey Eagle, MQ-1B Predator</td></tr>
<tr><td>Group 5</td><td>> 18,000 MSL</td><td>MQ-9 Reaper, RQ-4A/B Global Hawk</td></tr>
<tr><td colspan="5">Source: Department of Defense Unmanned Systems Integrated Roadmap, 2011-2036</td></tr>
</table>

The use of these aircraft have proved valuable to each mission and, in some circumstances, preserved military service members' invaluable lives.

It is well known the use of UAS and its technology has been growing steadily since the late 1990s. In Exhibit 6 the DOD's UAS flight hours for each branch of the military – Army, Air Force, Navy and Marine Corps, is reported from fiscal year 1996 to 2010. Analysis of the data indicates less than 50,000 flights hours between all four branches of the military took place from 1996-2003. From 2004-2010 the DOD's use of UAS grew annually at a rate of almost 40%. Note these values do not represent the use of Group 1 UAS, often referred to as small unmanned aircraft systems (sUAS) in the civilian or commercial markets. Increasing demands for added autonomous capabilities of UAS has driven continuous modifications and updates to UAS systems software and hardware. For example, once mission objectives are programmed into Northrop Grumman's RQ-4 Global Hawk (Group 5 UAS) the Air Force explains the UAS can "autonomously taxi, take off, fly, remain on station capturing imagery, return and land. Ground-based operators monitor the UAS's status, and can change navigation and sensor plans during flight as necessary."

Exhibit 6: Department of Defense UAS Flight Hours



Sources: Department of Defense, North Dakota Center for UAS Research

CIVILIAN

The demand for civilian use of UAS has been increasingly growing support. Outside of military and North Atlantic Treaty Organization (NATO) operations taking place in the Middle East and Africa Several public service agencies have been utilizing the capabilities of UAS with tangible examples of the value and cost effectiveness of utilization of this technology. Below are details of the successful implementation of this technology into the civilian market sector.

Federal Agency

The United States Customs and Border Patrol (CBP) UAS program focuses its operations on the CBP's priority mission of anti-terrorism through aiding in identification and interception of potential terrorists and illegal cross-border activity. The UAS program system also supports disaster relief efforts of with Department of Homeland Security (DHS) partners, including the Federal Emergency Management Agency (FEMA) and the U.S. Coast Guard (USCG).

The CBP's Predators' capability to provide high quality streaming video in advance of and following catastrophic events lends it to being an ideal aircraft for support of emergency preparations and recovery operations.

The Office of Air and Marine (OAM) also utilizes the Predator UAS to safely conduct missions with limited accessibility or those that pose a great risk to CBP manned ground or air personnel. In 2005 OAM first used the Predator UAS to support law enforcement operations on the country's border with Mexico and in 2009 progressing to a supportive role to the Canadian border.

Currently OAM utilizes three Predators from Libby Army Airfield in Sierra Vista, Arizona and two from Grand Forks Air Force Base, in North Dakota. OAM expects on continuing command and control of its Predators throughout border regions from a nationwide network of ground control stations.

Wingspan: 55 feet
Length: 27 feet
Weight: 1,130 pounds empty
Maximum takeoff weight: 2,250 pounds
Payload: 450 pounds
Speed: Cruise speed up to 135 mph
Range: Up to 770 miles
Ceiling: Up to 25,000 feet

The OAM is also able to provide emergency maritime support through the operation of two Guardian UASs flying from Cape Canaveral Air Force Station, Florida; and Naval Air Station Corpus Christi, Texas. The CBP maritime UAS provided emergency support for the 2008 Atlantic hurricane season and the 2009 and 2010 Red River floods in the Midwest.

Other Federal Agencies with UAS include:

- Washington State Department of Transportation
- National Aeronautics and Space Administration (NASA)
- Department of Agriculture
- National Oceanic and Atmospheric Administration (NOAA)

State Universities

In August 2009, under the implications described in an emergency certificate of authority from the FAA, the University of Alaska coordinated emergency response efforts with real time imagery supplied from a ScanEagle UAS. By tracking the progression of fires and hot spots for a 440,000-acre area, on board infrared sensors proved beneficial in identifying edges of the wildfires resulting in improved emergency response rate with accurate maps of the location of fires.

Researchers and responders from The Texas A&M University System announced in October 2011 the receipt of a grant from the National Science Foundation (NSF) to research the use of a "common ground" between search and rescue operators and using sUAS.

Texas A&M Engineering News reported "response professionals from the Texas Engineering Extension Service (TEEX) Disaster Preparedness and Response Division (DPR) will fly weekly at Disaster City® with researchers from the Texas Engineering Experiment Station's (TEES) Center for Robot-Assisted Search and Rescue (CRASAR), speeding the development and refinement of the natural user interface." The 52 acre Disaster City® complex features simulations of full-scale simulations such as:

- Strip Mall
- Office Building
- Industrial Complex
- Theater
- Single family home
- Train derailments

The project and research team have expressed a goal of creating an open source tablet interface for a vertical takeoff and land (VTOL) UAS – the AirRobot UK, and the Dragon Eye sUAS within 24 months. They expect to receive a "significant, measurable improvement in team performance as well as high user acceptance" of the system once in place.

UAS Profile:

WASP III

Photo Courtesy: United States Air Force

Wingspan: 28.5 inches
Length: 10 inches
Weight (air vehicle): 1 pound
Weight: (total system) 14.4 pounds
Speed: 20 - 40 mph
Operating altitude: From 150 to 500+ feet AGL
Altitude: 1,000 feet

Another leader in the use and implementation of UAS technology is the University of North Dakota (UND). It has partnered with industry and military stake holders to develop a UAS Center of Excellence and was the first in the country to offer a Bachelor of Science degree in Unmanned Aircraft Systems Operations. With this curriculum in place the university anticipates the UAS Operations degree will aid in meeting the increasing demand for qualified UAS pilots and sensory and payload operators.

Other universities with involved in UAS research and education:

- Kansas State University
- Northland Community and Technical College (Minnesota)
- New Mexico State
- University of Kansas
- University of Florida
- Oklahoma State

Law Enforcement Agencies

The State of Utah Highway Patrol is using digital photographs taken from a UAS to expedite auto accident recreations and the ensuing investigation process. Other law enforcement agencies, such as the Sheriff's Office of Montgomery County, Texas, has partnered with the DHS to acquire an UAS to complement their operations. The Sheriff's office is operating a sUAS, named the ShadowHawk, reported to cost $40 per hour to operate as opposed to $500 per hour for a manned aircraft alternative. The UAS itself cost approximately $300,000.

As with other agencies authorized by the FAA to fly UAS, the Sheriff's departments UAS operations is limited to flights over unpopulated areas at an altitude of no more than 400 feet. Members of the public have expressed concerns about invasion of privacy and the UAS, which is capable of being equipped with advanced imagery cameras, sensors and weapons, although the sheriff's office has indicated this is not the case.

Other law enforcement agencies researching the use of UAS include:

- Arlington Police Department (Texas)
- Houston Police Department
- Miami-Dade Police Department

COMMERCIAL

Within the commercial industry several opportunities exist for UAS operations to complement current efforts, for example:

Agriculture and Conservation – In agriculture and conservation UAS can perform a variety of functions related to monitoring of soil erosion, crops and flood plain research. UAS are also capable of dispersing insecticides and seeding in addition to several other ag aviation related operations. One of the most beneficial uses of UAS in agriculture is geo coded three dimensional mapping and topography analysis for precise land use planning and management.

Sample UAS Imagery

Real Estate – UAS can be equipped to create high definition video and photo imagery for promotional purposes that ordinary use of cameras would not be able to mimic. Due to the flexibility of navigating a UAS, it is capable of capturing the intended target which might otherwise require the costly operation and expertise of a helicopter or imagery software.

Construction – Similar to real estate and agriculture, when a UAS is properly equipped it can capture CAD quality geo coded imagery data to create three dimensional maps and topography analysis to assist in the development of:

- Roads and bridges
- Commercial and industrial development
- High rises
- Family homes

Utility/Railroads – UAS may provide utility and rail companies with a cost effective way to increase the efficiency of pipeline and transmission lines' inspections. Dependent upon the model and payload, many UAS are designed to fly autonomously, even in severe weather conditions, reducing employee risks associated with working in adverse weather. Additionally UAS can be equipped with sensors to safely observe and record the release of toxic chemicals and leaks from a refinery or other type of facility with hazardous materials.

Maritime and Shipping – A simple UAS platform with a high definition camera has the ability to conduct valuable surveillance in ports and around ships the size of super tankers. This gives operator(s) and security personnel the opportunity to cover large areas and view an intended target in critical situations - increasing the useful information required to make a timely and informed decision.

Entertainment/News Media – Applications for UAS operations to complement the entertainment and news media industry exist similarly to real estate. High definition imagery and recordings while flying at unusual altitudes and angles are possible when deploying a UAS. These aircraft can also observe on location for breaking news stories.

Other examples of commercial UAS operations can include VIP transportation security, monitoring of infrastructure, damage assessments and surveying, wildlife monitoring and sporting event coverage and security and archeology and geology.

E. FAA OUTLOOK, POLICIES AND PROCEDURES

UAS technology and its capabilities have matured and expanded worldwide over the past several years from systems with limited features to fully autonomous platforms prepared to function outside of strictly Department of Defense (DOD) mission requirements. In the 2011-2031 Aerospace Forecast (AF) the FAA recognizes 100 U.S. companies, academic institutions, and government organizations developing over 300 UAS designs to fill the potential opportunities and demand for UAS in the civilian market. The FAA AF also projects, based upon the expected regulatory environment, the following development of the small UAS (sUAS) fleet:

- 10,000 active units in the next five years
- 25,000 active units in the next ten years

- 30,000 active units by 2030

As both civil and commercial applications are expected to further develop UAS have the potential to become a major component of commercial aviation within the United States. Specifically for civil government and commercial operators, sUAS are seen to become great assets to reduce work related risks but also increase efficiency and effectiveness. More detailed discussion can be seen in the Design and Use section of this report.

In June 2005 the initial FAA release of AFS-400 Policy Memo 05-01 (05-01) stipulating a high level review on the terms for UAS operations in the NAS was published. Three years later the FAA issued the Interim Operational Approval Guidance 08-01, formally replacing 05-01, addressing “Unmanned Aircraft Systems Operations in the U.S. National Airspace System.” This document further details guidelines for UAS operations in the United State’s NAS by expanding on information including:

- Definitions of terminology
- Methods of authorization and applicability
- General process for applying for a certificate of waiver or authorization (COA)
    - FAA Form 7711-2, Application for Certificate of Waiver or Authorization
    - UAS COA Online System
- Alternate methods of compliance
- UAS airworthiness
- Continued airworthiness
- Flight Operations
- Personnel qualifications

Currently many common limitations of COAs, see Exhibit 7 for COAs as of January 2011, include operating UAS ranging from 2-50 pounds, flights up to 400 feet above ground level (AGL), flying strictly VFR via line of sight with a trained observer, class 2 or 3 FAA medical certificates and a satisfactory passing grade on the FAA private pilot written exam.

Exhibit 7: UAS Certificate of Authorizations as of January 2011

Type of COA	*Total*
Active	266
Pending (including renewals)	151
Active and Pending	**417**
Total COAs Issued in CY 2010	**298**
	Source: FAA

Its preeminence was followed by a notice from the FAA’s Air Traffic Organization, effective March 28, 2011 – March 27, 2012, providing “information and interim guidance on air traffic policies and prescribes procedures for the planning, coordination, and services involving the operation of unmanned aircraft systems (UAS) in the NAS."

To date, the FAA has worked with the Aviation Rulemaking Committee (ARC) comprised of industry, associations, and other government agencies creating recommendations to the FAA for operations of UAS under 55 pounds. The next FAA steps are to draft regulations for:

- Certification of pilots
- Registration of aircraft
- Approval of sUAS (small unmanned aircraft systems) operational requirements
- Define sUAS operational limits
  - Best practices
- A regulatory approach for all sUAS

The latest implications suggest the FAA is developing a Notice of Proposed Rulemaking (NPRM) expected to be released in January 2012. A public comment and review process will follow and is anticipated to close in April 2012. The conclusion of this process will lead to commercial sUAS operations in the NAS to develop further into various civilian markets with the expectation the commercial market segment – real estate photography, aerial inspections, agriculture, will be close to follow.

In Appendices A and B a FAA UAS Fact Sheet has been provided and a visual roadmap of the planned integration of civil/public UAS integration into the NAS.

F. UAS IN NORTH CENTRAL TEXAS

Locally the Arlington Police Department (APD) has been granted a COA by the FAA to pilot a sUAS during a 12-month training and evaluation period. The COA stipulates flights will remain confined to a secure area near the Lake Arlington dam. Additional flight restrictions include VFR flights limit operations to line-of-sight, reaching an altitude not to exceed 400 feet AGL, and only during daylight hours.

The APD expects to follow a 3 phase time line –

- Phase 1: Training and Evaluation
  - a. Test flight operations within a restricted flight area
  - b. Mission exercises with FAA approval, controlled flight exercises outside existing restricted area below 400 ft. AGL
- Phase 2: Mission Ready
  - Daylight line of sight operations with an emergency COA under 400 ft. AGL per FAA approval
- Phase 3: Fully Integrated Missions
  - Flight at will with one hour of air traffic control (ATC) approval notification and FAA approval

In the fall of 2011 the police department and the sUAS manufacturer – Leptron Robotic Helicopters, completed a free leasing period agreement. Next steps are to complete the purchase of two aircraft. Below are technical equipment specifications provided from the police department:

- Battery-operated
- Payload supporting –
  - Cameras
  - Night vision
  - Heat sensing
  - Radiation detecting
- Operational capabilities in winds up to 40 miles per hour and in temperatures of 0 degrees to 120 degrees Fahrenheit
- Video and still photos transmitted to ground stations via radio signal for immediate viewing and storage

Although the APD's current FAA COA does not permit flights outside its training area, the police department hopes to use this new technology in the future to take high quality imagery and photographs at crimes scenes and critical incidents. Currently the department has identified the following as specific situations where the use of high definition imagery, infra-red, and other remote sensors would benefit law enforcement:

- Search and rescue
- Serious traffic accident
- Barricaded persons
- Incidents involving active shooters
- Hazardous material spills
- Surveying flooding and tornado damage

The department has indicated it has no plans to utilize sUAS for routine surveillance and patrol but rather as another tool to ensure the safety of residents and visitors in Arlington.

UAS Profile:

Leptron Avenger

Photo Courtesy: Arlington Police Department

Height: 19.75 inches
Length: 58 inches
Weight: less than 55 pounds
Payload: Up to 10 pounds
Speed: Varies
Range: 2 nautical miles/10 nautical miles (satellite)
Ceiling: Up to 12,000 feet

G. CONCLUSION

As the integration of UAS into the NAS generates more interest nationally, and in North Central Texas, on-going data collection and tracking efforts may be necessary to understand the intended uses and frequency of future operations. Using this data to understand the operations of this new technology will benefit aviation stakeholders by planning for infrastructure and security enhancements to support the growth of this new technology.

Consideration of a regional group or committee of North Central Texas aviation stakeholders to analyze data collected and the progress of UAS growth regionally may be of value. This could include the group or committee coordinating with the FAA to develop effective reporting and operational requirements to help monitor regional UAS growth and the potential impact it may have on the region's navigable airspace. Growing interest from local governments and the possibility of a UAS unit being based at the Naval Air Station, Fort Worth Joint Reserve Base (NASJRB) may indicate the widespread use of UAS is in the not too distant future.

As a part of potential coordination efforts a public comment process for any proposed UAS activity in the region, similar to the FAA's Obstruction Evaluation Airports Airspace Analysis (OEAAA), to involve airport sponsors and users in the process. This approach or one similar, could serve as an effective means of educating the public on local organizations and agencies seeking the ability to regularly operate UAS.

H. UAS REPORT RESOURCES

FAA OFFICIAL UAS COA WEBSITE –
http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/systemops/aaim/organizations/uas/coa/

FAA COA REQUENTLY ASKED QUESTIONS –
http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/systemops/aaim/organizations/uas/coa/faq/

SAMPLE FAA COA APPLICATION –
http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/systemops/aaim/organizations/uas/media/COA%20Sample%20Application%20v%201-1.pdf

FAA CIVIL/PUBLIC USE ROADMAP –
http://www.faa.gov/about/initiatives/uas/media/FAA_Civil_Roadmap.ppt

FAA UAS REGUALTIONS AND POLICIES –
http://www.faa.gov/about/initiatives/uas/reg/

FAA UAS CERTIFICATIONS AND AUTHORIZATIONS –
http://www.faa.gov/about/initiatives/uas/cert/

APPENDIX A. FAA FACT SHEET

FACT SHEET
UNMANNED AIRCRAFT SYSTEMS (UAS)
From AOC press release December 1, 2010.
http://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=6287

Introduction

Unmanned Aircraft Systems (UAS) come in a variety of shapes and sizes, and serve diverse purposes. They may have a wingspan as large as a Boeing 737 or smaller than a radio-controlled model airplane. A pilot on the ground is always in charge of UAS operations.

Until recently, UASs mainly supported military and security operations, but that is rapidly changing. Unmanned aircraft promise new ways to increase efficiency, save money, enhance safety and even save lives. Interest is growing in a broad range of uses such as aerial photography, surveying land and crops, monitoring forest fires and environmental conditions, and protecting borders and ports against intruders.

In the United States alone, approximately 50 companies, universities, and government organizations are developing and producing some 155 unmanned aircraft designs.

The FAA's Role: Safety First

The FAA's main concern about UAS operations in the National Airspace System (NAS) is safety. The NAS encompasses an average of more than 100,000 aviation operations per day, including commercial air traffic, cargo operations, and business jets. Additionally, there are more than 238,000 general aviation aircraft in the system at any time. It is critical that aircraft do not endanger other users of the NAS or compromise the safety of persons or property on the ground.

Recreational use of the NAS is covered by FAA Advisory Circular (AC) 91-57 which generally limits operations to below 400 feet above ground level and away from airports and air traffic.

There are two acceptable means of operating UAS in the NAS outside of "restricted" airspace: a Special Airworthiness Certificate – Experimental Category or a Certificate of Waiver or Authorization (COA).

A Special Airworthiness Certificate in the Experimental Category is the only certification available to civil operators of UAS. Due to regulatory requirements, this approval precludes carrying persons or property for compensation or hire, but does allow operations for research and development, market survey, and crew training.

Since July 2005, the FAA has issued 78 experimental certificates for 17 different aircraft types. Through these efforts, the FAA works with manufacturers to collect technical and operational data to help improve the UAS airworthiness certification process.

The COA process is available to public entities, such as government agencies (including local law enforcement and state universities), who want to fly a UAS in civil airspace. Applicants apply online and the FAA evaluates the request. The FAA issues a Certificate of Waiver or Authorization (COA), generally based on the following principles:

- The COA authorizes an operator to use defined airspace and includes special provisions unique to each operation. For instance, a COA may include a requirement to operate only under Visual Flight Rules (VFR) and/or during daylight hours. Most COAs are issued for a specified time period (up to one year, in most cases).
- Most, if not all, COAs require coordination with an appropriate air traffic control facility and may require the UAS to have a transponder to operate in certain types of airspace.
- Due to the UASs inability to comply with ”sense and avoid” rules, a ground observer or an accompanying “chase” aircraft must maintain visual contact with the UAS and serve as its “eyes” when operating outside of airspace that is restricted from other users.

The FAA is streamlining the COA process and has also increased staffing by more than a dozen people. In 2009, the FAA issued 146 COAs. As of December 1, 2010, there were 273 active COAs. The agency has issued COA’s in 2010 to 95 users on 72 different aircraft types.

Operation and Certification Standards

To address the increasing civil market and the desire by civilian operators to fly UASs, the FAA is developing new policies, procedures, and approval processes. Developing and implementing new UAS standards and guidance is a long-term effort.

- The FAA created the Unmanned Aircraft Program Office (UAPO) and the Air Traffic Organization (ATO) UAS office to integrate UASs safely and efficiently into the NAS.
- The FAA is working closely with stakeholders in the UAS community to define operational and certification requirements. It is critical to develop and validate appropriate operational procedures, regulatory standards and policies for routine UAS access to the NAS.
- The FAA has asked RTCA– a group that frequently advises the agency on technical issues – to work with the industry and develop UAS standards. RTCA will answer two key questions:

  1. How will UASs handle communication, command, and control?
  2. How will UASs “sense and avoid” other aircraft?

These are long-term activities. The first of three milestones is targeted for completion prior to 2015.

The FAA continues to work closely with its international counterparts to harmonize standards, policies, procedures, and regulatory requirements.

Data is Key

More safety data is needed before the FAA can make an informed decision to fully integrate UASs into the NAS, where the public travels each day. Continuing to review of UAS operations will enhance the FAA's ability to assess the safety and improve the use of this technology.

Small Eyes in the Sky

The FAA expects small UASs to experience the greatest near-term growth in civil and commercial operations because of their versatility and relatively low initial cost and operating expenses. The agency has received extensive public comment on small UASs, both from proponents who feel their size dictates minimal regulation and from groups concerned about hazards to piloted general aviation aircraft and the safety of persons or property on the ground..

In April 2008, the FAA chartered an Aviation Rulemaking Committee (ARC) to examine these operational and safety issues and make recommendations on how to proceed with regulating Small UASs. The agency has received the ARC recommendations, and is drafting a proposed rule. The FAA aims to publish a proposed rule in 2011.

One of the most promising potential uses for small UASs is in law enforcement. Although the Small UAS ARC was not specific to law enforcement organizations, they participated in the Committee.

Currently, any law enforcement organization must follow the COA process if they wish to conduct demonstration flights. The FAA has already worked with urban police departments in Houston and Miami on test programs involving unmanned aircraft. The goal is to help identify the challenges that UASs will bring into this environment and what type of operations can safely be conducted by law enforcement.

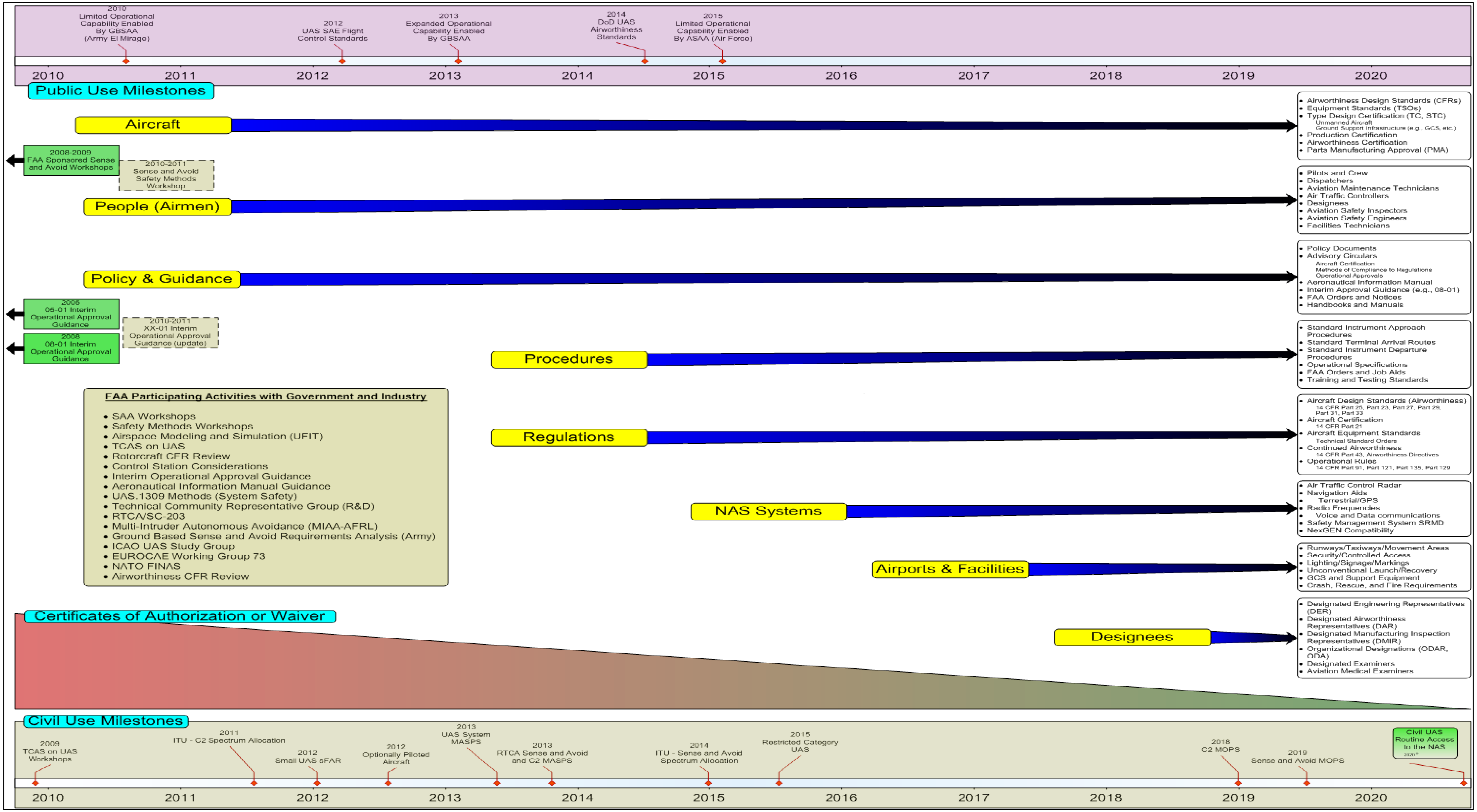
The Bottom Line

The introduction of UASs into the NAS is challenging for the FAA and the aviation community. UAS proponents have a growing interest in expediting access to the NAS. There is an increase in the number and scope of UAS flights in an already busy NAS. The design of many UASs makes them difficult to see and adequate "detect, sense and avoid" technology is years away. Decisions being made about UAS airworthiness and operational requirements must fully address safety implications of UASs flying in the same airspace as manned aircraft, and perhaps more importantly, aircraft with passengers.

FAA Testimony on Unmanned Aircraft Systems:

- July 15, 2010
  http://www.faa.gov/news/testimony/news_story.cfm?newsId=11599
- September 13, 2010
  http://www.faa.gov/news/testimony/news_story.cfm?newsId=11841

APPENDIX B. FAA CIVIL/PUBLIC UAS ROADMAP



Source: FAA Unmanned Aircraft Program Office