

July 2012

NONPROLIFERATION

Agencies Could Improve Information Sharing and End-Use Monitoring on Unmanned Aerial Vehicle Exports



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Highlights of [GAO-12-536](#), a report to the Ranking Member, Subcommittee on National Security, Homeland Defense, and Foreign Operations, Committee on Oversight and Government Reform, House of Representatives

Why GAO Did This Study

The global use of UAVs has increased significantly over time, raising concerns about their proliferation. MTCR and Wassenaar are the multilateral regimes that address UAV proliferation. MTCR seeks to limit the proliferation of weapons of mass destruction delivery systems, while Wassenaar seeks to limit the spread of certain conventional weapons and sensitive technologies with both civilian and military uses. This report is an unclassified version of a classified report issued in February 2012. GAO was asked to address (1) global trends in the use of UAV technology, (2) U.S. national security considerations concerning UAV proliferation, (3) multilateral and bilateral tools to control UAV proliferation, and (4) coordination of U.S. efforts to limit the spread of UAV technology. To conduct this review, GAO analyzed intelligence, licensing, and end-use monitoring data, and interviewed U.S. and foreign officials.

What GAO Recommends

GAO recommends that State improve its export licensing database to better identify authorized UAV exports, that relevant agencies improve mechanisms for sharing information relevant to the export licensing process, and that State and DOD harmonize their UAV end-use monitoring approaches. The agencies generally agreed with the recommendations.

View [GAO-12-536](#). For more information, contact Thomas Melito at (202) 512-9601 or melitot@gao.gov.

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What GAO Found

Since 2005, the number of countries that acquired an unmanned aerial vehicle (UAV) system nearly doubled from about 40 to more than 75. In addition, countries of proliferation concern developed and fielded increasingly more sophisticated systems. Recent trends in new UAV capabilities, including armed and miniature UAVs, increased the number of military applications for this technology. A number of new civilian and commercial applications, such as law enforcement and environmental monitoring, are available for UAVs, but these applications are limited by regulatory restrictions on civilian airspace.

The United States likely faces increasing risks as countries of concern and terrorist organizations seek to acquire UAV technology. Foreign countries' and terrorists' acquisition of UAVs could provide them with increased abilities to gather intelligence on and conduct attacks against U.S. interests. For instance, some foreign countries likely have already used UAVs to gather information on U.S. military activities overseas. Alternatively, the U.S. government has determined that selected transfers of UAV technology support its national security interests by providing allies with key capabilities and by helping retain a strong industrial base for UAV production. For instance, the United Kingdom and Italy have used UAVs purchased from the United States to collect data on Taliban activity in Afghanistan.

The United States has engaged in multilateral and bilateral diplomacy to address UAV proliferation concerns. The United States principally engaged the Missile Technology Control Regime (MTCR) to address multilateral UAV proliferation concerns. Since 2005, the United States proposed certain significant changes to address how MTCR controls UAVs, but members could not reach a consensus for these changes. Also, while the Wassenaar Arrangement (Wassenaar) controls the export of some key dual-use UAV components, it does not control other dual-use technologies that are commonly used in UAVs. The Department of State (State) has also used diplomatic cables to address the proliferation of UAV-related technologies bilaterally. State provided to GAO about 70 cables that it sent from January 2005 to September 2011 addressing UAV-related concerns to about 20 governments and the MTCR. Over 75 percent of these cables focused on efforts by a small number of countries of concern to obtain UAV technology.

U.S. agencies coordinate in several ways to control the spread of UAV technology, but could improve their UAV-related information sharing. For instance, an interagency group reviews many license applications to export UAV technology. However, there is not a formal mechanism to ensure that licensing agencies have relevant and timely intelligence information when making licensing decisions. Also, State's licensing database cannot provide aggregate data on military UAV exports State has authorized, which may impair the U.S. government's ability to oversee the release of sensitive UAV technology. The Department of Defense (DOD) and State each conduct end-use monitoring of some UAV exports, but differences in the agencies' programs may result in similar types of items being subject to different levels of oversight.

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Abbreviations

BIS	Bureau of Industry and Security
CBP	Customs and Border Protection
Commerce	Department of Commerce
CIA	Central Intelligence Agency
DCS	Direct Commercial Sales
DDTC	Department of State Directorate of Defense Trade Controls
DECA	Defense Export Control Agency
DHS	Department of Homeland Security
DOD	Department of Defense
DOJ	Department of Justice
DSCA	Defense Security Cooperation Agency
DSS	Defense Security Service
ECCN	Export Control Classification Number
FAA	Federal Aviation Administration
FBI	Federal Bureau of Investigation
FMS	Foreign Military Sales
ICE	Immigration and Customs Enforcement
MTCR	Missile Technology Control Regime
MTEC	Missile Technology Export Control Group
NASA	National Aeronautics and Space Administration
NASIC	National Air and Space Intelligence Center
NEECN	National Export Enforcement Coordination Network
State	Department of State
UCAV	unmanned combat aerial vehicle
Wassenaar	Wassenaar Arrangement
UAV	unmanned aerial vehicle

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Accountability * Integrity * Reliability

United States Government Accountability Office
Washington, DC 20548

July 30, 2012

The Honorable John Tierney
Ranking Member
Subcommittee on National Security, Homeland Defense, and Foreign
Operations
Committee on Oversight and Government Reform
House of Representatives

Dear Mr. Tierney:

The use of unmanned aerial vehicles (UAVs) has increased significantly in recent years.¹ UAVs have demonstrated their effectiveness in recent conflicts, such as the wars in Iraq, Afghanistan, and Libya, where they have been used for intelligence, surveillance, and reconnaissance missions, as well as attack functions. UAVs are also increasingly being used for civilian purposes such as border security, environmental monitoring, and disaster relief. For example, the United States used UAVs to help the Japanese government survey the damage to the Fukushima nuclear power plant resulting from the March 2011 earthquake. The growing sophistication and availability of UAVs poses risks for U.S. interests. Consequently, the United States has sought to limit the spread of UAV technology through bilateral diplomacy and by working with like-minded supplier countries through multilateral regimes such as the Missile Technology Control Regime (MTCR) and the Wassenaar Arrangement (Wassenaar).² In addition, the United States and other countries control some UAV exports through national export control licensing and enforcement efforts.

¹While the term UAV has been in use for some time, the Department of Defense and the Federal Aviation Administration, among other U.S. and international organizations, now use the term unmanned aircraft systems, or UAS, when referring to these systems. For this report, we use the term UAV because it remains the official term used by both U.S. and multilateral export control bodies.

²Multilateral export control regimes are voluntary, nonbinding arrangements among like-minded supplier countries that aim to restrict trade in sensitive technologies to peaceful purposes. Multilateral export control regimes are referred to as either regimes or arrangements, and countries invited to participate in them are variously referred to as members, participants, participating states, or partners. In this report, we use the term regimes and refer to participating countries as members.

In response to your request, we have updated our 2004 report on cruise missile and UAV proliferation, focusing solely on UAVs.³ This report is a public version of the prior classified report that we provided to you in February 2012, which addressed since 2005, (1) trends in the development, acquisition, and application of UAV technology worldwide; (2) U.S. national security considerations associated with transfers of UAV technology; (3) the extent to which the United States has engaged in multilateral and bilateral diplomacy to address UAV proliferation concerns; and (4) the extent to which the U.S. government has coordinated its export control efforts to limit the spread of UAV technology. The Departments of Defense (DOD), State (State), and Homeland Security (DHS) deemed some of the information in the prior report as classified, which must be protected from public disclosure, as did the Federal Bureau of Investigation (FBI) and the Central Intelligence Agency (CIA). Therefore, this report omits sensitive information about efforts by countries of concern and terrorists to obtain and use sensitive UAV technology, as well as details about the U.S. proposals that the multilateral regimes did not adopt. This report also omits sensitive information about U.S. uses of bilateral diplomacy to address UAV proliferation concerns, U.S. efforts to coordinate and use certain sensitive information as part of the licensing process, and U.S. government efforts to coordinate the enforcement of export controls on UAVs. Furthermore, this report omits the full text of two of the three recommendations contained in the classified report, as well as State's, DOD's, and the Department of Commerce's (Commerce) written comments, as these contained sensitive information. This report is part of a larger body of work involving export controls.⁴

³GAO, *Nonproliferation: Improvements Needed to Better Control Technology Exports for Cruise Missiles and Unmanned Aerial Vehicles*, [GAO-04-175](#) (Washington, D.C.: Jan. 23, 2004). In [GAO-04-175](#), we found that cruise missiles and UAVs posed a growing threat to U.S. national security interests; multilateral export control regimes and national export controls were limited in their capacity to address cruise missile and UAV proliferation concerns' and the U.S. government had performed little end-use monitoring to verify that exporters and foreign recipients complied with licensing conditions.

⁴For example, GAO, *Persian Gulf: Implementation Gaps Limit the Effectiveness of End-Use Monitoring and Human Rights Vetting for U.S. Military Equipment*, [GAO-12-89](#) (Washington, D.C.: Nov. 17, 2011), and GAO, *Export Controls: Agency Actions and Proposed Reform Initiatives May Address Previously Identified Weaknesses, but Challenges Remain*, [GAO-11-135R](#) (Washington, D.C.: Nov. 17, 2010).

To address these objectives, we obtained fiscal years 2005 through 2010 export control licensing and end-use monitoring data from Commerce and State. We also obtained DOD fiscal years 2005 through 2010 Foreign Military Sales (FMS) program and end-use monitoring data. Based on our analysis of the data and interviews with agency officials, we determined that the data were sufficiently reliable for our use. We reviewed Commerce, State, and DOD documents, as well as intelligence and open source private sector reports on the proliferation of UAV technology. In Washington, D.C., we met with officials from Commerce, State, and DOD involved in the licensing and transfer process, and those officials knowledgeable about U.S. activities within the two multilateral regimes that the United States principally uses to address UAV proliferation concerns. We also met with officials from agencies responsible for enforcing export control laws and regulations, including Commerce, DHS, and the Department of Justice (DOJ), as well as with U.S. government analysts knowledgeable about UAVs. In addition, we met with U.S. embassy and foreign government officials in three countries—Israel, Italy, and the United Kingdom. We selected these three countries based on analyses of DOD and State data and open source reporting showing that these countries either had extensive experience operating U.S.-made UAV systems or were a UAV producer. We also met with leading UAV manufacturers and industry associations in the United States, Israel, Italy, and the United Kingdom. In addition, we examined applicable laws and directives. Appendix I provides a more detailed description of our scope, and methodology.

We conducted this performance audit from October 2010 to July 2012 in accordance with generally accepted government auditing standards. These standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

Used only sparingly in past military operations, UAVs are now making national headlines as they are used in ways normally reserved for manned aircraft. UAVs come in a variety of sizes and configurations, ranging from as small as an insect to as large as a small commercial airliner. In our work, we focused on mini, tactical, and strategic UAVs. According to available analysis, mini and tactical UAVs constituted the vast majority of the UAV systems in operation from 2005 to 2011, while strategic UAVs included some of the most versatile UAVs, typically

capable of operating up to 30,000 to 45,000 feet in altitude with a maximum endurance of more than 20 hours. Figure 1 briefly describes these three types of UAVs.

Figure 1: Three Major Categories of UAVs

Category	Mini	Tactical	Strategic
Altitude	Low	Low to medium	Medium to high
Endurance	Short (about an hour)	Medium (up to several hours)	Long (ranges from hours to days)
Range	Close-range	Limited to line-of-sight (approximately 300 kilometers or less) (about 186 miles)	Long range
Example	Raven 	Shadow 	Global Hawk 

Sources: CIA (information); DOD (photos).

Multilateral Export Control Regimes That Address UAVs

The two principal multilateral regimes that address exports of UAVs are the MTCR and Wassenaar. MTCR, established in 1987, is a voluntary association of 34 countries that share the goal of limiting the spread of ballistic and cruise missiles and UAVs capable of delivering weapons of mass destruction. Wassenaar, established in 1996, is a voluntary association of 41 countries that share the goal of limiting the spread of certain conventional weapons and sensitive dual-use items having both civilian and military applications.⁵ Both are consensus-based, requiring that all members must agree to any proposed changes in regime documents or activities. In both instances, members agree to restrict exports of sensitive technologies by placing them on commonly agreed to lists and incorporating these lists into their national export control laws

⁵Appendix II contains a list of the MTCR and Wassenaar members.

and regulations. Members also conduct activities in support of the regimes, such as sharing information about denied license applications and conducting outreach to countries that are not members of the regimes.

Wassenaar has two control lists: a munitions list and a dual-use list. The MTCR members control a common list of items, which is contained in the MTCR Annex. The Annex covers complete missile systems, including rocket systems and UAVs, as well as a broad range of equipment, software, and technology.⁶ The MTCR Annex consists of two categories of items: Category I and Category II. Under MTCR, complete UAV systems can be controlled as either a Category I or a Category II system, depending on their range and payload capacity.

- Category I UAVs are considered the most sensitive, and include strategic UAVs capable of delivering a payload of at least 500 kilograms (about 1,100 pounds) to a range of at least 300 kilometers (approximately 186 miles). MTCR member nations considering the export of these UAVs commit to apply a “strong presumption of denial” standard regardless of purpose, meaning that such transfers should occur only on rare occasions and only in instances that are well justified under the MTCR Guidelines.
- Category II UAVs are considered less sensitive, consisting primarily of UAVs that do not meet Category I criteria, but are capable of flying at least 300 kilometers. While these items require review through national export control systems, these items are not subject to the MTCR “strong presumption of denial,” except for exports judged by the exporting country to be intended for use in delivering weapons of mass destruction.
- MTCR members have agreed to a “no undercut” policy for all MTCR-controlled items, meaning that MTCR members have agreed to consult with each other before considering exporting an item on the list that has been notified as denied by another member pursuant to the MTCR Guidelines.

⁶The Annex is formally known as the Equipment, Software, and Technology Annex. The MTCR’s documents include the MTCR Guidelines and Annex. The Guidelines define the purpose of MTCR and provide the overall structure and rules to guide the member nations and those adhering unilaterally to the Guidelines.

Laws Governing Arms Exports and Sales of UAVs

Several U.S. laws authorize the sale or transfer of export controlled technologies from U.S. companies or the U.S. government to foreign countries, or in certain cases foreign entities. The Arms Export Control Act of 1976, as amended,⁷ provides the President the authority to control the sale or transfer of defense articles and services. Under the Arms Export Control Act, State's Directorate of Defense Trade Controls (DDTC)⁸ licenses direct commercial sale (DCS) exports of defense articles and services on the U.S. Munitions List,⁹ while DOD's Defense Security Cooperation Agency (DSCA) administers the FMS program under the supervision and general direction of State.¹⁰ In addition, the Arms Export Control Act, as amended, also requires end-use monitoring for the sale or export of defense articles and services, and delegates these responsibilities to the same agencies that administer the program. DDTC administers the Blue Lantern program to conduct end-use monitoring for defense articles exported under DCS, while DSCA administers the Golden Sentry program to monitor the end-use of defense articles transferred through FMS.

In addition, the Export Administration Act of 1979, as amended,¹¹ provides the President the authority to control the sale of dual-use technologies on the Commerce Control List, including certain dual-use components. Commerce's Bureau of Industry and Security (BIS) administers this license review process, with support from the Defense Technology Security Administration and other agencies.¹² BIS also

⁷Arms Export Control Act, as amended, 22 U.S.C. §§ 2751-2799aa-2.

⁸DDTC relies on other agencies, principally DOD's Defense Technology Security Administration, for technical assistance in conducting license reviews.

⁹The U.S. Munitions List provides a list of the defense articles and services that require a license for export.

¹⁰While DCS involves negotiations between a U.S. supplier and a foreign buyer, FMS involves negotiations between the U.S. government and a foreign government or organization.

¹¹50 U.S.C. App. §§ 2401-2420. The Export Administration Act of 1979, as amended, is not permanent legislation. Since August 21, 2001, the Export Administration Act has been in lapse. However, the President has continued the regulations in effect through Executive Order 13222 of August 17, 2001 (3 C.F.R., 2001 Comp 783 (2002)), which most recently was extended by Presidential Notice on August 12, 2011, under the authority provided by section 202(d) of the National Emergencies Act (50 U.S.C. § 1622(d)).

¹²Within BIS, Export Administration administers the license review process.

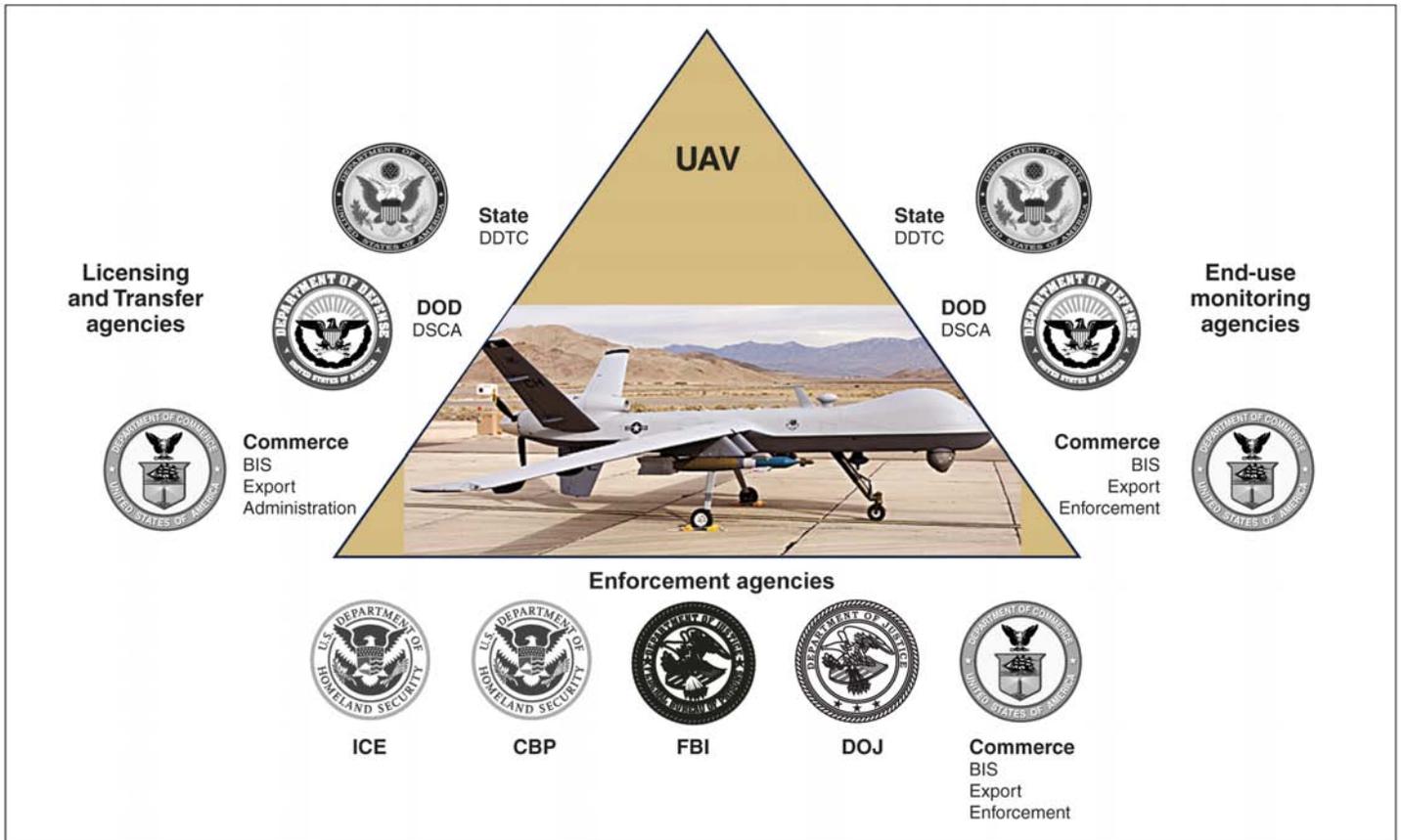
administers Commerce's end-use monitoring program for technologies covered by the Commerce Control List.¹³

The U.S. export control enforcement system consists of multiple agencies. Within DHS, Immigration and Customs Enforcement (ICE) investigates suspected export control violations involving both U.S. Munitions List and Commerce Control List items. In addition, DHS' Customs and Border Protection (CBP) inspects selected exports to determine whether proper licenses were obtained prior to shipment and may interdict suspicious items being shipped. Within Commerce, BIS' Office of Export Enforcement has authority to investigate violations involving Commerce Control List items. Within DOJ, the FBI can take the lead in certain export control investigations involving counterintelligence and counterterrorism. DOJ prosecutes suspected export control violations. Investigations can result in criminal prosecutions; fines; and imprisonment or administrative penalties, such as export denial orders barring a party from exporting any U.S. items for a specific period of time. Figure 2 shows the principal agencies that have a role in the export control process.¹⁴

¹³Within BIS, Export Enforcement administers Commerce's end-use monitoring program.

¹⁴As we discuss further in this report, there is no formal mechanism to ensure that licensing agencies have relevant and timely intelligence information when making licensing decisions. For this reason, the intelligence community is not represented in figure 2.

Figure 2: Principal UAV Licensing, Transfer, End-Use Monitoring, and Enforcement Agencies



Sources: GAO analysis of information provided by State, Commerce, DOD, DHS, and DOJ; Corel Draw (clip art).

Note: While DSCA does not actually issue licenses for military UAVs and related technology transferred through FMS, we include them since they manage the U.S. government's process for reviewing and making recommendations to State on transfers of such items through FMS. For the purposes of this report, transfers include defense articles and services authorized for sale through direct commercial sales, as well as defense articles and services that the U.S. government sells to foreign governments and international organizations through FMS.

There are also U.S. government agencies that gather and analyze information on the proliferation of UAV systems and related technologies and produce UAV-related threat assessments and other UAV-related information. The Director of National Intelligence serves as the head of the intelligence community, establishing objectives and priorities for collection, analysis, production, and dissemination of national intelligence. Moreover, the Defense Security Service (DSS) provides threat assessments in support of its mission to oversee the protection of U.S. classified information and data in the hands of cleared DOD contractors.

The executive branch is currently considering reforms to the U.S. export control system in an Export Control Reform Initiative, including the creation of a single control list and a single information technology system. This initiative could affect export control licensing and enforcement efforts involving UAVs and related technologies and components.

Trends Show Rapid Growth in Global Acquisition, Development, and Military Application of UAVs

There has been rapid growth globally in UAV acquisition, development, and military applications. From 2005 to 2011, nations, including countries of proliferation concern and key allies, sought to improve their intelligence gathering and military aviation capabilities by developing and fielding their own UAV systems. Furthermore, militaries across the globe sought to expand the uses for UAVs, particularly in the area of armed strike missions. UAVs are also increasingly used in a number of civil and commercial applications, such as law enforcement, but national and international regulations place restrictions on most of these applications.¹⁵

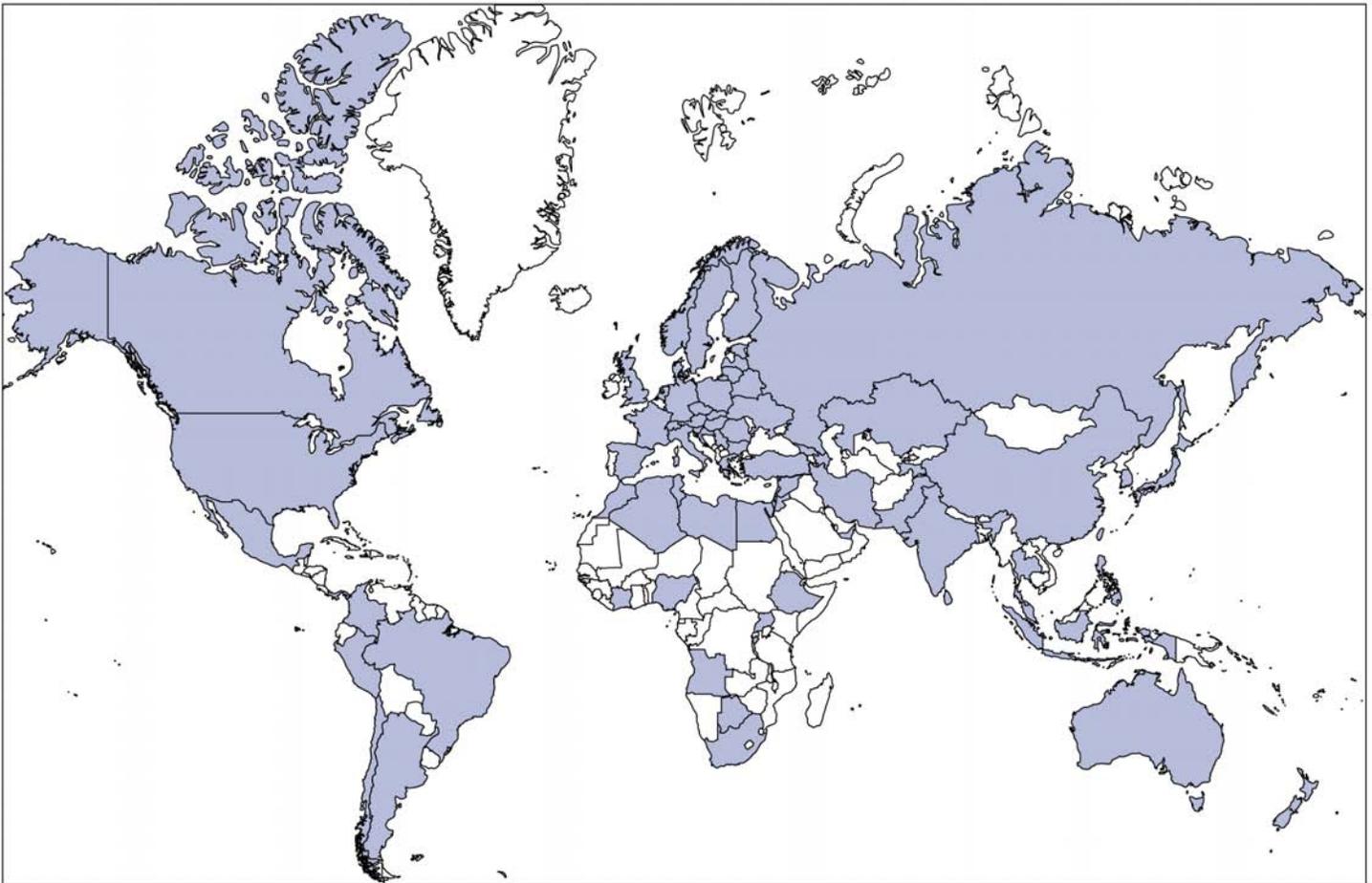
Countries with UAVs Nearly Doubled in Seven Years

Our analysis of open source information shows a significant increase in the number of countries that acquired a UAV system since 2005. In 2004, we reported that approximately 41 countries had acquired a UAV.¹⁶ Our review of current U.S. export licensing data and open source materials found that this number grew over the intervening period to at least 76 countries. Figure 3 provides a global picture of the countries that have acquired UAVs.

¹⁵For our report, we looked at the acquisition of UAVs in terms of which countries have obtained complete UAV systems and who they had acquired those systems from. For development, we looked at which countries were building UAV systems and what they were building. The applications of UAVs addressed which tasks UAVs were performing and things that limited the tasks they were allowed to perform.

¹⁶[GAO-04-175](#).

Figure 3: Map of Countries That Acquired UAVs by December 2011



Algeria	Chile	Greece	Libya	Poland	Syria
Angola	China	Hungary	Lithuania	Republic of Korea	Taiwan ^a
Argentina	Colombia	India	Malaysia	Romania	Thailand
Australia	Croatia	Indonesia	Mexico	Russia	Trinidad and Tobago
Austria	Czech Republic	Iran	Morocco	Serbia	Tunisia
Azerbaijan	Denmark	Israel	Netherlands	Singapore	Turkey
Belarus	Egypt	Italy	New Zealand	Slovakia	Uganda
Belgium	Estonia	Ivory Coast	Nigeria	Slovenia	Ukraine
Botswana	Ethiopia	Japan	Norway	South Africa	United Arab Emirates
Brazil	Finland	Jordan	Pakistan	Spain	United Kingdom
Bulgaria	France	Kazakhstan	Panama	Sri Lanka	United States
Burundi	Georgia	Latvia	Peru	Sweden	
Canada	Germany	Lebanon	Philippines	Switzerland	

Sources: GAO analysis of various unclassified sources; Map Resources (map).

Note: Shaded countries have acquired UAV systems.

^aAlthough the United States does not have diplomatic relations with Taiwan, we have listed it as a separate country because whenever the laws of the United States refer or relate to foreign countries, nations, states, governments, or similar entities, such terms shall include and shall apply to Taiwan. For the purposes of this report, Taiwan is included as a country.

According to available analysis, the majority of foreign UAVs that countries have acquired fall within the tactical category. Tactical UAVs primarily conduct intelligence, surveillance, and reconnaissance missions and typically have a limited operational range of at most 300 kilometers. However, some more advanced varieties are capable of performing intelligence collection, targeting, or attack missions. Mini UAVs were also frequently acquired across the globe during this period.

Several countries acquired UAVs from the United States, which increased its export of this technology from fiscal year 2005 to December 2011. U.S. export licensing data show an upward trend in approved military and dual-use UAV export licenses since 2005. Approved dual-use export licenses totaled almost \$4 million from fiscal year 2005 to fiscal year 2010. For military DCS licenses over this same period, the total value of approved UAV licenses was at least \$240 million.¹⁷ In addition, the United States sold \$144 million worth of UAV technology to other governments through the FMS program from fiscal years 2005 to 2010. The United States exported a variety of UAV systems, ranging from mini UAVs, such as the Raven, to strategic systems, such as the Predator and Global Hawk. To date, the United States has exported a limited number of Category I UAV systems, sending Reapers and Predators to Italy, Reapers to the United Kingdom, and Global Hawk airframes to Germany and NATO as part of joint UAV development programs. Officials from two U.S. defense manufacturers that produce strategic UAVs both stated that there is additional demand internationally for Category I UAVs but that they are unable to meet this demand due to export control restrictions placed on these systems by the U.S. government.

Many countries acquired their UAVs from Israel, one of the predominant global exporters of this technology, according to available analysis. Several key allies, such as Germany, France, and the United Kingdom, leased or purchased UAVs from Israel for use in Afghanistan. Countries such as India, Russia, and Georgia also acquired UAVs from Israel.

¹⁷We were unable to calculate a more precise figure for the military DCS licenses because of limitations in State's licensing database, which are discussed later in this report.

According to Israeli UAV manufacturers, exports are critical to their UAV programs as they account for the majority of revenue from the production of a system. Israel exports both mini and tactical UAVs. In addition, Israel has exported the Heron I, which is a strategic UAV. Company officials at an Israeli manufacturer told us they are currently marketing the Heron TP, a strategic UAV that would fall under Category I of the MTCR (see fig. 4). Because Israel has made several changes to its export control regime since 2006 and is one of the three countries that we visited, we provide further details about the changes that Israel has made to its export control regime since 2006 in appendix III.

Figure 4: Heron TP-Strategic UAV Produced by an Israeli Manufacturer



Source: NASIC.

Countries acquired UAVs from a limited number of other exporters, including Austria, South Africa, and Italy, who used foreign sales to support their developing UAV industries. An Austrian company produces a tactical rotary UAV that has been exported to a range of countries such as the United Arab Emirates and a South African company produces a range of systems for export including both mini and tactical UAVs. In addition, an Italian manufacturer has produced and exported the Falco UAV system to Pakistan.

Countries of Concern and U.S. Allies Developed and Fielded UAVs

Both countries of concern and U.S. allies sought to develop and field their own UAVs from 2005 to the present. We were informed that the number of countries developing UAVs has increased dramatically from 2005 to the present. Currently, there are over 50 countries developing more than 900 different UAV systems. This growth is attributed to countries seeing the success of the United States with UAVs in Iraq and Afghanistan and deciding to invest resources into UAV development to compete economically and militarily in this emerging area. We were also told that these programs benefited significantly from the availability of commercial UAV technology. Countries such as China and Iran made advances in UAV technology and successfully fielded a number of systems. China has pursued UAV development to obtain capabilities equal to current Western systems. Like many countries, China is developing mini and tactical UAV systems, but is also one of a small number of countries developing larger and more advanced systems, such as high-speed UAVs that are specially designed for combat.¹⁸ Iran has developed and fielded tactical UAVs that are less sophisticated than Western designs, but still can perform missions, such as intelligence, surveillance, and reconnaissance and one-way strike missions.

Throughout this period, the United States and Israel were the world leaders in UAV development. Both countries developed and successfully fielded a wide range of mini and tactical UAVs and also produced MTCR Category I systems. Israel and the United States invested in the development of new varieties of systems, such as rotary-wing UAVs, unmanned cargo aircraft, and advanced handheld micro UAVs.

¹⁸These vehicles are commonly referred to as unmanned combat aerial vehicles.

Many other nations have initiated their own UAV development programs. Countries such as South Africa, Singapore, Turkey, and nations in Western Europe, each developed UAVs alone or in cooperation with others. We were informed that many countries chose tactical UAVs for their development program. Tactical UAVs were chosen because they can easily incorporate available dual-use technology. Countries such as Italy, Germany, and South Africa have fielded and subsequently exported their UAV systems. In the last few years, countries such as Turkey, Russia, South Africa, and European consortiums established plans to develop their own strategic UAVs. According to available analysis, interest in armed UAVs has increased and development of these systems is expanding. However, in the near term, it is likely that only established UAV developers will be able to produce these systems, given the technical expertise required to successfully integrate weapons onto a UAV.

UAV Military Applications Increased, but Civilian and Commercial Applications Remain Limited

We were told that the variety of applications for UAVs and U.S. military use of them has grown since 2005, although the majority of UAVs have been used for military intelligence, surveillance, and reconnaissance missions. While U.S. UAVs primarily perform intelligence, surveillance, and reconnaissance missions, the United States has also armed many of its strategic UAVs, such as the Predator and the Reaper, and is in the process of arming tactical UAVs, such as the Shadow. DOD reports that the U.S. military has increased its use of UAVs significantly, growing from just over 10,000 UAV flight hours in 2005 to more than 550,000 in 2010. In addition, the United States transferred armed Reapers to the United Kingdom in 2006 for use as part of NATO efforts in Afghanistan. Other countries are also seeking to expand the range of missions for their UAVs by pursuing systems with armed capabilities, according to available analysis.

Militaries now also seek new ways to use this technology. For example, some military units use miniature handheld rotary UAVs, according to available analysis. The United States and other nations are researching specially designed high-speed unmanned combat aerial vehicles (UCAV) that can include stealth technology that will allow them to evade radar detection. The proposed design for the U.S. Navy UCAV currently in development is provided in figure 5. Additionally, the U.S. military recently began evaluating unmanned helicopter systems for use as cargo transport vehicles to free up pilots needed for critical combat missions.

Figure 5: Northrop Grumman's X-47B UCAV



Source: DOD.

UAV industry groups, manufacturers, and market analysts stated that civil and commercial UAV applications continue to grow, even though current national and international airspace regulations place restrictions on most of these activities. In 2008, we reported that there were potential civil uses for UAVs, such as law enforcement and disaster monitoring, as well as commercial applications, such as real estate photography and pipeline surveying.¹⁹ Since then, civilian government entities—such as CBP, the National Aeronautics and Space Administration (NASA), the National Oceanic and Atmospheric Administration, and local law enforcement agencies—have acquired and used UAVs. NASA, for instance, used the Global Hawk system to track climate patterns in the arctic. Countries such

¹⁹GAO, *Unmanned Aircraft Systems: Federal Actions Needed to Ensure Safety and Expand Their Potential Uses Within the National Airspace System*, [GAO-08-511](#) (Washington, D.C.: May 15, 2008).

as Australia, Brazil, and Japan used UAVs for purposes such as law enforcement, border protection, crop dusting, and environmental monitoring. These uses, however, are restricted by current national and international airspace regulations. In the United States, the Federal Aviation Administration (FAA) requires that a UAV operator obtain either a Special Airworthiness Certification or a Certificate of Authorization to fly a UAV.²⁰ From 2005 to 2011, FAA issued 88 Special Airworthiness Certificates and as of March 2011 had 264 active Certificates of Authorization. Other countries' restrictions can be even more limiting, according to FAA officials. Italian defense officials we spoke with stated that their regulations require a certification for each UAV and allow flights only in a specially designated off-shore corridor. In Israel, the military controls the country's airspace and does not permit the use of nonmilitary UAVs, according to U.S. embassy and Israeli officials.

Governments recognize the interest in UAV civilian and commercial applications and are addressing this issue. In the United States, FAA is developing regulations to permit greater use of small UAVs inside some U.S. airspace and plans to draft and publish these regulations by 2013. Other countries also have taken steps to address this issue. For instance, officials from the United Kingdom's Civil Aviation Authority stated that they had established special airspace corridors for UAVs, which allow for testing and system development. Also, in October of 2011, Italian UAV companies announced that they had performed joint test flights of their systems within civilian airspace for the first time. The International Civil Aviation Organization, an organization that governs international airspace and assists with the establishment of common national airspace regulations, has a task force working to address obstacles to integrating UAVs in national and international airspace. Organizations such as the International Civil Aviation Organization and FAA have identified several issues, including establishing (1) signal frequencies and bandwidths for UAVs to use without disrupting other transmissions; (2) standards for "sense and avoid" technology to help UAVs avoid mid-air collisions; and (3) airworthiness certification standards that establish the required specifications for UAVs to be allowed to fly. Once these issues are

²⁰A Special Airworthiness Certification is issued to a private entity to allow it to fly their UAV for research, training, or testing purposes. A Certificate of Authorization is provided to a federal, state, or local government entity to allow it to fly a UAV under specific conditions as part of its duties.

addressed, UAV market analysts estimate that the civil and commercial markets for these systems have a strong potential for growth.

UAV Proliferation Presents Risks for the United States, but Selected Transfers Support Its Interests

The United States likely faces increasing risks as additional countries of concern and terrorist organizations acquire UAV technology. UAVs can provide countries and terrorists organizations with increased abilities to gather intelligence on and conduct attacks against U.S. interests. Alternatively, selected transfers of U.S. UAV technology support U.S. objectives by increasing allies' capabilities and by strengthening the industrial base for UAV production in the United States.

Foreign Countries' UAV Acquisition Puts U.S. Military Assets at Risk

Available analysis has determined that foreign countries' acquisition of UAVs can pose a threat because it puts U.S. military assets at increased risk of intelligence collection and attack. We were told that the significant growth in the number of countries that have acquired UAVs, including key countries of concern, has increased the threat to the United States. Because some types of UAVs are relatively inexpensive and have short development cycles, they offer even less wealthy countries a cost-effective way of obtaining new or improved military capabilities that can pose risks to the United States and its allies.

We were informed that currently, the potential threat to the United States primarily involves tactical UAVs, rather than more sophisticated, strategic systems. However, according to available analysis, countries of concern are pursuing more advanced UAVs through acquisitions from foreign suppliers and indigenous development. Such UAVs would be capable of flying higher, longer, and further and would be capable of a wider range of missions.

According to a publicly released DSS report, many countries of concern seek to illegally obtain U.S. UAV technology as part of their strategy to advance their UAV capabilities. DSS reported in 2009 that foreign targeting of U.S. UAV technology through both overt and covert collection efforts had increased dramatically in recent years.²¹ According to DSS, the United States' acknowledged status as a global leader in UAV development makes the U.S. defense industry a primary focus of foreign

²¹See Defense Security Service, *Targeting U.S. Technologies* (2009).

collection attempts. The targeted technologies included engines, optics sensors, communications gear, and guidance and navigation systems.

We were informed that by acquiring UAVs, countries can enhance their capability to gather intelligence, surveillance, and reconnaissance information on U.S. forces and other assets. UAVs can allow countries to collect potentially harmful data on the location, strength, and movement of U.S. troops that can be used to more effectively plan or conduct attacks against U.S. interests. Available analysis also suggests that the use of UAVs by foreign parties to gather information on U.S. military activities has already taken place. We were informed that as more countries acquire UAVs, such intelligence, surveillance, and reconnaissance collection efforts are likely to increase.

Hostile countries could also use UAVs to attack U.S. interests. While only a limited number of countries have fielded lethal or weaponized UAVs, this threat is anticipated to grow, given the number of countries pursuing the acquisition or development of such systems, including countries of concern.²² According to others' analysis, as the number of countries with such capabilities increases, it will likely alter the nature of future conflicts because countries will be able to field a larger number of strike assets without risking their manned aircraft.

Terrorist Organizations Could Use UAVs to Harm U.S. Interests, but Factors May Limit the Near-Term Risk

Available analysis has also shown that terrorist organizations' acquisition of UAVs to harm U.S. interests poses a risk for the United States. Certain terrorist organizations have acquired or are developing some form of UAV technology. For the most part, these organizations are currently limited to using smaller, more rudimentary UAVs, such as radio-controlled aircraft that are available worldwide from hobby shops or through the Internet. Hezbollah is one terrorist organization that has acquired and used UAV technology to date.

Although no terrorist organization has successfully carried out an attack with a UAV to date, available analysis has found that there are likely some terrorist organizations interested in using UAVs to deliver both conventional and unconventional weapons. For example, in September

²²Lethal UAVs are designed to conduct one-way attacks with the vehicle being destroyed upon detonation. Weaponized UAVs are two-way attack vehicles that fly to a target, fire their munitions, and then return.

2011, the FBI arrested an individual in the United States on charges that he planned to crash radio-controlled unmanned airplanes loaded with explosives into the U.S. Capitol and the Pentagon.

Available analysis has noted that there are likely advantages to using UAVs in terrorist attacks, but also factors that may limit the near-term risk. For instance, in certain situations, small UAVs could potentially be more precise in conducting terrorist attacks than using other items, such as mortars or rockets. The impact of such attacks might be lessened though, given the inability of small UAVs to carry large explosives. However, if terrorists were able to equip UAVs with even a small quantity of chemical or biological weapons an attack could potentially produce lethal results. Certain challenges were cited in acquiring the technology and expertise necessary to field a UAV sophisticated enough to carry out more destructive attacks with conventional weapons. Larger, more sophisticated systems would potentially also be harder to operate without detection.

Transfers of U.S. UAV Technology Increase Allies' Capabilities and Strengthen the Industrial Base for UAV Production

Although UAV proliferation poses risks, the U.S. government has determined that selected transfers of UAV technology can further national security objectives. The transfer of U.S. UAV systems to allies provides these countries with increased capabilities to contribute to U.S. efforts globally. It also helps ensure that allies' military equipment is interoperable with that of U.S. forces. Allies have used UAVs acquired from the United States to support a variety of U.S. objectives. For instance, coalition partners have successfully deployed U.S. UAVs to assist in the wars in Afghanistan and Iraq. The U.S. Air Force reported that Italy effectively used Predators purchased from the United States to locate roadside bombs and weapons caches in Iraq, supporting coalition efforts to stabilize the country in advance of national elections. Italy and the United Kingdom also successfully deployed U.S. UAVs in Afghanistan to collect intelligence, surveillance, and reconnaissance data on Taliban activity. State officials said that allowing such sales improved Italy's and the United Kingdom's abilities to function with the United States in an interoperable manner and provided U.S. and NATO commanders with additional assets. Allies also used UAVs purchased from the United States in support of such U.S. security objectives as counternarcotics and counterterrorism operations.

Additionally, DOD has noted the importance of allowing selected transfers of UAV technology in order to strengthen the U.S. industrial base for UAV production. According to some U.S. government officials, the ability to sell

American UAVs to foreign purchasers helps defray the U.S. government's acquisition costs. U.S. government officials also noted that opening larger potential markets to American UAV producers provides additional incentives for producers to invest resources in the research and development of UAV systems, and helps the United States retain a technological lead over foreign UAV producers. According to private sector representatives, UAVs are one of the most important growth sectors in the defense industry and provide significant opportunities for economic benefits if U.S. companies can remain competitive in the global UAV market.

The United States Has Used Diplomacy to Address UAV Proliferation Concerns with Limited Results

The United States has used multilateral and bilateral diplomacy to address UAV technology advances and proliferation concerns. For instance, to address advances in UAV technology, the United States proposed several changes to the MTCR; however, MTCR members agreed to only one change. Moreover, nonmembers continue to acquire, develop, and export UAV technology. In addition to multilateral diplomacy, the United States used bilateral diplomacy in the form of demarches to foreign governments to address specific UAV proliferation concerns with countries.²³

The United States Made Proposals to Address the Proliferation of UAVs through the MTCR but Members Did Not Agree to Most of the Changes

The United States proposed changes to address how the MTCR applies to UAVs, but MTCR members only reached a consensus to accept one of the changes. The United States principally focused these efforts through the MTCR because it addresses the potential use of UAVs to deliver weapons of mass destruction, according to State. According to documents provided by State and State officials, the United States proposed six UAV-related changes to the MTCR Annex and members accepted one.

The five U.S.-sponsored UAV-related proposals that were not adopted were closely related. They were significant since they would have resulted in moving some UAVs currently categorized under MTCR Category I to Category II, according to State documents and State and DOD officials. However, MTCR members could not achieve a consensus to adopt the proposals. As we reported in 2004, both MTCR and

²³A demarche is a formal diplomatic protest or representation.

Wassenaar use a consensus process that makes decision making difficult. MTCR last discussed these U.S. proposals in 2008 and removed them from its agenda the following year, pursuant to MTCR rules.

MTCR members have adopted a total of 22 UAV-related technical changes during the 2005 to 2011 period, according to State. For instance, MTCR members adopted controls on turboprop systems used in Category I UAVs and inertial navigation systems in Category II UAVs, according to State officials. However, according to available analysis, only 7 percent of UAV systems are subject to MTCR's strictest controls.

The United States Made Proposals to Address the Proliferation of UAV-Related Dual-Use Technologies, but Wassenaar Does Not Control Some Key Technologies

The United States proposed three major changes to the Wassenaar control list, which members adopted. The first, adopted in 2005, added to the control list equipment and components specially designed to convert manned aircraft to UAVs, as well as equipment specially designed to control UAVs and guidance and control systems for integration into UAVs, among other things. The second, adopted in 2007, added to the control list, engines designed or modified to power a UAV above 50,000 feet. The third, adopted in 2008, refined the control policy on navigation, altitude, and guidance and control systems for UAVs.

While Wassenaar applies to the export of some military and dual-use systems used on UAVs, it does not apply to other dual-use enabling technologies, according to available analysis. Some of these dual-use technologies are critical to the development of UAV programs in certain countries of concern; however, they are difficult to control because they have other commercial applications.

Some Countries of UAV Proliferation Concern Are Not MTCR or Wassenaar Members

Regime members agree to provide greater scrutiny to trade in technologies identified as sensitive by the regimes through their national laws and regulations. Regime members also share license application denial and other information. Our most recent work shows that some countries that produce and export UAVs do not belong to MTCR or Wassenaar. This fact raises concerns about the potential for nonmembers to undermine the regimes' ability to limit UAV proliferation.

The United States Has Also Used Bilateral Demarches to Address UAV Proliferation Concerns

In addition to employing multilateral diplomacy to address UAV proliferation concerns, the United States employed bilateral diplomacy, chiefly in the form of demarches, to address specific concerns with foreign governments. State provided to us approximately 70 cables containing UAV-related demarches issued to 20 foreign governments and a multilateral regime during the period from January 2005 to September 2011. Over 75 percent of the cables provided responded to efforts by a small number of countries of concern to obtain controlled and uncontrolled technologies for use in their UAV programs.²⁴ While the regimes do not control the proliferation of all enabling technologies used by countries of concern to develop UAVs, the United States has issued demarches to foreign governments even for exports of certain uncontrolled technologies when these were clearly to be used for a military purpose. In addition, State cables show that several countries took actions in response to U.S. demarches.

U.S. Agencies Coordinate to Control the Spread of UAV Technology, but Could Strengthen Their Approval, Monitoring, and Enforcement Efforts

U.S. agencies coordinate in a variety of ways to control the spread of UAV technology, but could strengthen their processes for approving, monitoring, and enforcing export control requirements on UAVs. First, U.S. agencies have established procedures for coordinating the review and approval of UAV transfers, but limitations in information sharing hamper these efforts. Second, DOD, State, and Commerce each conduct end-use monitoring of some UAV technology, but differences in the agencies' programs may result in similar items being subject to different levels of oversight. Third, U.S. agencies have coordinated UAV-related prosecutions and other enforcement actions, but the nature of UAV technology and general issues with export control investigations present enforcement challenges.

²⁴To conduct our analysis of the extent to which the United States used bilateral diplomacy to address UAV proliferation concerns, State provided to us copies of UAV-related demarches. We did not conduct an independent assessment to determine whether our sample contained all the UAV-related demarches that State presented to foreign governments from January 2005 to September 2011. Appendix I provides a broad discussion of how we determined which demarches were UAV-related.

Agencies Use an Interagency Process to Review and Approve UAV Transfers, but Limitations in Information Sharing Hamper This Process

Various U.S. government agencies, including Commerce, State, and DOD, play a role in the process to review and approve transfers of U.S. UAV technology to foreign purchasers. These agencies' decisions are guided by regulatory controls that have been established to govern the transfer of both military and dual-use UAV technology. Controls on military UAV systems and related technology are outlined in the U.S. Munitions List, while controls on dual-use UAV systems and related technology are listed in the Commerce Control List. The Commerce Control List contains three Export Control Classification Numbers (ECCNs) exclusively dealing with UAV systems and related items: 9A012, 9A120, and 9B010.²⁵ Additionally, we identified at least 29 other ECCNs that include controls on components or materials that can be used in UAVs. Unlike the Commerce Control List, the U.S. Munitions List does not include sections that outline controls for UAVs specifically.²⁶ Rather, controls for military UAV technology fall under several more general U.S. Munitions List categories. For instance, applicable controls for complete UAV systems are contained in Category VIII of the U.S. Munitions List, which deals with aircraft and associated equipment more broadly. According to State and Commerce officials, U.S. controls on UAVs are primarily based upon the MTCR and Wassenaar control lists. In addition, U.S. law establishes unilateral controls that limit the transfer of various items, including UAV technology, to particular countries. For instance, State noted that the U.S. trade embargos on countries such as Iran, North Korea, and Syria cover UAV technology, along with a wide array of other items. Additionally, the U.S. government has enacted laws that suspend the approval of any transfers of items on the U.S. Munitions List, including military UAV technology, to China.

While State and Commerce are responsible for reviewing and approving export licenses for military and dual-use UAV technology respectively, the U.S. government has established several mechanisms to coordinate

²⁵The Commerce Control List is divided into 10 broad categories (categories 0 through 9), with each category containing ECCNs that describe the specific controls on a particular item or type of item.

²⁶The U.S. Munitions List is divided into 21 broad categories, with each category further divided into subcategories.

these decisions with other relevant agencies.²⁷ For instance, State and Commerce, as the lead licensing agencies, “staff” out license applications to other relevant agencies, including DOD’s Defense Technology Security Administration, for their review. State and Commerce officials noted that it is particularly important to provide licenses to DOD for review since DOD officials often have the technical expertise regarding particular items. Additionally, many UAV-related license applications are reviewed by the Missile Technology Export Control Group (MTEC). The MTEC is an interagency body that is chaired by State’s Bureau of International Security and Nonproliferation. It includes representatives from State’s DDTC, DOD, Commerce, NASA, and the Department of Energy. During the weekly MTEC meetings, participants can make recommendations to approve or deny licenses or propose conditions to be placed on these licenses. According to State, the MTEC assesses whether license applications are consistent with U.S. laws and regulations, nonproliferation policy, and international commitments. For instance, in one case, the MTEC and the Missile Annex Review Committee²⁸ worked with a U.S. UAV producer to determine what modifications the company needed to make to one of its existing UAV systems to ensure that it was not inherently capable of delivering at least a 500 kilogram payload to a range of at least 300 kilometers. The resulting design ensured that the UAV was classified as an MTCR Category II system and thus not subject to the “strong presumption of denial,” if the company sought to export the system.

State and DOD also coordinate decisions regarding the transfer of military UAV technology through the FMS program. For instance, DOD procedures in its Security Assistance Management Manual specify that DSCA or State may initiate coordination to approve or disapprove a transfer within 5 days of receiving the information copy of the Letter of Request, which is a formal request from a country to purchase an item

²⁷The majority of UAV-related dual-use and military items exported commercially require an export license from Commerce and State, respectively. Approval to transfer military UAV items through the FMS program is granted by the U.S. government through a Letter of Offer and Acceptance. DOD’s DSCA manages this process, but State has final authority regarding the approval of FMS transfers.

²⁸The Missile Annex Review Committee is an interagency working group led by State’s Bureau of International Security and Nonproliferation. It is tasked with addressing technical issues related to the MTCR Annex. For instance, it reviews proposals for amending the Annex. At the request of groups such as the MTEC, it can also make determinations as to whether particular items are controlled by MTCR.

through FMS. DSCA consults with State on these requests in order to determine if there are any immediate objections to the proposed sale within the U.S. government. Further, State must approve any arms transfer through FMS.

Limitations in License Database

The U.S. government has authorized the export of a range of UAV technology, but database limitations impair its ability to oversee the release of such technology. The U.S. government approved the export or transfer of a range of complete military and dual-use UAV systems, as well as key UAV components, from fiscal years 2005 through 2010, but it has no comprehensive view of the volume of UAV technology it authorized for export. Specifically, State's licensing database was not designed to produce complete data on the number, types, and value of UAV technology that State has licensed for export. Since State's database organizes items by U.S. Munitions List category and subcategory, and the list has no dedicated category or subcategory for UAV technology, State lacks an effective means of querying the database to identify UAV-related licenses. In July 2009, State issued a request that exporters list in the "purpose" field of their export license application if an item was a "UAV-related license," covered under certain subcategories within Category VIII of the U.S. Munitions List. State issued this request to assist it in routing license applications to the appropriate internal unit for review, rather than to facilitate monitoring of the volume of UAV technology authorized for export, according to State officials.²⁹ Although State has issued the request to exporters, it does not have procedures to ensure that exporters comply with this request and the request does not apply to UAV-related licenses involving items not covered by Category VIII. In announcing the request, State noted its intention to automate this process, but had not done so as of February 2012.

In contrast, Commerce's database does allow for identification of UAV-related items falling under the Commerce Control List's three UAV-specific ECCNs. However, it has limitations in determining the extent to which certain UAV components have been authorized for export. The Commerce Control List contains at least 29 other ECCNs that control items that are used in UAVs, but can also be used for other purposes. For

²⁹According to State officials, Category VIII licenses are automatically assigned to DDTC's Aircraft Division; however, the DDTC's Space and Missile Technology Division is responsible for reviewing UAV-related licenses. Thus, the new procedure was designed to ensure UAV licenses were routed correctly.

items controlled under these 29 ECCNs, Commerce's database does not provide a means for easily determining which items authorized for export are to be used in UAVs and which are to be used for other purposes, such as in manned aircraft. DOD's system for recording FMS cases is better able to provide a complete picture of UAV technology that has been transferred overseas via FMS.

These limitations in the U.S. government's licensing data impair the ability of U.S. agencies and Congress to oversee the release of sensitive UAV technology. As a result, U.S. agencies may face additional challenges in working to effectively counter UAV proliferation. For instance, U.S. officials may lack complete information on relevant, past licensing decisions, when determining whether or not to grant an export license for a particular UAV item. Additionally, these data issues reduce U.S. agencies' ability to conduct analysis of denied UAV-related license applications to determine if there are particular trends in questionable parties' attempts to acquire UAV technology, according to U.S. government officials.

Despite these limitations, we analyzed State and Commerce licensing data, as well as FMS data, to estimate the extent to which the U.S. government authorized the export of UAV technology in fiscal years 2005 through 2010.³⁰ In total, the U.S. government approved FMS transfers of complete UAV systems in 15 cases over the period.³¹ Additionally, we identified 1,278 UAV-related licenses that State processed over the period. Of these, State approved 90 percent, denied 3 percent, and returned to the applicant without action 7 percent.³² We could not

³⁰For Commerce's licensing data, we reported only those licenses for commodities controlled under the three UAV-specific ECCNs: 9A012, 9A120, and 9B010. Although we identified another 29 ECCNs that control commodities that could be used in UAVs, we did not report on licenses involving these commodities because they are not exclusively used in UAVs. For State's licensing data, State provided us all licenses that had gone before the MTEC over the period from fiscal years 2005 through 2010. While the majority of UAV licenses go before the MTEC, certain UAV-related licenses may not be captured within the data State provided. See appendix I for additional information about the limitations of the data and the steps we took to refine the data.

³¹In several of these cases, countries also purchased various components, parts, and accessories in addition to the systems themselves.

³²If a license applicant fails to provide the necessary information for State to make a determination whether to approve or deny the license, State may return the application without action to the applicant.

accurately determine the number of approved licenses that were for complete UAV systems, given limitations in State's database, but the data indicate that State authorized the export of several complete UAV systems including the Desert Hawk, the ScanEagle, and the Raven. From fiscal years 2005 through 2010, we identified 134 licenses to export dual-use UAV technology that Commerce processed. It approved 74 percent of these applications, denied 2 percent and returned without action 24 percent. Of the 99 licenses that Commerce approved, we identified at least 55 that appeared to involve complete dual-use UAV systems based upon the descriptions in Commerce's data. In addition to complete UAV systems, the U.S. government authorized the export of an array of UAV components and subsystems. Table 1 shows a breakdown of the estimated number of UAV-related licenses for fiscal years 2005 through 2010.

Table 1: Estimates of State and Commerce UAV-Related Licenses, Fiscal Years 2005 through 2010

Agency	License applications total	Licenses approved	Licenses denied	Licenses returned without action
State	1,278	1,150	36	92
Commerce	134	99	3	32

Source: GAO analysis of State and Commerce data.

The U.S. government authorized the transfer of UAV systems to a variety of countries over fiscal years 2005 through 2010. For instance, it authorized the transfer of military UAVs to NATO allies such as Denmark, Italy, Lithuania, and the United Kingdom, as well as other countries such as Australia, Colombia, Israel, and Singapore.

Limitations in Information Sharing

In addition to the U.S. government's limited ability to determine the volume of authorized UAV exports, U.S. licensing agencies have limited information sharing mechanisms with the intelligence community. Both State and Commerce officials stated that the intelligence community does not have a formal process in place to directly provide them timely and relevant intelligence to assist in the licensing process. For instance, intelligence agencies may be consulted by the MTEC on occasion, but they are not routinely represented at weekly meetings. Some intelligence agencies participate in the interagency Missile Trade Analysis Group,

which is a State-chaired interagency working group responsible for stopping specific shipments of missile and UAV proliferation concern worldwide.³³ Although the group is not directly involved in licensing issues, State officials noted that representatives from State's DDTC and Commerce's BIS attend the group's meetings to help ensure a strong working relationship with licensing agencies. Moreover, State officials stated that because both the MTEC and the Missile Trade Analysis Group are chaired by State's Bureau of International Security and Nonproliferation it helps ensure coordination and information-sharing on issues affecting both groups.

According to State and Commerce officials, certain intelligence agencies previously had a more formalized role in the licensing process, but chose to remove themselves from it in 2008. For instance, State officials stated that certain intelligence agencies had previously participated in the MTEC and helped validate the bona fides of foreign parties in license transactions. Additionally, Commerce officials reported one intelligence agency had previously hired contactors to screen foreign parties in Commerce export license applications against intelligence reporting. According to Commerce officials, this agency decided to end its formalized support for the licensing process due to budget cuts and other priorities. State officials said that, since 2008, State has struggled to get timely and relevant intelligence information to assist in licensing decisions. Additionally, Commerce officials stated that they did not believe they were getting access to all pertinent intelligence information as part of their license review process. Some DOD officials also expressed concern with the lack of official mechanisms for the intelligence and licensing agencies to coordinate and noted that some derogatory information available to them on parties listed on license applications may not be getting factored into licensing decisions.

According to U.S. government officials, the administration is currently discussing how the intelligence community can provide better support to the licensing agencies. Additionally, Commerce noted that it has received funding to establish its own intelligence center, known as the Strategic Intelligence Liaison Center, within BIS, to fill the gaps caused when the

³³The Missile Trade Analysis Group is led by State's Bureau of International Security and Nonproliferation and includes representatives from State's Bureau of Intelligence and Research and DDTC, as well as Commerce, DOD, the Department of Energy, DHS, the FBI, the National Security Agency, and the CIA.

intelligence community stopped reviewing Commerce export licenses. The center will, among other things, check the names of parties in license applications against intelligence systems, as was previously done by the intelligence community. While the focus of the center will be on Commerce export licenses, Commerce officials stated that they are working with other relevant agencies to ensure that the information the center generates is available to them, as appropriate. Commerce stated that the center was established as of the end of 2011.

Three Agencies Conduct End-Use Monitoring of UAVs, but Procedures Are Different for Similar Items

State, Commerce, and DOD each conducts end-use monitoring on some UAV-related exports and transfers. Since our previous report on UAV proliferation, all three agencies have taken some steps to increase their end-use monitoring of UAVs and related items.

In 2004, the director of the Office of Enforcement Analysis within Commerce's BIS issued a memo to his staff that highlighted the need to focus greater attention on conducting end-use monitoring of UAV exports. The memo identified certain types of items that should have priority for end-use monitoring, given their utility in developing UAVs. Unlike Commerce, State issued no specific guidance on how to target its end-use monitoring of military UAV technology. Although State has not issued UAV-specific end-use monitoring guidance, State has identified UAVs as an example of a sensitive commodity that might trigger a Blue Lantern check, given the negative impact on national security if the item were to be diverted or illicitly retransferred.³⁴ State officials said that they consider a variety of factors when making a determination as to whether end-use checks on sensitive items, including UAV technology, are warranted. For instance, State may be more likely to do a Blue Lantern check if the end-user has no established history with controlled items, if the number of items ordered by the end-user is more than would reasonably be needed, if the shipment involves an illogical routing, or if the purchaser is paying in cash or at above market rates.

Shortly after our 2004 report, DOD took steps to strengthen its end-use monitoring of UAV technology transferred via FMS. In March 2004, DOD announced that MTCR Category I UAVs would be among those items

³⁴State's DDTC administers the Blue Lantern program to monitor arms exported through DCS.

subject to enhanced end-use monitoring under the Golden Sentry program.³⁵ For those items subject to enhanced end-use monitoring, DOD officials stationed in the host country are required to conduct inventories of transferred items following delivery and at regular intervals thereafter to verify that the items are accounted for and being used in accordance with the terms and conditions of the transfer. DOD can also require enhanced end-use monitoring on non-Category I UAVs, if the transfer is deemed to be of significant risk to warrant such a step. DOD officials reported that, as of February 2012, there had only been one instance where DOD required enhanced end-use monitoring for a non-Category I UAV.³⁶ Items not requiring enhanced end-use monitoring are subject to routine end-use monitoring under the Golden Sentry program. Routine end-use monitoring is conducted in conjunction with other required security-related duties. For example, U.S. officials might observe how a host country's military is using U.S. equipment when visiting a military installation on other business. Given the large volume of defense articles transferred through FMS, DSCA officials have instructed DOD personnel to concentrate routine end-use monitoring efforts on a "watch list" of specific categories of items. DOD has included UAVs among the items on the watch list. However, some DOD officials that we interviewed, as well as officials interviewed by other GAO teams in 2011, noted that there was not clear guidance on the activities that constitute routine end-use monitoring and how to document these efforts.³⁷

The majority of end-use monitoring done for UAV-related items has had favorable results, but agencies found problems in some cases. From fiscal years 2005 through 2010, State identified 45 UAV-related Blue Lantern checks that it conducted and Commerce identified 201 UAV-related end-use checks that it conducted.³⁸ Of the checks State identified as being UAV-related, 66 percent resulted in favorable findings, 16 percent in unfavorable findings, and another 18 percent were

³⁵DOD's DSCA administers the Golden Sentry program to monitor arms transferred through FMS.

³⁶Details of this transfer are designated for official use only and are not reported here.

³⁷[GAO-12-89](#).

³⁸To obtain this data on UAV-related end-use checks, State and Commerce queried their respective databases and provided us data on those end-use checks they deemed to be UAV-related over the period from fiscal years 2005 through 2010.

Differences in Agencies' End-Use Monitoring Programs May Result in Different Levels of Oversight for Similar Items

inconclusive.³⁹ Of the checks Commerce identified as being UAV-related, 58 percent were favorable, 6 percent were unfavorable, and the remaining 36 percent had limited or inconclusive results.⁴⁰ Of the checks that were unfavorable, some identified significant concerns related to unauthorized end-users or end-uses. For instance, State conducted a Blue Lantern check as part of a request to amend a license application to allow for the provision of additional services to one country in support of a U.S. UAV it had already purchased. State found that the country was basing and operating the UAV in a manner that violated the U.S. government's prohibition against using U.S. Munitions List items in internationally disputed territory. Thus, the check was deemed unfavorable.

All three agencies have conducted end-use monitoring on UAV technology, but differences in their respective end-use monitoring programs may result in similar types of items being subject to different levels of oversight. Further details of these differences in U.S. agencies' end-use monitoring programs for UAVs are addressed in the classified version of the report.

U.S. agencies may also have differing levels of access to facilities and equipment when conducting end-use monitoring, contributing to differences in the level of oversight of exported items. Although DOD requires that countries agree to permit inventories and physical inspections as a condition of FMS transfers, State sometimes lacks this type of agreement from countries for items exported through DCS. In fact, U.S. government officials noted that some bilateral agreements prohibit U.S. officials from directly conducting end-use monitoring on State-licensed items. Even when State does have such authority, it

³⁹According to State, if the critical questions have been answered satisfactorily, the transaction appears legitimate, and the *bona fides* of the end-users or other parties are confirmed, the case will likely be closed "favorable." If the transaction's legitimacy cannot be confirmed, the consignees or end-user appear untrustworthy, or if there are other troubling discrepancies, the case will likely be closed "unfavorable."

⁴⁰According to Commerce, a check may result in a limited or inconclusive finding under a number of conditions. For instance, a check may be deemed limited if the official conducting the check cannot view the commodity in question on-site, but only the documents related to the sale, because the item was legally resold to another party. An inconclusive check may occur when the official conducting the check is unable to conclusively determine the end-use of an item because there is potentially conflicting or missing information, but there is not enough evidence to deem the check unfavorable.

inconsistently visits end-users to verify compliance with license conditions, in at least some countries. For instance, we reported in November 2011 that State infrequently visited end-users in Persian Gulf countries when conducting Blue Lantern post-shipment checks on night vision devices.⁴¹

Agencies Coordinated Efforts to Enforce UAV Export Controls, but the Nature of UAV Technology Creates Enforcement Challenges

U.S. agencies coordinated their UAV enforcement actions through several mechanisms, including the National Export Enforcement Coordination Network, and the Exodus Command Center, but officials acknowledged limitations with each. We have previously reported on challenges in enforcing export control laws and regulations more generally. Among other things, we found enforcement agencies have had difficulty coordinating cases and agreeing on how to proceed on investigations.⁴²

The National Export Enforcement Coordination Network (NEECN) was designed to be a hub for coordination on export control investigations. Among other things, NEECN assisted law enforcement agencies in apprising each other of investigative leads, disseminating investigative leads to law enforcement field offices, providing support to ongoing investigations, and identifying proliferation trends. As of November 2011, NEECN was replaced by the new Export Enforcement Coordination Center, as part of the administration's export control reform initiative. To help ensure greater coordination, the administration has required key agencies to partner in this effort in contrast with NEECN, which was a voluntary effort and at times suffered from a lack of agency participation, according to some law enforcement officials.⁴³

Another key coordination mechanism is the ICE-led Exodus Command Center. Enforcement agencies, including ICE and CBP, submit license determination requests through the center to confirm with State or Commerce whether a particular item requires a license, and if so, whether the required license has been obtained. During fiscal years 2005 through

⁴¹See [GAO-12-89](#).

⁴²See [GAO-11-135R](#).

⁴³The Export Enforcement Coordination Center includes the Departments of Commerce, Defense, Energy, Homeland Security, Justice, State, and Treasury, as well as the Office of the Director of National Intelligence.

2010, law enforcement officials used the Exodus Command Center for license determination requests involving UAV-related technology; however, details of these requests are designated as sensitive but unclassified and are not reported here. Law enforcement officials noted that while the Exodus Command Center is a key tool, license determination requests can take a significant amount of time, thus impacting their ability to move forward on investigations or other enforcement actions. In March 2012, we issued a report that explores in more detail the challenges that law enforcement agencies face in investigating illicit transshipments, including license determination delays.⁴⁴

U.S. agencies have worked together to take certain enforcement actions against violators of export control laws and regulations on UAV technology. Based on our analysis of DOJ reporting on export control enforcement prosecutions from October 2006 through June 2011, we identified at least seven prosecutions involving attempts to illegally export UAV-related technology. For instance, in 2009, a District of Columbia couple pleaded guilty to making false statements regarding the export of autopilots for mini UAVs to China.

According to U.S. enforcement officials, they encountered certain difficulties enforcing export laws and regulations on UAVs that are common across all export control investigations. For instance, of the 34 closed investigations that ICE identified for us as being UAV-related in fiscal years 2005 through 2010, none of the cases resulted in a criminal prosecution. In the majority of the 34 cases, the investigations were closed as a result of investigators losing touch with the suspects outside of the country. We previously reported that many suspects in export control violation cases are located outside of the country and foreign governments may not always choose to cooperate with U.S. law enforcement officials.⁴⁵

⁴⁴ See GAO, *Export Controls: Proposed Reforms Create Opportunities to Address Enforcement Challenges*, [GAO-12-246](#) (Washington, D.C.: Mar. 27, 2012).

⁴⁵ See GAO, *Export Controls: Challenges Exist in Enforcement of an Inherently Complex System*, [GAO-07-265](#) (Washington, D.C.: Dec. 20, 2006).

Law enforcement officials also identified two issues that make UAV cases particularly difficult to pursue. DOJ officials noted that it can be difficult to prosecute a case involving an export control violation, particularly those involving dual-use technologies, because proving the violation took place typically involves showing that the commodity in question was specifically designed for use in a technology or application requiring an export control license. For instance, in the 2009 case discussed previously, DOJ ultimately prosecuted the District of Columbia couple for making false statements and not for illegally exporting the autopilots to China. DOJ did this because prosecutors could not prove that the autopilots were specially designed for use in military UAVs, despite evidence that this was their intended use, according to DOJ officials. As part of the administration's efforts to move items on the U.S. Munitions List to the Commerce Control List, Commerce issued a proposed rule in the Federal Register in July 2011 defining what is meant by specially designed and requesting public comment on the proposed definition.⁴⁶ The comment period for this proposed rule closed on September 13, 2011. After reviewing the comments submitted and further review of the issue, Commerce issued another proposed rule further revising the definition of "specially designed" in the Federal Register in June 2012.⁴⁷ The comment period for this proposed rule will close on August 3, 2012. In addition, ICE, CBP, and Commerce officials noted that it is often difficult for law enforcement officials to determine whether violations are occurring because many law enforcement officials lack the technical skills to differentiate controlled UAV components from similar components used in model aircraft or ultralights, which are not subject to export control restrictions. Commerce officials also noted that the rapidly evolving nature of the technologies for use in UAVs could make it more difficult for law enforcement to readily identify these technologies in the future. According to ICE officials, to provide law enforcement officials with the technical skills to identify UAV-related technologies, ICE has provided UAV training to its agents in multiple locations throughout the country.⁴⁸ Commerce has also provided technical training to law enforcement officials; however,

⁴⁶76 Fed. Reg. 41,958, *Proposed Revisions to the Export Administration Regulations (EAR): Control of Items the President Determines No Longer Warrant Control Under the United States Munitions List* (July 15, 2011).

⁴⁷77 Fed. Reg. 36,409, *"Specially Designed" Definition* (June 19, 2012).

⁴⁸This information was provided after the publication of our classified report in February 2012.

this training did not specifically focus on UAV technologies, according to Commerce officials.

Conclusions

Multiple factors highlight past and likely persistent limitations of U.S. efforts to control the proliferation of UAV technology through the export control process. First, the key trends in the acquisition, development, and applications of UAV technology globally show enormous growth in demand for military uses of UAVs, including for lethal applications, and an increasing ability of countries to acquire or develop their own systems. While only a few countries will have a near-term ability to develop and field the most sophisticated systems, many are expected to have sufficiently useful UAVs. These could threaten U.S. forces and interests. Second, the U.S. government recognizes the risks related to the proliferation of UAV technology, but faces difficulties setting controls on systems and components that countries of concern are interested in obtaining. Third, the U.S. government used multilateral and bilateral mechanisms to restrict the proliferation of UAV technology to a great extent, but as we reported in 2004, the nonbinding and consensual nature of multilateral export control regimes can challenge the U.S. government's ability to achieve its objectives in these forums.

While technological advances and the consensual nature of the multilateral export control regimes complicate the task of avoiding widespread proliferation to U.S. adversaries, the U.S. government can take steps to better coordinate its efforts to address national security considerations through its controls on the transfer and export of UAV technology. For instance, some agencies have routine and formal roles in reviewing licenses, but others have no formal mechanism to share significant information with each other. In fact, the role of some agencies with potentially important information to provide has diminished in recent years. Furthermore, U.S. government efforts to provide reasonable assurance that UAV exports and transfers are used as intended are marked by differing levels of protection through State and DOD end-use monitoring activities. As we previously reported on a similar situation involving night vision devices for Persian Gulf countries, major differences in the two agencies' monitoring programs need to be harmonized. Finally, certain information that would be useful to executive branch and congressional decision-making is unavailable because State's licensing database cannot readily identify all licenses authorizing military UAV exports. Thus the U.S. government cannot readily identify the full range of UAVs it has authorized for export to foreign countries.

Recommendations for Executive Action

We are making three recommendations:⁴⁹

- As part of the Administration's export control reform initiative, we recommend that the Secretary of State establish a mechanism in the licensing database to better enable the identification of licenses authorizing the export of UAVs and related components and technologies.
- We recommend that all U.S. agencies with information relevant to the export licensing process should seek to improve mechanisms for information sharing.
- To close gaps in the implementation of UAV end-use monitoring programs that may limit the ability of DOD and State to adequately safeguard defense articles upon their arrival and basing, we recommend that the Secretaries of State and Defense take steps to harmonize their approaches to end-use monitoring. Such steps might include developing a plan for how and when each agency's end-use monitoring approaches would be harmonized.

Agency Comments and Our Evaluation

We provided a draft of our February 2012 classified report to State, DOD, Commerce, DHS, DOJ, and the CIA for their review and comment. State, DOD, Commerce, and DHS provided written comments. We have reprinted DHS' written comments in appendix IV. State's, DOD's, and Commerce's comments discussed classified information and cannot be publicly released; however, we have included an unclassified summary of their comments, as well as those of DHS. State, Commerce, and DOD also provided technical comments, as did the CIA, which we incorporated in the report as appropriate.

State agreed with our recommendation to establish a mechanism in the licensing database to better identify licenses authorizing the export of UAVs and related components and technologies. According to State, the U.S. Munitions List is being rewritten to redefine its controls on UAVs and better differentiate them from controls on other military aircraft. State noted that these changes to the U.S. Munitions List, along with the

⁴⁹The full texts of the second and third recommendations were deemed to contain sensitive information and are not included here. They are included in our February 2012 report.

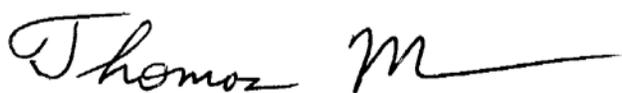
introduction of USXports as the U.S. government's export control licensing case management system, will provide an opportunity to improve database collection and facilitate the identification of UAV licenses.

State, DOD, and Commerce agreed with our recommendation to take additional steps to establish better interagency information sharing. According to State, the administration is currently trying to address such concerns as part of its export control reform initiative. Both DOD and Commerce noted that as part of the administration's export control reform initiative, a new unit, known as the Information Triage Unit, is being established to facilitate information sharing among various U.S. agencies. To begin implementing the functions of the Information Triage Unit, Commerce noted that it has established a Strategic Intelligence Liaison Center. DHS and Commerce noted the role of the Export Enforcement Coordination Center with respect to the exchange of export control-related information among certain U.S. agencies.

State and DOD also agreed with our recommendation to harmonize their approaches to the end-use monitoring of UAVs. State said that it has and will continue to make improvements in its end-use monitoring program. State also said that the report lacks some critical perspective on the number and scope of transfers involving the most sophisticated UAVs. We acknowledge that the United States has to date transferred only a limited number of more sophisticated UAVs, but this does not lessen the importance of ensuring that UAVs the United States transfers to foreign recipients are well protected. Additionally, we note U.S. government officials we met with anticipate that the number of such UAVs transferred will increase in the future. Thus, the importance of effective U.S. end-use monitoring of UAVs will likely continue to increase over time. DOD stated that it welcomes the opportunity to work with State on the end-use monitoring issues raised in our recommendation.

As agreed with your office, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies to interested congressional committees, the secretaries and agency heads of the departments addressed in this report, and other interested parties. In addition, the report will be available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have questions about this report, please contact me at (202) 512-9601 or at melitot@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix V.

A handwritten signature in black ink that reads "Thomas M" followed by a long horizontal flourish.

Thomas Melito
Director, International Affairs and Trade

Appendix I: Scope and Methodology

To assess the global trends in the development, acquisition, and application of unmanned aerial vehicle (UAV) technology worldwide since 2005, we obtained, analyzed, and corroborated private sector open source and U.S. government reporting on U.S. and foreign UAV activities from various sources and spoke to representatives of U.S. private sector associations representing companies that manufacture UAVs. For this report, we defined the term “acquisition” to mean those countries that have obtained complete UAV systems, as well as the countries from which they acquired these UAVs. We defined the term “development” to mean those countries producing and supplying UAVs and the systems they are building. The term “applications” addressed the tasks that UAVs perform and the limitations in their capacity to achieve these tasks. Private sector associations we met with included the Association for Unmanned Vehicle Systems International and the Aerospace Industries Association. We also interviewed representatives of UAV manufacturers in the United States, as well as various analysts within the U.S. government who track UAV issues. We also obtained copies of their briefs as well as some of their reports. In addition, to get a better understanding of the regulatory and technological limitations that affect UAV development, we met with officials from the Federal Aviation Administration. As our trend assessment dealt with global trends, we also met with industry, trade association, and foreign government officials in three countries—Israel, Italy, and the United Kingdom—and obtained reports on their UAV programs. We selected these countries based on analyses of open source reporting and Department of Defense (DOD) and Department of State (State) data showing that these countries either have extensive experience operating U.S.-made UAV systems or are important producers of UAVs and related components. We traveled to Patuxent Naval Air Station in Patuxent, Maryland, to gain a firsthand understanding of the current state of UAV technology, observing the U.S. Navy’s Broad Area Maritime Surveillance-Demonstrator system and the Shadow 200. The Broad Area Maritime Surveillance-Demonstrator UAV is based on the Global Hawk platform—a strategic UAV—while the Shadow 200 is a tactical UAV in use by the U.S. Army that is currently undergoing modification for use by the U.S. Marine Corps.

To assess the national security considerations associated with the proliferation of UAV technology, we met with private sector and U.S. government analysts knowledgeable about UAVs. We also obtained and analyzed a range of private sector and unclassified and classified reports and briefings by the intelligence community discussing the threats associated with the spread of UAV technology to countries of concern and terrorist organizations. Additionally, we interviewed officials from

State, the Department of Commerce (Commerce), and DOD to gather information on the key risks and benefits associated with the spread of UAV technology. To better understand the security considerations associated with transfers of U.S. UAV technology to U.S. allies, we met with foreign government and U.S. embassy officials in Italy to document the Italian Ministry of Defense's experience purchasing and operating U.S.-made systems. While in London, we were unable to meet with United Kingdom military officials knowledgeable about their experience purchasing and operating U.S. systems, but we obtained written responses to questions from the United Kingdom's Ministry of Defense and met with U.S. embassy officials familiar with the United Kingdom's experience.

To assess the extent to which the U.S. government used the multilateral regimes and bilateral demarches to foreign countries to address UAV technology proliferation, we obtained and analyzed classified State reporting cables documenting the results of the 2005 through 2009 Missile Technology Control Regime (MTCR) plenaries and other meetings. We also reviewed various MTCR and Wassenaar Arrangement (Wassenaar) documents, including the two regime's control lists and the various U.S. proposals submitted to the MTCR and Wassenaar. Additionally, we interviewed State, Commerce, and DOD officials to gather information on the steps that the U.S. government has taken through the regimes to work with other participants to control UAV proliferation. We also met with officials of the Wassenaar Arrangement Secretariat. We attempted to meet with MTCR officials, but were not able to due to scheduling limitations. To better understand the limitations of the multilateral regimes, we met with officials from State, Commerce, DOD, and other agencies. To assess the extent to which the United States used bilateral diplomacy to address UAV proliferation concerns, we obtained and analyzed approximately 70 demarches presented to foreign countries during the January 2005 to September 2011 timeframe that State provided to us.¹ We also interviewed State officials knowledgeable about the demarches. We did not conduct an independent assessment to determine whether our sample contained all the UAV-related demarches that State presented to foreign countries during this timeframe.

¹A demarche is a formal diplomatic protest or representation.

To assess the extent to which the U.S. government has coordinated its export control efforts to limit the spread of UAV technology, we obtained and analyzed fiscal years 2005 through 2010 export licensing and end-use monitoring data from Commerce and State. We also obtained DOD fiscal years 2005 through 2010 Foreign Military Sales program and end-use monitoring data. To assess the reliability of these various data sets, we conducted interviews with relevant agency officials, reviewed agency documentation, reviewed past GAO assessments of the databases used to produce this data, and conducted our own reviews of the data provided by the agencies. We determined that the data were sufficiently reliable for our use; however, we identified certain limitations, including with State's licensing database in particular, which are discussed further below. We also reviewed Commerce, State, and DOD documents and reports and met with officials in Washington, D.C., involved in licensing, transfer, and end-use monitoring activities from these three agencies. We also met with agency officials from Commerce, Immigration and Customs Enforcement, Customs and Border Protection, the Federal Bureau of Investigation, and the Department of Justice responsible for enforcing export control laws and regulations.

To analyze Commerce's UAV-related export control licensing data, we identified the 3 principal export control classification numbers (ECCNs) that exclusively control UAV systems and technology, as well as 29 additional ECCNs that include technology that could be used in UAVs, but can also be used for other purposes. To identify these ECCNs, we first conducted a search of the Commerce Control List to determine which ECCNs contained the terms: "unmanned aerial vehicle," "UAV," "unmanned aerial system," and "UAS." We also reviewed Commerce documentation discussing UAV-related ECCNs. Finally, we validated the choice of these ECCNs with officials from Commerce and the Defense Technology Security Administration and made modifications to our list based upon their input. We validated our list of ECCNs with Commerce and the Defense Technology Security Administration because Commerce manages the database used to track dual-use license applications and the Defense Technology Security Administration is the main agency that Commerce uses for technical assistance in conducting license reviews. We then analyzed Commerce export licensing data and quantified the number of license applications associated with each of these ECCNs during fiscal years 2005 through 2010. However, in the final report, we chose to limit our discussion to only those licenses involving the three ECCNs that are UAV-specific. We chose to do so because, through our own analysis and interviews with Commerce and Defense Technology Security Administration officials, we determined there was not a reliable

way of identifying which of the more than 7,000 license applications involving the other 29 ECCNs included items that were to be used in UAVs, versus those licenses that included items to be used for other purposes, such as in manned aircraft. Because our final analysis does not include any license applications involving these 29 ECCNs, our results may not have captured some UAV-related licenses; however, we believe the results are sufficiently reliable to provide a reasonable estimate of the number of UAV-related licenses submitted to Commerce in fiscal years 2005 through 2010.

State's licensing database is organized according to U.S. Munitions List category and subcategory and there is no specific category or subcategory for UAVs and related technology. Thus, to analyze State's UAV-related licensing data, we obtained data for more than 7,000 license applications that State had submitted to the Missile Technology Export Control Group (MTEC) during fiscal years 2005 through 2010. While the majority of UAV licenses go before the MTEC, certain UAV-related licenses may not be captured within the data State provided, according to State officials. For instance, certain sensors or other types of payloads used in UAVs, but also used in other types of aircraft, might not be reviewed by the MTEC because they are not considered missile technology controlled by the MTCR, according to State officials. Additionally, the data provided by State included a significant number of licenses that were not UAV-related and instead pertained to other types of missile technology. To better identify the UAV-related licenses, we identified 34 key terms to use in filtering the data. These terms included both general terms that are commonly used to describe UAVs, such as "unmanned aerial system" and "UAS," and also specific terms that are the names of key UAV systems that are produced in the United States and abroad, such as "Predator" and "ScanEagle." We validated these terms with State and the Defense Technology Security Administration. We validated the choice of these terms with State and the Defense Technology Security Administration because State manages the database used to track U.S. Munitions List-related license applications and the Defense Technology Security Administration is the main agency that State uses for technical assistance in conducting license reviews. We used these terms to assist in separating out those licenses that were UAV-related from those that were not. Nonetheless, we found that Direct Commercial Sales (DCS) data could not identify with certainty all licenses authorizing UAVs and related components without a manual review of tens of thousands of licenses. As a consequence, we could not accurately report the magnitude of DCS arms transfer authorizations for UAVs; however, we believe the results are sufficiently reliable to provide a

general estimate of the number of UAV-related licenses submitted to State in fiscal years 2005 through 2010.

To analyze State and Commerce end-use monitoring of UAV-related exports, we obtained end-use monitoring data from both agencies identifying the number, location, and type of UAV-related end-use monitoring checks conducted in fiscal years 2005 through 2010. Both State's and Commerce's end-use data have limitations because the agencies' databases are not designed to provide a means of automatically identifying end-use checks that are UAV-related. As a result, both agencies developed queries using terms such as "UAV" and "unmanned aerial vehicle." Based upon our discussions with agency officials, we believe that these queries identified the majority of relevant end-use check records, but some UAV-related checks may not have been captured in the queries. However, we determined that the agencies' end-use monitoring data is sufficiently reliable to provide a reasonable estimate of the number and types of checks performed by the two agencies.

To analyze DOD's transfers of UAV technology via the Foreign Military Sales (FMS) program, we obtained from the Defense Security Cooperation Agency (DSCA) a breakdown of the number, country, and type of UAV technology transferred during fiscal years 2005 through 2010. To produce this data, DSCA developed a query of its 1200 system to identify relevant FMS transfers involving UAV technology. We also obtained Golden Sentry UAV-related end-use monitoring data from DSCA for the same period.

To ensure the accuracy of the information contained in appendix III, we provided a copy of this appendix to Israeli government officials, who provided technical comments. We have incorporated their comments as appropriate.

DOD, State, the Department of Homeland Security, the Federal Bureau of Investigation, and the Central Intelligence Agency deemed some of the information in our February 2012 report as classified, which must be protected from public disclosure. Therefore, this report omits sensitive information about efforts by countries of concern and terrorists to obtain and use sensitive UAV technology, as well as details about the U.S. proposals that the multilateral regimes did not adopt. This report also omits sensitive information about U.S. uses of bilateral diplomacy to address UAV proliferation concerns, U.S. efforts to coordinate and use certain sensitive information as part of the licensing process, and U.S.

government efforts to coordinate the enforcement of export controls on UAVs.

We conducted this performance audit from October 2010 to July 2012 in accordance with generally accepted auditing standards. These standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: List of MTCR and Wassenaar Members

Table 2: List of MTCR and Wassenaar Members

MTCR	Wassenaar
Argentina	Argentina
Australia	Australia
Austria	Austria
Belgium	Belgium
Brazil ^a	Bulgaria
Bulgaria	Canada
Canada	Croatia ^b
Czech Republic	Czech Republic
Denmark	Denmark
Finland	Estonia ^b
France	Finland
Germany	France
Greece	Germany
Hungary	Greece
Iceland	Hungary
Ireland	Ireland
Italy	Italy
Japan	Japan
Luxembourg	Latvia ^b
Netherlands	Lithuania ^b
New Zealand	Luxembourg
Norway	Malta
Poland	Mexico ^b
Portugal	Netherlands
Republic of Korea	New Zealand
Russia	Norway
South Africa	Poland
Spain	Portugal
Sweden	Republic of Korea
Switzerland	Romania ^b
Turkey	Russia
Ukraine	Slovakia ^b
United Kingdom	Slovenia ^b
United States	South Africa
	Spain

**Appendix II: List of MTCR and Wassenaar
Members**

MTCR	Wassenaar
	Sweden
	Switzerland
	Turkey
	Ukraine
	United Kingdom
	United States

Source: MTCR and Wassenaar.

^aBrazil is a member of MTCR, but not Wassenaar.

^bCroatia, Estonia, Latvia, Lithuania, Mexico, Romania, Slovakia, and Slovenia are members of Wassenaar, but not MTCR.

Appendix III: Israel's Export Control System Since 2006

According to Israeli officials we spoke with, the changes that have occurred in Israel's export control system since 2006 were significant because they elevated the importance of export controls. For this reason, this appendix provides additional information about these changes. According to Israeli officials we spoke with, in general, the changes are designed to encourage more interagency coordination and to facilitate enhanced enforcement of export control laws.

In July 2006, Israel established a single export control agency within the Ministry of Defense, named the Defense Export Control Agency (DECA). DECA is responsible for reviewing and consequently approving or denying applications for licenses that involve items, technologies, know-how, and services which are considered under the definition of defense exports.

According to Israeli officials and documents, in cases where a license application involves purely military items or dual-use items that are destined for a military end-user, DECA bears full responsibility, although it is required to consult with the Ministry of Foreign Affairs. In these instances, the licensing process is a two-stage process with a marketing license preceding the export license. In cases of applications involving dual-use items destined for a civilian end-user, the Israeli Ministry of Industry, Trade, and Labor bears the responsibility, while consulting with DECA. In these cases, the licensing mechanism is a one-stage process, as it includes the issuance and granting of the export license alone.

According to Israeli officials and documents, for license applications in which DECA bears full responsibility, a mechanism was established within the Ministry of Defense to coordinate the review of these licenses. This includes the establishment of advisory committees. In addition, a technical committee called the "MTCR Committee" reviews license applications involving possible technologies controlled by MTCR. That committee's task is to determine whether an item is contained within an MTCR control list and if so, what category.

According to Israeli officials and documents, by law, DECA is solely responsible for enforcing export control directives and regulations. Within the framework of that responsibility, DECA is often assisted by Israeli Customs, which in practice, enforces most of the directives and regulations. In addition, DECA is responsible for conducting outreach to companies that export military and dual-use items, technologies, know-how, or services.

According to Israeli officials that we spoke with, Israel also adopted export control legislation to control the export of both military and dual-use items, technologies, know-how, and services. According to Israeli documents, in July 2007, the Israeli Parliament enacted a new Defense Export Control Law, which entered into force in December of that year. This law elevated the importance of export controls in several ways, according to Israeli officials. For instance, Israeli officials stated that the law established a requirement for Israeli exporters to register before applying for any export control license and to create a new position within the company—director of export control. According to Israeli officials, the law also established periodic reporting, record-keeping, and inspection requirements; provided for new administrative penalties such as fines, suspensions, and revocations of licenses; and strengthened criminal penalties for those found violating the law. Moreover, according to Israeli documents, the Defense Export Control Law led the Ministry of Defense to establish separate lists of controlled technologies—one based on the MTCR Annex, two based on the Wassenaar munitions and dual-use lists, and a third dual-use list for transfers to the Palestinian Authority.

The lists of controlled technologies are updated annually in two ways, according to Israeli officials. First, DECA meets with MTCR and Wassenaar Arrangement officials in outreach sessions conducted by the two regimes. The outreach sessions are designed in part to inform key countries that are not MTCR or Wassenaar Arrangement members about control list changes agreed to by member countries, according to Wassenaar Arrangement officials. In addition, DECA meets with export control counterparts from the United States, United Kingdom, Germany, and other countries, according to Israeli officials.

With respect to license application approvals, the Israeli government typically imposes certain conditions, according to Israeli government and industry officials. For instance, DECA requires manufacturers to obtain re-export approval for all controlled components not made in Israel from the country of origin as a pre-condition for considering a license application. In addition, DECA typically imposes certain license conditions, for instance, requiring end-users to sign an end-use or end-user certificate. According to Israeli government officials, approved licenses often state that technology cannot be transferred to a third party without authorization from DECA.

According to Israeli government officials and documents, with respect to license applications involving UAV technology, the Israeli government typically imposes additional licensing conditions as well. For instance,

license applications must specify under which MTCR category the UAV falls, if any. According to Israeli government and industry officials, for MTCR Category I UAVs such as the Heron TP, the Israeli government has adopted a “presumption of denial” standard. In instances where authorization is eventually given to export a Category I UAV, it is limited to MTCR member countries only. In cases where authorization is granted to export an MTCR Category II UAV, these may be marketed or sold to MTCR nonmember countries only as long as they provide a declaration that they fully adhere to MTCR controls.

Appendix IV: Comments from the Department of Homeland Security

U.S. Department of Homeland Security
Washington, DC 20528



**Homeland
Security**

December 5, 2011

Thomas Melito
Director, International Affairs and Trade Team
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Re: [REDACTED]

Dear Mr. Melito:

Thank you for the opportunity to review and comment on this draft report. The U.S. Department of Homeland Security (DHS) appreciates the U.S. Government Accountability Office's (GAO's) work in planning and conducting its review and issuing this report.

The Department is pleased to note GAO's positive recognition of the DHS-led Export Enforcement Coordination Center (EECC), which serves as the primary government forum for the exchange of information and intelligence related to export enforcement. The EECC is staffed with full-time personnel from U.S. Immigration and Customs Enforcement as well as individuals detailed from the U.S. Departments of Treasury, Defense, Justice, Commerce, Energy, and elsewhere. Specific functions of the EECC include:

- Coordinating the de-confliction of criminal and administrative enforcement operations and coordination of industry enforcement outreach activity;
- Serving as a conduit between federal law enforcement agencies and the U.S. Intelligence Community;
- Acting as the primary point of contact between enforcement agencies and export licensing agencies for enforcement and licensing matters;
- Resolving interagency conflicts not settled in the field; and
- Establishing government-wide statistical tracking capabilities for U.S. export enforcement activities.

We noted that the report did not contain any recommendations for DHS. The Department remains committed to continuing its work with our interagency partners to improve our law enforcement capabilities to investigate violations of U.S. export control laws.

**Appendix IV: Comments from the Department
of Homeland Security**

Again, thank you for the opportunity to review and comment on this draft report. Technical and sensitivity comments were provided under separate cover. We look forward to working with you on future Homeland Security issues.

Sincerely,



Jim H. Crumpacker
Director
Departmental GAO-OIG Liaison Office

Appendix V: GAO Contact and Staff Acknowledgments

GAO Contact

Thomas Melito, (202) 512-9601 or melitot@gao.gov

Staff Acknowledgements

In addition to the contact named above, the following staff made key contributions to this the report: Joseph A. Christoff, Director (ret.); Jeff Phillips, Assistant Director; Lynn Cothorn; Martin De Alteriis; Elias Lewine; Grace Lui; José M. Peña; and Ryan Vaughan. Mitch Karpman provided technical assistance in statistics and data analysis, Jena Sinkfield provided graphics support, and Sarah McGrath provided editorial assistance. Burns Chamberlain, Gifford Howland, Mason Calhoun, Drew Lindsey, Rachel Dunsmoor, Judith Williams, and Juan P. Avila provided additional technical assistance.

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