

The Hague Security Delta



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A Blessing in the Skies: Unmanned Opportunities for Business and Security

In recent years, the development of Unmanned Aerial Vehicles (UAVs), or 'drones', has grown dramatically. Today millions of UAVs are deployed for a wide variety of purposes worldwide. In the Netherlands too there is a growing interest in the use of UAVs in the public and the private sector. For emergency services the use of UAVs offers opportunities for improving public safety and national security. For companies the UAV industry represents a large potential for developing a domestic industry for UAV technology. However, there are various challenges that need to be overcome to satisfy stakeholders in government, aerospace companies and knowledge institutes. Among these challenges are stifling regulations, as well as a risk that each actor will want to build up its own autonomous drone capabilities, thus limiting the potential for synergies.

Another issue is that many actors involved in national and public security are using ICT networks for communication, coordination and data analysis purposes, but that adding UAV surveillance information to these networks will lead to a data overload. Analyzing huge amounts of data requires an enormous analysis effort, which no single service has the capacity to do on its own. Thus, a stove-piped approach when introducing surveillance UAVs will almost certainly seriously hamper the effectiveness of civil security authorities and emergency services.

This HSD Issue Brief takes a closer look at how UAVs can make a substantive contribution to enhancing our national security; the challenges that are being faced in introducing UAVs for this purpose; and suggests various solutions to boost the fledgling UAV industry in the Netherlands as well as how to facilitate safe use of UAVs by public and commercial partners. This brief does not assess the existing legal framework in great detail, but does touch upon some of the inhibiting regulations currently in force with respect to unmanned flight.

Overview of UAVs and Market Developments UAVs in all Shapes and Sizes

UAVs come in many forms, shapes, and sizes.¹ Broadly speaking there are two major categories of UAVs: those fitted with sensors

for aerial observation and those equipped with weapons to be used in a combat role;² also known as Unmanned Combat Aerial Vehicles (UCAVs).³ Within both categories of UAVs, three weight classes can be distinguished. Class I UAVs comprise smaller-sized UAVs up to 150kg. Medium-high altitude and long endurance UAVs primarily fall under Class II (150-600kg) and Class III (>600kg).

Out of these three classes, Class I UAVs are rapidly making their way onto the commercial market. Class I UAVs comprise three sorts of UAVs: small (15 - 150kg), mini (<15kg) and micro (<2kg) (see Table 1 for a full overview).⁴ These UAVs can be used for multiple purposes, including traffic control, law enforcement, wildlife protection, pollution control, cartography, coastal and border patrols, but also for property surveillance and neighborhood watch, televising sporting events, leisure activities such as sports, and many others. For example, Amazon, the online retailer, announced in late 2013 it was testing UAVs to perform deliveries.⁵ Soon after however, Amazon's ambitious plans were dashed by the US Federal Aviation Administration (FAA) which ruled 'model aircraft' unfit to be used for 'delivering packages to people for a fee.'⁶ From a business perspective, the projected growth of the commercial market also offers ample opportunities for companies that are keen to take part in the development of commercial drone

| UAVs UP TO 150KG IN (MIL/CIV) SECURITY ROLES | | | | | | | | |
|--|--------------------|---|--------------------------------------|-------------------------------|-----------------------|----------------------------------|---|---|
| Class | Cat. | Normal Military Employment | Normal Civil Employment | Normal Operating Altitude AGL | Normal Mission Radius | Sensor Suite | Civil Mission | Vehicle |
| Class I (< 150 kg) | Small (15- 150 kg) | Tactical Unit Observation Launch System On Site | Regional / Local Observation | Up to 5.000 ft. (1,5 km) | 50 km LOS | EO & IR | High-Res / Real Time Imagery / Detection / Vehicle Identification / Neighborhood Over Watch | Scan Eagle Phoenix |
| | Mini (< 15 kg) | Tactical Unit Observation Hand Launched | Local Observation | Up to 3.000 ft. (900 m) | Up to 25 km LOS | EO or IR | Low-Res Real Time Imagery Detection / Vehicle Identification | Raven / Aladin / Altura / Zenith / Parrot |
| | Micro (< 2 kg) | Individual Observation Hand Launched | Local / On site / Indoor Observation | Up to 200 ft. (60 m) | Up to 5 km LOS | Daylight Color (Video) Streaming | Personal Reconnaissance / House / Room / Search | Black Widow Black Hornet |

Table 1 Class I UAVs for Civilian/Military use

applications. HSD counts several of such companies among its members. As such, a nascent UAV industry in the Netherlands can boost R&D development, and in turn, support economic growth.

Commercial UAVs: A Rapidly Growing Market

The 2013 edition of the *Aerospace America* Global UAV Roundup lists a total of 57 producing countries and 270 companies, which collectively are responsible for the production of more than 960 different types of UAVs. In 2011, these numbers were significantly lower, at 44 countries, 226 companies and 675 types of drones. Since 2011, growth has been significant: 20% for companies, 30% for countries and 40% for UAVs.⁷

North America dominates the global market for UAVs. It is expected that this dominance will remain, at least in the short term. A projection of the global UAV market by region by 2017 conducted by Eurosmart shows Europe in second place, with only 15% of the market compared to 66% for North America

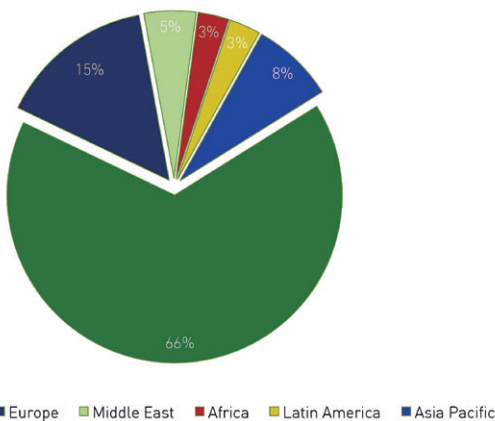


Figure 1 Unmanned Aerial Vehicle Market by region (%), 2017
Source: Eurosmart

The majority of investments in UAVs are directed at the defense industry. However, according to a 2014 report by *Business Intelligence*, 12% (US \$ 11,76 billion) of an estimated US \$ 98 billion in cumulative global spending on aerial drones over the next decade will be targeted at civilian applications. Indeed, the market for civilian applications shows gradual growth.

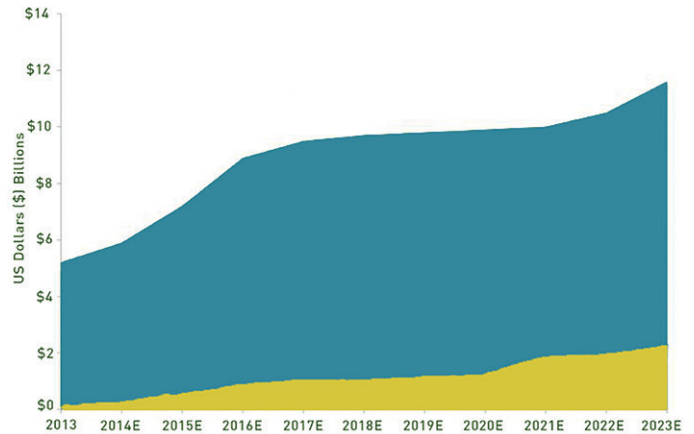


Figure 2 Global Aerial Drone Market Forecast until 2023⁸

Source: Teal Group, Michael Toscano, BI Intelligence estimates

Small-sized UAVs in particular are making great strides. Some estimates place the value of the civilian drone market as high as US \$ 400 billion.⁹ The proliferation of smaller systems brought about a reduction in production costs, enabling a greater use by private companies and individuals. Demand for small-scale UAV technology is set to increase as it is in many cases seen as an effective and low-cost alternative to manned aircraft.¹⁰ These growth figures show that there is great business potential in developing a domestic UAV industry.

Opportunities

UAV technology offers a wide range of opportunities to enhance public safety and national security.¹¹ Emergency services can benefit from the use of drones to gain quick access to an incident area. Unmanned aerial systems can also collect data that enable operators to regulate traffic flows and respond to traffic incidents at a much lower cost than conventional helicopters can. Fire fighters also are dangerously exposed when fighting forest- and industrial fires. The use of small-sized UAVs can greatly enhance situational awareness and provide timely information on the development of a fire.

The fire that took place at Chemie-Pack in the Dutch area of Moerdijk on 5 January 2011 was one of the largest industrial fires ever to take place in the Netherlands. Wilbert Kleijer of the Dutch fire department comments that **“in fighting such a large (industrial) fire, I believe my colleagues could have benefited greatly from the use of small-sized UAVs in order to create a full overview of the disaster area. Had we had such a view of the fire and the surroundings via UAV imaging, we probably could have reacted differently to the fire, we could have been more efficient and it could have required significantly less manpower in dangerous operating conditions.”**□

New legislation allows law enforcement authorities to use UAVs in crowd control.¹² Doing so can drastically cut surveillance costs as it requires significantly less manpower. Another promising avenue is the inspection of buildings where suspects are holding up, for example in hostage situations. However, many more actors can benefit from UAVs. For instance, small-sized UAVs can be used for environmental monitoring over sparsely or otherwise inaccessible areas.¹³

Challenges and Concerns in Developing a UAV Market

Apart from the numerous opportunities for the use of UAVs in the domain of national security, the development of a successful market for UAVs is also faced with a number of important challenges.

Absence of Adequate Legislation and Regulation

Existing regulations in the Netherlands are predominantly based on manned flight. Today, it is forbidden to fly UAVs for a commercial purpose unless a (temporary) exemption is granted by the competent authorities. The procedure for obtaining an exemption is viewed as time consuming and a hindrance to successful product development for start-up companies.¹⁴

According to Rob van Nieuwland, chairman of the Dutch Association for Unmanned Aircraft Systems (DARPAS): **“Dutch companies find themselves at an international competitive disadvantage due to the absence of fixed and proportional regulation. Some companies have filed for bankruptcy as their ability to test their product is hampered by the absence of a clearly defined set of technical and safety standards. The main reasons for this is that the processing time required for obtaining an exemption is too long and that policy on getting permission to take-off and land outside an airfield differs per province.”**

Security

Another concern is the extent to which a UAV is under the effective control of its operator. Incidents have been reported whereby the GPS signals of drones were ‘hacked’, causing the vehicle to be hijacked.¹⁵ Thus, UAVs could potentially be purposefully guided into buildings or individuals. Non-state actors such as terrorist groups could also opt to weaponize

drones or turn the vehicles into flying bombs. Reports have also emerged of smaller criminal networks using UAVs to ship illicit material such as drugs into prison compounds.¹⁶

Safety

In the US, the risk of collisions between drones and collisions of UAVs with other objects or even people is expanding exponentially.¹⁷ The first signs of similar developments in Europe are already present.¹⁸ Growing demand for small UAVs is putting pressure on airspace authorities to approve the use of UAVs in civil airspace.¹⁹ During the March 2014 Nuclear Security Summit in The Hague, multiple drones were detected in violation of local airspace restrictions.²⁰ These incidents raise questions about the security of public figures and the public alike, and about the ease with which individuals with malicious intentions can approach them.

Privacy

There is a growing concern among the general public that UAVs used by law enforcement encroach on people’s privacy. Also, it is not inconceivable that people will start using privately-owned and operated UAVs not just to guard their property but also to spy on others. Drones fitted with cameras which can upload their pictures directly onto Facebook or Twitter can already be purchased online.

Towards safe use of UAVs and promoting a niche industry

Developing a UAV industry could help to give the sluggish European economies a nudge in the right direction, including in the Netherlands. For governments, UAVs could bring significant advantages in the area of national security, while for companies, there are numerous opportunities to exploit such new technology to their benefit. However, numerous challenges remain that need to be addressed in order for UAVs to be successfully integrated into European airspace.

Draft comprehensive legislation and regulations for UAVs for governmental, commercial and private use

In the Netherlands, specific regulations on unmanned aerial flights are currently being explored. One solution prior to introducing new legislation would be to declare UAVs used by the Dutch police and fire units as state-owned (as is the case for UAVs operated by the Ministry of Defence), thus obviating the need for such services to apply for permits on every occasion. Alternatively, fire-fighting units and police units certified to operate UAVs could be allowed to fly in close proximity and immediately over industrial and forest fires or crime scenes without prior permission.

Provide for adequate test areas

When asked about the ability to test experimental UAVs, stakeholders in the Dutch defense industry, emergency services and UAV business organizations complain about a lack of adequate testing facilities with co-located airspace. To solve a similar situation in the US, the FAA designated six unmanned aircraft systems research and test sites across the country.²¹ In the Netherlands, one option could be to grant permission to

UAV manufacturers and developers to use terrain owned by the Dutch Ministry of Defense as UAV test sites. Possible locations could be the Artillery Range near Oldebroek, the former airfield De Peel (Lt-Gen Best Kazerne), Twente airport, or the former airfield Valkenburg.²²

Create an interdepartmental policy on UAVs

Stakeholders in the defense industry, emergency services and UAV business organizations plead for the establishment of an interdepartmental policy for the management and control of UAV capacities in order to avoid unnecessary duplication of capabilities and for cost-saving purposes.²³ One possibility would be to set up a system for the pooling of UAV capacity analogous to the system used under the European Air Transport Command (EATC). Under the EATC, air transport, air-to-air refueling and aeromedical evacuation capacities are shared between member states and paid for by means of a budget-neutral financial exchange mechanism based on the number of flying hours. Essentially, the more flights a country executes, the more 'credits' they earn. These credits can

then be used when 'purchasing' flights from other countries.²⁴ The same logic could be applied to UAVs operated by the police, the fire department, defense, and other government agencies. Arguably the most important reason for an inter-departmental approach would lie in improving the ability of law enforcement authorities and emergency services to analyze massive data flows through a network-centric approach involving all security authorities, military and civil services, thus creating an integrated network with a single data base to be used by all services within the network.

Establish a UAV 'triple helix' for UAV development

There is great potential for the establishment of a UAV 'triple helix' group, containing members from knowledge institutes, industry and government for the development of UAV capacities in the Netherlands.²⁵ Such collaboration could be beneficial to all parties involved. It seems obvious that such a construction would need a pro-active government agency serving as 'innovation leader' as well as 'launching customer'. European laws and regulations, however, are said to form a tough obstacle.²⁶

Footnotes

- ¹ The European Commission uses the terms *Remotely Piloted Aircraft Systems (RPAS)*. RPAS, as the name suggests, are controlled by a pilot from a distance. In this paper, we use the term UAVs synonymously with RPAS.
- ² A third category is quickly reaching operational status: rotary & fixed wing cargo UAVs. See for instance the Kaman Aerospace/Lockheed Martin 'K-Max', <http://www.kaman.com/aerospace/aerosystems/air-vehicles-mro/products-services/unmanned-aerial-systems/>
- ³ Myrto Hatzigeorgopoulos, "European Perspectives on Unmanned Aerial Vehicles," December 2012, 2.
- ⁴ "NATO Naval Armaments Group Joint Capability Group on Unmanned Aerial Vehicles Military Committee Air Standardization Board/Air Operations Working Group / Joint Unmanned Air Vehicles Panel UAV Classification Guide" (NATO, August 9, 2011), 1–2; Maziar Arjomandi, "Classification of Unmanned Aerial Vehicles" (University of Adelaide Faculty of Mechanical Engineering, n.d.), 8.
- ⁵ "Amazon Prime Air," 2014, <http://www.amazon.com/b?node=8037720011>.
- ⁶ James Vincent, "Amazon's Drone Delivery Grounded by the FAA," *The Independent*, accessed June 30, 2014, <http://www.independent.co.uk/life-style/gadgets-and-tech/amazons-drone-delivery-grounded-by-the-faa-9561807.html>.
- ⁷ UAV Roundup 2013 (Aerospace America, August 2013), 26.
- ⁸ Marcelo Ballve, "DRONES: Commercial Drones Are Becoming A Reality, With Huge Impacts For Many Industries," *Business Insider*, March 22, 2014, <http://www.businessinsider.com/drones-navigating-toward-commercial-applications-2-2014-1>.
- ⁹ Chris Wickham, "Military Drones Zero in on \$400 Billion Civilian Market," *Reuters*, November 14, 2012, <http://www.reuters.com/article/2012/11/14/us-science-drones-civilian-idUSBRE8AD1HR20121114>.
- ¹⁰ "Report: Demand for UAVs Rises as Costs Drop," *iHLS Israel's Homeland Security Home*, February 14, 2014, <http://i-hls.com/2014/02/report-demand-uavs-rises-costs-drop/>.
- ¹¹ Enhancements to public safety include flight safety and accident prevention. This includes flight regulations and certification of companies, pilots and unmanned aircraft. Enhancements to national security include the overall raising of situational awareness through surveillance and observation, registration of UAV sales, as well as improving the efficiency of emergency services.
- ¹² "Wetsvoorstel Flexibel Cameratoezicht" (*De Minister van Veiligheid en Justitie*, July 19, 2013).
- ¹³ "Using Unmanned Aerial Vehicles for Environmental Monitoring," *International Atomic Energy Agency (IAEA)*, May 17, 2013, <http://www.iaea.org/newscenter/news/2013/aerialvehicles.html>.
- ¹⁴ Interview with Dutch defence industry representative, April 15, 2014; Interview with UAV business representation, April 25, 2014.
- ¹⁵ Guy Kindermans, "Gps-Systeem van Onbemand Vliegtuigje Gekaapt," *Datanews.be*, accessed April 1, 2014, <http://datanews.knack.be/ict/nieuws/gps-systeem-van-onbemand-vliegtuigje-gekaapt/article-4000131044505.htm>.
- ¹⁶ "Israël Haalt Drone Hezbollah Neer - 'hier Wordt Israël Heel Nerveus Van,'" *Nrc.nl*, accessed April 1, 2014, <http://www.nrc.nl/nieuws/2013/04/25/leger-israel-haalt-drone-van-hezbollah-neer/>; Marc Goodman, "Criminals and Terrorists Can Fly Drones Too," *Time*, accessed February 28, 2014, <http://ideas.time.com/2013/01/31/criminals-and-terrorists-can-fly-drones-too/>.
- ¹⁷ "Drone Botste Bijna Met Vliegtuig VS," *NOS.nl*, May 10, 2014, <http://nos.nl/l/646024>.
- ¹⁸ "Drone Crasht Op Event," *Eventplanner.be /nl*, accessed April 1, 2014, http://www.eventplanner.nl/nieuws/5750_drone-crasht-op-event.html.
- ¹⁹ UAV Roundup 2013, 28.
- ²⁰ "Drones Onderschept Op Kerntop," *NOS.nl*, accessed April 14, 2014, <http://m.nos.nl/artikel/631951-drones-onderschept-op-kerntop.html>.
- ²¹ "Unmanned Aircraft Systems (UAS)," *template, Federal Aviation Administration (FAA)*, accessed May 22, 2014, <http://www.faa.gov/about/initiatives/uas/>.
- ²² Interview with representative of Dutch Ministry of Defence, May 8, 2014.
- ²³ Interview with Dutch defence industry representative; Interview with representative of the fire department Netherlands; Interview with UAV business representation.
- ²⁴ Peter Wijninga, "Europese Samenwerking Met Een Noord-Atlantisch Tintje," *Atlantisch Perspectief* 38, no. 2 (2014): 6.
- ²⁵ Interview with representative of Dutch Ministry of Defence; Interview with representatives of the Dutch National Police, May 8, 2014.
- ²⁶ Interview with Dutch defence industry representative.

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