

Summary

The use of drones

An exploratory study on unmanned aerial vehicles (UAVs)

Background, research questions and scope

Unmanned aerial vehicles (UAVs), often referred to as drones, have become easy and inexpensive to buy, and it is generally expected that the use of drones by private individuals, businesses and public authorities will increase tremendously in the coming years. This raises questions as to what is technologically feasible, legally permissible, and socially desirable.

The main research question is: what are the anticipated possibilities and threats associated with the use of drones, to what extent does the current legal framework offer room for these possibilities and measures to counter these threats, and to the extent that this room does not exist, what are the contours of legislation that would provide this room? To answer this question, six sub-questions were formulated:

- 1 What types of drones exist and what is technologically feasible?
- 2 What are the opportunities and threats associated with the use of drones? In particular, what are the opportunities and threats associated with the use of drones with regard to national security and criminality?
- 3 What is the existing legal framework in the Netherlands for the use of drones by the government (for civil, non-military purposes) and by private individuals, and what are the issues encountered here?
- 4 What are the possible (negative) effects of the use of drones with regard to privacy and in what way can privacy be most effectively safeguarded?
- 5 What legislation do surrounding countries have with regard to the use of drones?
- 6 What are the contours of future legislation to prepare society for the use of drones?

This is an exploratory study into the opportunities and threats of drone use and into legal framework for drone use, and not a study into the desirability of different applications for the use of drones. This study not only describes the current possibilities of and threats posed by the use of drones, but also describes future developments. In most cases the horizon is fairly short (1 to 5 years), but sometimes the longer term is examined (10 to 15 years). The focus of this study is on the use of drones by the state for civil (non-military) purposes and the use of drones in the private sector. Military applications fall outside of the scope of this study.

Methodology

The research questions have been answered through literature study and interviews. The literature study has been conducted on the basis of an analysis of scientific literature, professional literature and media messages with regard to the use of drones. For the legal research questions, the current legal frameworks and case law regarding the use of drones have been analysed. This legal study focused on the Dutch situation, but also examined the situation in Belgium, France, Germany, the United Kingdom, Australia and the United States. No exhaustive comparative legal study was performed, as this is merely an exploratory study.

Interviews were held with experts in various relevant disciplines, including scientists who develop drones, companies that build or use drones, companies that offer services using drones and organisations that purchase such services, organisations in the security sector and scholars in the fields of privacy, ethics and fundamental rights, and scholars and experts in the fields of criminal law, aviation law and privacy law. All in all, in-depth interviews were held with 17 individuals, with the aid of a semi-structured questionnaire. The interviews were complemented with conversations with roughly the same number of people in other organisations.

Results and conclusions

The different *types of drones* can be differentiated in terms of the type (fixed-wing, multi-rotor, etc.), the degree of autonomy, the size and weight, and the power source. These specifications are important, for example for the drone's cruising range, the maximum flight duration and the loading capacity. Aside from the drone itself (i.e., the 'platform') various types of payloads can be distinguished, including freight (e.g., mail parcels, medicines, fire extinguishing material, flyers, etc.) and different types of sensors (e.g., cameras, sniffers, meteorological sensors, etc.). The trend is for drones to become smaller, lighter, more efficient and cheaper. As a result, drones will become increasingly available to the public at large and will be used for an increasing range of purposes. Drones will become increasingly autonomous and also more capable of operating in swarms.

The *possibilities* for the use of drones can be found in virtually all sectors of society. In the public sector they can potentially be used in the prevention of crime, in making reconstructions of crime scenes, in countering disasters, for dike inspections, countering fraud, guarding borders, and for environmental and agricultural inspections. In the private sector there is potential for camera applications, to make aerial photographs, neighbourhood crime prevention, and for population census estimations. Drones also have wide possibili-

ties in the field of cinematography, television and entertainment. Additionally, there are numerous potential applications for drones equipped with a payload, such as drones with heat sensors to detect cannabis plantations, drones that carry water, food or medicine for rescue operations, and drones with pesticides for use in agriculture.

The potential for drones is offset by the *threats* that make drones the target of damage, the means of inflicting damage, or an environmental factor that can be responsible for damaging effects. Regarding drones as target of damage includes the deliberate damaging or theft of drones or of their payloads, including collected data. As a means of inflicting damage, this includes a wide variety of (intentional) threats, for instance security threats by using drones to collide with people or objects, to drop certain (hazardous) payloads, and privacy risks in terms of spying on people or annoyingly monitoring them. As an environmental factor, this includes (especially non-intentional) safety and privacy risks. Non-intentional safety risks include various threats regarding air traffic (crashing, colliding, etc.). Privacy risks can consist of being harassed by drones (nuisance and annoyance), but also the large-scale (legal or illegal) collection of personal data, inadequate transparency for citizens as to what data are collected and what the data are used for, as well as ‘function creep’ (using data for other purposes than they were originally collected for).

In the Netherlands, the most relevant *legal frameworks* with respect to the use of drones are aviation law, liability law, privacy law and criminal law. The Ministry of Infrastructure and the Environment enforces a prohibition on commercial and professional use of drones. For flights with drones on commercial grounds, as part of the performance of a professional or business activity, or by government entities, an exemption must be obtained which is subject to several conditions, such as having proper insurance and completing a training course. Flights are, in principle, limited to an altitude of 120 metres, must remain outside the reach of humans, and may not be conducted over buildings. Before any flight is made, local authorities need to be informed, a ‘temporary and special use’ (*tijdelijk en uitzonderlijk gebruik*, TUG) exemption must be obtained from provincial level government authorities, and a so-called ‘Notice To Air Men’ (NOTAM) must be submitted to the Ministry of Infrastructure and the Environment. New regulations are currently being drafted to enable the use of drones on commercial and professional grounds on the basis of a permit. No exemption is required for the recreational use of drones that weigh less than 25 kg. In that case the drones are designated as ‘model planes’ and the ‘regulation on flying model planes’ (*regeling modelvliegen*) applies. Recreational use of drones is only permitted under conditions of daylight, within the operator’s direct view, to a maximum altitude of 300 metres, and not over people or buildings.

As regards *legal issues* associated with the use of drones, it is notable how respondents who use drones on commercial or professional grounds perceive the rules as being very strict. The TUG rule and the NOTAM notification, in particular, are seen as unnecessary. By contrast, other respondents point to the danger of using drones for other aerial traffic and the damage that drones may cause to people and buildings. Enforcement authorities are searching for ways to effectively stop the illegal use of drones, and to maintain area prohibitions for drones. Another issue is that the current regulations are seen as complex, also by professional organisations. Respondents voiced virtually no criticism of the legal frameworks of civil law, particularly with regard to liability law and criminal law. Both legal frameworks appear to be adequate and to impose clear limits on the use of drones.

Potential (negative) effects of the use of drones that can occur (intentionally or not) with respect to *privacy* include spying on people, monitoring them in an annoying manner, the large-scale collection of personal data, inadequate transparency and 'function creep'. The right to privacy is laid down in the Dutch Constitution as well as in the European Convention on Human Rights (ECHR). Specific provisions for criminal investigation and law enforcement can be found in the Dutch Penal Code. Furthermore, where it concerns the collection and/or processing of personal data, for instance when shooting images in which people are recognizable, the Personal Data Protection Act (*Wet bescherming persoonsgegevens*, Wbp) applies. The Wbp stipulates that personal data may only be collected and processed if this has a legal basis, and this collection and processing must meet certain conditions. Using drones with cameras is a violation of people's right to privacy as stipulated in ECHR Article 8, which also applies to public space. The state is permitted to use drones for public safety and criminal investigations only when the conditions of ECHR Article 8 are met. The relevant authorities must determine to what extent other, less intrusive measures could achieve the same result, and the proportionality of the measure.

The legal framework thus offers various legal *safeguards* for privacy. As enforcement of the protection of privacy can be difficult, other than legal safeguards can also be considered. An organisational measure could be to draw up a policy vision that outlines how the state will use drones within its existing legal competences. This may create more transparency, more legal assurances and more realistic expectations regarding privacy. New legislation could moreover be tied to a privacy impact assessment that maps out privacy risks explicitly and in detail, and to mandatory evaluations. A technical measure could be to use software to render individuals and car license plates unrecognisable. Privacy could furthermore be protected by limiting the collection and processing of personal data in terms of size (selective use) and storage term. The transparency of and familiarity with the use of drones

could possibly be increased by means of area demarcations where drones are used, colour codes for drones, and providing the public further information on what drones are and what they are capable of.

The *international comparison* with Belgium, France, Germany, the United Kingdom, Australia and the United States shows that Dutch aviation law is very similar to most of these countries. Most of the examined countries apply exceptions to the aviation law rules for drones weighing up to 25 kg. It is notable that a number of countries apply even less demands to the use of the lightest (micro) drones of 7 kg and less. It is also remarkable how the maximum altitude of 300 metres for the recreational use of drones in the Netherlands deviates from the maximum altitude that other countries apply. For reasons of air traffic safety, all countries apply regulations that aim to prevent too liberal use of drones. At the same time, many countries including the Netherlands are studying whether the regulations are sufficient to cope with future developments, and are debating which types of drones use should be permitted. The Netherlands is not a frontrunner here, but with regard to the social debate on the use of drones and on possible amendments to rules and regulations, it certainly does not trail behind other countries either.

It is not possible to set out in detail the *contours for future legislation*, as this depends on future technological developments and the social and political desirability of permitting or prohibiting particular applications of drones. A broad inventory of the desirability of and the social support for specific applications of drones falls outside the scope of this study. Future aviation law, privacy law and criminal investigation law could be supplemented with the creation of a policy vision, more cooperation between government entities, the pursuit of international regulations, making rules independent of technology (to some extent), the use of privacy impact assessments, privacy by design, and the incorporation of mandatory evaluations. Given the number of drones already in use now and the further possibilities for their use, one option to consider would be to create a lighter legal framework (in aviation law) for drones weighing up to 5 or 7 kg. It should be noted however that weight is not the only factor to determine safety risks.

Particularly for the non-professional user – a rapidly growing group – information campaigns could be very valuable with a view to compliance with regulations. Information material could for example be disseminated via the sales outlets for drones. A further mitigation of the risks and threats of the use of drones could be achieved by defining additional (technical) specifications and (mandatory or not) certification and training.

The number of drones in the air is expected to increase rapidly in the coming years. This will put enormous pressure on a system of permits and exemp-

tions. Having large numbers of drones will also put the enforcement of such rules under pressure. Expanding the possibilities for drone use while maintaining safety would meet the demands of particular groups of users, and would help to regulate the technological developments. Concretely, we may draw analogies with the introduction of automobiles over a century ago. Since then, a whole infrastructure has been developed for cars consisting of road markings, traffic signs, signposting, parking places, license plates, asphalt and highways. With large numbers of drones in the air we can likewise imagine air routes, with take-off and landing sites and specific approach lanes, and the demarcation of drone flight zones. Insurances and license markings (with a view to liability) and colour coding (for transparency and recognisability) would also need to be considered eventually.