54th CONFERENCE OF DIRECTORS GENERAL OF CIVIL AVIATION ASIA AND PACIFIC REGIONS

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AGENDA ITEM 3: AVIATION SAFETY AND AIR NAVIGATION

MANAGEMENT OF SMALL DRONES OPERATIONS

(Presented by France)

INFORMATION PAPER

SUMMARY

This paper presents the current methods and equipment used in France for providing suitable flight information, processing flight declarations, issuing authorizations for small drones operations as well as for detecting non cooperative machines.

MANAGEMENT OF SMALL DRONES OPERATIONS

1. INTRODUCTION

1.1 Small drones operations are those conducted with machines of a MTOM (Maximum Take Off Mass) up to 25 kg. These operations are on a very steep increase since 2012, when France published the first regulation dealing with small drones. More than 4000 professional operators are now listed as using approximately 8000 machines. The number of non-professional drones is about one hundred thousand.

1.2 This high number of professional and non-professional users claims for the introduction of dedicated processes in order to, at least, maintain the current level of safety in ATM while enabling drone flights both in non-urban and urban areas. Consequently, to be pragmatic, France started addressing the most urging needs expressed by users and authorities.

Moreover, security concerns related to small drones operations required a solution for detecting small non cooperative machine to be developed.

1.3 Professional and non-professional requirements are different. On the one hand, because they do not need to issue a flight declaration when flying in volumes accessible without prior authorization, non-professional users usually only need basic information.

On the other hand, professionals must, most often, declare their flights and be granted flight authorizations from the police authorities as this is compulsory when flying in urban areas.

Moreover, when flying Beyond Visual Line Of Sight (BVLOS), an approval from French DGAC is required. Process of these authorizations and flight declarations are thus the main issues for professional users.

1.4 Finally, France chose to deal with security concerns through the use of radar and high definition cameras technologies.

2. SMALL DRONE FLIGHT INFORMATION MODULE (SOFIA)

2.1 Aeronautical Information Services (AIS) generally do not pay much attention to the restricted or dangerous areas existing below 500 ft AGL because usually, civil aircraft do not fly that low. Information about obstacles is also rather scarce, except in the immediate airport vicinity, where drones are not allowed to fly.

2.2 NOTAM are another source of difficulty, as they are not easy to understand by non-professional users, and even sometimes by professional ones. The main objection to the NOTAM media is that it is extremely difficult to “visualize” their impact, as they are quite often issued in a “text only” mode.

2.3 In order to overcome these difficulties, French DGAC has decided to:

- launch a cooperation with IGN (Institut Géographique National[1], the French national geodetic survey), in order to get access to:
    - the positions of the schools and hospitals;
    - the limits of French urban areas;
    - the national digitalized terrain model;

[1] http://www.ign.fr/

- launch a partnership with various federations of air enthusiasts, in order to get precise information about ultra-light aircraft platforms, the areas where air models are being flown; and
- develop a module that make NOTAMs translated into graphical objects, every time this is possible.

2.4 The following figure, issued from the SOFIA tool, shows, as an example, the map for metropolitan France presented on IGN website[2]. Red areas are temporarily or permanently forbidden for drone flights, orange areas may be overflown after getting an authorization whereas other areas can be overflown according with the general French regulation.

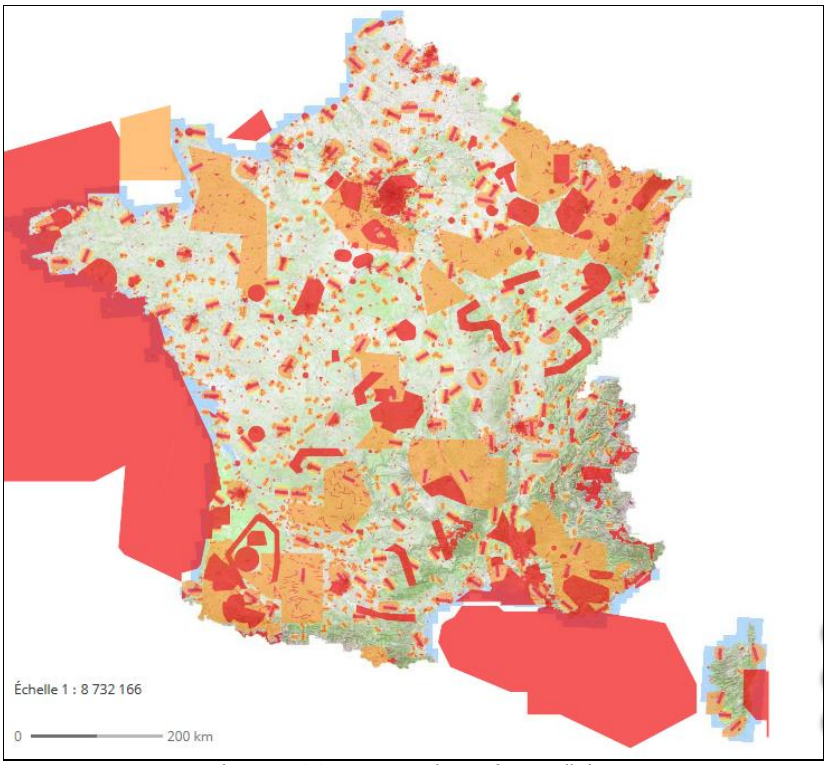

Figure 1: SOFIA general map for small drones

2.5 The tool provides also a more precise airspace description as presented in Fig.2 hereunder: this example concerns the airspace of a part of french Southern Alps around Barcelonnette airfield.

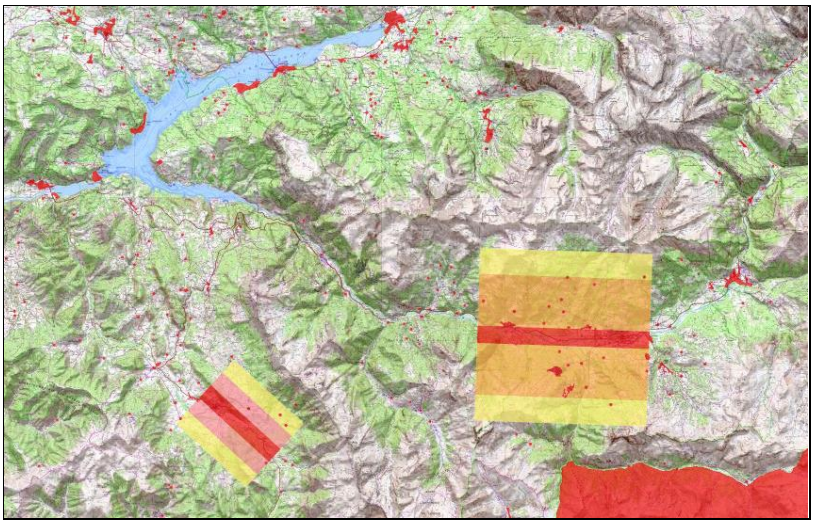

Figure 2: Airspace in the vicinity of the Barcelonnette airfield

[2] https://www.geoportail.gouv.fr/actualites/drones-de-loisirs-volez-en-toute-securite

2.6 It is therefore much simpler for any user and with relevant precision to identify whether the envisaged activity is located in a red, orange, yellow or white area and thus avoid flying in an area where the presence of the drone could be hazardous.

2.7 As a general provision, in France:

- unless a specific authorization is granted, red areas are not accessible;
- flight is possible up to:
  - 60 ft AGL in orange areas,
  - 150 ft AGL in yellow areas,
  - 500 ft AGL elsewhere.

3. SMALL DRONE FLIGHT DECLARATION AND FLIGHT AUTHORIZATION PROCESSING MODULE (MEDRANO TOOL)

3.1 Flight declaration is compulsory for flights above 150 ft. AGL in all French airspace.

3.2 Specifically when in urban area and/or Beyond Visual Line Of Sight and/or close to an airport (i.e: in the orange and yellow areas shown above), a flight authorization must be granted.

3.3 Police authorities and DGAC have thus to process the flight declaration of intention and may issue an authorization to operate the flight, if necessary with some limitations for safety or security reasons.

3.4 It has soon been noticed that processing flight declarations and authorization in an automated manner would greatly reduce the administrative burden for users and consequently increase the knowledge of the flights and safety level. This was especially true, as authorizations imply two different sources that are not used to working together: the police and the DGAC. This led to the specification of a specific tool named MEDRANO.

3.5 DGAC accepted to be the unique channel collecting all flight intentions and flight authorization requests. It has thus decided to develop an interface, called MEDRANO, which will:

- Enable users to register themselves;
- Enable owners to register the drones they use;
- Enable users to declare flight intentions when necessary;
- Automatically send the request for flight authorization to police authorities, get the reply and return it to the requester;
- Additionally send flight declaration data to the French Air Force in order to provide reliable information and thus reduce the risk of a collision between a small drone and a military traffic when flying at very low altitude for training purposes.

4. DETECTION OF SMALL NON COOPERATIVE DRONES (HOLOGARDE TOOL)

4.1 Several unauthorized flights of small drones over nuclear plants and other restricted areas have triggered a response from the French security authorities, namely SGDSN (Secrétariat Général de la Défense et de la Sécurité Nationale).

4.2 In order to limit the risk induced by such overflights, a contest was launched, with the objective to develop integrated technological benches that would be able to intercept small non cooperative drones.

4.3 On its side and in the wake of this contest, DGAC tested its own solution, hereunder described as HOLOGARDE, based on holographic radar and High Definition (HD) Pan-Tilt-Zoom (PTZ) cameras.

4.4 The HOLOGARDE system is based on holographic radar, developed by the Aveillant company. It also features two HD PTZ cameras, one in the visible spectrum and one infrared, as well as a radiofrequency detector.

4.5 The system has been successfully tested and proved its ability to detect a DJI Inspire drone 5 kilometres away from the radar at a height of 300 ft. AGL, and at a distance of more than 2 km away from the radar at a height of 20 ft. AGL.

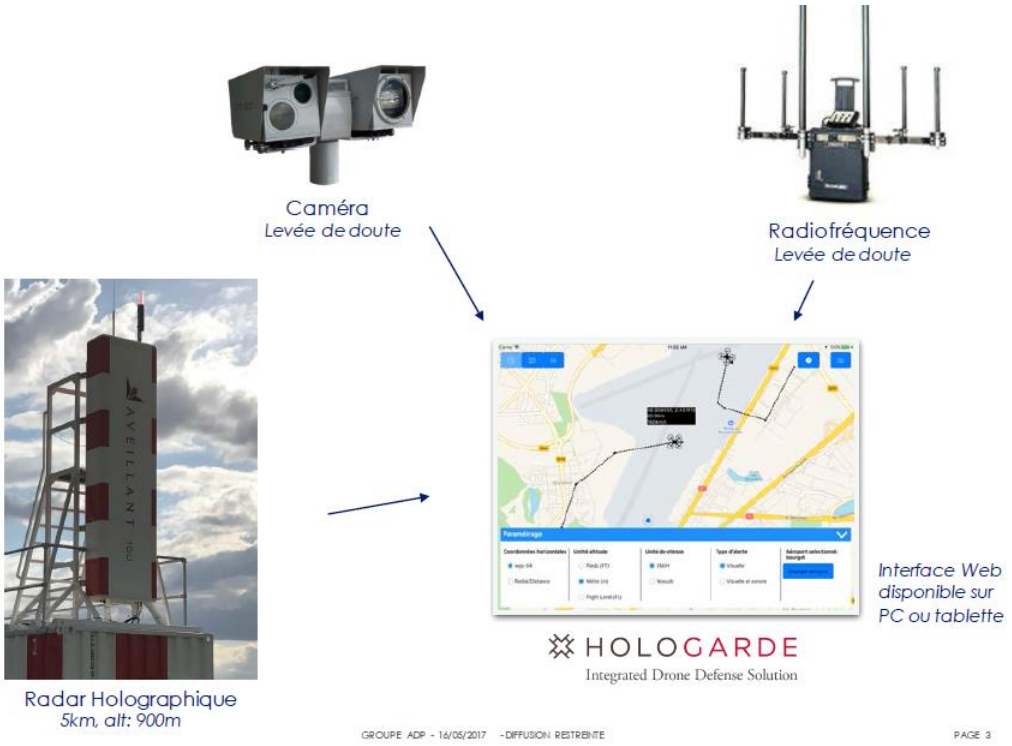

Figure 3: The HOLOGARDE system, able to detect a small drone 5 km away

5. BENEFITS OF THE STRATEGY AND WAY FORWARD

5.1 The current benefits of this strategy are a better involvement of the telepilots of small drones in safety matters. A key step is currently ongoing as State authorities are in the process of collecting feedback in order to fine tune an adequate safety management frame.

5.2 The evolutions that are envisioned today for the SOFIA tool are:

- The possibility for users to use their MEDRANO identification when using the SOFIA interface;
- The processing of the temporary and permanent obstacles;
- The elaboration of a complete national airspace digital model, including ground digital terrain modelization.

5.3 The MEDRANO tool will be connected to the future system of electronic identification in order to provide a live display of the positions of small drones. Specifications of this future system are currently under development in collaboration with Police authorities.

5.4 The HOLOGARDE system is currently installed and will be available at Paris Charles de Gaulle airport by September 2017. The opportunity to equip and protect other major airports is being considered.

6. ACTION BY THE CONFERENCE

6.1 The Conference is invited to:

a) Note the information contained in this paper; and

b) Discuss whether the forthcoming ICAO DRONE ENABLE Symposium on the UAS Traffic Management[3] (UTM) should further develop initiatives as described in this paper.

— END —

[3] https://www.icao.int/Meetings/UAS2017/Documents/UAS2017_RFI.pdf