EENA Operations Document

Remote Piloted Airborne Systems Operations Manual

A template document for use by the emergency services

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1 Executive Summary

The use of Remotely Piloted Airborne System (RPAS) by the emergency services is being more and more visible and their role and impact as part of an overall emergency response is being more widely known. There are many challenges when using an RPAS during an emergency response situation but equally there are significant opportunities for the emergency services.

There are, at the time of writing, ongoing efforts by various European agencies to create a legislative framework for using RPAS for civilian use and the expectation is that the future rules and regulations that govern their use will be adopted at a pan-European level with national authorities then creating national regulations. The hope is that this will be harmonised and not a piecemeal transposition where there are 28 Member State solutions. Regardless of the future legislation, the current procedure for receiving permission to operate an RPAS by an emergency service in many countries is through the respective Aviation Authority.

One of the requirements that many such Aviation Authorities have is that in order to receive permission to operate, each emergency service should create and furnish an Operations Manual, as well as other requirements. Within each Aviation Authority there are national conditions that need to be adhered to and country-specific regulations that should be considered in producing an Operations Manual.

As a result, this document aims to provide a working template for the emergency services to support them in writing their Operations Manual. It is not intended to be a de facto template as a 'one size fits all' approach would simply not work. It is intended that those emergency services who are intending to create their Operations Manual could use this template as a starting point and then amend and adjust it so as to help them towards RPAS implementation in their service.

2 Introduction

EENA has been following the topic of the use of RPAS by the emergencies for some time and in 2015 we published a White Paper[1] on the topic. We also in 2015 established a Working Group which has looked at the wider topic and discussed many of the operational, technical and legal aspects of using RPAS during emergencies.

One of the Recommendations that came from the aforementioned White Paper was the publication of a Operations Manual template document which the emergency services could use as a starting point to help them deploy RPAS in their service.

EENA is also working on a separate project[2] with the RPAS manufacturer DJI where 4 Pilot sites in Europe are testing and trialling RPAS platforms and equipment provided by DJI during emergencies. The use cases and lessons learned from the project will be published in Q4 2016.

EENA is of the view that the RPAS operated by an emergency services, whether it is responding to an emergency or carrying out a training exercise, should not be treated the same as a commercial RPAS operator or hobbyist and that derogations should apply when compared with this category of user. However, the safety of the general public, the emergency services and those operating the RPAS equipment is paramount and the emergency services themselves are absolutely committed to ensuring that they adhere to all of the applicable safety rules.

3 Operations Manual Template

[1] EENA White Paper 20 Nov 2015

[2] EENA + DJI Pilot Project

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The following sections offer an opportunity for the emergency services that are looking to deploy RPAS as part of their emergency response capabilities to take this template and adapt to their own specific needs. EENA would encourage to copy and paste the proposed sections and follow the guidelines described in each of the various sections, and add more information as needed. It is offered as a suggestion only but hopefully it will act as a starting position for some and perhaps an opportunity for others to refine their existing Operations Manual.

Template STARTS

3.1 SECTION ONE – Administration

Glossary of Terms

CBRNE	*Chemical, Biological, Radiological, Nuclear, and Explosive*
ES	*Emergency Service*
FRS	*Fire and Rescue Service*
IC	*Incident Commander*
RPAS	*Remotely Piloted Airborne Systems*
RTAs	*Road Traffic Accidents*
SAR	*Search and Rescue*
VLOS	*Visual Line of Sight*
BVLOS	*Beyond Visual Line of Sight*

Version Control

The process of handling any changes and amendments should be identified here in order to ensure that out-of-date versions are not being used. Version number, date and authorised person responsible for the changes should be noted in this section also.

3.2 SECTION TWO – Responsibilities and Operational area

In this section the roles and responsibility of the RPAS unit along with the geographical area of operation is defined.

Flight Team Composition

In this section, the role of the principal participants in the RPAS unit should be outlined and their specific responsibilities should be defined. This could be done in a schematic format or listed in order of the chain of command. Typically the list would include the following roles:

a. *Commander of the Unit – the person who ultimately has accountability for the overall RPAs team*
b. *Chief Pilot – the person designated as the pilot who has ultimate control over the operation and who maintains all procedures and processes.*
c. *Flight Safety Manager – the appointed person responsible for all safety aspects of the RPAS unit and/or operation*
d. *Pilot – the person who will fly the aircraft and who will receive and carry out 'eyes on' requests, typically from the Incident Commander (IC).*
e. *Spotter/Pilot's Support team – the person(s) who will act as the on-the-ground support for the Pilot and be a second pair of eyes to observe the on-screen display. The person may also carry out additional safety checks before, during and after the mission such as take-off and landing checks, battery levels, altitude indicators, wind speed readings etc.*
f. *In addition, a statement ensuring that the observing of any Visual Line of Sight (VLOS) rules could also be included here.*

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Area of operation

In this section the geographical area of the RPAS unit is outlined. It may be the case that the RPAS unit is tasked to assist other emergency services outside their main area of operation and this should be highlighted also. Critical infrastructures within the area of operation should also be identified and described (e.g. power plants, bridges, transport hubs etc). Typical use cases of the RPAS unit

In this section the main uses of the RPAS should be identified and would follow the main responsibilities of the emergency service itself. For example for a Fire and Rescue Service (FRS) it may involve some of the following examples:

a. *Flooding*
b. *Fires (large/small)*
c. *CBRNE incidents*
d. *Missing person searches*
e. *Person-in-danger missions (e.g. attempted suicide)*
f. *Road Traffic Accidents (RTAs)*
g. *Support of other emergency services*
h. *Infrastructural inspections*

Legislation and regulations

In this section the rules and regulations that are applicable should be defined and outlined. It is probable that not all of the specific rules need to be listed here but the ones that are specific to and effect the emergency service's operation of the RPAS should be listed and understood by all of the persons listed above in the section on Roles and Responsibilities. For example,

a. *Civil Aviation Authority*
b. *General aviation legislation and regulations*
c. *Specific legislation/regulation involving RPAS*
d. *RPAS types – Limitations regarding the type and the weight. Which requires registration of aircraft and have a certificate of airworthiness?*
e. *Responsibility – who is the responsible person for the RPAS and the operation?*
f. *Name plate – is identification required on the RPAS?*
g. *Max height – what is the maximum height permitted to be flown by the RPAS?*
h. *VLOS – what are the rules pertaining to maintaining Visual Line of Sight (VLOS)?*
i. *BVLOS – what are the rules pertaining to the operation involving Beyond Visual of Sight (BVLOS)?*
j. *Overfly congested areas – is this possible? If not what is the rule with flying close to buildings? What is the limit allowed under legislation? Rules around airports – what are rules in place around airports or other critical infrastructures?*
k. *Night-time authorisation – What are the rules governing night-time missions? Do the limits change for example? What authorisation must be obtained?*
l. *Non-emergencies (training missions etc) – If the emergency service simply wants to use the RPAS during training mission, what rules should apply?*
m. *Civil liability insurance - does the emergency service need special insurance in place for example?*
n. *Accident notifications and incident reporting - how does this happen currently and what would the procedure be for the emergency service in the future?*
o. *Established limitations through the protection of personal data regulations under Directive 95/46/EC*

3.3 SECTION THREE – Platform type and Pilot Qualifications

Platform and equipment

In this section the type of platform that the emergency service will use should be documented. It may vary depending on the incident type, the prevailing conditions that exist or the availability of the platform itself.

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a. *Outline the type of platform(s) being used and the year of manufacture*
b. *Outline the technical specification of the platform(s); it is usually provided by the manufacturer(s).*
c. *The list of any modifications should be added (e.g. extra cameras fitted, landing lights added etc)*
d. *Logs and records of flights taken (updated regularly)*

Pilots qualifications and training

In this section the flight team's qualifications and training records should be documented and updated regularly. In many countries, there is a requirement to ensure that only training from an approved training school is obtained. The following items may help in completing this section:

a. *Name of the recognised training company*
b. *Description of the training programme*
c. *Record of each Pilot's training history including any refresher training or continuous professional development (CPD)*
d. *Health records and 'authorisation to fly' logs*

3.4 SECTION FOUR – Flight planning and pre-flight procedures

Procedures for deploying the RPAS

In order to launch the RPAS, the procedure for doing so along with the chain of command should be well down by all those involved. In this section the following topics may be included:

a. *Order to deploy – in this section the process for deploying the RPAS should be clearly documented and known to all of the RPAS unit members. Whilst the order/request to deploy is made, the ultimate decision to launch should be down to the RPAS team itself, probably the Pilot.*
b. *Weather checks – the weather will be a deciding factor in the decision to launch or not and therefore accurate and up-to-date weather forecasts should be obtained. Here the procedures for obtaining regular weather briefings should be outlined.*
c. *Location of deployment – before launching, the Pilot will need to know where the RPAS team is required and as much situational awareness information should be obtained as possible regarding the site details, type of airspace being flown in, surrounding topography and near/far-field obstacles, 'return to home' landing area in the case of battery changes etc. In this section the procedure for obtaining this information should be documented.*
d. *Pre-flight checklist – before launching the RPAS, a full pre-defined checklist should be undertaken by the Pilot. The checklist could include the following:*

    i. *Assembly of the RPAS platform (in accordance with the manufacturer's instructions)*
    ii. *Firmware version status*
    iii. *Battery check (RPAS and RC control) including health of spare batteries*
    iv. *WiFi signal quality (if used)*
    v. *Weather check (rain, ice and solar storms)*
    vi. *Near-field obstacles*
    vii. *Far-field obstacles*
        i. *Check propellers, release the gimbal (if one is being used) and removing the protection bracket for the camera*
        ii. *GPS calibration (in line with the manufacturers specifications)*
        iii. *Emergency shutdown procedure*
        iv. *Alternate landing site if required*

3.5 SECTION FIVE – Landing and post-flight procedures

In this section the procedures for preparing the RPAS to land should be detailed and should cover such items as landing gear check, obstacle avoidance checks and prevailing weather conditions.

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Procedures for landing the RPAS

Landing the RPAS – the procedure for landing the RPAS should be documented in this section and can include the following items by way of example:

a. *Landing gear check – if the RPAS has retractable landing gear, they should be checked to ensure they have been deployed for landing*
b. *Landing lights/mats – if they are used, they should be switched on and made visible*
c. *Obstacles – the Pilot and Spotter should be aware of any potential obstacles prior to landing as well as the terrain*
d. *Weather – the wind speed and direction should be checked also prior to landing*

Post flight checklist

Post-flight checklist – after the RPAS has finished its mission, the Pilot may have to carry out certain procedures and these could be listed here as follows:

a. *Mission log completion including flying time, location, incident type, result, observations, procedural issues if any etc*
b. *Any hardware or software performance issues*
c. *Safe battery storage and transport procedures*
d. *Extraction of any key data from the RPAS*

3.6 SECTION SIX – Emergency Procedures

This section will cover all procedures related to actions that may be needed during an emergency. This should cover all safety procedures, risk mitigation processes required to operate the RPAS.

Risk mitigation

In this section the emergency service should identify all of the risks that it has identified when using the RPAS and what steps which have been taken to reduce the risk. The Flight Safety Manager along with the Chief Pilot and/or Commander of the RPAS unit should work together to compile the list and update/review it on a regular basis. Some of the potential risks that may be covered are as follows:

a. *Weather – current and forecasted conditions*
b. *Human – likely duration of the mission and pilot fatigue*
c. *Equipment (limits and failures) – what are the maximum wind speed limit that the RPAS and Pilot can handle; what are the possible risks with equipment failure and how are those risks mitigated?*
d. *Jamming – what are the possible risks in relation to the device being jammed? How can those risks be overcome?*
e. *Overhead obstructions – what is the process for watching out for overhead cables, building height variations, trees and other obstacles?*
f. *Close proximity to buildings – what type of processes should be considered for observing and reporting proximity to buildings and other such infrastructure?*
g. *Over crowds etc – what are the risks identified with flying over crowds and how can those risks be reduced?*

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Appendix A - PERMISSIONS & EXEMPTIONS *This appendix should detail all the regulatory permissions and exemptions that the emergency service has been granted.*
Appendix B - AIRCRAFT CHECKLISTS *This appendix should cover all the checklists and be updated as regularly.*
Appendix C - RECORDS AND LOGS *This appendix should detail all the flight records, technical logs, error logs and repair logs.*

Template ENDS

4 Conclusion

In conclusion, EENA hopes that this document will act as a support tool for the emergency services as they begin to implement RPAS as part of their overall emergency response toolkit. RPAS are right now supporting the work of the emergency services and in the future will continue to play a key role towards the achievement of having effective, efficient and highly flexible emergency response teams.

5 Appendix

EENA is fully aware that there is not one operations manual that will fit every RPAS team, and given the confidential nature of most of the existing documents within emergency response organizations, we consider worth mentioning as an example the template from the Civil Aviation Authority in the UK, which can be accessed freely at http://www.caa.co.uk/WorkArea/DownloadAsset.aspx?id=4294975606.

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