DG ECHO LEAPFROG (GA 872233)

Deliverable B.3: Report on RPAS intra- and inter-communication

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1 Introduction

Communication between flight crew members is one of the most important aspects for a successful outcome in any operation. However, during an emergency response operation, various RPAS teams may operate at the same time to speed up their deployment and monitor a larger geographical area, either for Search and Rescue operations, post disaster evaluation, or for disaster prevention. Therefore, communication between teams is vital.

In order to analyze the whole communication structure and procedures, it is important to understand how a single flight crew squad is composed, how a team is structured and how all these people communicate to each other effectively. An RPAS team is mainly composed from a Liaison officer (LO), a Remote Pilot in Command (RPIC), a Visual Observer (VO) and Technical and Safety officer (TSO). TSO is a supportive role within the flight crew and therefore he is not required to communicate with anyone during flight operation. Although, he should be next to RPIC during flights and silently monitor the operation while staying on-call if the RPIC requires any assistance. A team is composed from at least two flight crew team members (i.e., the RPIC and the VO), while the LO could be the same for the whole team as shown in Figure 1. The LO is the only flight crew member that is responsible for communicating and transferring information to other teams operating in the area and to the operation commander. Therefore, the LO should be in the operation command center of the event and acting as the communication link of the team.

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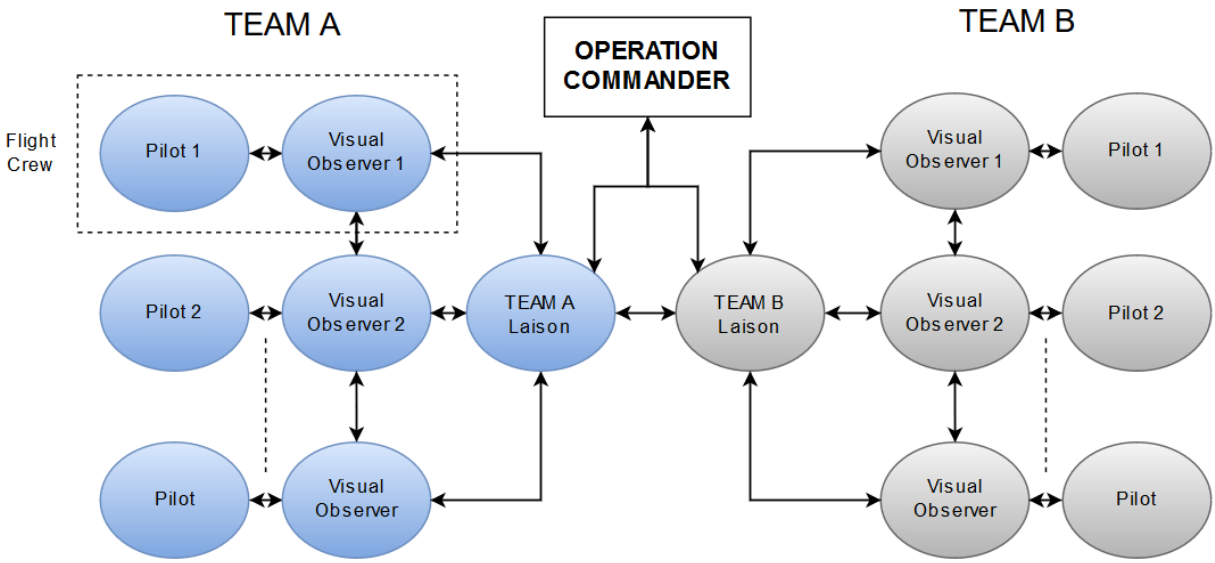

Figure 1: Intra- and inter-communication structure between RPAS teams.

2 Pre-flight communication procedures

Before any team operates, the LO should contact a briefing to discuss and interchange as much information as possible about the event and get informed from the Operation/ Incident Commander regarding any requests and needs they have from the RPAS teams. It is very important that the operation commander assigns a geographical area to the team and let team's LO knows exactly all the information required about the flight, for example flight altitude to operate, coordinates of the geographical area, any restrictions to the area, points of higher interest, NOTAMS etc. It is the responsibility of the LO(s) to do the overall area segmentation and assign each team with an area of responsibility. The area assigned to each team should be chosen according to the capabilities of the team in terms of equipment and total flight crew number. For example, a team with three flight crews should be assigned a larger geographical area for better workload distribution. Another parameter affecting the area assignment is the equipment. A team may have sensors and more advanced equipment that could be more useful in more complicated sections of the field. Furthermore, it is vital that the LO(s) apply altitude separation to the neighboring teams for safety purposes and provide each team with a range of altitudes that are cleared to operate without any altitude

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conflict with the neighboring teams. All the flight crews will strictly operate within these predetermined boundaries as assigned by the LO(s).

After all the information required regarding their RPAS mission has been acquired, the LO should communicate with the pilots of his team and let them know all the aims and objectives of the operation, restrictions etc. Afterwards the RPICs will perform a pre-flight briefing to discuss the operation procedures, aims and objectives of the mission etc. During the pre-flight briefing, the flight crews of each team will divide their predetermined area into segments and assigned each segment to a flight crew, this procedure is called area sub-division. Although each flight crew is assigned with a different segment within their area of interest, it is vital to set an altitude separation between the flight crews for safety purposes. If multiple flight crews are operating at the same time, then the airspace should be controlled. For instance, if an RPIC is about to change altitude for any reason, perform a take-off or landing, he should communicate with his VO and the VO will make sure that all other flight crews within the team are aware about their intentions. All other flight crew RPICs should respond back with a negative or affirmative response depending on their current flight state. If and only if all other flight crews currently operating in the area, approve the request from their fellow RPIC then the request should be executed.

3 Inter and intra-communication during operation

Pilots should mainly focus in flying the aircraft and avoid any unnecessary external disturbances, thus, they should communicate only with the Visual Observer during flight operations and only when is necessary. Visual observers within a team should communicate with each other during flight operations if it is required, for example sharing important information or if an RPIC needs to interact with other RPIC within a team or if the RPIC requests a change in his flight status (e.g. take-off, landing, change of altitude). Each flight crew should be equipped with a pair of two-way communication radios equipped with a headset. A headset is very important during operations to keep the conversation private and to minimize external disturbances to the flight crew.

Video stream and telemetry ideally is transmitted to a local ground station of the team. Therefore, all VO of a team are located in the same place monitoring the video stream and telemetry. Depending on the needs of the flight, RPICs may not be next to each other or they

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may not be very close to the command and control center. Therefore, it is important that VO keep a constant communication between them in order to transfer to their pilots important information and keep them aware of any other pilot's activity in the field.

When a flight crew has some useful information that needs to be shared, then the VO of the flight crew will contact immediately the team's LO. Thereafter, the LO will report to the Operation/Incident Commander the information in as much detail and clarity as possible. Then the Operation/ Incident Commander, at his/her discretion, will report to the interested emergency responder parties. At this point, the inter-communication within a team has been transferred to intra-communication between all responsible emergency services.

4 Conclusions

To achieve effective communication between the RPAS teams, the communication hierarchy should be structured and followed, as explain in the pre-flight and operating procedures, at all times. It is also important to divide and sub-divide the geographical area into segments and clearly state to each flight crew their area of operation providing them with all the restrictions, constrains and requirements that have to be followed. Combining a well-structured plan for the operation with a well-structured communication hierarchy will provide a smooth and clarified operation procedure while at the same time it will contribute to the prevention of any human errors, misunderstandings and ensure a safe, secure and efficient operation.

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