DD Month, YYYY

Checklist for Obtaining Permission/Approval for Flights Involving Simultaneous Multi-UAS Operation (Category II Flight) v.1.0

Intended users of this checklist

1. This checklist is intended for operators who have previously applied for and received permission/approval for unassisted BVLOS (UAS-to-PIC ratio of 1:1).
2. This checklist can also be used by operators other than those listed above to assist with their applications.

Checklist usage notes

1. This checklist is intended to facilitate the application process for permission, etc. for operations falling under the concept of operations (Attachment) assumed for Simultaneous Multi-UAS Operation under Category II Flight. It provides additional explanations for items with which operators must demonstrate compliance. This checklist does not prevent operators from conducting operations consistent with the assumed concept of operations (Attachment) without using this checklist. When using the checklist, indicate 'Simultaneous Multi-UAS Operation checklist (v.1.0) used' in the 'Other Special Notes' section of the DIPS application form (4/4), ensure that the checklist is available at the operator's premises, and be prepared to provide it to the competent authority upon request.
2. Please note that submitting this optional form does not guarantee that permission/approval will be granted for Simultaneous Multi-UAS Operation. This form is positioned as an optional document for operators to provide additional safety-related explanations.
3. Please note that this checklist is based on the premise that restricted-access sites to prevent entry by third parties have been set up. For more information on the setup of restricted-access sites, please refer to the concept of operations assumed for Simultaneous Multi-UAS Operation under Category II Flight (Attachment)
4. This checklist may also be used as reference information for operations outside the scope of the attached concept of operations.
5. If using an aircraft that has already obtained UAS certification, etc., corresponding to Simultaneous Multi-UAS Operation as described in the assumed concept of operations (Attachment) in the attachment, start from item ③ of the checklist.

Category II Flight:

Of the specified flights, it is a flight that is conducted after taking access control measures on the ground under the flight path of an unmanned aircraft so that it does not fly over a third-party land. With the exception of some case[1], flight permission/approval procedures under the Civil Aeronautics Act are required.

[1] For Category II flights in which unmanned aircraft are flown above a densely inhabited district at night, beyond visual line of sight, without keeping a 30 m or more operating distance between the UA and persons or properties, and where the total weight of the UA to be flown is less than 25 kg, if a person who has obtained Unmanned Aircraft Remote Pilot Certification flies an unmanned aircraft that has obtained Unmanned Aircraft System (UAS) certification after taking access control measures, the need to obtain the flight permission/approval can be eliminated by taking necessary measures to ensure the safety of the flight of unmanned aircraft, such as preparing a flight manual. (JCAB, Ministry of Land, Infrastructure, Transport and Tourism, https://www.mlit.go.jp/koku/permitapproval/en/)

	Items to check	Check result
Check items for aircraft	① For UAS capable of automated operations, the following criteria must be met even in the case of Simultaneous Multi-UAS Operation:[2] - ①-1 The automated operations system (i.e. a system that enables flight through automated operations; hereinafter the same) must be capable of performing stable take-off and landing - ①-2 The automated operations system must be capable of maintaining stable flight (climb, lateral movement, flight in a horizontal plane, hovering (rotorcraft only), descent, etc.). - ①-3 The design must allow for forced human intervention at all times, regardless of the pre-set flight program, so that the UAS operator can safely land the aircraft in the event of a malfunction or other issues. However, this does not apply if the manufacturer can prove that the design has functions that do not require human intervention, including response to malfunctions during flight, and that these functions have sufficient reliability (e.g. reliability equivalent to the DAL level corresponding to the flight risk).	■ Compliant / ☐ Non-compliant

[2] JCAB, Ministry of Land, Infrastructure, Transport and Tourism, 'Guidelines for Permission/Approval for UAS Flight (Category II Flight)' Excerpt from (5) of 4-1-1 All UAS, 4-1 Functions and performance of UAS, 4. Basic Criteria for Permission, etc.

Checklist item: Aircraft

Images and descriptions that explain ①

Example: Describe whether deviation prevention systems (geo-fencing, geo-awareness, etc.) are equipped. Clearly specify the automatic response items managed by the automatic system. If the operator performs human intervention, clearly specify the items requiring such intervention. Confirm that, even in the event of a crash, the flight is not conducted in a location where fire or other damage could result, and state the confirmation content.

- Provision of deviation prevention systems
  The UAS is equipped with deviation prevention systems (geo-fencing, geo-awareness, etc.).
- Items to be addressed by the automatic system during nominal phases of flight and in an emergency condition
  - ➢ During nominal phases of flight:
    During normal phases of flight, the system receives GPS signals and navigates according to the waypoint settings, requiring no special operation. The aircraft performs OEDR for objects and obstacles using vision sensors mounted on the aircraft.
    References:
    Attached material, '_aa_Aircraft Manual, p.xx Waypoint Settings'
    Attached material, '_aa_Aircraft Manual, p.xx OEDR Using Vision Sensor'
  - ➢ In an emergency condition:
    The following items have been automated in the aircraft:

	Items anticipated in emergency conditions	Initial response		Reference
		Automatic response by aircraft	Human intervention required	
Aircraft	Power system (Low battery, etc.)	●		Attached material, '_aa_Aircraft Manual, p.xx'
	Propulsion system (Overheating of the aircraft, etc.)	●		Attached material, 'bb_Automation Items Not Included in Aircraft Manual, p.xx'
	Loss of C2 link	●		Attached document, 'aa_Aircraft Manual, p.xx'
	Loss of GNSS	●		Attached material, '_aa_Aircraft Manual, p.xx'
	Control station power loss	● *Mission will continue.		Attached material, 'bb_Automation Items Not Included in Aircraft Manual, p.xx'
	Other failures		●	Attached material, '_cc_Flight Manual, p.xx'
Weather conditions	Rain and icing during flight		●	Attached material, '_cc_Flight Manual, p.xx'
Collision avoidance*	Response to buildings and obstacles	●		Attached material, '_aa_Aircraft Manual, p.xx'

*Third-party access is not expected during this operation (see Attachment). Shielded operation is assumed as a countermeasure against other manned aircraft, while notification to DIPS and prior public notice are assumed for other UAS.

- Confirmation that, even in the event of a crash, the flight is not conducted in a location where fire or other damage could result.
  It has been confirmed that, even in the event of a crash, the operation will not take place in an area where fire or other damage could occur. Since the operation is conducted within the operator's own premises, damage to buildings or other property is not taken into account.

Checklit item: Aircraft	② The aircraft must be equipped with an automated operations system and be capable of monitoring its surroundings using cameras mounted on the aircraft, even in the case of Simultaneous Multi-UAS Operation.[3]	■ Compliant / ☐ Non-compliant
	Images and descriptions that explain ②	
	Example: Provide an explanation of the system's ability to monitor the surroundings of multiple aircraft (an image of an interface that allows simultaneous viewing of camera feeds from multiple aircraft is assumed). If monitoring the surroundings of the aircraft by means other than cameras, describe the system used and discuss its effectiveness (e.g. an interface displaying telemetry for each aircraft, operation information on other aircraft, and weather conditions). Cameras are used to monitor the surroundings of the aircraft, and the pilot interface enables monitoring of the surroundings of the aircraft transmitted from multiple aircraft. *The images are examples.  Source: Anzen Unmanned LLC, 'Final Report for Piloting Multiple,Simultaneous UAS BVLOS (Public)'	

[3] JCAB, Ministry of Land, Infrastructure, Transport and Tourism, 'Guidelines for Permission/Approval for UAS Flight (Category II Flight)' Excerpt from (1) a) of 5-4 BVLOS, 5. 'Additional Criteria for Flight Configurations'

<table>
<tr><td rowspan="3">Checklist items: Aeronautical experience, knowledge, and skills</td><td>③ Even in the case of Simultaneous Multi-UAS Operation, it must be possible to perform the following checks before flight.[4]
- Safety check of the surrounding area (access by third parties, wind speed, wind direction, weather conditions, etc.)
- Remaining fuel or battery level check
- Operational check of communication and propulsion systems</td><td>■ Compliant /
☐ Non-compliant</td></tr>
<tr><td colspan="2">Images and descriptions that explain ③</td></tr>
<tr><td colspan="2">Example: It is expected that images proving that safety checks of surrounding areas can be performed before flight, images proving that fuel or batteries can be checked, and images proving that the operation of communication and propulsion systems can be checked will be attached.

For preflight check procedures for multiple aircraft, please refer to the Attached material, ‘cc_Flight Manual p.xx’.
The pilot interface enables the operator to perform safety checks around each aircraft, check remaining fuel or battery levels, and check the operation of the communication and propulsion systems.</td></tr>
</table>

[4] JCAB, Ministry of Land, Infrastructure, Transport and Tourism, ‘Guidelines for Permission/Approval for UAS Flight (Category II Flight)’ Excerpt from (3) a) of 4-2 UAS aeronautical experience and knowledge and skills necessary to operate UAS, 4. Basic Criteria for Permission, etc.

<table>
<tr><td rowspan="3">Checklist items: Aeronautical experience, knowledge, and skills</td><td>④ In the case of UAS capable of automated operations, the following capabilities must be ensured even in the case of Simultaneous Multi-UAS Operation.[5]
a) The automated operations system must be capable of appropriately setting the flight path.
b) In the event of a malfunction during flight under the automated operations system, appropriate human intervention must be possible to safely land the UAS.</td><td>■ Compliant /
☐ Non-compliant</td></tr>
<tr><td colspan="2">Images and descriptions that explain ④</td></tr>
<tr><td colspan="2">Example: For human intervention, submit materials demonstrating that training has been conducted to enable correct intervention even when the event requiring the longest time or most complex procedure for intervention occurs simultaneously on all aircraft in use.

• Setting appropriate flight paths
The operator has received training on the procedures for setting flight paths for multiple aircraft.
The contents of the training are available for submission if necessary.

• Appropriate human intervention
Training is conducted to ensure that human intervention can be performed correctly even if the propulsion system malfunction that requires the longest time for intervention occurs simultaneously on all aircraft in use.
The contents of the training are available for submission if necessary.</td></tr>
</table>

[5] JCAB, Ministry of Land, Infrastructure, Transport and Tourism, 'Guidelines for Permission/Approval for UAS Flight (Category II Flight)' Excerpt from (3) c) of 4-2 UAS aeronautical experience and knowledge and skills necessary to operate UAS, 4. Basic Criteria for Permission, etc.

Checklist item: Organization	⑤An organization must be established that allows UAS to fly while complying with the following items, even in Simultaneous Multi-UAS Operation.[6] - ⑤-1: Before flight, it must be confirmed that the weather conditions (e.g. wind speed at which flight is possible as specified in the specifications), the aircraft's condition, and the flight path are all satisfactory for safe flight. - ⑤-2: If a contingency arises that makes UAS unsafe to continue flight, such as gusts of wind exceeding the limits specified in the instruction manual, the flight must be stopped immediately. - ⑤-3: Other aircraft in flight must be checked, and if a collision is considered likely, appropriate measures such as bringing the aircraft down to the ground must be taken.	■ Compliant / ☐ Non-compliant
	Images and descriptions that explain ⑤	
	Example: Explain that the organization for implementing steps ⑤-1 to ⑤-3 is established by using the relevant procedures, etc. If aircraft checking using the camera mounted on the aircraft in ⑤-3 is not performed, describe the alternative measures and the basis for their effectiveness (compliance with ASTM F3442, methods for proving that the risk of aircraft intrusion is low, etc.). One possible approach is to inquire with the JCAB to confirm the status of past flight permission/approval for manned aircraft in the planned airspace, or to have the applicant prove that there will be no manned aircraft entering the flight airspace. However, it should be noted that there is no compiled data on the flight permission/approval status of manned aircraft (as of December 2024), and there is no established evaluation method for assessing the proof provided by the applicant that there will be no manned aircraft entering the airspace. ⑤-1: For preflight check procedures for multiple aircraft, please refer to the attached material, 'cc_Flight Manual p.xx'. ⑤-2: For details on the assumed contingencies and corresponding procedures, please refer to the attached material, 'cc_Flight Manual p.xx'. ⑤-3: The use of cameras mounted on the aircraft to check for aircraft may be substituted if it can be demonstrated that no manned aircraft will intrude into the flight airspace. In such cases, shielded operations will be conducted as a countermeasure against manned aircraft. • Shielded operations When performing shielded operations, the following two measures must be implemented together. ➢ a. Limiting the flight to within 30 meters above the ground or objects[7] Set a flight area by monitoring the flight altitude or using a system that prevents vertical deviation above the ground or objects, limited to 30 meters. ➢ b. Implement responses ① to ④ below, coordinate with operators in low-altitude airspace to reach agreement, and confirm temporary take-off and landing sites (off-airport and emergency sites). ■ Response ①: Check whether the planned drone flight area falls within a 240-meter radius[8] of the temporary take-off and landing site. For temporary take-off and landing sites around the flight area, please refer to the attached material, 'List of Temporary Take-off and Landing Sites, p. xx'. ■ Response ②: Confirm with manned aircraft operators who routinely operate in the prefecture or city whether they ever fly within 30 meters of the ground or objects around the drone flight location. Please refer to the attached material, '_ee_Prior Sharing of Flight Plans with Operators of Manned Aircraft, p. xx'. ■ Response ③: Share the flight plan with five parties: fire department, police, Self-Defense Forces, US military, and the Japan Coast Guard's doctor helicopter services. For details on evidence, Please refer to the attached material, '_ee_Prior Sharing of Flight Plans with Operators of Manned Aircraft, p. xx'.	

[6] JCAB, Ministry of Land, Infrastructure, Transport and Tourism, 'Guidelines for Permission/Approval for UAS Flight (Category II Flight)' Excerpt from 4-3-1(2), (3) and (7) of 4-3 Organization necessary to ensure safety when flying UAS, 4. Basic Criteria for Permission, etc.

[7] Permission/approval has been granted under EASA PDRA G-03 for operations within 30 meters of the ground or objects. In interviews with manned aircraft operators, they stated that flying at an altitude of 30 meters above the ground or objects generally does not occur due to the risk of downwash affecting objects on the ground. (While low-altitude flights may be conducted in emergencies, they also stated that such locations can be avoided if the drone flight plan is shared in the pre-operation briefing.)

[8] The separation from temporary take-off and landing sites used by rotorcraft is determined based on the slope ratio of the approach surface. In the case of an off-airport take-off and landing site, the slope of the approach surface should be less than 1/8 in the direction of take-off and less than 1/4 in the direction of landing. Shielded operations are limited to 30 meters above the ground or objects. Note that although a separation of 240 meters is required in the take-off direction and 120 meters in the landing direction, a uniform distance of 240 meters is specified for convenience.
Reference: Ministry of Land, Infrastructure, Transport and Tourism, 'Administrative Process Criteria for Off-Airport Take-off and Landing Permission at Regional JCAB', p. 3
For emergency take-off and landing sites, the approach slope ratio may vary depending on local government guidelines (e.g. 1:5 or steeper in unavoidable situations). If an emergency take-off and landing site is located near the planned flight area, individual confirmation is recommended.

	■ Response ④: Conduct interviews with operators of manned aircraft arriving from distant locations or operated by subcontractors, and provide them with the flight plan.

Checklist item: Organization	⑥ In order to maintain compliance with the criteria for the functions and performance of UAS, the methods for inspecting and maintaining the aircraft should be described, taking into consideration the following items.[9] - Aircraft inspection and maintenance methods The following are examples of information that should be included: ・Items to be checked during periodic or routine inspections and maintenance ・Timing of inspection and maintenance, etc.	■ Compliant / ☐ Non-compliant
	Images and descriptions that explain ⑥	
	Example: The flight manual should state that the actions listed in (6) can be performed remotely without an assistant (e.g. by confirming via telemetry). The description should include either an image of the relevant section of the flight manual or a reference to the appropriate section. For details on the remote inspection method and procedure for the aircraft and ports, please refer to the attached material, 'cc p.xx_Flight Manual'.	

[9] CAB, Ministry of Land, Infrastructure, Transport and Tourism, 'Guidelines for Permission/Approval for UAS Flight (Category II Flight)' Excerpt from 4-3-2(1) a) of 4-3 Organization necessary to ensure safety when flying UAS, 4. Basic Criteria for Permission, etc.

<table>
<tr><td rowspan="3">Checklist item: Organization</td><td>⑦ To secure and maintain the aeronautical experience, knowledge, and skills of persons operating UAS, their training methods, etc. must be described, taking into consideration the following items:[10]
- Training methods for acquiring knowledge and skills
The following are examples of information to be included:
• Training methods for acquiring aeronautical experience, knowledge, and skills, as well as abilities appropriate to the flight configuration
• Methods for confirming whether an individual has the appropriate capabilities to operate a UAS for business purposes.
- Methods for maintaining skills
The following are examples of information to be included:
• Content of routine training and related activities</td><td>■ Compliant /
☐ Non-compliant</td></tr>
<tr><td colspan="2">Images and descriptions that explain ⑦</td></tr>
<tr><td colspan="2">Example: The flight manual should state that training has been conducted to acquire the skills required for Simultaneous Multi-UAS Operation, and that ongoing training is provided to maintain those skills. The description should include either an image of the relevant section of the flight manual or a reference to the appropriate section.

In addition to the competence certification under the UAS remote pilot certificate system etc., additional training is conducted, including: system training on the remote flight system; classroom training on relevant legal systems (e.g. regulations related to shielded operations); and multi-aircraft operation training (e.g. practical training using actual aircraft in simulated multi-aircraft operations without real emergency events, and simulation-based training).

The applicant prepares and retains documentation describing the training content, ready to be submitted to the JCAB to confirm that proper training was conducted in the event of an accident or serious incident.

The recorded flight hours also include time spent operating multiple aircraft.</td></tr>
</table>

[10] JCAB, Ministry of Land, Infrastructure, Transport and Tourism, ‘Guidelines for Permission/Approval for UAS Flight (Category II Flight)’ Excerpt from 4-3-2 (2) a) and b) of 4-3 Organization necessary to ensure safety when flying UAS, 4. Basic Criteria for Permission, etc.

Checklist item: Organization	⑧ Describe the necessary organization to ensure safety, taking the following points into consideration.[11] - How to set up areas where third-party access is restricted (i.e. restricted-access sites)	■ Compliant / ☐ Non-compliant
	Images and descriptions that explain ⑧	
	Example: The flight manual should state the method for restricting third-party access to all locations where Simultaneous Multi-UAS Operation are conducted. The description should include either an image of the relevant section of the flight manual or a reference to the appropriate section. All planned flight locations are fenced off, with only two access points where third parties can enter. Security guards are stationed at both points. Although unauthorized entry by malicious third parties is possible, it is not taken into account.	

[11] JCAB, Ministry of Land, Infrastructure, Transport and Tourism, 'Guidelines for Permission/Approval for UAS Flight (Category II Flight)' Excerpt from 4-3-2 (3) b) of 4-3 Organization necessary to ensure safety when flying UAS, 4. Basic Criteria for Permission, etc.

(Attachment)

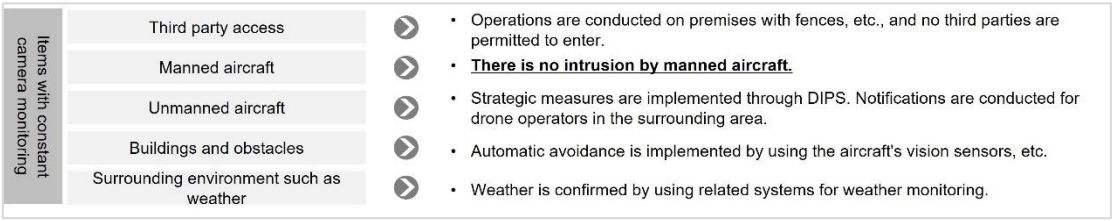
Concept of Operations Assumed in This Checklist

Background

In the development of this checklist, the concept of operations was defined. This concept of operations was developed based on feedback from operators, focusing on types of Simultaneous Multi-UAS Operation that are both in high demand and progressing toward social implementation. Some operators are already conducting these operations in an implementation phase, primarily for inspection and security purposes.

Assumptions of the checklist

The concept of operations in this checklist is based on the premise of considering methods that do not rely on ‘a human checking via a camera mounted on the aircraft and taking action as necessary’. In Simultaneous Multi-UAS Operation, it is difficult to check the cameras mounted on all aircraft. Therefore, the information that would be checked via cameras is substituted with other measures.



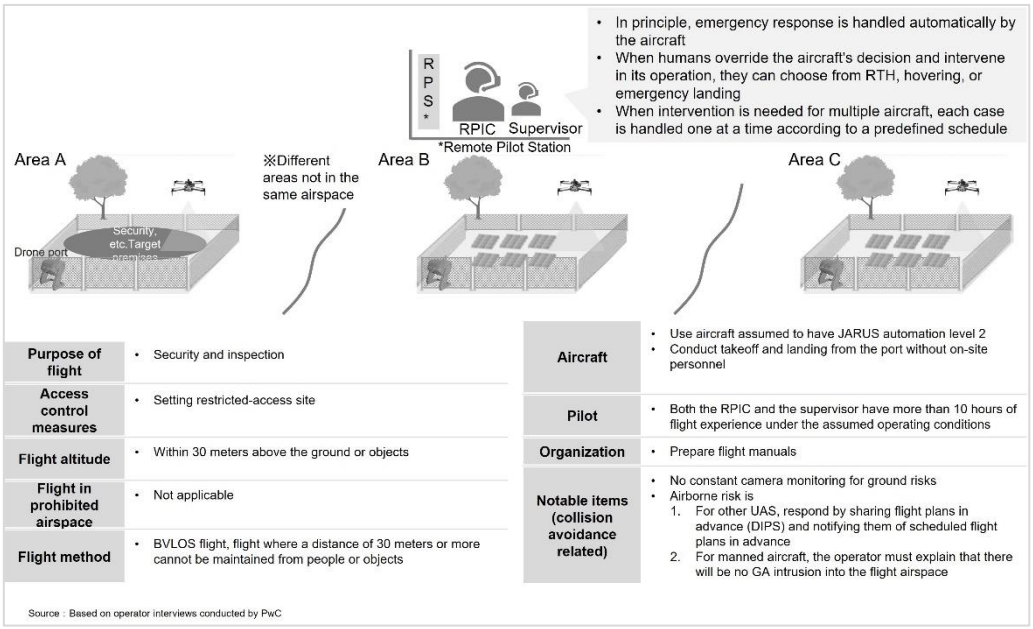
In particular, tactical measures for checking and responding to manned aircraft are implemented by confirming via cameras mounted on the aircraft and taking appropriate action as needed (Guidelines[12] 4-3-1 (7)). As a countermeasure against manned aircraft, shielded operation, used in the US[13] and Europe[14], has been adopted. Shielded operations are conducted based on the premise that the risk of manned aircraft intrusion is extremely low, as long as operation altitude is limited to 30 meters above the ground or objects. Although comprehensive data on the actual history of low-altitude manned aircraft operations in Japan is not available for viewing, estimates (based on provisional figures) indicate that the risk of collision with manned aircraft during shielded operations is extremely low. Accordingly, tactical measures against manned aircraft are being replaced by shielded operations, moving away from the conventional approach of ‘a human checking via a camera mounted on the aircraft and taking action as necessary’.

To prevent UAS from flying over third parties (Guidelines 4-3-1 (1)), measures have been implemented by establishing restricted-access sites as specified in Guidelines 5-4 (3) c) (i), thereby eliminating the need for ‘a human checking via a camera mounted on the aircraft and taking action as necessary’. In other words, these operations do not involve camera surveillance either as a tactical measures against manned aircraft or for confirming the access by third parties.

[12] Guidelines for Permission/Approval for UAS Flight (Category II Flight)
[13] FAA, ‘UAS Beyond Visual Line-of-Sight Operations’
[14] EASA, ‘Predefined Risk Assessment (PDRA)’

Assumed concept of operations

The concept of operations assumed in the checklist is shown below. The remote pilot in command (RPIC) controls drones in three separate areas with non-overlapping airspace, from a remote pilot station. In principle, the aircraft operates under automated operations and remains under continuous control. If an event occurs that requires human intervention, the RPIC responds accordingly.



The aircraft used is assumed to be Level 2 equivalent in terms of the level of automation[15] defined by JARUS. At Automation Level 2, the machine performs continuous control and detects and responds to obstacles and events.

Table 1 Automation Level of an Individual Function Supporting UAS Flight Operations

Criteria \ Level	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5
	Manual Operation	Assisted Operation	Task Reduction	Supervised Automation	Manage by Exception	Full Automation
Human-Machine Teaming	Human led	Human-In-the-loop	Human-In/On-the-loop	Human-In/On-the-loop	Human-On-the-loop	Human-Off-the-loop
Fallback (Integrity Thresholds Exceeded)	Human	Human	Human	Human	Fall back Ready Human (Operator/ATS)	Machine (Limited or Segregated Operations)
System Function Examples \ Level	**Level 0**	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**
Sustained Aircraft Maneuver Control	Human	Human *AND* Machine	Machine (Managed by Human)	Machine (Supervised by Human)	Machine	Machine
Object and Event Detection and Response (OEDR)	Human	Human	Machine (Managed by Human)	Machine (Supervised by Human)	Machine	Machine
Communication with External Systems (Ground and Airspace systems)	Human	Human	Human *OR* Machine (Managed by Human)	Machine (Supervised by Human)	Machine	Machine

Note: Most modern aircraft are highly integrated platforms with many modes of operation and a wide range of capabilities depending on which systems are available to provide information; as a result, aircraft may employ different levels of automation for the same task in other contexts.

[15] JARUS, '[JARUS Methodology for Evaluation of Automation for UAS Operations]'