UNMANNED AIRCRAFT SYSTEM SAFETY

Hazard Identification Questionnaire

OVERVIEW

This questionnaire is designed to help identify potential risks and help identify areas of risk exposure. It is not an exhaustive list. This questionnaire is best utilized early in the mission operation planning stages, prior to any flight readiness reviews or pre-departure operations. Boxes shaded in gray may be pre-populated from a flight planning software.

Two models are implemented: Man, Machine & the Environment, and SHELL.

MAN, MACHINE & THE ENVIRONMENT MODEL

The man, machine & the environment model looks at the hazards and risks associated with the three major components of air safety. Each section contains asks to describe details of the component in question and pose questions related to risk.

MACHINE

The aircraft and all related components (attached or separate) that form the Unmaned Aircraft System

Hardware

Aircraft type	
Aircraft Make	
Aircraft Model	

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Aircraft Registration Number	
Aircraft Size	
Aircraft weight	
Aircraft flight endurance	
Aircraft wind tolerances	
Aircraft visibility limit	
Aircraft telemetry range (list for different systems)	
Expected range of flight altitudes	
Number of motors or propulsion elements	
Are there propulsion element safeguards?	
Does the aircraft airframe have sufficient safety factors?	
Fixed-wing: Have the wings undergone a wing load test?	
Rotary-wing: Is the total aggregate propulsion thrust > 2x total aircraft weight?	
Describe all non-aircraft components of the system	

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Are there Maintenances check prior to departure?	
Are there Maintenances check prior to each flight?	
Are there Maintenances check after each flight?	
Is there Airframe maintenance control?	
Is there Avionics maintenance control?	
Is the vehicle properly protected while in storage?	

Other Notes

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Software

Is the system equipped with an autopilot system? (include make/model)	
Is the system equipped with an attitude stabilization system or mode?	
Is the system equipped with GPS positioning?	
Is the system capable of waypoint flight planning	
Can a pilot interupt a flight plan with manual controls?	
Can the system be programmed with new coordinates while in flight?	
Can the system be programmed with new flight patterns while in flight?	
Are there software system testing procedures?	
Are there automated failsafe system testing procedures?	
Is there live or real-time data telemetry	
Is there live or real-time video telemetry	
What is the resolution of the video telemtry?	
What is the data telemetry update rate?	
List telemetry information and update rate	

Is there a Software version control?	
Are there avionics system checks on the preflight checklists?	
What are the testing procedures for failsafe systems?	
How are software systems tested prior to flight?	
Can the aircraft be operated without payload?	
If the payload system fails in flight, is airworthiness compromised?	

Other Notes

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THE ENVIRONMENT

The environment includes the airspace, the weather, the flight terrain, and non-participants

Flight Location coordinates	
Airspace Class	
Proximity to Airports	
Proximity to runway approaches	
Proximity to heliports or emergency response	
Proximity to buildings	
Proximity to trees, powerlines or other obstructions (Please describe)	
Is the flight location near a VFR marker or other area where general aviation is common?	
Describe the flight location	
Is the flight location access controlled?	
How are non-participants kept safe (please describe)	
What is the ground elevation of the flight location?	
Are there nearby hills?	

Are there areas of significant concrete or asphalt nearby?	
Are there concerns of thermals or downdrafts	
Describe the weather conditions	
What is the predicted wind speed and direction?	
Precipitation	
Lightning or storm warnings	
Fog warnings	
Visibility distance	

Other Notes

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THE HUMAN

The human includes the operator, ground crew and any management or organizational procedures and oversight.

Operator and Ground Crew

Pilot Certificate	
Pilot Experience	
Ground Crew Experience	
How is experience validated?	
What are the preflight procedures for the pilot?	
What are the preflight procedures for the ground crew?	
What are part of the pre-flight briefings?	

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Management

What training procedures are in place?	
How are accidents or incidents handled?	
Is there a 3rd party verification process for any process (please describe)	
Is there organization pressure on completing on time?	
Is there a strong safety culture?	

Other Notes

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SHELL MODEL

The SHELL model addresses the interconnection of several components of the system. Whereas the Man, Machine & the Environment Model address inherint risks, the SHELL model address system risks that may arise from the connections between the components.

Software ↔ Liveware

How does the pilot check the software configurations?	
How does the pilot monitor correct software performance?	
How does the pilot use preflight checklist?	
Is there a procedure for software validation?	
Is there a procedure for monitoring payload software performance?	
Describe the attention needs of the software system at different phases of flight	
Are there processes to keep attention at the appropriate levels?	

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Hardware ↔ Liveware

How does the the pilot control the aircraft	
How does the ground crew interact with the aircraft?	
Are there launching procedures for ground crew members?	
Are there landing procedures for ground crew members?	
Does the pilot have the ability to override automated controls?	
Does the autopilot have the ability to override pilot commands?	
Describe the attention needs of the hardware system at different phases of flight	
Are there processes to keep attention at the appropriate levels?	
Does the flight path lead directly to any participants at any time?	

Environment ↔ Liveware

Do the weather conditions require additional provisions for the pilot and ground crew?	
Is there communication protocols for alerting ground crew and pilot for changes in environment	
Is the pilot able to see potential obstructions during the flight path?	
Are visual observors positioned to see intruding air traffic?	
Are provisions provided for the comfort of the pilot and ground crew?	
Describe the attention needs of monitoring the environmental conditions at different phases of flight	
Are there processes to keep attention at the appropriate levels?	

Liveware ↔ Liveware

Is there a standard nomenclature or phrasing system in place?	
Are communication equipment tested prior to use?	
What management oversight is provided?	
Is there a process to validate safety checks?	
Is there a flight readiness review process?	
Is the flight readiness review process validated by a 3rd party or safety personnel?	
How does the pilot communicate to ATC?	
How does the pilot communicate risks to the flight crew?	
How does the pilot communicate risks to non-participants?	
How does the ground crew communicate risks to the pilot?	
Is there a 'sterile cockpit' rule in place?	
How are spectators managed?	

Other Notes