



What Would You Have Done? Learning From Others' Aviation Safety Events

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Acknowledgments

NASA's Human Contributions to Safety Team

SWS / Airspace Operations Safety Program /
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Learning from Others' Aviation Safety Events

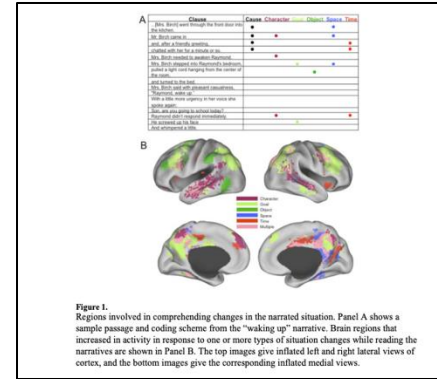


Opportunities to engage with substantial and timely aviation safety resources currently exist through the Aviation Safety Reporting System (ASRS). Formulating ways to effectively utilize and build upon these resources for strengthening safety learning have been explored.

Background & Purpose

Learning literature & opportunities

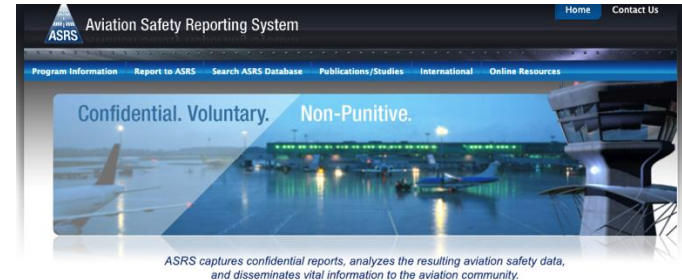
- Cognitively active vs. passive learning (Stanger-Hall, 2012)
- Brain regions activated – observing ~ reading (Speer et al., 2009)
- Maximize learning through engagement – construct simulations of situations



Speer et al., 2009

Tasks

- To describe an approach to utilize ASRS newsletters and reports
- Leverage already available datasets – minimum resources
- Identify meaningful prompts to elicit engagement
- Expand on learning from others’ experiences and develop study stimuli



<https://asrs.arc.nasa.gov>

Aviation Safety Reporting System (ASRS)



➤ Database (Report to & Search)

- Incident reporting from pilots, controllers, maintenance, cabin crew, and others
- Voluntary, confidential (de-identified), non-punitive, independent
- Currently >1.9m report narratives; est. 1976 (NASA / FAA)
- Data fields & narrative section – “tell your story!”
- In April 2021 - tailored forms for UAS/Drone Pilot, Visual Observer, & Crew

UAS Safety Reporting
From NASA's Aviation Safety Reporting System

CONFIDENTIAL. VOLUNTARY. NONPUNITIVE.

Anyone involved in Unmanned Aircraft Systems (UAS) / Drone operations can file a NASA ASRS report to describe close calls, hazards, violations, and safety related incidents

Submit UAS/Drone Report Form (e.g. UAS/Drone Pilot, Visual Observer, & Other Crew)

*For immediate action of UNSAFE or UNAUTHORIZED drone operations contact local authorities.

Recreational Flyers | Part 107 Crews | Public Operators | Part 135 Operators



UAS FORM
For immediate action of UNSAFE or UNAUTHORIZED drone operations contact local authorities.

DO NOT REPORT UAS ACCIDENTS AND CRIMINAL ACTIVITIES ON THIS FORM. ACCIDENTS AND CRIMINAL ACTIVITIES ARE NOT INCLUDED IN THE ASRS PROGRAM AND SHOULD NOT BE SUBMITTED TO NASA.

ALL IDENTITIES CONTAINED IN THIS REPORT WILL BE REMOVED TO ASSURE COMPLETE REPORTER ANONYMITY. NO RECORD WILL BE KEPT OF YOUR IDENTITY. This section will be returned to you.

TELEPHONE NUMBERS where we may reach you for further details of this occurrence.

TYPE OF EVENT / SITUATION (select all that apply):
 Airspace Incursion / Excursion
 Collision (aircraft, person)
 Deviation (altitude, procedure)
 Equipment Issue (Use Command/Ctrl to multi-select)

NAME (required) _____
ADDRESS PO BOX (required) _____
ADDRESS LINE 2 _____
CITY (required) _____ STATE _____ ZIP (required) _____

DATE OF OCCURRENCE (MM/DD/YYYY) _____
LOCAL TIME (24 HR. CLOCK) (HH:MM) _____

PLEASE FILL IN APPROPRIATE SPACES AND CHECK ALL ITEMS WHICH APPLY TO THIS EVENT OR SITUATION.

REPORTER [Reset]

How were you involved in the UAS operation?	Single Person Crew (e.g. eyes/instrument)	Multi-Person Crew	Not
If part of a Multi-Person crew tell us:	Crew Size: (total including reporter)	Role at time of event: (select all that apply) <input type="checkbox"/> Person Manipulating Controls (ground control station / remote control / transmitter) <input type="checkbox"/> Remote Pilot in Command (RPIC) <input type="checkbox"/> Visual Observer Other Crew Member: _____	
Reporter Location	Outdoor / Field Station Indoor / Ground Control Station	Repair Facility Other: _____	
Time manipulating controls of UAS (estimated. Time rounded to nearest quarter hour)	Total Time to Date in all UAS Make / Models: (e.g. 14.25) hrs	Time Last 90 Days in all UAS Make / Models: (e.g. 9.50) hrs	Time to Date in UAS Make / Model involved in event: (e.g. 0.75) hrs
Manned aircraft flight experience (if applicable)	Total Time: _____ hrs		
FAA Certificates / Ratings held	Remote Pilot / Part 107 Private - Manned Commercial - Manned ATP - Manned	Flight Instructor - Manned Instrument - Manned Multiengine - Manned NIA (non-certificated recreational flyer)	
Other:			

➤ Publications

ASRS Publications: Monthly safety newsletters



- **CALLBACK** (1st issue of WWYHD, June 2003)



What Would You Have Done?

This month, *CALLBACK* again offers the reader a chance to “interact” with the information given in a selection of ASRS reports. In “The First Half of the Story,” you will find report excerpts describing an event or situation up to a point where a specific decision must be made, an immediate action must be taken, or a non-normal condition must be actively managed. You may then exercise your own judgment to make a decision, determine a possible course of action, or devise a plan that might best resolve the situation. The selected ASRS reports may not provide all the information you want, and you may not be experienced in the type of aircraft involved, but each incident should give you a chance to refine your aviation judgment and decision-making skills. In “The Rest of the Story...” you will find the actions that were taken by reporters in response to each situation. Bear in mind that their decisions may not necessarily represent the best course of action, and there may not be a “right” answer. Our intent is to stimulate thought, training, and discussion related to these reported incidents.

The First Half of the Story

Part 121 – Limitations A CRJ900 First Officer's Report

■ On our second leg of the day from ZZZ to ZZZ1, the Captain was Pilot Flying and I was Pilot Monitoring. We were at our cruise altitude of 35,000 feet for a while when we unexpectedly felt a vibration and jolt through the aircraft that lasted for a few seconds. We initially looked at each other and wondered if it was turbulence. At that moment, the Captain pointed out the rising Interstage Turbine Temperature (ITT) on the Number 2 engine and then it exceeded the ITT limitation reaching upwards of 1000 C.

What Would You Have Done?

Part 91 – Hydraulics A Citation Excel Captain's Report

■ Upon approaching ZZZ we called for Flaps 15 but they did not move. We then called to lower the landing gear. The

handle moved down but the gear did not lower. We got a red Gear warning light and no green lights.

What Would You Have Done?

Part 121 – Engine Trouble A CRJ900 Captain's Report

■ During the climb at approximately FL280 we had a R ENG FLAMEOUT warning message. There was a noticeable yaw, in addition right engine gauges indicated severe damage with diminishing rotation.

What Would You Have Done?

Part 135 – Broken Glass A Hawker 400 First Officer's Report

■ Departed ZZZ enroute to ZZZZ. As we were climbing through FL250, we heard a loud bang and noticed that the Right-Side B Panel Window was shattered. In less than 40 seconds, the window let go and we experienced an explosive decompression.

What Would You Have Done?

The Rest of the Story...

Part 121 – Limitations

■ The Captain began to idle the affected engine and simultaneously the parameters began to roll back. Simultaneously, we agreed that I would [request priority handling] with Center and then request an immediate descent down to FL250. I [requested priority handling] and requested a descent down to FL250 and we were approved to descend. As we started to descend, we had multiple quick Crew Alert System (CAS) caution message pop ups. I briefly saw the R Bleed Caution and then it disappeared and we were left with R ITT exceedance status message. As we were descending the Captain noticed that the cabin [altitude] was rising and we both put on our oxygen masks. At around 25,000 feet the engine started operating normally again



- **Safety In Sight**



What Would You Have Done?

Every ASRS report is a learning opportunity. In this issue of *UAS Safety In Sight*, we present a report from a recreational drone flyer that describes an unexpected turn of events. The report offers an opportunity to explore the sequence of events, the outcomes, and lessons learned. In short, the report offers an opportunity to ask, “What would I have done?”

To start, we present “The First Half” of an actual ASRS report that describes an event up to a point where a decision was made. We invite you to read the story and then stop and ponder the scenario. Exercise your own judgement to make a decision or determine a possible course of action. Then, read the rest of the story to find out what actions the reporter took. Bear in mind that their decisions may not necessarily represent the best course of action, and there may not be a “right” answer. The selected report may not give all the information you want, but each incident should give you a chance to exercise your decision-making skills. Our intent is to stimulate thought, training, and discussion related to these reported incidents.



* What Would You Have Done (WWYHD)

ASRS “UAS Safety In Sight” WWYHD Example



Unexpected and Approaching Fast

A Recreational Drone Operator reported:

The First Half of the Story...

I was flying legally at 120 ft. above the tree tops outside of Class C [airspace] when two alerts popped up on my screen saying that aircraft were approaching at the same altitude. I quickly turned the UAS around and spotted a Blackhawk helicopter (UH-71) at 500 ft. which went to my east... The other I spotted at the same altitude approaching fast. I was headed to my landing spot but would have had to climb to around 300 ft. due to terrain even though the drone was in visual line of sight the whole time...

...The Rest of the Story

... I made the decision that this was an emergency and it was safer to try and put the drone as close to the tree tops without crashing and hope that they didn't lose altitude... The UH-71 flew directly over my drone with maybe 250 ft. separating my drone... The UH-71 should have been able to easily spot my drone and take action to avoid the possible collision. I was prepared to crash my drone into the trees if needed but that could have caused a forest fire which would have put the nearby homes and residents at risk... My drone is registered and I hold a TRUST certificate. I [was running] nav lights visible for 3 NM and checked NOTAMs, weather, and logged my location.

What Would You Have Done Next?

Stop and ponder the scenario.

Exercise your own judgement to make a decision or determine a possible course of action that might best resolve the situation.

Then read The Rest of The Story to find out what actions the reporter took.

Do you agree with the Reporter's decision or would you have taken a different action?



➤ Database search by Reporter Organization

- Filed by UAS remote pilots (n= 165)
- April 2021 - September 2024
- **Recreational** operator reports (n=86),
Commercial operator reports (n=79)

➤ Report features

- Many reports descriptions of ignorance of the rules
- Lack of knowledge about the system(s)
- Too short, not enough information

The screenshot displays the ASRS Database search interface. The main search area includes sections for "Date & Report Number", "Place", "Environment", "Person", "Aircraft", and "Event Assessment". The "Person" section is highlighted with a yellow box, showing the filter "Reporter Organization was [type]". A pop-up window titled "Add values from the list below:" is open, showing a list of reporter organizations: Air Carrier, Air Taxi, Commercial Operator (UAS), Contracted Service, Corporate, FBO, Fractional, Government, Military, Personal, and Recreational / Hobbyist (UAS). The "Selected Items:" section at the bottom of the pop-up shows "Commercial Operator (UAS)" and "Recreational / Hobbyist (UAS)" checked.



➤ Report characterization criteria:

Coding Factors

Was there at least one decision point in the narrative for which there was some uncertainty about the outcome?

Did the narrative describe a situation that went beyond ignorance of either regulations or standard operating procedures (SOPs)?

Did the narrative provide sufficient information/detail to ask, "What would you have done"?

Did the narrative contain explicit discussion of goal trade offs?

Did the reporter describe what they were thinking?

Length of narrative in words (i.e., word count)

If “yes” to these identified as a WWYHD candidate!

16% of the reports met the criteria for candidacy



➤ Report Length X Coding Factors (t-tests)

- Significant differences for *all factors* except for a description of “a situation beyond ignorance of either regulations or SOPs”
- Those coded as “Yes” for a WWYHD candidate were *significantly longer* than those coded as a “No” for a WWYHD candidate

	"Yes" codes			"No" Codes			t(1,163)	P-value
	N	Mean	StDev	N	Mean	StDev		
Included critical decision point	52	330.08	333.57	113	159.91	124.08	4.766	< .0001
Beyond ignorance of regs/SOPs	87	227.85	270.41	78	197.58	165.30	0.856	0.394
Sufficient detail	40	395.05	368.79	125	155.46	105.75	6.510	< .0001
"WWYHD?" candidate	27	415.74	408.93	138	173.98	142.00	5.501	< .0001
Discussed goal tradeoffs	30	365.60	315.04	135	179.75	187.37	4.269	< .0001
Described their thinking	106	269.01	262.56	59	113.88	69.46	4.447	< .0001



Analyses

- Operator Type X Word Count was *not significantly different* between **Recreational** and **Commercial** operator reports
- Operator Type X Coding Factor – *more reports filed by Recreational operators than Commercial with “a situation that went beyond ignorance of either regulations or SOPs”*

*“I flew my new drone for the first time in the immediate vicinity of my house around XA:30 local time in order to practice learning how to fly it... I live inside the Class Charlie airspace of SNA (I am about 4.5 miles from the airport)... I was **unaware that I needed LAANC approval** still even when flying below the airspace limitation shown. I inadvertently flew the drone around my house inside airspace, not realizing I needed LAANC authorization...”*

- Excerpt from ASRS Report Accession #2135727

*“The conditions supplied above (lost link and “return to home”) are what **caused me to question the drone configuration**. I occasionally fly automated missions in controlled airspace with LAANC approval for an altitude of 50 feet. Autel Robotics EVO 2 drones do not allow pilots to set the “maximum altitude” or the emergency “return to home” altitude to anything less than 82 feet, a value they established for some European countries. This has the **potential to cause safety issues in the NAS...**”*

- Excerpt from ASRS Report Accession #1883509



Recreational Flyers



Part 107 Crews



Public Operators

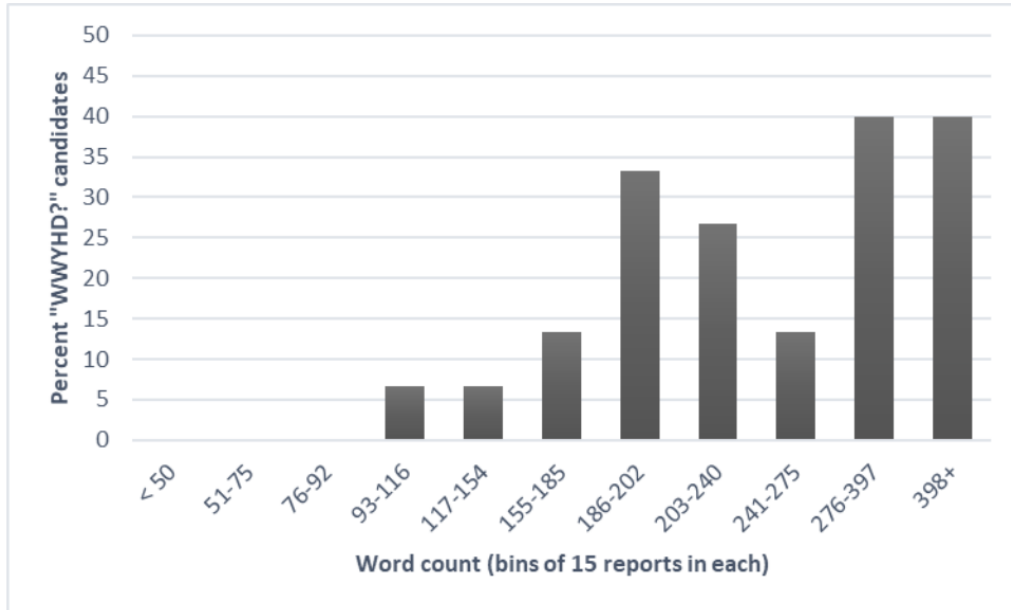


Part 135 Operators

Analyses



Distribution of WWYHD candidates by Word Count



Median split of reports

- For those below the 170 word count, 3.6% were candidates
- For those above the 170 word count, 29.3% were candidates

Summary



- Learning from others' experiences exist through ASRS narratives and constructive question prompts
- Developed method to code reports to identify WWYHD candidate reports
- Consider characteristics of narrative reports (e.g., coding criteria, narrative text length >170 words for “hits”)
- Using candidate set of reports, will explore other factors to learning
 - Specific types of questions asked
 - Response medium (self-generated, written, verbal)
 - Learning setting (individually, group)



Thank you!

Any questions, contact:
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