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PEGASAS Project 4
Phase 4
General Aviation Weather
Technology in the Cockpit (WTIC)

Exploratory Study on Features for a PIREP Submittal
Tool: Preliminary Results

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PIREPs

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PIREP SR20 ✖

Obs Time: 2018-07-10T15:20:00Z
 Turb intensity: NEG
 Wind: 320 at 16knt
 Cloud Cover: SKC
 Flight level: 065

PIREP: CLI UA /OV CLI/TM 1520/FL065/TP SR20/SK
 SKC/WV 32016KT/TB NEG

PIREP Turb: ⊖ NIL ▲ LGT ▲ MOD ▲ SEV
 PIREP Ice: ⊖ NIL ⊣ LGT ⊣ MOD ⊣ SEV
 PIREP Other: ✈

PIREPs are one way that pilots may help other pilots know more about the weather conditions along their flight path.



How are PIREPs used?

“Making a PIREP is the most direct way that you can help another pilot.” NASA

- Valuable only if made available to others in the National Airspace System (NAS)
- Air traffic controllers, dispatchers, and other pilots use PIREPs to plan short- or long-term actions
- Flight Service (FSS) uses PIREPs in their briefings, in-flight advisories and WX avoidance procedures
- Weather forecasters use them to enhance their forecasts, better understand developing weather phenomena, and develop improved weather models

https://www.nts.gov/safety/safety-alerts/Documents/SA_064.pdf; <https://nts.gov/safety/safety-studies/Documents/SIR1702.pdf>





What are *some* of the Issues for PIREPs?

- Overall, GA pilots do not submit a number of PIREPs that is proportionate to their amount of flying
- Not all PIREPs are disseminated
- Submitting a PIREP in-flight for GA pilots may mean switching the radio to FSS or talking to a controller for extended periods of time
- GA pilots may be busy flying when the WX event occurs and may have to report several minutes later and rely on best estimates of altitude and location.



Purpose and Structure of an Exploratory PIREP Study Focused on GA Pilots

The overall goal of this study is to explore methods to help pilots more easily submit accurate, timely, and needed PIREPs.

The research team:

- Summarized 15 gaps that influence PIREP submission
 - Lack of awareness of importance; unfamiliar with submission procedure; lack of dissemination of past reports; increased workload; reporting and data entry errors; no feedback from ATCs
- Identified 6 potential features for electronic PIREP submission
- Developed animated mockups of the features of potential in-flight app or tool for an exploratory study





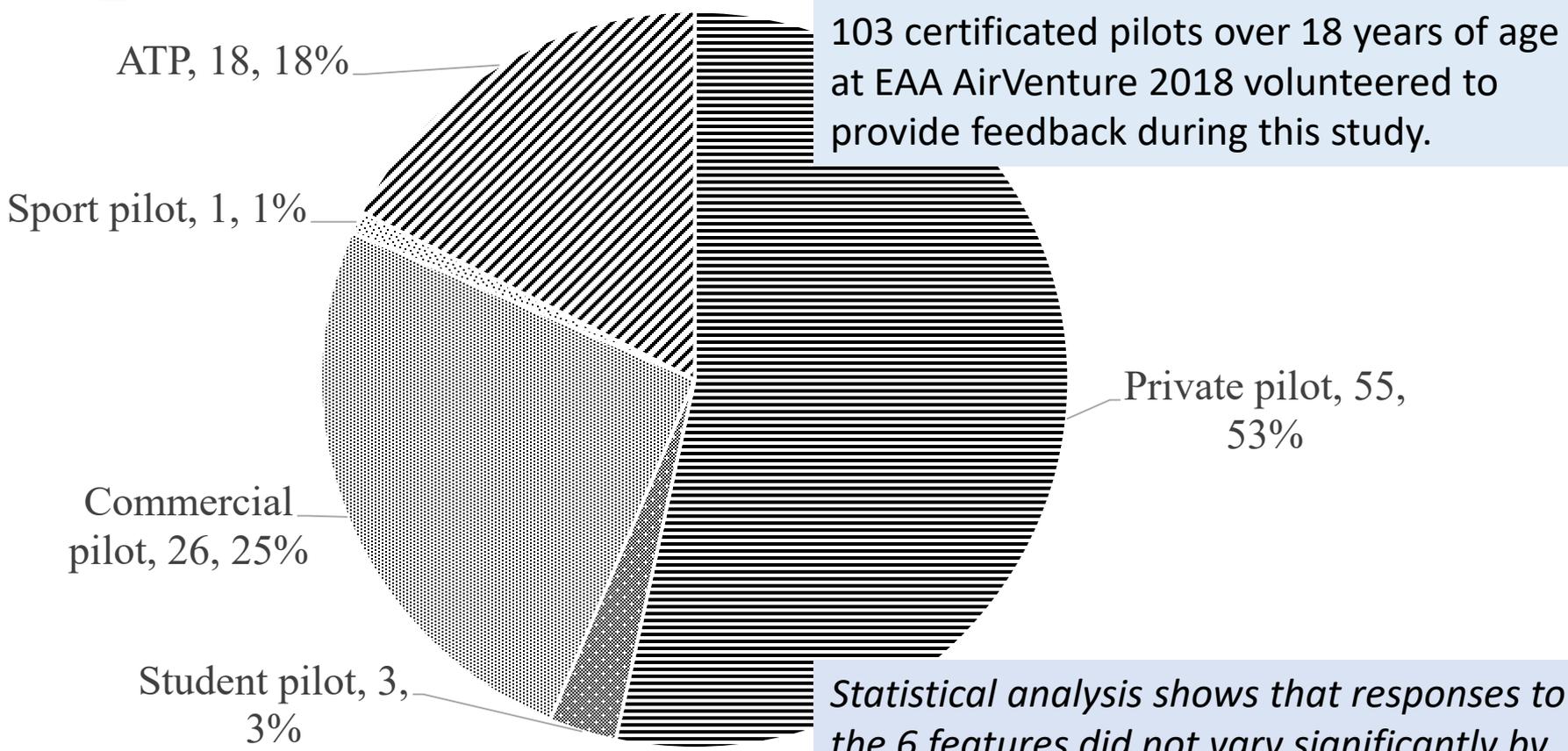
Purpose and Structure of an Exploratory PIREP Study Focused on GA Pilots

- **Purpose:** Determine which of 6 features on a PIREP submission tool pilots believe will make them more likely to submit PIREPs
 1. PIREP Waypoint
 2. Auto-detect
 3. Type-in
 4. One-touch icons
 5. Do it later
 6. Speech-to-text
- **Structure:** Ask qualified volunteers to view realistic, animated mock-ups of PIREP submission tool features shown on a tablet device and to provide feedback





Demographics of Participants



103 certificated pilots over 18 years of age at EAA AirVenture 2018 volunteered to provide feedback during this study.

Statistical analysis shows that responses to the 6 features did not vary significantly by pilot certification type





After each of these features was shown, the pilot was asked to answer:

Do you believe that this feature will make you more likely to submit PIREPs?

Answer using a Likert-type scale from 1 to 7 on a paper form.

- 1 – Strongly disagree
- 2 – Disagree
- 3 – Somewhat disagree
- 4 – Neither agree or disagree
- 5 – Somewhat agree
- 6 – Agree
- 7 – Strongly agree

H_0 : The true mean of the Likert-type scale scores =4
 H_a : The true mean of the Likert-type scale scores >4
A significance value of 0.05 was selected to evaluate the hypotheses for this exploratory study.

At the end, each pilot was asked to answer an open-ended question:

What features would make it more likely for you to submit PIREPs?





The preliminary results for these six features are:

Table 2. *The results of the one-sample t tests on the six potential features*

Null hypothesis: H_0 : True mean = 4				
Alternative hypothesis: H_a : True mean > 4				
Significant when ≤ 0.05				
Feature	n	Mean	Standard Deviation	p-Value
*PIREP Waypoint	103	5.709	1.202	< 0.001
*Auto-Detect	103	5.961	1.328	< 0.001
Type-In	103	4.233	1.705	0.168
*One-Touch Icons	103	5.951	1.132	< 0.001
*Speech to Text	103	5.447	1.551	< 0.001
*Do it Later	101	4.861	1.913	< 0.001

Note. * Significant in one-sample t test



A Sampling of Pilot Feedback Organized into Categories

	Category	Themes
	PIREP Waypoint	<ul style="list-style-type: none">• PIREP Waypoint would increase workload.• It would be good if waypoints can be set up automatically when receiving a request from ATC or FSS.• It would let pilots know that where PIREPs are wanted.• It would not make me more likely to submit more PIREPs because I only report the weather that does not match the forecast.
	Auto-Detect	<ul style="list-style-type: none">• Auto Detect is good.• Auto Detect may interrupt or annoy pilots during flight.• Auto Detect should be able to be turned off.
	One-Touch Icons	<ul style="list-style-type: none">• One-Touch Icons provide too many choices and too crowded.• Using universal symbols to represent weather conditions.• One-Touch Icons is easy to use and don't have to talk over radio.•••





Summary

- Highlights of the study findings:
 - Overall, pilots indicated that 5 of the 6 features would make them more likely to submit PIREPs
 - The data collected in the open-ended question is summarized into themes; the raw data itself is also valuable.
 - Additional study data was collected and analyzed
- There is more work to do to develop electronic PIREP submission tools.
- Submission and dissemination of PIREPs is vital to aviation safety.





References

- FAA (2017). *Aeronautical Information Manual. Sections 7-1-20 – 7-1-29.* https://www.faa.gov/air_traffic/publications/media/aim.pdf
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