PEGASAS Project 4
General Aviation Weather Technology in the Cockpit (WTIC)
User Information Needs Assessment

2018 FPAW Meeting @ NBAA

Orlando, Oct 17 2018

1. Summary of WTIC info needs and past work

2. Connections to FPAW regarding usefulness of conclusions presented

3. Feedback regarding paths to implementation / dissemination

- Why we're doing it

- What we're doing

- Where we hope to end up

GAP	Description	4A	4B	4C	4D	Status	Next Step?	Finding
0	There is a limited understanding of how FAA-authorized weather information sources, as presented / displayed in the range of available tools (including mobile devices and software applications), influences pilot interaction with and use of weather information in degrading weather conditions.	X	X	X	X			
1	Lack of training (mainly due to little opportunity) for student pilots to fly in and experience different weather patterns and their associated visual and other cues. (Source: Survey/Focus Groups).	X	X			IN PROGRESS; CONTINUE TO PHASE 3 (internal)	REVISE FOR PHASE 3 (internal)	Despite classroom and part-task training, limited effect was seen on pilot decision making in adverse weather; new latency
2	GA pilots often do not understand the limitations of the technology in the cockpit. (Source: Survey/Focus Groups).	X	X			IN PROGRESS; CONTINUE TO PHASE 3 (internal)	NEW CAPABILITY TO CLOSE IN PHASE 3	Skills Based exposure needed; proposed work WMU immersive decision tree demonstration
3	There is a perceived gap in skills related to VFR-into-IMC decision-making. (Source: Survey/Focus Groups).	X	X			IN PROGRESS; CONTINUE TO PHASE 3 (internal)	NEW CAPABILITY TO CLOSE IN PHASE 3	Skills Based exposure needed; proposed work WMU immersive decision tree demonstration
4	Lack of Situational Awareness relating to VFR-into-IMC. (Source: Survey/Focus Groups).	X	X	X		UNABLE TO CLOSE		Despite classroom and part-task training, limited effect was seen on pilot decision making in adverse weather; new latency demonstrator may provide additional capability
5	Retention of weather knowledge was identified as a gap. (Source: Survey/Focus Groups).	X	X			UNABLE TO CLOSE		Despite classroom and part-task training, limited effect was seen on pilot decision making in adverse weather; new latency
6	Lack of ability of pilots to correlate, interpret and apply weather information related to VFR-into-IMC Weather Factors, specifically convection, icing, lowered ceilings, quickly emerging weather events, precipitation, or pilot-reported turbulence (Source: Survey/Focus Groups).		X	X		IN PROGRESS; CONTINUE TO PHASE 3 (internal)	NEW CAPABILITY TO CLOSE IN PHASE 3	Skills Based exposure needed; proposed work WMU immersive decision tree demonstration
7	Existing pilot training activities do not provide pilots with adequate exposure to the impact of adverse weather events, information latency, or information resolution on the hazards of flying VFR-into-IMC or adverse weather conditions. (Source: Survey / Focus Groups / Past Literature).	X	X			IN PROGRESS; CONTINUE TO PHASE 3 (internal)	NEW CAPABILITY TO CLOSE IN PHASE 3	Despite classroom and part-task training, limited effect was seen on pilot decision making in adverse weather; new latency demonstrator may provide additional capability with skills-based exposure
8	Existing pilot training activities to not sufficiently develop or improve KSAs regarding adverse weather events, information latency, or information resolution on the hazards of flying VFR-into-IMC or adverse weather conditions. (Source: Survey / Focus Groups).	X	X			IN PROGRESS; CONTINUE TO PHASE 3 (internal)	NEW CAPABILITY TO CLOSE IN PHASE 3	Skills Based exposure needed; proposed work WMU immersive decision tree demonstration
9	Pilot applicants taking written knowledge certification examinations can fail all weather questions but still pass the examinations. (4.1.3.8)		X			BEING CLOSED ELSEWHERE (ERAU project)		Knowledge certification questions addressed by Embry-Riddle Aeronautical University; addition cooperation proposed with Prof. Elizabeth Blickensderfer
10	No specific guidance on weather knowledge assessment in the Flight Review FAR 661.56 .. (Source: Survey/Focus Groups).		X			TO CLOSE ELSEWHERE (ERAU project)		Weather knowledge assessment addressed by Embry-Riddle Aeronautical University; addition cooperation proposed with Prof. Elizabeth Blickensderfer
11	Identification of adverse weather event triggers (and impact on pilot planning efforts) differs between out the window and mobile device / software application presentations of weather conditions; differences in awareness of trigger severity and potential impact affects pilot planning task and time sequences. (Source: Product Literature / Technology Evaluation).			X	X	CLOSED		PC-based latency demonstrator has been created and recreated, capable of implementation and dissemination for use to close Gaps 1, 2, 3, 6, 7, 8

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2	GA pilots do not understand the limitations of the technology in the cockpit. (Source: Survey/Focus Groups).					PHASE 3 (internal)	3 (internal)	
3	There is a perceived gap in skills related to VFR-into-IMC decision making. (Source: Survey/Focus Groups)							
4	Lack of Situational Awareness relating to VFR-into-IMC. (Source: Survey/Focus Groups)							
5	Retention of weather knowledge was identified as a gap. (Source: Survey/Focus Groups).		X	X		UNABLE TO CLOSE		seen on pilot decision making in adverse weather; new latency
6	Lack of ability of pilots to correlate, interpret and apply weather information related to VFR-into-IMC Weather Factors, specifically convection, icing, lowered ceilings, quickly emerging weather events, precipitation, and reported turbulence (Source: Survey/Focus Groups).							
7	Existing pilot training activities do not provide pilots with adequate exposure to the impact of adverse weather events, information latency, or information resolution on the hazards of flying VFR-into-IMC or adverse weather conditions. (Source: Survey / Focus Groups / Past Literature).						NEW CAPABILITY	
8	Existing pilot training activities to not sufficiently develop or improve KSAs regarding adverse weather, information latency, or information resolution on the hazards of flying VFR-into-IMC or adverse weather conditions. (Source: Survey / Focus Groups).							
9	Pilot applicants taking written knowledge certification examinations can fail all weather questions on the examinations. (4.1.10)							
	No specific guidance on weather knowledge assessment in the Flight Review FAR §61.56 . . (Source:					TO CLOSE		

"GA pilots often do not understand the limitations of the technology in the cockpit."

"There is a perceived gap in skills related to VFR--into--IMC decision-- making."

"Lack of Situational Awareness relating to VFR--into--IMC."

"Retention of weather knowledge was identified as a gap."

"Existing pilot training activities do not provide pilots with adequate exposure to the impact of adverse weather events, information latency, or information resolution on the hazards of flying VFR--into--IMC or adverse weather conditions."

"Existing pilot training activities to not sufficiently develop or improve KSAs regarding adverse weather events, information latency, or information resolution on the hazards of flying VFR--into--IMC or adverse weather conditions."

- Needs Assessment and Translation
  - The PEGASAS WTIC team has been generating lots of different types of information for dissemination to the GA public
    - GA pilots
    - Flight instructors
    - Aviation researchers
    - Human performance / human factors researchers
- What Do You Need, and How?
  - Types of information
  - Organization (card sort)

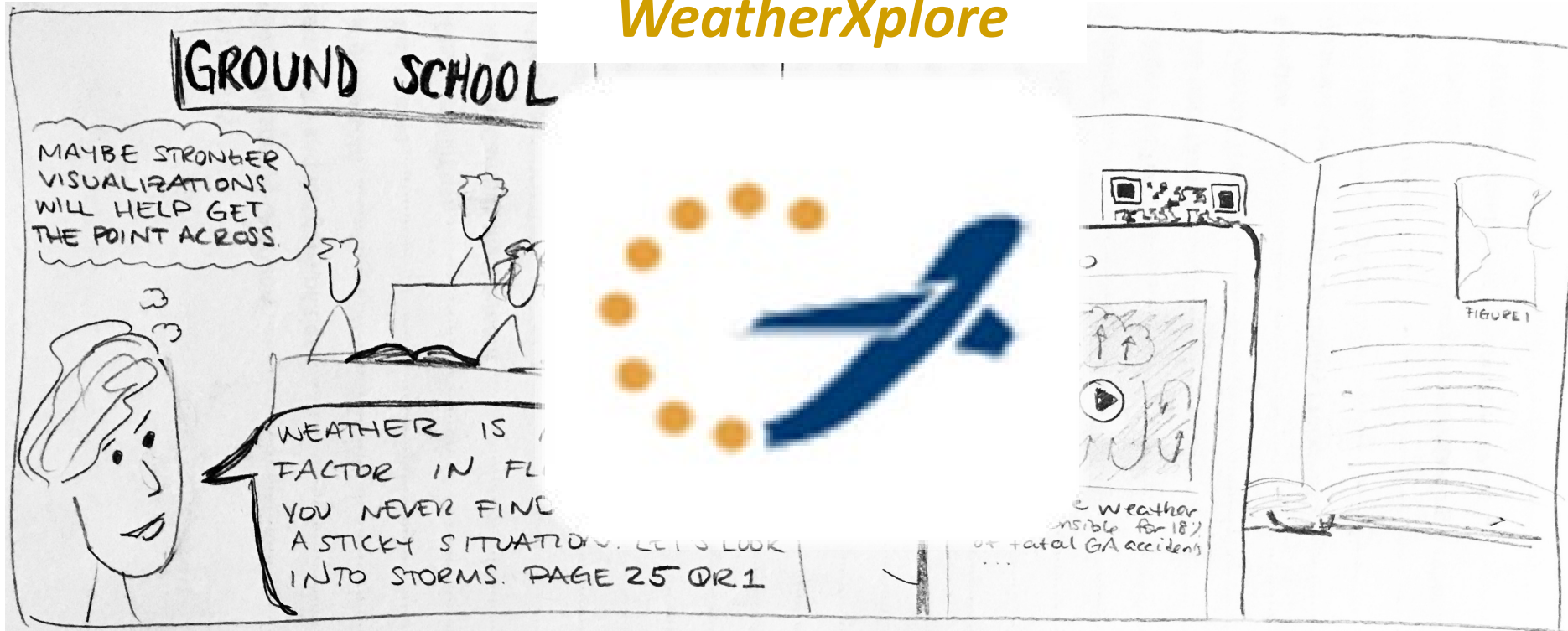*4.2   Long-term retention of immersive skills experiential education*
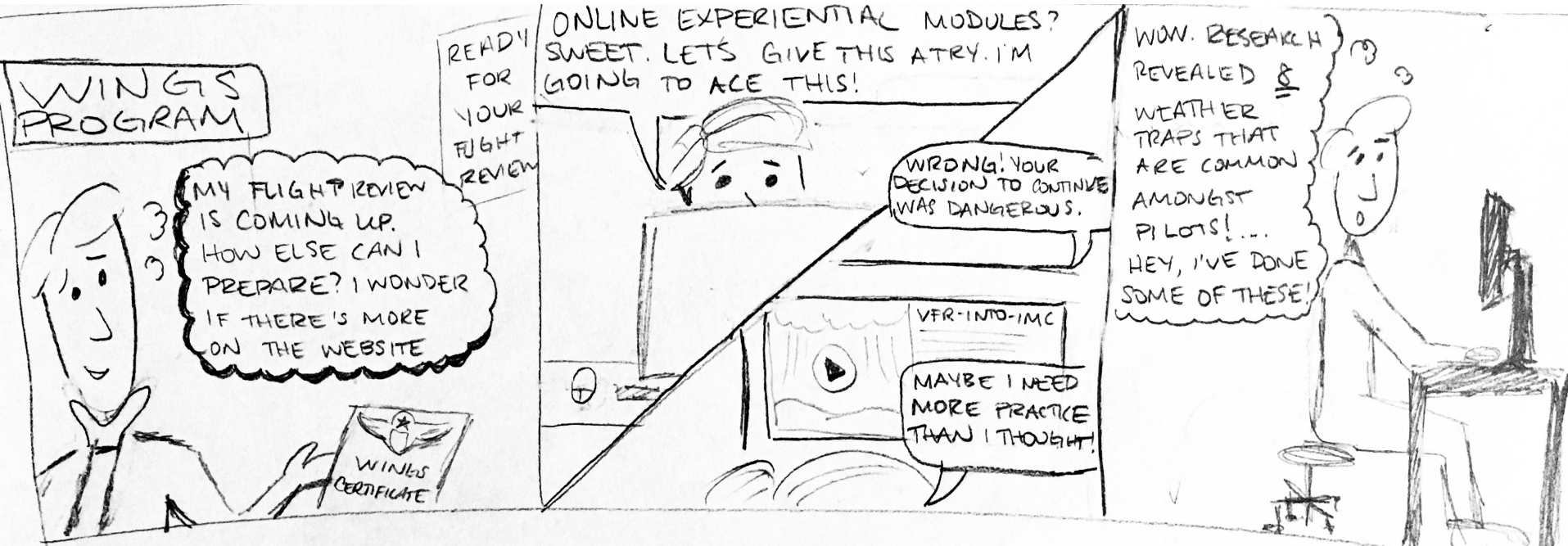
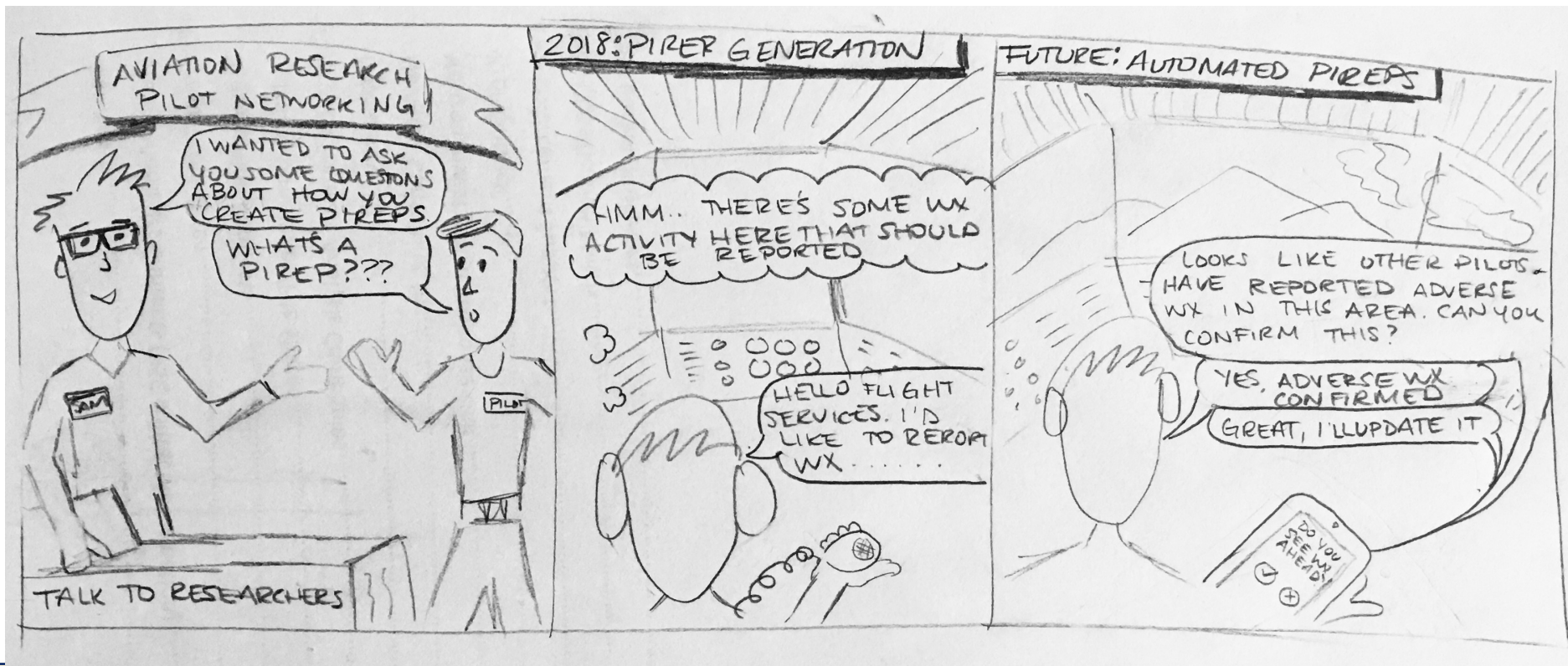4.4. *Develop and evaluate augmented reality tools to improve weather information presentation*
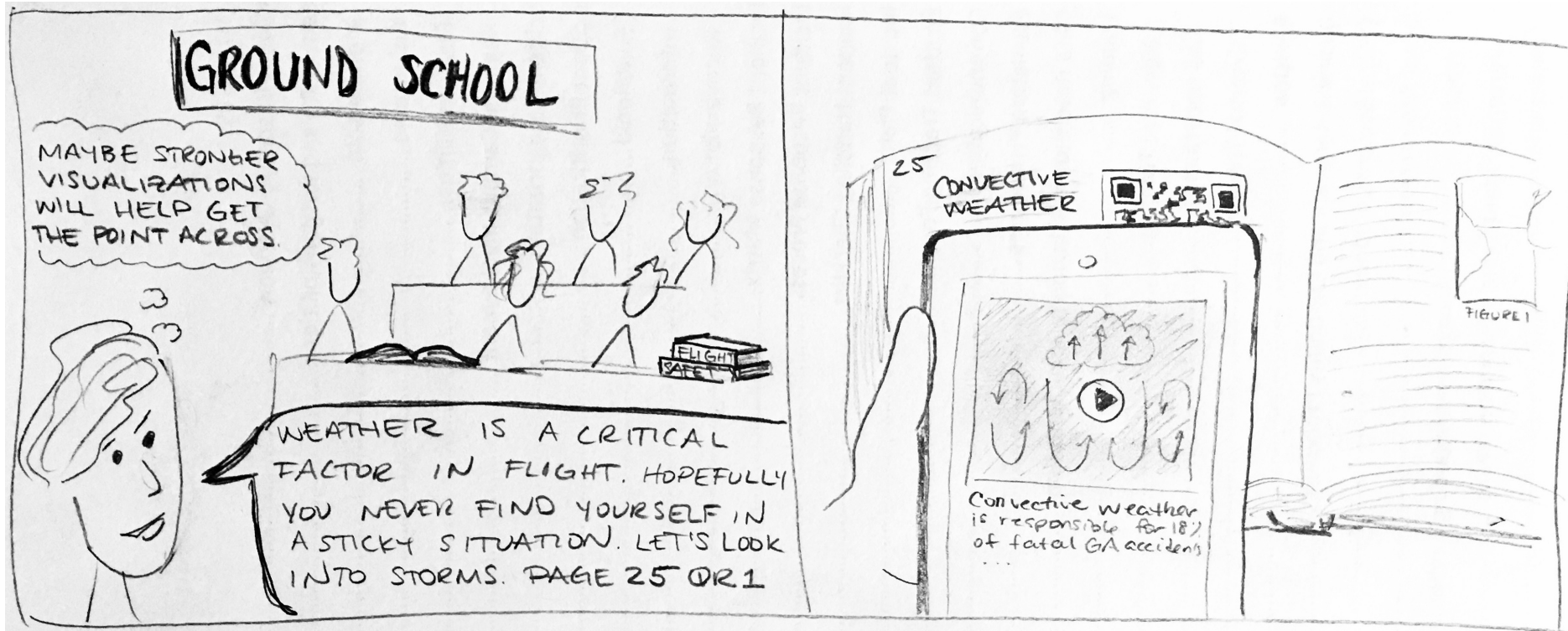
4.4.   Develop and evaluate augmented reality tools to improve weather information presentation

WeatherXplore

4.6.   Explore and assess capability of automated PIREP generation / reporting tools in GA flight

WHY:

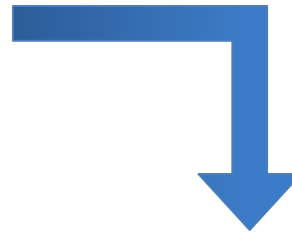**To facilitate transfer of research outcomes to industry / practice.**
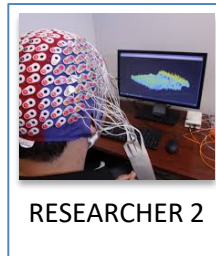

| SETUP | PILOT | INSTRUCTOR |

| RESEARCHER 1 | RESEARCHER 2 |

USE CASE	CURRENT DOCUMENTATION GROUPS >>>>	Which Use Case Do I Use?	8 Wx Traps	Research Documentation	Gaps Identified	WILD Introduction	WILD Specifications
Setup	Researcher/Demonstrator	x	x	x	x	x	x
Pilot	Pilot operator	x	x			x	
Instructor	CFI / Ground Instructor	x	x			x	
Research1	Human Factors Investigator	x	x	x	x	x	
Research2	Aviation Researcher	x	x	x	x	x	
Research3	Education/Training Researcher	x	x	x	x	x	

Project Area 4.7: Design information architecture and permissions for Project 4 HUB data repository.

WTIC Info Needs Assessment

- Qualtrics Survey: We Want YOUR Feedback
  - What is your (primary) role in GA?
  - What Wx Products do you want, and what are your goals for having them?

  - We have several types of products: how would you organize them?
  - What would you call those groupings?

- https://purdue.ca1.qualtrics.com/jfe/form/SV_2sOOms48mdGJJ7T

Qualtrics Survey QR Code

INDUSTRY PARTNERS WELCOME

- New efforts with Webmanuals.aero , and other potential partners to transfer information repository architecture responsibility, funding, and/or development to industry partners for maintenance beyond PEGASAS.

- Outline of sponsorship opportunities, press releases and other outreach information for increasing partnerships. Presentation at AOPA (Oct 10) and NAFI (TBD).

- "Deeper" incorporation with Mindstar Aviation LLC and others into EAA's Pilot Proficiency Center and EAA partnerships beyond AirVenture and other airshows (i.e. latency features developed into simulator software, etc.)

- Ongoing Partnerships
    - FAA Alaska
    - AOPA HQ
    - Mindstar Aviation

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Much appreciation to PEGASAS/WTIC leads:

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- *Ian Johnson (FAA HF Lead, WTIC Program)*
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- *William Crossley (PEGASAS Director)*
  - *Crossley@Purdue.edu*

- A FAA Center of Excellence: Partnership to Enhance General Aviation Safety, Accessibility, and Sustainability (PEGASAS)

- Mission: To enhance general aviation safety, accessibility, and sustainability by partnering the FAA with a national network of world-class researchers, educators and industry leaders.

- www.PEGASAS.aero

FAA Technical Points of Contact (POC)

- Ian Johnson, HF Lead

- Gary Pokodner, WTIC Program Mgr

Research Team

- **Purdue University:** Drs. Barrett Caldwell, Mary Johnson and Brandon Pitts, PhD students Megan Nyre-Yu, Chenyu Huang, Gaojian Huang, Yue Gu, Yilin Feng and Xun Zhao , and contractor Prof. Mel Futrell of Glendale College

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- **Texas A&M University:** Dr. Thomas Ferris, and PhD students Trey Roady, Carolina Rodriguez Paras, and Johnathan McKenzie

- **Western Michigan University:** Dr. Geoff Whitehurst; Prof. Lori Brown, Dr. William Rantz, and Dominic Nicolai