Gap Areas Identified by PEGASAS During Phase I Research
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- **Knowledge Gaps**
  - Acquisition through Skill / Training

- **Skill Gaps**
  - Application of Knowledge through Training and experience

- **Ability Gaps**
  - Natural or acquired ability to perform Skills

- **Training Gaps**
  - Structured activities to inform, instill, and enhance KS

- **Assessment Gaps**
  - Formal evaluations to determine current capabilities in KSA areas

- **Technology Gaps**
  - Available software or hardware tools to support actual flight or training activities, including pilot KSA

- **Information Presentation Gaps**
  - Capability of available software or hardware tools to provide information suitable to enhance or expand pilot KSA during flight
Knowledge Gaps
- **Gap 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.
- **Gap 2**: GA pilots often do not understand the limitations of the technology in the cockpit.

Skill Gaps
- **Gap 3**: There is a perceived gap in skills related to VFR-into-IMC decision-making.
- **Gap 4**: Lack of Situational Awareness relating to VFR-into-IMC.
- **Gap 5**: Retention of weather knowledge was identified as a gap.

Ability Gaps
- **Gap 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.
Training Gaps

+ **Gap 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).

+ **Gap 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 condition.

Assessment Gaps

+ **Gap 9**: Pilot applicants taking written knowledge certification examinations can fail all weather questions but still pass the examinations.

+ **Gap 10**: No specific guidance on weather knowledge assessment in the Flight Review FAR §61.56.
Technology Gaps

- **Gap 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.

- **Gap 12**: Existing, commercially available aviation training device (ATD) simulators, regardless of certification level, do not present NEXRAD or other weather information with the latencies commonly experienced during actual flight.
• **Information Presentation Gaps**
  - **Gap 13**: The effectiveness of available mobile device and software application tools is affected in unknown ways due to timely availability of tool features and high-salience alerts. (Source: Past Literature / Technology Evaluation).
  - **Gap 14**: Information presentation and interface design in some mobile devices and software applications may limit or prevent pilot planning activity in potentially degrading ways during adverse or degrading weather conditions. (Source: Past Literature / Survey / Technology Evaluation).
  - **Gap 15**: Updates to flight conditions after a pilot obtains a flight briefing may not be communicated in a timely manner to pilots.
Specific Gaps Addressed by WTIC Research
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• There is a need for attention-orienting cues to call attention to or ‘highlight’ when new information is available.
  - Gap Category: info content, rendering, technology
  - Research Activity: PEGASAS, WTIC I-V, Adverse Alerting

• Pilots are not making (when conducting VFR operations) early enough decisions to avoid instrument meteorological conditions: visibility below three statute miles and/or clouds lower than 1000 feet above ground level
  - Gap Category: training
  - Research Activity: WTIC IV, PEGASAS

• Existing, commercially available aviation training device (ATD) simulators, regardless of certification level, do not present NEXRAD or other weather information with the latencies commonly experienced during actual flight.
  - Gap Category: info content, rendering, technology
  - Research Activity: ERAU, PEGASAS, ATSC NEXRAD Latency
Specific Gaps Addressed by WTIC Research

- 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.
  - Gap Category: info content, rendering
  - Research Activity: PEGASAS, ERAU, NEXRAD Course, ROMIO?, EDR Uplink?

- Pilot applicants taking written knowledge certification examinations can fail all weather questions but still pass the examinations.
  - Gap Category: standards, training
  - Research Activity: ERAU, PEGASAS, NEXRAD Course

- Existing pilot training activities do 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 condition
  - Gap Category: training, standards
  - Research Activity: PEGASAS, NEXRAD Course, ERAU
Specific Gaps Addressed by WTIC Research

- 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.
  - Gap Category: training, standards
  - Research Activity: PEGASAS, NEXRAD Course, ERAU

- Retention of weather knowledge was identified as a gap
  - Gap Category: training, standards
  - Research Activity: PEGASAS

- 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
  - Gap Category: standards
  - Research Activity: PEGASAS, NEXRAD Course

- Shortcoming in training and guidance materials for pilots regarding adverse weather (e.g. VFR into IMC) conditions and the use of in-cockpit weather information technologies to help manage such conditions, or more importantly, help avoid such conditions
  - Gap Category: training
  - Research Activity: PEGASAS, ERAU, NEXRAD Course, ROMIO, EDR Uplink
Specific Gaps Addressed by WTIC Research

- There is no standard for MET product symbology / latency (e.g. ground-based radar) or how specific weather products or notifications are depicted/presented (e.g. out the window vs cockpit presentation differ)
  - Gap Category: standards, rendering
  - Research Activity: PEGASAS, ATSC Capabilities, MET/AIS Datalink Study, WTIC I-IV

- Pilots not maintaining safe separation from adverse weather
  - Gap Category: training, rendering
  - Research Activity: PEGASAS, ATSC Probabilistic, WTIC II-IV, MET/AIS Datalink Study, ROMIO, EDR Uplink

- Current commercial rendering of MET information results in inconsistent interpretation of MET information (including timestamp)
  - Gap Category: info content, rendering, training
  - Research Activity: WTIC I-IV, ATSC Probabilistic, WTIC ConOps, ATSC NEXRAD, PEGASAS

- Current rendering of METAR information on commercially available cockpit applications results in inconsistent recognition of change of state of information
  - Gap Category: rendering
  - Research Activity: PEGASAS, WTIC II, ATSC Probabilistic