

Risk Management Handbook



U.S. Department
of Transportation
**Federal Aviation
Administration**

Perceive

PAVE identifies hazards

Pilot Aircraft EnVironmental External Pressures

Process

CARE identifies which hazards are risks

Consequences Alternatives Reality External Pressures

Perform

TEAM suggests ways to manage risks

Transfer Minimize Accept Mitigate

Flight Risk Assessment Tool

Hazard

Risk

Severity

Composit

Not IFR proficient

LOC

remote

catastrophic

serious

Alcohol and lack of sleep

Fatigue related errors

occasional

critical

serious

carry full fuel

Anticipate

fuel exhaustion

remote

catastrophic

serious

d for known ice

LOC

occasional

catastrophic

high

performance

Override LOC or CFIT

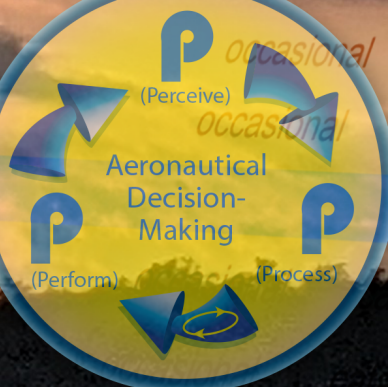
occasional

critical

serious

low ceilings

LOC and CFIT



CFIT

occasional

occasional

occasional

occasional

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Chapter 2: Personal Minimums

Introduction

Federal regulations that apply to aviation do not cover every situation nor do they guarantee safety. For example, a pilot may legally fly in marginal VFR conditions at night even though low visibility and night hazards increase the risk for an incident or accident. Therefore, pilots should consider non-mandatory self-regulation in the form of personal minimums.

Personal Minimums

Pilots who understand the difference between what is “smart” or “safe” based on pilot experience and proficiency establish personal minimums that are more restrictive than the regulatory requirements. The following six steps allow pilots to establish a set of personal minimums in order to reduce risk and fly with greater confidence.

Step 1—Review Weather Flight Categories

Establishing personal minimums normally begins with weather, and pilots should know the range of ceiling and visibility that defines each category. [Figure 2-1]

Category	Ceiling		Visibility
Visual Flight Rules VFR	Greater than 3,000 feet AGL	and	Greater than 5 miles
Marginal Visual Flight Rules MVFR	1,000 to 3,000 feet AGL	and/or	3 to 5 miles
Instrument Flight Rules IFR	500 to below 1,000 feet AGL	and/or	1 mile to less than 3 miles
Low Instrument Flight Rules LIFR	below 500 feet AGL	and/or	less than 1 mile

Figure 2-1. Weather category values for ceiling and visibility.

Step 2—Assess Experience and Comfort Level

Pilots should also take a few minutes to complete the certification, training, and experience summary in Figure 2-2 by filling in the right column. Some pilots fly different aircraft categories and classes and may develop different personal minimums based on the specific aircraft flown. For example, many pilots will have a different set of personal minimums when flying a single-engine airplane versus a multiengine airplane. Depending on pilot experience, the minimums in a multiengine airplane could be higher than the single-engine airplane minimums. Pilots may use the information entered in Figure 2-2 to set personal minimums for a variety of situations using tables in Figure 2-3, Figure 2-4, and Figure 2-5.

Experience and “Comfort Level” Assessment			
VFR & MVFR			
Weather Condition		VFR	MVFR
Ceiling		> 3,000	1,000–3,000
	Day	—	2,500
	Night	5,000	—
Visibility		> 5 miles	3–5 miles
	Day	—	4 miles
	Night	8 miles	—

Figure 2-3. A sample pilot experience and comfort level assessment for VFR and MVFR.

For IFR, *Figure 2-4* shows how a pilot recorded the lowest IFR conditions recently and regularly experienced. Although a pilot may have successfully flown in low IFR (LIFR) conditions, it does not mean the pilot was “comfortable” in these conditions. In this example, the pilot did not fill in the LIFR boxes for known “comfort level” in instrument meteorological conditions (IMC) after deciding to avoid flight in those conditions.

Experience and “Comfort Level” Assessment			
IFR & LIFR			
Weather Condition		IFR	LIFR
Ceiling		500–999	< 500
	Day	800	—
	Night	999	—
Visibility		1–3 miles	< 1 mile
	Day	1 mile	—
	Night	3 miles	—

Figure 2-4. A sample pilot experience and comfort level assessment for IFR and LIFR.

If combined into a single table, the summary of a pilot’s known “comfort level” for VFR, MVFR, IFR, and LIFR weather conditions might appear as shown in *Figure 2-5*.

Experience and “Comfort Level” Assessment					
Combined VFR & IFR					
Weather Condition		VFR	MVFR	IFR	LIFR
Ceiling					
	Day	2,500		800	
	Night	5,000		999	
Visibility					
	Day	4 miles		1 mile	
	Night	8 miles		3 miles	

Figure 2-5. Experience and comfort level assessment for combined VFR and IFR.

Step 3—Consider Other Conditions

Pilots should also have personal minimums for wind and turbulence and record the most challenging wind conditions comfortably experienced during the last six to twelve months. As shown in *Figure 2-6*, a pilot may record these values for category and class, or for a specific aircraft.



Figure 3-9. *The direct route from Durango to Santa Rosa.*

Tricia makes a quick analysis and figures she can fly this trip nonstop in just under five hours, with 6 hours and 45 minutes of endurance with full tanks. She then evaluates the weather and immediately foresees some challenges.

A low-pressure system with a trailing cold front is moving south into northwest Colorado. The front is triggering severe convective activity as it collides with moist air in the southwest. Low ceilings and poor visibility are widespread behind the front, with mountain obscuration and icing in clouds above 8,000 feet. The weather in Durango should remain good VFR on Monday, but change to IMC early Tuesday morning as the weather system slowly moves southeast.

Data

Tricia needs to organize, consider, and evaluate all the information.

Pilot and Passengers

The pilot and passenger data is as follows:

- Current under 14 CFR part 61 for VFR and IFR
- Last instrument time logged four months ago
- Tricia's weight is 130 pounds, the Smiths weigh 340 pounds together
- Tricia has 40 pounds of baggage, the Smiths have 80 pounds

Aircraft

The aircraft data is as follows:

- Not certificated for flight in known icing conditions
- Empty weight: 1903 pounds, Maximum gross weight 2,740 pounds
- Luggage compartment carries 120 pounds
- Current fuel 25 gallons (150 pounds) Fuel capacity 64 gallons (384 pounds)
- Average fuel consumption at 10,000 feet: 8.6 gallons per hour

Proficiency

A pilot who remains proficient is better prepared to defend against threats, errors, and undesired aircraft states. This can be depicted in the context of a Swiss cheese model. Each piece of Swiss cheese is a component of the defense against threats, errors, and undesired aircraft states. [Figure 6-1] Each of the holes in the cheese is a weakness in those defenses. A greater level of proficiency reduces the likelihood the holes will align.

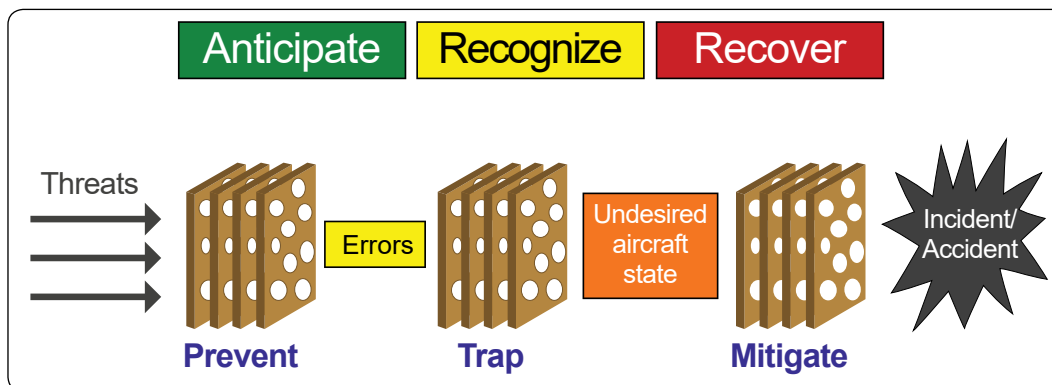


Figure 6-1. The Swiss cheese model.

Discipline

Discipline stems from good training and habit patterns. A disciplined pilot will perform a task in a similar manner each time regardless of proficiency. For example, completing the preflight inspection of the aircraft by using and following the approved checklist every time is a mark of discipline. Discipline also affects aeronautical decision-making. A disciplined pilot will be guarded and inoculated against hazardous attitudes and operational pitfalls, as shown in Figure 6-2. In general, a disciplined pilot will always do the right thing. Just like proficiency, discipline will lessen the likelihood that a threat or error will find a path through the pilot defenses.

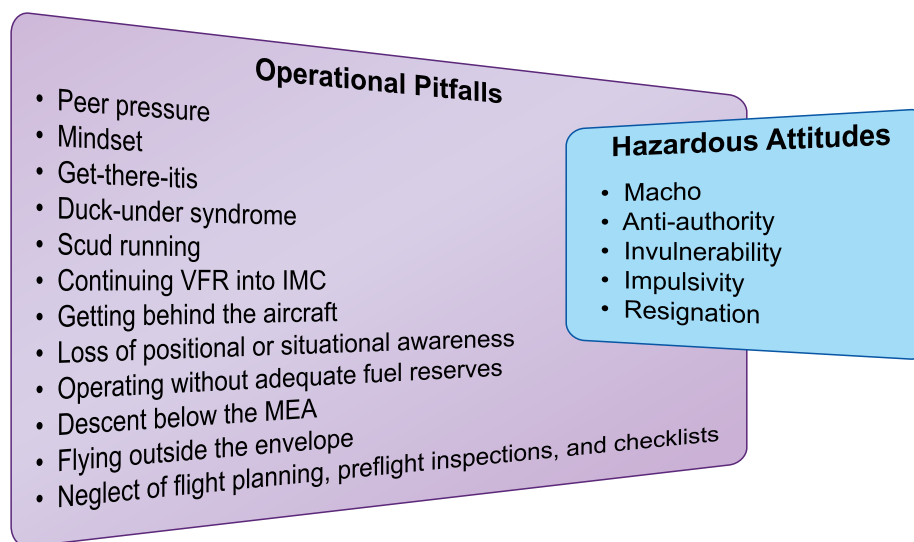


Figure 6-2. Operational Pitfalls and Hazardous Attitudes.

Chapter Summary

Defenses against threats and errors are either provided to the pilot or provided by the pilot. Pilots should perceive threats and errors and respond appropriately. The response may require the use of an appropriate checklist or may require more complex decision-making. A trained, proficient, and disciplined pilot uses appropriate threat and error management strategies to prevent or recover from an undesired aircraft state.

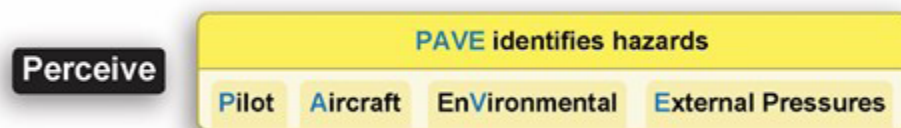


Figure B-5. 3P “Perceive” analysis and PAVE checklist risk identification.

Additional Risk Assessment Tools

The CARE checklist provides a breakdown of rationale pilots use during the 3P “process” stage [Figure B-6]. It includes a perspective of what could happen (consequences), what may be done to prevent an unwanted outcome (alternatives), a check of the actual conditions (reality), and an analysis of pilot motivation (external pressures).

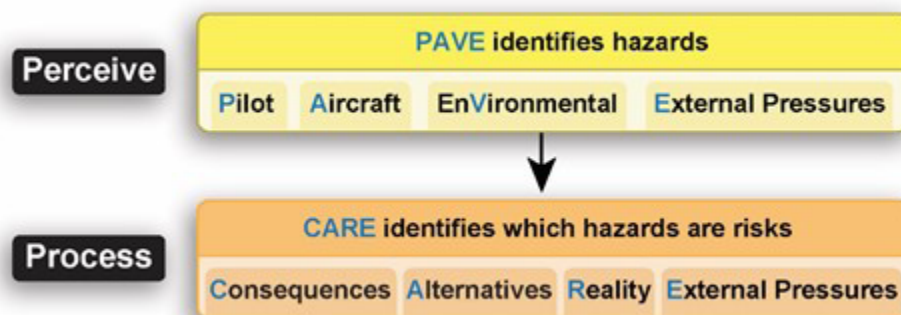


Figure B-6. Process using the CARE checklist for risk assessment.

Risk Mitigation Tools

The TEAM checklist shares the “perform” step in the 3P model as well as the “alternatives” component from the CARE checklist.



Figure B-7. “Perform” using the TEAM checklist for risk mitigation.

Analysis of hazards and associated risks may follow the six-step DECIDE Model shown in Figure B-8.