Aeronautical Decision Making and Judgement

Small Unmanned Aircraft Systems

About me

Len Casteel

Instructor

OE324 Journeyman & Apprentice Training Fund Inc.

Contact Information

Office Location Sam T. Hart Education Center
275 E. Highland Rd. Howell, MI. 48843

Office Phone (517) 546-9610 x1712

Fax (517) 546-9793

Email leonard.casteel@iuoe324.org

OE324.org

About me

Jonathan Arseneault
Instructor
OE324 Journeyman & Apprentice Training Fund Inc.

Contact Information

Office Location Sam T. Hart Education Center
275 E. Highland Rd. Howell, MI. 48843

Office Phone (517) 546-9610 x1708

Fax (517) 546-9793

Email jonathan.arseneault@iuoe324.org

OE324.org

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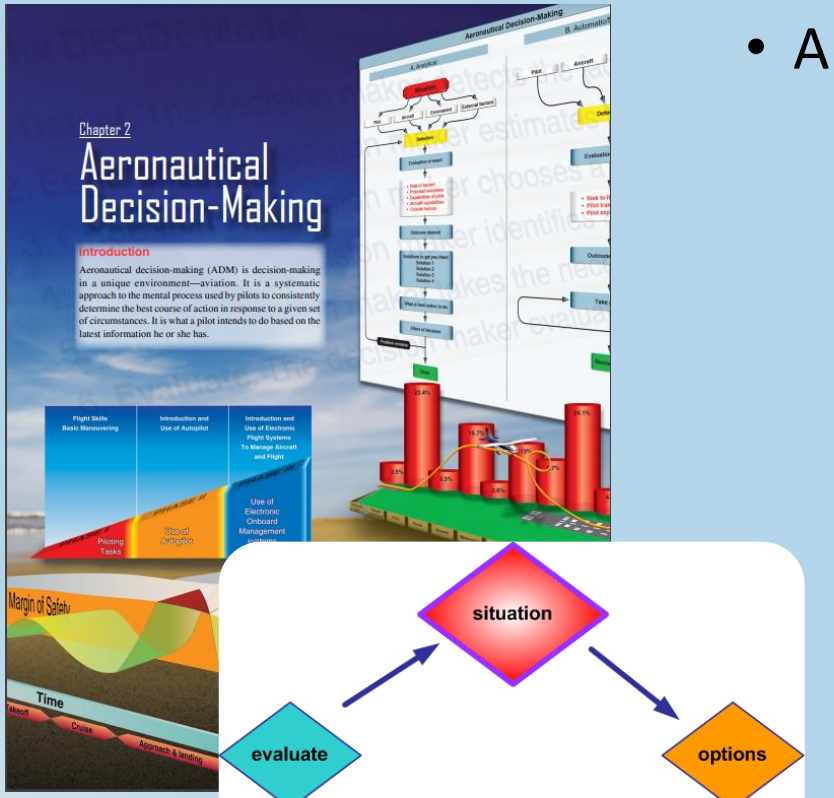
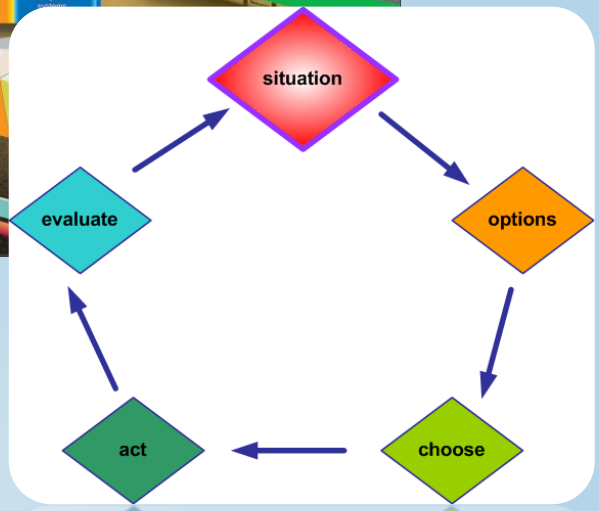
Good judgement can be taught.

0% True

0% False

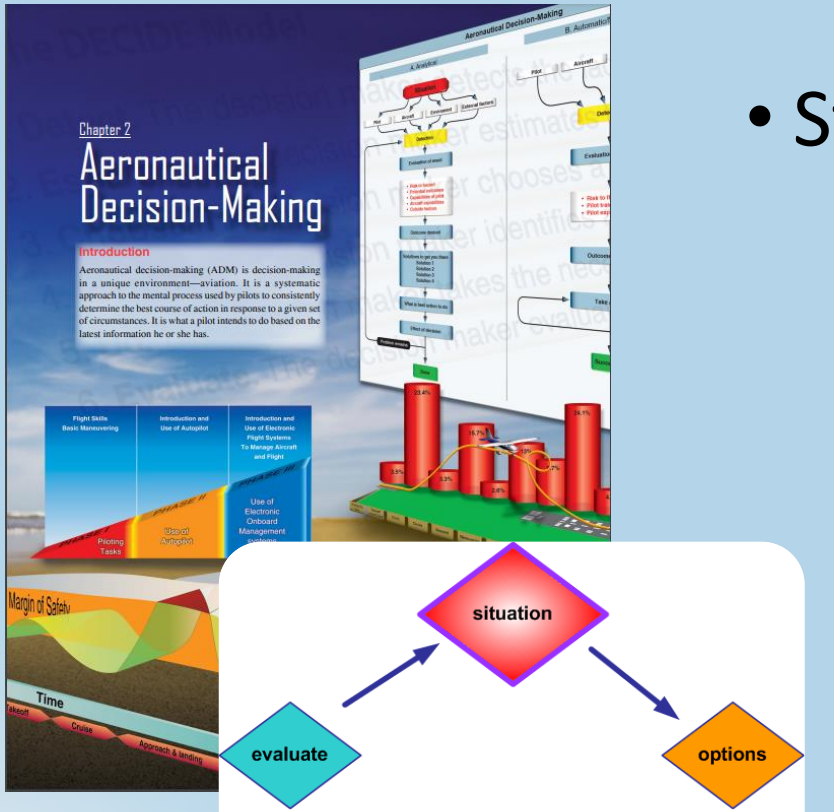
Aeronautical Decision Making and Judgement

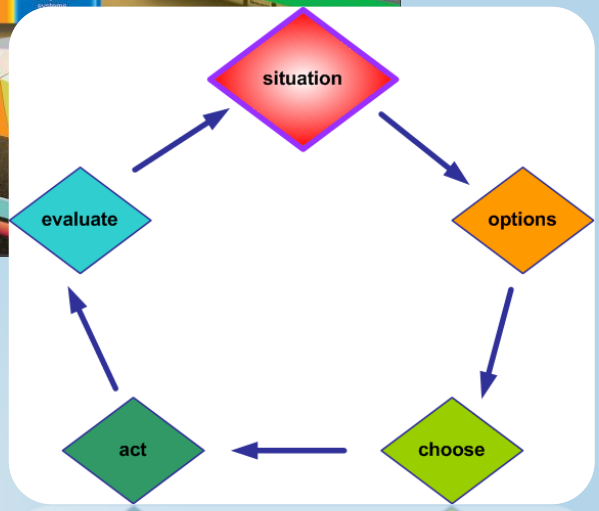




- ADM
  - It is a systematic approach to the mental process used by pilots to consistently determine the best course of action in response to a given set of circumstances.
  - It is what a pilot intends to do based on the latest information he or she has.
  - Contrary to popular opinion, good judgement can be taught
  - It is estimated that approximately 80% of all aviation accidents are related to human factors and the vast majority of these accidents occur during landing (24.1%) and takeoff (23.4%)
  - The ADM process addresses all aspects of decision-making in the flight deck and identifies the steps involved in good decision-making.

Aeronautical Decision Making and Judgement





- Steps for good decision-making are:
  1. Identifying personal attitudes hazardous to safe flight
  2. Learning behavior modification techniques
  3. Learning how to recognize and cope with stress
  4. Developing risk assessment skills
  5. Using all resources
  6. Evaluating the effectiveness of one's ADM skills

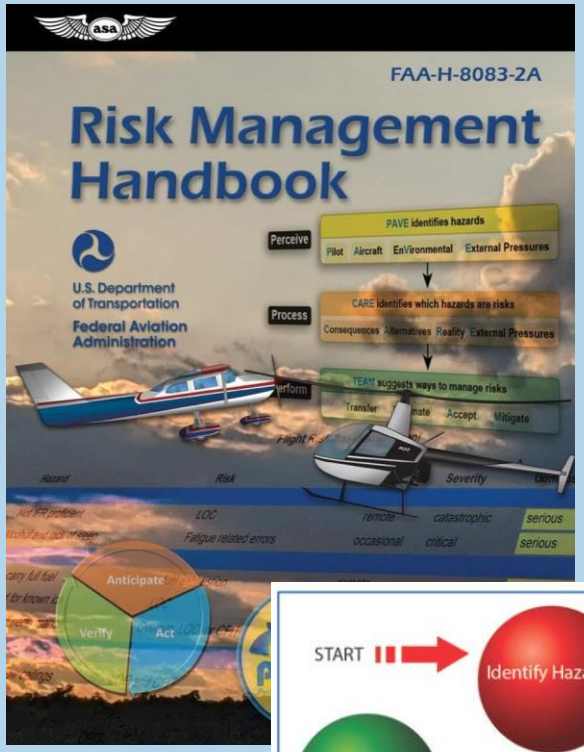


Figure 10-1. *Risk management decision-making process.*

Risk Management

- Risk Management
  - The goal of risk management is to proactively identify safety-related hazards and mitigate the associated risks.
  - When a pilot follows good decision-making practices, the inherent risk in a flight is reduced or even eliminated.
- The ability to make good decisions is based upon direct or indirect experience and education.
- The formal risk management decision-making process involves six steps as shown in figure 10-1

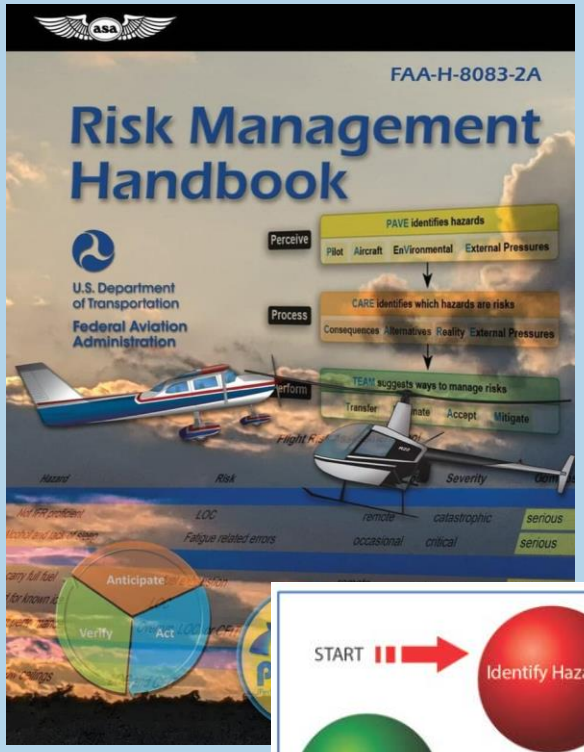


Figure 10-1. *Risk management decision-making process.*

Risk Management

- There are four principles to risk management:
  - Accept no unnecessary risk. Flying is not possible without risk, but unnecessary risk comes without a corresponding return.
  - Make risk decisions at the appropriate level. Risk decisions should be made by the person who can develop and implement risk controls.
  - Accept risk when benefits outweigh dangers (costs). In any flying activity, it is necessary to accept some degree of risk.
  - Integrate risk management into planning at all levels. Because risk is an unavoidable part of every flight, safety requires the use of appropriate and effective risk management not just in the preflight planning stage, but in all stages of the flight.

What do you feel poses the greatest risk to sUAS operations on a construction site?

Rogue Operators **(A)**

0%

Public Perception **(B)**

0%

FAA Regulatory Policies **(C)**

0%

sUAS Limitations (Technology/Performance) **(D)**

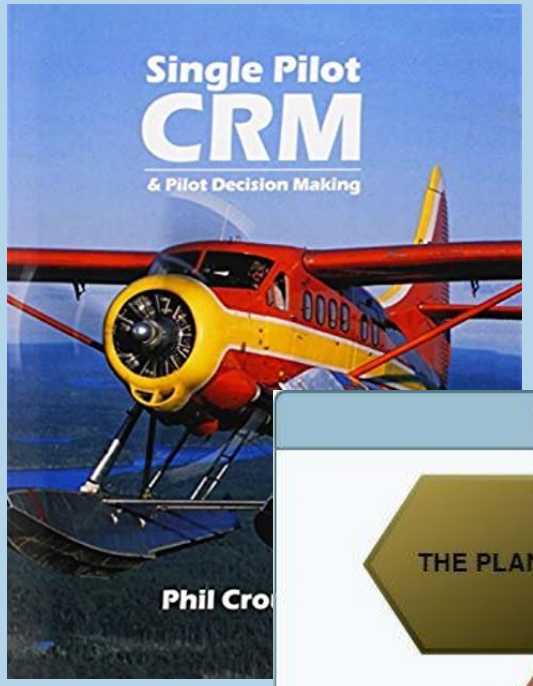
0%

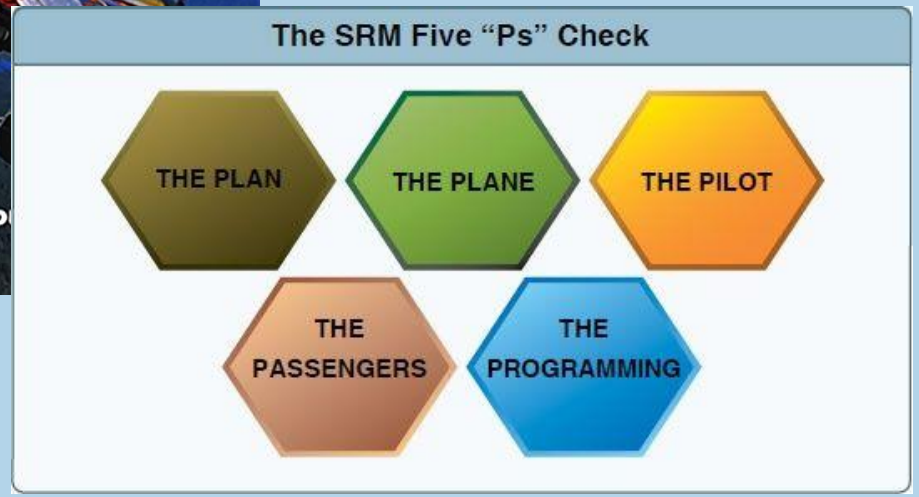
Crew Resource Management (CRM)

- Crew Resource Management (CRM) training for flight crews is focused on the effective use of all available resources: human resources, hardware, and information supporting ADM to facilitate crew cooperation and improve decision-making.
- The goal of all flight crews is good ADM and the use of CRM as one way of making good decisions.
- Research in this area prompted the Federal Aviation Administration (FAA) to produce training directed at improving the decision-making of pilots and led to current FAA regulations that require that decision-making be taught as part of the training curriculum.

Single Pilot Resource Management (SRM)

- Single Pilot Resource Management (SRM)
  - While CRM focuses on pilots operating in crew environments, many of the concepts apply to single pilot operations.
- The SRM Five “P’s” Check
  - The Plan
  - The Plane
  - The Pilot
  - The Passengers
  - The Programming
- SRM includes the concepts of:
  - ADM
  - Risk management (RM)
  - Task management (TM)
  - Automation management (AM)
  - Controlled flight into terrain (CFIT) awareness
  - Situational awareness (SA)

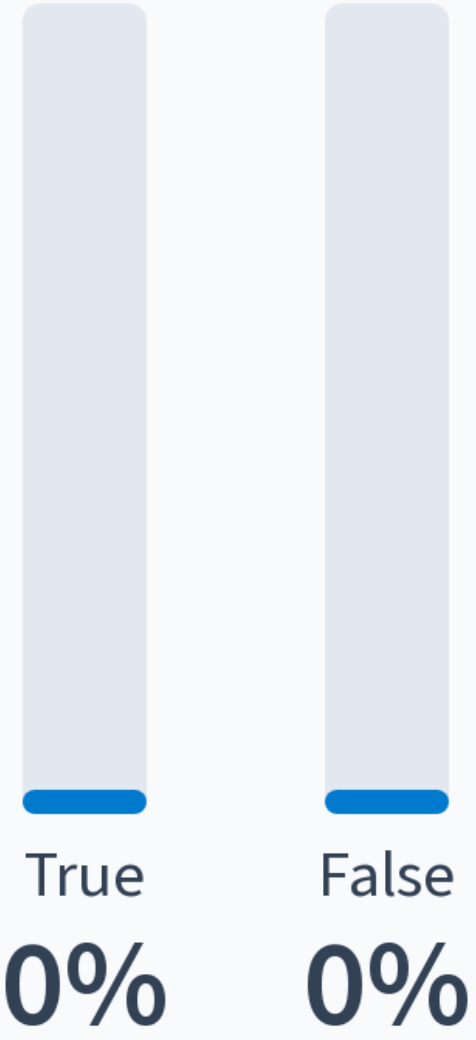




Hazard & Risk

- Two defining elements of ADM are hazard and risk.
- Hazard is a real or perceived condition, event, or circumstance that a pilot encounters.
- Risk is an assessment of the single or cumulative hazard facing a pilot; however, different pilots see hazards differently.
- Elements or factors affecting individuals are different and profoundly impact decision-making. These are called human factors and can transcend education, experience, health, physiological aspects, etc.

Hazardous attitudes are real



The Five Hazardous Attitudes

- Being fit to fly depends on more than just a pilot's physical condition and recent experience.
- Attitude is a motivational predisposition to respond to people, situations, or events in a given manner.
- Hazardous attitudes contribute to poor pilot judgment but can be effectively counteracted by redirecting the hazardous attitude so that correct action can be taken.

The Five Hazardous Attitudes	Antidote
Anti-authority: "Don't tell me." This attitude is found in people who do not like anyone telling them what to do. In a sense, they are saying, "No one can tell me what to do." They may be resentful of having someone tell them what to do or may regard rules, regulations, and procedures as silly or unnecessary. However, it is always your prerogative to question authority if you feel it is in error.	**Follow the rules. They are usually right.**
Impulsivity: "Do it quickly." This is the attitude of people who frequently feel the need to do something, anything, immediately. They do not stop to think about what they are about to do, they do not select the best alternative, and they do the first thing that comes to mind.	**Not so fast. Think first.**
Invulnerability: "It won't happen to me." Many people falsely believe that accidents happen to others, but never to them. They know accidents can happen, and they know that anyone can be affected. However, they never really feel or believe that they will be personally involved. Pilots who think this way are more likely to take chances and increase risk.	**It could happen to me.**
Macho: "I can do it." Pilots who are always trying to prove that they are better than anyone else think, "I can do it—I'll show them." Pilots with this type of attitude will try to prove themselves by taking risks in order to impress others. While this pattern is thought to be a male characteristic, women are equally susceptible.	**Taking chances is foolish.**
Resignation: "What's the use?" Pilots who think, "What's the use?" do not see themselves as being able to make a great deal of difference in what happens to them. When things go well, the pilot is apt to think that it is good luck. When things go badly, the pilot may feel that someone is out to get them or attribute it to bad luck. The pilot will leave the action to others, for better or worse. Sometimes, such pilots will even go along with unreasonable requests just to be a "nice guy."	**I'm not helpless. I can make a difference.**

Which hazardous attitude are YOU most likely to experience?

Anti-Authority

0%

Impulsivity

0%

Invulnerability

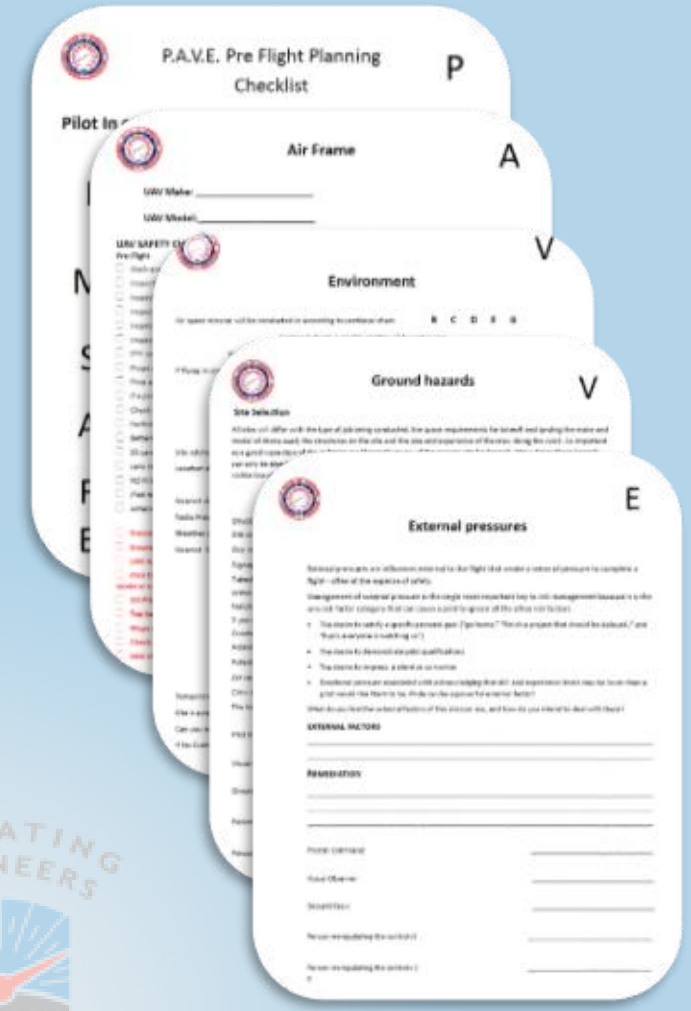
0%

Macho

0%

SEE MORE

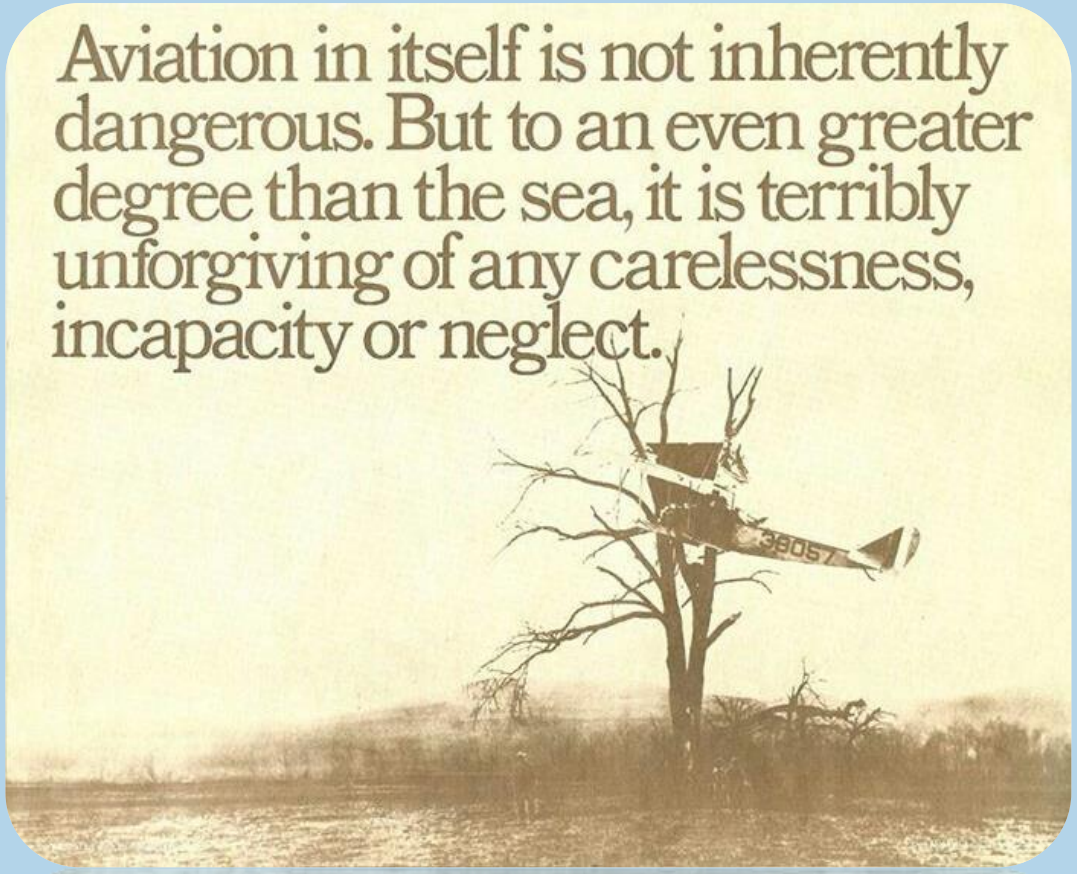
The P.A.V.E. Checklist



- To fly safely, the pilot needs to assess the degree of risk and determine the best course of action to mitigate the risk.
- Pilots can help perceive hazards by using the PAVE checklist of:
  - Pilot, Aircraft, enVironment, and External factors.
- They can process hazards by using the CARE checklist of:
  - Consequences, Alternatives, Reality, External Factors.
- Finally, pilots can perform risk management by using the TEAM choice list of:
  - Transfer, Eliminate, Accept, or Mitigate

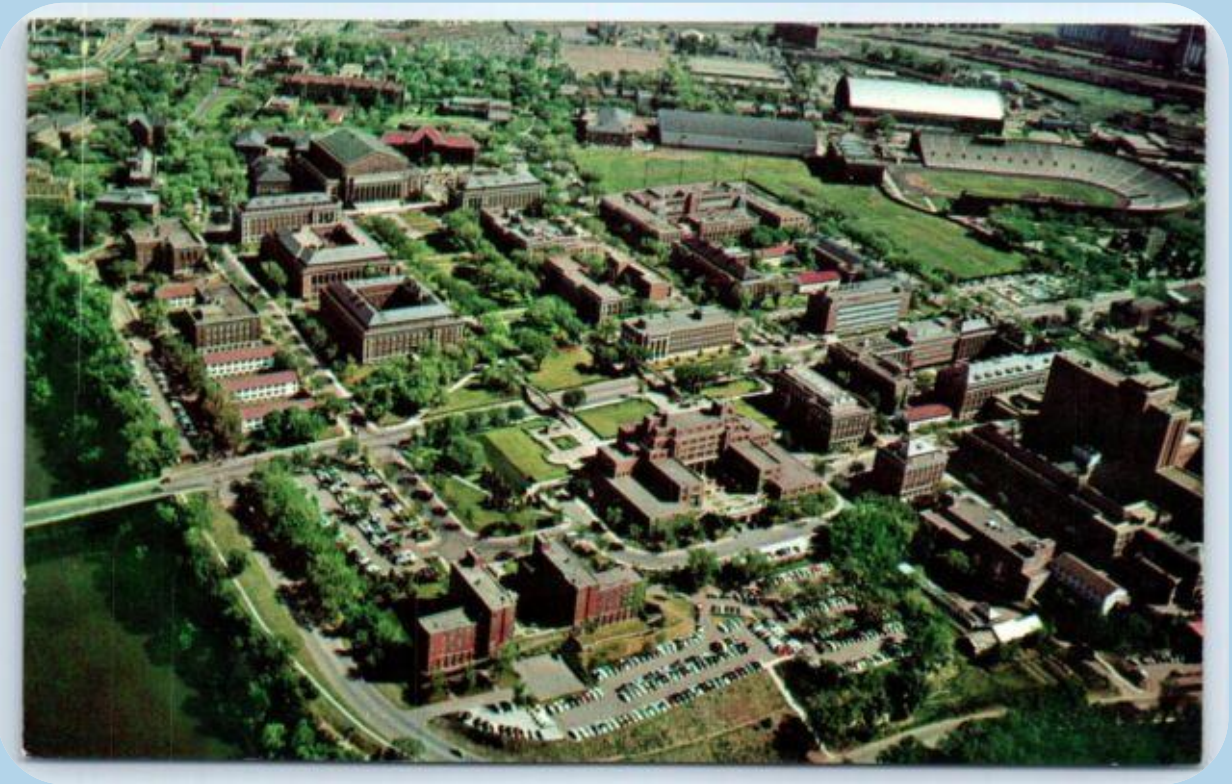
Human Factors

- Why are human conditions, such as fatigue, complacency and stress, so important in aviation?
- Human conditions directly cause or contribute to many aviation accidents and have been documented as a primary contributor to more than 70 percent of aircraft accidents.
- These conditions, along with many others, are called human factors.



Human Factors

- Studies of human behavior have tried to determine an individual's predisposition to taking risks and the level of an individual's involvement in accidents.
- In 1951, a study regarding injury-prone children was published by Elizabeth Mechem Fuller and Helen B. Baune, of the University of Minnesota.
- The accident-free group showed a superior knowledge of *safety*, was considered *industrious* and *cooperative* with others, but were not considered physically inclined.
- The accident-repeater group had better gymnastic skills, was considered *aggressive* and *impulsive*, demonstrated *rebellious* behavior when under stress, were poor losers, and liked to be the center of attention.



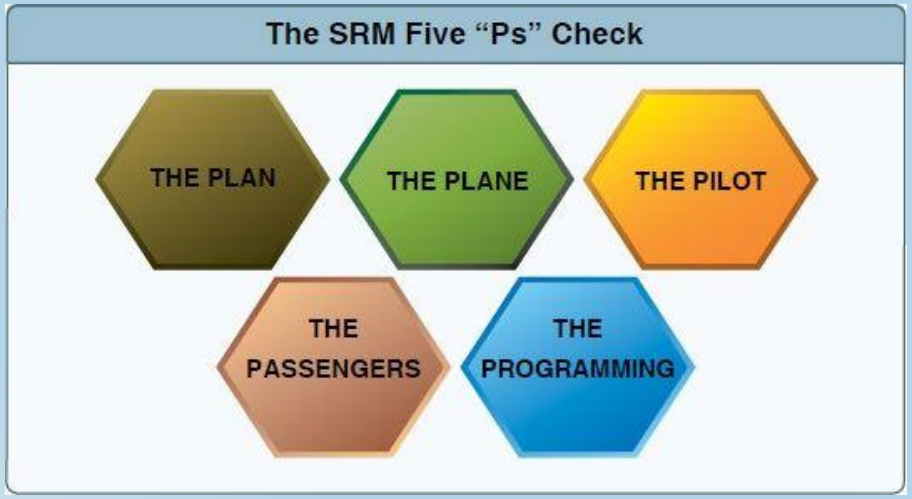
Human Behavior

- The successful pilot possesses the ability to concentrate, manage workloads, and monitor and perform several simultaneous tasks.
- The FAA oversaw an extensive research study on the similarities and dissimilarities of accident-free pilots and those who were not.
- The project surveyed over 4,000 pilots, half of whom had “clean” records while the other half had been involved in an accident.

Human Behavior

- Five traits were discovered in pilots prone to having accidents. These pilots:
  - Have disdain toward rules
  - Have very high correlation between accidents on their flying records and safety violations on their driving records
  - Frequently fall into the “thrill and adventure seeking” personality category
  - Are impulsive rather than methodical and disciplined, both in their information gathering and in the speed and selection of actions to be taken
  - Have a disregard for or tend to under utilize outside sources of information, including copilots, flight attendants, flight service personnel, flight instructors, and ATC

The Decision-Making Process

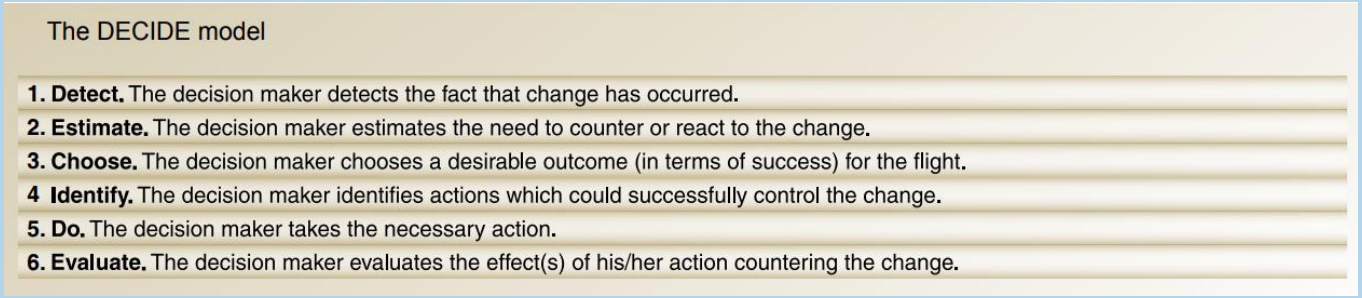


- The Five "P's" Check
  - The Plan - The "Plan" can also be called the mission or the task.
  - The Plane - The "plane" consists of the usual array of mechanical and cosmetic issues that every aircraft pilot, owner, or operator can identify.
  - The Pilot – The pilot in command.
  - The Passengers (Not applicable with a sUAS) - While there are no passengers on a sUAS, there may be some ground participants that need to be briefed and coordinated with.
  - The Programming - The electronic instrument displays, GPS, and autopilot reduce pilot workload and increase pilot situational awareness.

The Decision-Making Process

- Perceive, Process, Perform (3P) Model
  - The 3P model for ADM offers a simple, practical, and systematic approach that can be used during all phases of flight.
- To use it, the pilot will:
  - Perceive the given set of circumstances for the flight
  - Process by evaluating their impact on flight safety
  - Perform by implementing the best course of action

The Decision-Making Process



The DECIDE model

1. **Detect.** The decision maker detects the fact that change has occurred.
2. **Estimate.** The decision maker estimates the need to counter or react to the change.
3. **Choose.** The decision maker chooses a desirable outcome (in terms of success) for the flight.
4. **Identify.** The decision maker identifies actions which could successfully control the change.
5. **Do.** The decision maker takes the necessary action.
6. **Evaluate.** The decision maker evaluates the effect(s) of his/her action countering the change.

- The DECIDE Model is another continuous loop process that provides the pilot with a logical way of making decisions.
  - Detect – The decision maker detects the fact that change has occurred.
  - Estimate – The decision maker estimates the need to counter or react to the change.
  - Choose – The decision maker chooses a desirable outcome (in terms of success) for the flight.
  - Identify – The decision maker identifies actions which could successfully control the change.
  - Do – The decision maker takes the necessary action.
  - Evaluate – The decision maker evaluates the effect(s) of his/her action countering the change.

Decision Making In A Dynamic Environment

- Automatic Decision-Making
  - In an emergency situation, a pilot might not survive if he or she rigorously applies analytical models to every decision made as there is not enough time to go through all the options.
  - Under these circumstances he or she should attempt to find the best possible solution to every problem.
  - For the past several decades, research into how people actually make decisions has revealed that when pressed for time, experts faced with a task loaded with uncertainty first assess whether the situation strikes them as familiar.
  - The terms “naturalistic” and “automatic decision-making” have been coined to describe this type of decision-making.
  - This is a reflexive type of decision-making anchored in training and experience and is most often used in times of emergencies when there is no time to practice analytical decision-making.

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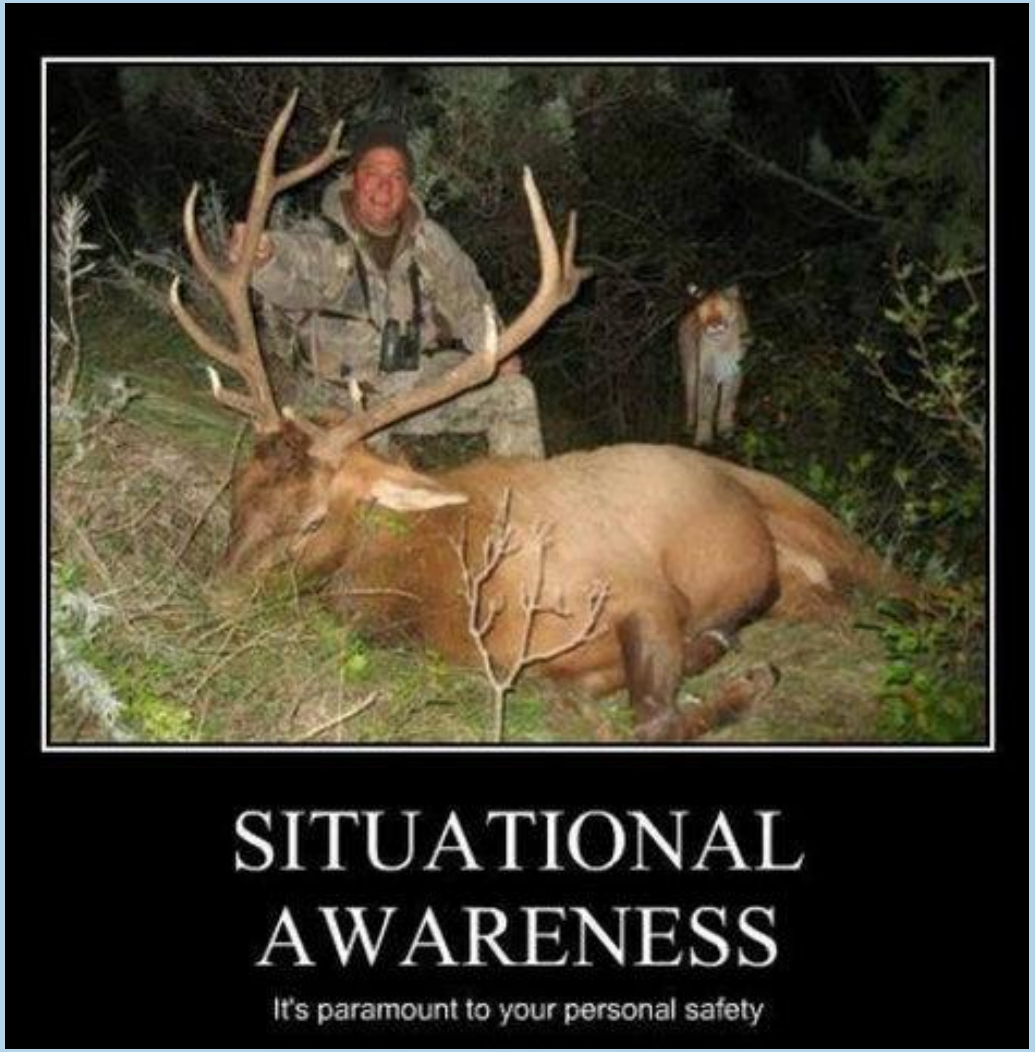
Decision Making In A Dynamic Environment

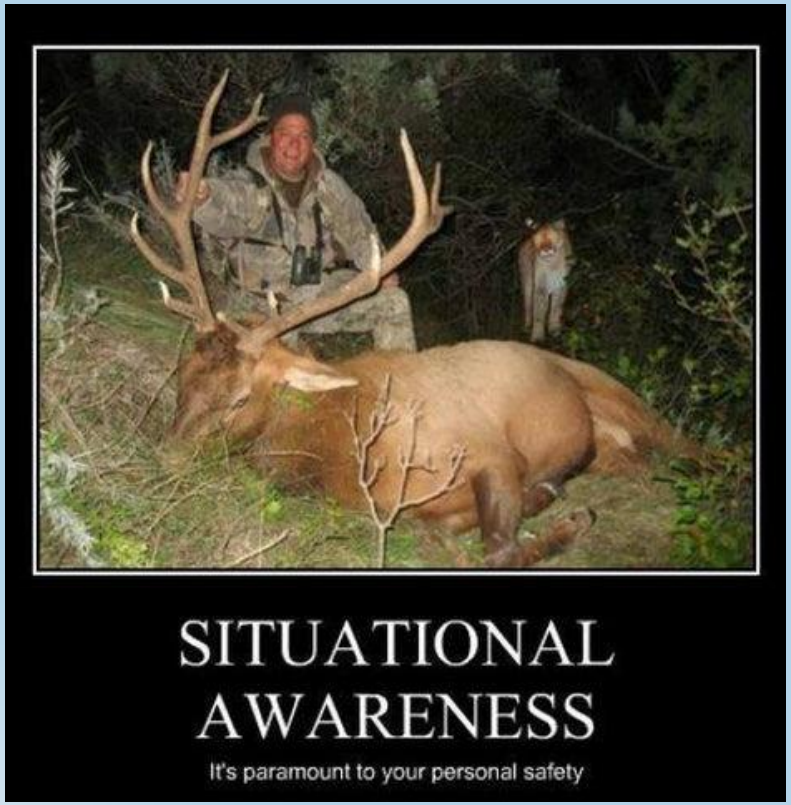
- Stress Management
  - Everyone is stressed to some degree almost all of the time. A certain amount of stress is good since it keeps a person alert and prevents complacency.
  - Performance generally increases with the onset of stress, peaks, and then begins to fall off rapidly as stress levels exceed a person's ability to cope.
  - There are two categories of stress—acute and chronic.
  - Factors referred to as stressors can increase a pilot's risk of error in the flight deck.
  - The key to stress management is to stop, think, and analyze before jumping to a conclusion

Situational Awareness

- Situational awareness is the accurate perception and understanding of all the factors and conditions within the five fundamental risk elements (flight, pilot, aircraft, environment, and type of operation that comprise any given aviation situation) that affect safety before, during, and after the flight.
- Maintaining situational awareness requires an understanding of the relative significance of all flight related factors and their future impact on the flight.



Situational Awareness



- Obstacles To Maintaining Situational Awareness - Fatigue, stress, and work overload can cause a pilot to fixate on a single perceived important item and reduce an overall situational awareness of the flight.
  - Workload Management - Effective workload management ensures essential operations are accomplished by planning, prioritizing, and sequencing tasks to avoid work overload.
    - Use a ground crew, person manipulating the controls (other than PIC), camera pilot, and visual observer to spread the workload.
  - Managing Risks - The ability to manage risks begins with preparation.
    - Assess the flight's risk based upon experience.
    - Brief entire crew to flight plan, emergency plan, and their individual roles and responsibilities.

QUESTIONS?

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