



DECISION MAKING

1. Introduction

We all make decisions every day!

Decision making is the cognitive process of selecting successive actions from among multiple alternatives.

Decision making in an aeronautical environment involves any pertinent decision a pilot must make during the conduct of a flight.

These decisions are very important because of the safety consequences of poor decisions.

The U.S. Federal Aviation Administration (FAA) definition of decision making (ADM) is (FAA Advisory Circular 60-22):

Decision making is a systematic approach to the mental process used by aircraft pilots to consistently determine the best course of action in response to a given set of circumstances.

2. Complex process

Human decision making is a complex process that is strongly dependent on the environment in which the decision must be made.

Since aviation is complex, decisions made while flying can have much impact on safety and economic consequences including the most dramatic ones.

Decisions in the aeronautical environment should involve the following considerations:

- A decision is not unique but, instead, is a series of multiple and interdependent decisions that are made in real time and in a continuously changing autonomous environment.
- A human being is not able to perceive, evaluate, understand and act on all aspects of the environment. The decision maker must simplify reality and make a decision within it.
- A decision is a continuous process in which a set of decisions is made while seeking satisfactory results to a given situation. (Decision maker has achieved a satisfying response to the situation).
- A successful decision is not necessarily the optimum or most rational decision. It is the decision the human being understands and knows how to apply effectively in the context of the situation.

The decision making process can be split into 3 basic steps:

- Define the problem.
- Choose a course of action.

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- Implement the decision and evaluate the outcome.

3. Risk and decision making

Good aeronautical decision-making includes risk management, a process that systematically identifies hazards, assesses the degree of risk, and determines the best course of action.

The choice between alternatives is a trade-off based on the expected results for each alternative and the risk of failure to achieve these results when adopting the selected alternative. The way risk is perceived and managed can limit some choices.

Decision makers tend to prefer solutions they are confident of achieving, even if the result will not be as good as might have been achieved with another, less-familiar solution.

One aeronautical decision-making model developed by the FAA Aviation Safety Program is the **DECIDE** model of decision-making (FAA-H-8083-9):

- **D**etect a change needing attention.
- **E**stimate the need to counter or react to a change.
- **C**hoose the most desirable outcome for the flight.
- **I**dentify actions to successfully control the change.
- **D**o something to adapt to the change.
- **E**valuate the effect of the action countering the change.

Another method is the **Perceive – Process – Perform** risk management and aeronautical decision-making model developed by the FAA Aviation Safety Program. There are three steps in this model:

- **PERCEIVE** hazards
- **PROCESS** to evaluate level of risk
- **PERFORM** risk management

3.1. PERCEIVE

The goal is to identify hazards, which are events, objects, or circumstances that could contribute to an undesired event. You need to consider hazards associated with:

- **P**ilot : general health, physical/mental/emotional state: proficiency, currency
- **A**ircraft : airworthiness, equipment, performance capability
- **e**n**V**ironment : weather hazards, terrain, airports/runways to be used, conditions
- **E**xternal Pressures : meetings, people waiting for you

3.2. PROCESS

Ask questions to determine what can hurt you. In short, why do you have to **CARE** about these hazards?

- What are the **C**onsequences?
- What are the **A**lternatives available to me?
- What is the **R**eality of the situation facing me?
- What kind of **E**xternal pressures may affect my thinking?

3.3. PERFORM

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Your objective is to make sure the hazard does not hurt **ME** or my loved ones, so work to **Mitigate** or eliminate the risk, and **Evaluate** the outcome of your actions.

4. Human factor

Most preventable accidents have one common factor: **human error**, rather than a mechanical malfunction.

All experienced pilots have fallen prey to, or have been tempted by, one or more of these dangerous tendencies or behavior patterns in their flying careers:

- Poor decision making based upon emotional response to peers rather than evaluating a situation objectively
- The inability to recognize and cope with changes in the situation different from those anticipated or planned.
- Clouds the vision and impairs judgment by causing a fixation on the original goal or destination combined with a total disregard for any alternative course of action.
- Tendency to sneak a peek by descending below minimums during an approach. Based on a belief that there is a built in "fudge" factor or an unwillingness to admit defeat and shoot a missed approach.
- Pushing the pilot and aircraft capabilities to the limit by trying to maintain visual contact with the terrain while trying to avoid contact with it. (scud running)
- Continuing VFR into IFR conditions often leads to spatial disorientation or collision with ground/obstacles. It is even more dangerous when not instrument rated or current.
- Allowing events or the situation to control your actions rather than the other way around.
- Loss of situational awareness which results in not knowing where you are, an inability to recognize deteriorating circumstances, and the misjudgment of the rate of deterioration.
- Ignoring minimum fuel reserve requirements, either VFR or IFR, is generally the result of overconfidence, lack of flight planning, or ignoring the regulations.
- Unjustified reliance on the (usually mistaken) belief that the airplanes high performance capability meets the demands imposed by the pilot's (usually overestimated) flying skills.
- Unjustified reliance on the pilot's short and long term memory, regular flying skills, repetitive and familiar routes, etc.

Typical hazardous attitude are:

Hazardous Attitude	Attitude description	Antidote
Anti-authority	"Don't tell me!" I don't like anyone telling him/her what to do. Resentful of rules & regulations.	Follow the rules, they're usually right.
Impulsivity	"Do something - do it now!" I need to do something, anything, quickly. Don't stop to think about better alternatives.	Not so fast... I shall think first.
Invulnerability	"It won't happen to me." Accidents happen to other people, not to me. I can take chances.	It could happen to me.
Macho	"I can do it." I always try to prove themselves better than others. Take risks and try to impress others.	Taking chances is foolish.
Resignation	"What's the use?" I can't make a difference.	I'm not helpless, I can make a difference. Never give up.

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	It's going to happen anyway, why bother? Leave actions to others.	
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5. Decision making errors

Situation-assessment errors can be of several types:

- situation cues may be misinterpreted, misdiagnosed or ignored, resulting in a wrong picture
- risk (threat or danger) levels may be underestimated
- the amount of available time may be misjudged

A common pattern was the crew's decision to continue with their original plan when conditions suggested that other courses of action might be more prudent.

4 factors are hypothesized as possible contributors to these decision errors:

- The situations were not recognized as ones that should trigger a change of course of action, due to the ambiguity of the cues
- Risk was underestimated, possibly because a previous similar situation was successfully handled
- Goals conflicted (e.g., safety vs. productivity, mission completion or social factors)
- Consequences were not anticipated or evaluated, possibly due to some of the environmental factors or biases discussed earlier

6. Example of decision making

You can find here a decision list: decision to be taken in order to avoid an accident or contribute to limiting the consequences.

- Decision to execute an avoidance manoeuvre on ground or in-flight, after a visual detection, or after an alert on the Airborne Collision Avoidance System (ACAS)
- Decision to execute a go-around in adverse weather or non-stabilized approach
- Decision to execute a landing procedure as a precaution outside any aerodrome boundaries with or without emergency conditions
- For unmanned aircraft systems, decision to land outside of aerodrome boundaries, intentional controlled flight into terrain, or intentionally crashing the aircraft.
- Decisions to execute landings on an unexpected surface, such as a secondary runway, a grass runway or a surface included within the aerodrome boundaries
- Decisions to reject a take-off, before or after starting the take-off roll or to continue the take-off
- Decision to return to the departure or alternate aerodrome after a flight interruption

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