By Michael R. Grüninger and Markus Kohler
of Great Circle Services AG (GCS)

DECISION MAKING

DECISION Capt. Sullenberger quickly accepted he was in an emergency and acted accordingly.

Decisions which Matter

I have always liked the power and responsibility needed to decide the course of actions and determine the outcome of an event. When someone asked what was great about being a pilot, I would answer: "Being a pilot forces me to take decisions which matter".

A prominent pilot who was in a position to make decisions which really mattered was taking off on January 15, 2009, about 1527 EST, from LaGuardia airport on U.S. Airways flight 1549. The Airbus A320 experienced multiple bird strikes during climb about two minutes into the flight. This resulted in an almost complete loss of thrust in both engines. With insufficient power available to maintain level flight, let alone climb, the flight crew ran out of options and altitude very quickly, but succeeded to safely ditch the aircraft in the Hudson river.

World media have reported extensively on this successful ditching event and Capt. Sullenberger, the commander of the flight, has since appeared in many TV shows and written his autobiography.

In this article we want to reflect on the decision-making processes in situations which matter, where the decision taken will make the difference between a successful outcome and a catastrophe.

The NTSB concluded that the decision-making of the flight crewmembers and their crew resource management during the accident sequence contributed to the successful outcome. Some commentators have challenged this analysis and suggested CRM played, basically, no major role in the sequence of actions. Langenwiesche wrote in "Fly by Wire" (page 20): "In fact, if you wanted to pick one accident in which elaborations on teamwork don't need to be made, this would be a good one to choose." The argument being that in this low altitude emergency the pilots worked in parallel, Sullenberger flying, navigating and communicating, the co-pilot working through the checklists, within the time constrains. Langenwiesche's comment appears to be relevant. Nonetheless, it is evident that this type of effective and successful sharing of tasks is very much an indication for good CRM.

An old joke says: A flight instructors simulates an engine failure during basic flight training. The student pilot starts sweating and becomes active in pushing and pulling knobs and buttons in order to re-establish power. The same flight instructor simulates an engine failure to another student pilot. This student simply looks down and says: We land there. He was a glider pilot.

Rapid Response

After the accident, some commentators suggested it was Capt. Sullenberger's experience as a glider pilot assisting his decision making on the day the geese were ingested. The key to the successful outcome was, besides the great portion of luck, a quick and determined decision making process by an expert glider. Sullenberger has publicly admitted that he was in disbelief for the first moments, until he realized that he needed to find a quick solution to the problem. But, he also stated in an interview with Swiss Television: "I was confident that based on my experience I can do that." In a different interview, he noted that "one way of looking at this might be that for 42 years, I've been making small, regular deposits in this bank of experience: education and training. And on January 15 the balance was sufficient so that I could make a very large withdrawal."

Obviously, experience played a major role in the ultimate result where there were two possible scenarios: The pilot as an hazard, or the pilot as an hero. Or the difference between pilot error and good judgement. James Reason has been advocating this double view of a pilot's contribution to accidents. He answers the question: "how does someone choose

between various possible paths," with the word "experience". They come up with a possible solution, one that their experience leads them to believe will work. They quickly run through it in their minds to look for flaws. If they don't find any, they act. If they do find one, they abandon the idea and look for a new solution that works. They don't, however, compare alternatives." This is why, working as a team in a flight deck is of paramount importance.

Time should be taken to compare all available alternatives and chose the best course of action. However there will be situations where many options would be available, or many aspects would have to be weighed in the evaluation of options, but not enough time would be available. A classical example of this is a fierce fire on board the aircraft. There is always yet another way to look at things which may also be reasonable, pick one option, check it, and if it has a good chance to work, act. Note that both scientific evidence as well as personal experience (probably by all of us) indicate that a well trained and experienced pilot's first gut-feeling option which intuitively appears to be the best usually is.

Together with critical thinking, experience and quick response times, these are the key factors not to be blocked by the event. In fact, often pilots confronted with an in-flight emergency respond with anti-authority, impulsivity, invulnerability, macho, and resignation. These attitudes, i.e. a predisposition to respond to people, situations, or events in a given manner, have been identified as hazardous since they can interfere with the ability to make sound decisions.

Now, an analysis of Capt. Sullenberger's reaction to the loss of power indicates that he was tempted by some of these hazardous attitudes. He clearly showed signs of invulnerability and macho. At the same time, he had found the antidotes to these attitudes. Invulnerability was counteracted by a strong sense of realism. Although it took him a few moments to understand that a serious emergency has occurred to him, he quickly accepted the reality and acted in it. The antidote to his macho attitude was experience, which rooted his "can-do" attitude in the real world's physics and personal capabilities.

He decided to take over controls from the F/O who was flying the airplane. Applying correct SOPs and good CRM principles, Sullenberger asked for the loss of thrust on both engines checklist in the QRH (quick reference handbook).

There was not much time to discuss all possible alternatives with his F/O, he decided to ditch on the Hudson River rather than attempting to land at an airport. In hindsight, it provided the highest probability that the accident would be survivable.

He decided to use flaps 2 for the ditching, based on his experience and perception of the situation. This decision was based on the limited civilian industry and military guidance that was available regarding forced landings of large aircraft without power.

SOPs and Captain's Decision

SOPs are excellent and necessary tools for all operations. However, there will be cases where particular emergency situations require a different mind-set.

Taxi, take-off, climb, cruise, descent, approach, and landing are tasks that require a varying amount of pilot skills and capabilities. High workload activities (e.g. take-off and landing), in combination with abnormal or emergency situations, may exceed a pilot's capabilities. That's the theory. In practice, the pilot must be able to identify a situation by which he may be unable to cope and then mitigate against the risks stemming from this excessive demand.

SOPs and abnormal and emergency checklists reduce the overall workload by providing a predetermined course of action or guidance to the assessment of the situation. CRM increases the overall team capability.

When a pilot continuously assesses risks and manages stress, aeronautical decision making is in function. It involves good judgment by pilots or, simply, airmanship.

Michael R. Grüninger *is the Managing Director of* ***Great Circle Services (GCS) Aviation Safety Advisors****. GCS assists in the whole range of planning and management issues, offering customized solutions to strengthen the position of a business in the aviation market. Its services include training and auditing (IS-BAO) consultancy (IS-BAO, IOSA), manual development and process engineering. He can be reached at michael.grueninger@gcs-safety.com or +41-79 442 44 89. His column, Safety Sense appears regularly in BART International.*

ATTITUDE
Pilots confronted with an in-flight emergency have a tendency to respond with impulsivity.