



Lessons from (the) Hudson

By Jean Pariès



Interview of Captain Sullenberger by US presenter Larry King

"You knew you were gonna crash?"

"I wouldn't put it quite that way. I would say that I expected that this was not going to be like every other flight I'd flown, for my entire career, and it probably would not end on a runway with the airplane undamaged."

"Are you saying this as calmly as you were then?"

"I was not this calm then, but I was very focused, talking to air traffic control, and I quickly determined that we were at too low an altitude, at too slow a speed, and therefore we didn't have enough energy to return to La Guardia, because it's too far away and we headed away from it. After briefly considering the only other nearby airport which was Teterboro in New Jersey, I realized it's too far away, and the penalty for choosing wrongly, and attempting to make a runway I could not make might be catastrophic for all of us on the airplane plus people on the ground."

We have all watched, again and again, the breathtaking images of US Airways Flight 1549: the floating airliner, the passengers on the wings, the merry-go-round of the ferries. And for days after, we read the emphatic words making the front pages of our newspapers. "Owe Lives to Hero". "Miracle on the Hudson River". A gentle kiss of a landing on the Hudson River has overshadowed hiking on the waters of Lake Tiberiade. Undisputable signs of modernity... And the entire crew was awarded, among other honours, the Master's Medal of the Guild of Air Pilots and Air Navigators (GAPAN). "This emergency ditching and evacuation, with the loss of no lives, is a heroic and unique aviation achievement" the GAPAN citation read.

All kidding aside, it was indeed unique. There have only been very few documented occurrences of controlled ditching by commercial public transport aircraft. In May 1970, Overseas



National Airlines Flight 980 from New York Kennedy to St Maarten in the Caribbean ran out of fuel after several unsuccessful attempts to land and diversions due to bad weather. The DC9 was forced to land in shark infested waters, 30 miles off the coast of St. Croix, resulting in 23 fatalities and 40 survivors. In 1996, a hijacked Ethiopian Airlines Boeing 767 was forced to ditch off the Comoro Islands in the Indian Ocean after it ran out of fuel. Of the 172 people aboard, 127 died. And it appears that prior to our recent US Flight 1549, only one known ditching of a passenger jet had been managed without fatalities: in St. Petersburg, Russia, in 1963, an Aeroflot Tu124 jet ran out of fuel during an emergency and landed on the Neva River. All 52 people aboard survived and the jet was towed to shore.

But is the Hudson River case a miracle? Or is it a heroic achievement? Or is it something else?

In the 1990s the US Bird Strike Committee estimated that there is a 25% chance in any decade that birds could cause a major airline crash. Taking into account the bird population growth and the adoption of twin-engine jets as the standard worldwide, the odds of a total thrust loss have probably increased even further. So it is worth considering whether only providence or heroic skills saved the day. Can we fish some ordinary safety lessons from the Hudson River? Yes, I believe we can. I believe that what happened is in some sense the opposite of a miracle: something fundamentally engineered into the aviation system.

Let's begin at the beginning. Jet engines are designed to withstand bird strikes. They must demonstrate their ability to cope during a series of certification tests in which two-kilogram chickens are shot out of a cannon at their blades while running at full power. In fact, engine blades are incredibly tough, and aircraft engines routinely ingest birds without a hiccup (tens of thousands of encounters every year).

But all tests have limitations, and these tests do not consider weights of four kilograms or more, not to mention a multiple ingestion of birds of this size. So when the US Airways Airbus A320 carved into a flock of Canada geese about two minutes after take-off, what happened clearly exceeded the engine designers' worst case scenario. Several of these huge birds were almost simultaneously sucked into both engines. And both engines promptly quit.

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Did all of our safety protections quit as well? No. True, the first (and main) line of defence was penetrated at this point. Yet because no twin engine aircraft has been made immune to dual engine failure, especially when flying through a flock of Canada geese, a total loss of thrust has been anticipated in the aircraft certification principles. Several systems (e.g. Auxiliary Power Unit, Ram Air Turbine) and procedures

are available to ensure that the crew can continue to maintain some aircraft control, even if, in the case of vertical speed, this control is limited. Since this thrust loss scenario can happen over water, ditching has also been anticipated. Landing a

large jet on water is highly unusual, but it's something pilots occasionally train for, even if simulation has obvious fidelity limitations in this case. So, the superb landing on the Hudson is the compound result of excellent pilot judgment on the day and the applica-



Jean Paries

Jean Paries graduated from the French National School of Civil Aviation as engineer, and then joined the DGAC for several positions dealing with air safety regulations.

He was a member of the ICAO Human Factors & Flight Safety Study Group since its creation in 1988. In 1990, he joined the Bureau Enquêtes Accident as Deputy Head, and Head of Investigations, where he led the technical investigation into the Mont Saint-Odile Accident, 1992. Currently Jean is CEO - of Dédale SA.

He holds a Commercial Pilot Licence with Instrument, Multi-engines, Turboprop, and Instructor ratings and a Helicopter Private Pilot Licence.

Lessons from (the) Hudson (cont'd)

tion of skills developed from previous flight experience and training, excellent aircraft behaviour mainly thanks to the Airbus fly-by-wire design and its embedded stability and stall protection, and quite a large dose of luck. It was daylight, there was a clear sky and good visibility, there was a river rather than the open sea nearby, the water surface was smooth with only a light surface wind and the crew was familiar with the area. The A320's ability to float long enough for all of Flight 1549's passengers and crew to be safely evacuated was not a miracle, but a result of intentional design (including a "ditch button" closing all valves to make the cabin watertight, apparently not used in the incident), as well as a result of cabin procedures for ditching and evacuation (including the routine lifejacket briefing that most of us pay no attention to while settling back into our seat...) very professionally implemented by the entire crew. There was also more than a touch of providence – no boats were hit, but many were readily available at the scene to assist with the rescue.

And what about the contribution of air traffic control? I am not an ATC expert, but listening to the communication record available on the web, I believe the controller did a superb job, responding quickly and efficiently, being both strong and flexible, staying calm, asking for intentions without inquisition, offering solutions without insisting. When the crew asked if they could attempt an emergency landing in New Jersey, he quickly contacted Teterboro' and obtained permission for a landing on Runway 1. Was he also an exceptional controller, a kind of a hero? Maybe he was. Or maybe he wasn't. Maybe he was just an "engineered hero": well selected, well trained, well managed, well motivated in his job, and definitely taking his full share of responsibility for

flight safety, regularly asking himself and colleagues questions about "what they would do if..."; keeping informed about safety, reading about safety. Exactly like US Airways Captain Chesley Sullenberger who left the book he was currently reading behind in the A320's watery cockpit. And guess what book? "Just Culture: Balancing Safety and Accountability" by my esteemed friend and colleague Sidney Dekker! And he might very well have left behind a book by another of my friends and heroes: the great Jim Reason, who began to set the scene for modern safety thinking about twenty years ago, or ironically – but then nobody would have believed him – a book by Patrick ... Hudson, someone who has spent years exploring the notion of Safety Culture, and who understands that Safety Culture is more than statistical answers to a Safety Culture questionnaire.

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These books, amongst several others, would all convey the same essential message: safety is something emerging from an organisation as a whole. Safety is not about flying "on a wing and a prayer", not about heroes and miracles, not about super pilots or super controllers commanding the impossible, not even about super CEOs speaking the super truth and managing the unmanageable.

Safety is created when an organisation generates properly selected and

trained people who use their relevant skills to implement properly designed processes on well-designed and procured equipment to reach reasonable goals, while feeling responsible for safety whatever their level in the hierarchy, and recognizing that they may screw up sooner or later, and still keeping in mind that Canada geese can fly too. Safety is about the collective will to be safe, a collective comprehension of what makes your system safe, and a collective feeling of being exposed to hazards and mishaps. Safety is about building, day after day, good reasons to be confident, while keeping, as a form of modesty, a touch of fear embedded into your professional pride.

The magnificent, dramatic and ironic lesson of the Hudson(s) is that we can, and we should, prepare to be unprepared. Because, as Scott Sagan wrote, "Things that have never happened before happen all the time". Indeed, things happen, just like that, as they did over New York City, in just a handful of seconds. Things that we will never be able to anticipate in detail, and at the same time, things that we will only be able to cope with if we have anticipated them to some extent. The future is unimaginable, so please, try again. Think, mentally simulate, discuss, read, then read again, challenge yourself, challenge your team, challenge your organization. Because when it is time to ditch, it's you, your team, your company at the controls, nobody else. As National Transportation Safety Board (NTSB) Member Higgins put it at a press conference after the accident: "These people knew what they were supposed to do and they did it, and as a result, nobody lost their life."

One of the small differences between a pant-wetting splash in the Hudson, and a dive into disaster. ■