# THE TRAGEDY OF FLIGHT : A COMPREHENSIVE CRASH ANALYSIS

Since the first flight taken by the Wright Brothers in Kitty Hawk, NC, aviation has become an integral part of our society. Humans have only been flying in heavier than air, powered aircraft for a little more than a century. But today humans can fly faster than the speed of sound and at altitudes that exceed earth's atmosphere. We can put people into orbit around the earth, travel throughout space, and transport people and packages to anywhere in the world in a matter of hours. Aviation has fundamentally changed the logistics of how our society functions

Flying is one of the safest ways modes of transportation. However, although they are rare, aviation accidents capture the attention of the general public, world leaders, and law makers alike. Accident investigations make headlines around the world. Preventing the accident from occurring in the first place is the most effective way to reduce the destruction and costs associated with an accident. However, considering the sheer quantity of flights that occur daily throughout the world in commercial, military, and general aviation, accidents are going to occur.
.

On the morning of July 25th, 2000, passengers boarded Air France Flight 4590 from Paris to New York and settled in for what was supposed to be a long flight on a supersonic aircraft. Sadly, their flight lasted less than two minutes. Just after liftoff, the supersonic jet crashed into a hotel in Gonesse, France, killing all 109 people aboard and an additional 4 people on the ground.

Five minutes before Flight 4590 took to the runway, a Continental flight headed to Newark, using the same runway, lost a titanium alloy strip. Normal protocol for a Concorde flight includes a full runway inspection before takeoff; this was not completed (perhaps because the flight was already delayed by an hour). During Flight 4590's takeoff, a piece of this debris from the Continental flight, cut and ruptured one of the Concorde's left tires. As the aircraft accelerated down runway 26R, this tire disintegrated and a piece of it struck the underside of the wing, where fuel tank 5 was located.

A pressure wave inside the tank caused it to rupture forward of the tire strike. Fuel poured from the tank and ignited. The Concorde had already reached a velocity where it could not stop safely by the end of the runway so it lifted off the runway with flames hanging from the left wing. There are some incredible photos that captured this amazing moment, a moment that cost the lives of 113 people, $125 million, and the heretofore stellar reputation of a truly impressive airliner.

The history of supersonic commercial air travel has its roots in the 1950s and 1960s, the same period that witnessed the Cold War American and Soviet spaceflight rivalry that launched a man into space. While the Cold War superpowers jockeyed to conquer the stars, Britain and France set its eyes on the skies with the ambition of air travel faster than the speed of sound–faster than commercial flights had ever flown–a reality.

In the late '50s, the US, France, Britain, and the Soviet Union all toyed with the idea of supersonic flights. British and French companies, in large part funded by their governments, developed designs that were ready to go to construction by the early 60s, but the cost of such an ambitious project proved too prohibitive for either to accomplish alone. In 1961, therefore, British Aerospace and France's Aerospatiale came together to produce and develop the project, whose development was negotiated not as a commercial agreement between the respective companies, but as an international treaty between the nations; the treaty was signed in 1962.

To get a better idea of what caused the crash of the Concorde, we built our very own cause map- ThinkReliability's root cause analysis tool- to order the causes and tie them to organizational goals. Cause Maps break incidents down into their individual contributing elements and are thus fantastic tools for understanding disasters like these (see space maps) fully and deeply.

Approaching an incident from a goals perspective solves several issues that one may otherwise encounter in undressing an incident. First, it prevents a root cause analysis free-for-all that fails to stick to the roots of the incident. Focusing on problems leads to blame and arguments rather than to proactive problem-solving.
Focusing on problems also removes the team performing the root cause analysis from the key purpose of the discussion in the first place: to make for a better future for the organization and all involved.
So, instead of asking what went wrong , we start with our goals as they relate to the ideal state of the airline. Naturally, fatalities are bad. Resource loss is also bad, but most people would agree that an organization that loses money but not lives is closer to its ideal state than one that saves money but loses lives.

In discussing incidents of this magnitude that involve not only loss of life but also extremely sophisticated and complex technology, it is often difficult to break down an incident to the extent that anyone–not just engineers or people who work in the industry–can understand them. Root cause analysis is a powerful tool for doing so. As we have demonstrated in our coverage of similar incidents in spaceflight, the Cause Mapping approach to root cause analysis analyzes incidents in terms of a detailed chain of cause and effect, promoting a better general understanding of the event at hand as well as multiple opportunities to enact solutions that prevent such catastrophes from happening again.