

This copy is for your personal, non-commercial use only. To order presentation-ready copies for distribution to your colleagues, clients or customers visit <https://www.djreprints.com>.

<https://www.wsj.com/articles/the-airline-safety-revolution-11618585543>

THE SATURDAY ESSAY

# The Airline Safety Revolution

No commercial airline in the U.S. has had a fatal crash since 2009. Here's the story of the industry insiders who came together to build new systems and to allay the worst fears of air travelers

By [Andy Pasztor](#)

Updated April 16, 2021 12:08 pm ET

Over the past 12 years, U.S. airlines have accomplished an astonishing feat: carrying more than eight billion passengers without a fatal crash.

Such numbers were once unimaginable, even among the most optimistic safety experts. But now, pilots for domestic carriers can expect to go through an entire career without experiencing a single engine malfunction or failure. Official statistics show that in recent years, the riskiest part of any airline trip in the U.S. is when aircraft wheels are on the ground, on runways or taxiways.

The achievements stem from a sweeping safety reassessment—a virtual revolution in thinking—sparked by a small band of senior federal regulators, top industry executives and pilots-union leaders after a series of high-profile fatal crashes in the mid-1990s. To combat common industry hazards, they teamed up to launch voluntary incident reporting programs with carriers sharing data and no punishment for airlines or aviators when mistakes were uncovered.

The pioneers bucked deep-seated doubts from some insiders and outright opposition from pilots' groups worried about disciplinary blowback. By the end of the 1990s, the Federal Aviation Administration, plane maker Boeing Co., labor representatives and the largest U.S. airline trade association all endorsed the unified, data-driven safety agenda. Together, they devised steps to make it happen.

Their approach was simple in its fundamentals but wickedly difficult to implement at the start, requiring unprecedented levels of trust among the participants. During the early stages, representatives of pilots and carriers grudgingly agreed to share information with each other, as well as with the government, regarding budding hazards and near-crashes. Tentative cooperation was dependent on FAA pledges that good-faith mistakes and procedural violations wouldn't result in enforcement actions.



Part of the wreckage dredged from TWA Flight 800's crash off Long Island, N.Y., in 1996, a recent peak year of fatalities aboard U.S. airlines.

PHOTO: BEBETO MATTHEWS/ASSOCIATED PRESS

The results have been remarkable. In 1996, before the safety reboot began, U.S. carriers had a fatal accident rate of roughly one crash for every two million departures. That year alone, more than 350 people died in domestic airline accidents, including 230 in the infamous fuel-tank explosion on TWA Flight 800 that sucked scores of passengers out of the fractured fuselage. Within 10 years, the fatal accident rate had been reduced by more than 80%, beating a goal set by a White House commission.

Today's travelers are benefiting from another decade-plus of improved safety for U.S. carriers, and the fatality rate has been driven down to one for every 120 million departures. (The single passenger death in the past dozen years was from an engine fan blade coming apart during a 2018 flight.) Yet neither the scope nor the significance of the underlying changes, expanded year after year with little fanfare, is generally recognized by the flying public.

"The magnitude of the improvement has far exceeded my expectations," said Randy Babbitt, head of the FAA from 2009 to 2011, who previously championed many of the early advances as president of North America's largest pilots union. The payoff turned out to be so dramatic overall, he added, "It's almost like buying a lottery ticket for 10 bucks and winning the jackpot."

Leaps in technology played a role, dramatically enhancing jet engine reliability over many years. Electrical and other aircraft systems became more durable and trouble-free due to upgraded designs and components. Improvements in cockpit automation provided stronger safeguards against crew errors, while increasingly sophisticated ground-based simulators made aviator training more rigorous and realistic.

But other factors produced the greatest progress. Overseas, where new-generation aircraft proliferated but voluntary reporting wasn't embraced, safety numbers have improved but to nowhere near the degree among American carriers. The astonishing safety record in the U.S. stems most of all from a sustained commitment to what was at first a controversial idea. Together, government and industry experts extracted safety lessons by analyzing huge volumes of flight data and combing through tens of thousands of detailed reports filed annually by pilots and, eventually, mechanics and air-traffic controllers. Responses led to voluntary industry improvements, rather than mandatory government regulations.

Recently, Boeing's 737 MAX jet debacle has partly overshadowed the results of this safety revolution. Two MAX crashes less than five months apart in 2018 and 2019 created a crisis for the Chicago-based plane maker and rekindled public fears about commercial aviation. But those accidents involved overseas carriers and primarily foreign victims, leaving the safety record of domestic airlines intact.

The safety shift in the U.S. began after a series of airborne tragedies leading up to the peak in 1996. Accidents in 1994 involving widely used Boeing and McDonnell Douglas jets operated by USAir, as well as two smaller turboprop aircraft, took 252 lives altogether. Then in December 1995, an American Airlines jet slammed into a mountain while approaching Cali, Colombia, killing 151 people. A ValuJet aircraft caught fire and plummeted into the Florida Everglades five months later, with 110 deaths. Two more fatalities stemmed from an engine failure on a Delta Air Lines MD-88 taking off from Pensacola, Fla.

Regulators and industry players recognized that changes were essential. "We were seeing the same mistakes made over and over, but nobody talked about them" until it was too late, according to Mr. Babbitt, who was then president of North America's largest pilots union.

High-level safety officials from Boeing, union chiefs at the Air Line Pilots Association and leaders of the U.S. industry's main trade group sketched out a startling trend. If accident rates remained the same while global passenger traffic continued growing at projected rates, on average there would be at least one major jet crash a week by 2015, producing hundreds of fatalities somewhere around the globe.

Some solutions were as simple as having the flight crew physically point to cockpit computers while both pilots double-checked out loud that the correct information had been entered.

So the principals set about developing new tactics to counter incipient dangers long before they turned into headline-grabbing tragedies. Ultimately, mechanics and air-traffic controllers embraced similar self-reporting programs. “It was an incredible breakthrough,” according to Ray Valeika, former head of engineering and maintenance at Delta. “We actually patted people on the back” for divulging mistakes. “But if management found it and you didn’t tell us,” he added, “then

you could lose your job.”

Early successes revealed common pilot errors, such as veering from assigned altitudes due to distractions or failing to properly position wing flaps and other flight-control surfaces for takeoffs. Some solutions were as simple as having the flight crew physically point to cockpit computers—which control altitude changes, for instance—while both pilots double-checked out loud that the correct information had been entered.

Voluntary revisions to internal airline rules proved faster and less obtrusive than changes imposed by regulators. The new strategies coincided with recommendations of the blue-ribbon White House commission, led by then-Vice President Al Gore. The commission’s 1997 report supported the concept of voluntary data sharing, endorsing industry-government partnerships to better coordinate information by “seeking to replace confrontation with cooperation.”

Airlines later developed more complex solutions to prevent dangerous piloting errors in which planes approached runways too fast, descended too rapidly or landed too far down runways to brake safely. Strict self-imposed rules by carriers required crews to abandon approaches under such conditions, leaving enough time to safely climb away from the field.

The promise of the approach was best summed up by Nick Sabatini, the FAA's top safety official from 2001 to 2009, who would reassure audiences at safety conferences: "The data will set you free." He urged greater reliance on information gleaned from routinely downloading and examining incident details from flight-data recorders. As the efforts gained momentum, airlines could compare themselves with competitors or the entire industry.



Travelers crisscross John F. Kennedy International Airport's Terminal 5 in New York City on a typically busy Wednesday in 2017.

PHOTO: MARK KAUZLARICH/BLOOMBERG NEWS

Predictably, there were squabbles and threats to scale back or end voluntary reporting. Delta, for example, temporarily pulled out of voluntary arrangements, contending the FAA was renegeing on promises to forego enforcement cases. Some high-ranking FAA officials who succeeded Mr. Sabatini angered pilots by complaining that voluntary, non-punitive reporting agreements sometimes amounted to a "get out of jail free" card for careless aviators.

Such programs take time to build, "but one false step can really bring them down in a day," Gabriel Acosta, global head of operational safety for the leading international airline trade group, told a conference last month.

Despite stumbles, collaborative arrangements survived and thrived. Delta rejoined the partnership after a couple of years, and participants got better at meeting the challenges of handling an avalanche of data. Over time, the efforts turned into ever more sophisticated data-collection and dissemination programs. The focus continued to be the pinpointing of accident precursors—such as inappropriate pilot responses to engine problems, or loss of control caused by unusual maneuvers.

Part of the industry's motivation was self-preservation. A lone jumbo jet crash with mass fatalities, according to industry estimates, can amount to a financial hit of nearly \$1 billion, including insurance payouts, additional legal liabilities, lost business and reputational damage.

In 2006, the data-driven method publicly demonstrated its value following the deadly crash of a Comair commuter plane trying to take off from the wrong runway at Lexington, Ky. The FAA scrubbed various databases to evaluate the extent of comparable hazards elsewhere. After analyzing years of pilot reports of similar runway confusion at other fields, the agency ordered improved signs, better tarmac markings and extra pilot warnings to prevent crews from inadvertently lining up for departure on an incorrect or dangerously short strip.

As the number of accidents dwindled, however, each one sparked more public scrutiny. In February 2009, distracted and inadequately trained pilots of a Colgan Air turboprop failed to recover from a stall approaching the Buffalo, N.Y., airport. The otherwise perfectly functioning aircraft plunged to the ground, killing 50 people.





Federal investigators examine an engine after its fan blade fractured in flight on a Southwest Airlines plane in 2018, causing the only passenger fatality aboard a U.S. airline in the past 12 years.

PHOTO: NTSB/ASSOCIATED PRESS

That was the last deadly U.S. accident until April 2018, when a fan blade on a Southwest Airlines Co. jet ruptured at 32,000 feet. The engine's front cover was blown off and shrapnel punctured the fuselage; the plane landed safely but a passenger seated by a window sustained fatal injuries. There have been no fatalities on U.S. carriers since then.

Both accidents, nine years apart, prompted intense publicity, congressional criticism and a flurry of regulatory action. But throughout the period, a second industry-government safety push was intensifying. Safety experts further expanded data sharing by combining detailed written reports from pilots with radar information from air-traffic control and other data. This entailed analyzing information from tens of millions of flights and many more radar tracks, spanning multiple years.

As this follow-up initiative launched, “there was a high degree of skepticism that it would ever succeed,” says Hassan Shahidi, president and chief executive of the Flight Safety Foundation, a global, nonprofit advocacy group. He was previously at Mitre Corp., which oversees the storehouse of voluntary safety information submitted by airlines and their employees. The common refrain from both industry and labor, Mr. Shahidi recalled, was “we will give you 24 months.” By then, “we need to have a few examples of actually identifying and mitigating risks.”



Soon enough, the stepped-up data analysis prompted changes to questionable flight paths that sometimes brought jetliners dangerously close to hilltops on approaches to Oakland, Calif. The result was new approach procedures and more accurate topographical data loaded into the collision-warning systems on planes.

---

MORE SATURDAY ESSAYS

---

[The False Promise of Quick-Fix Psychology](#) April 9, 2021

[Recovering the Strangeness of Easter](#) April 2, 2021

[Herd Immunity Won't Save Us—but We Can Still Beat Covid-19](#) March 26, 2021

[Why Stephen Sondheim Is America's Greatest Living Writer](#) March 12, 2021

---

All told, the FAA has established a total of 10 separate, voluntary reporting or data-sharing programs, covering everyone from airport workers to FAA engineers to technicians who maintain the agency's traffic-control equipment. Voluntary changes adopted in the U.S. include, among other things, more extensive pilot training to understand warning signs when flight-control computers are set improperly or when airplanes are

approaching an incorrect runway, how to adjust engine settings to prevent internal ice buildup and using cockpit radars more effectively to avoid turbulence in clear weather. Over the years, airlines also have refined data systems to help spot troublesome engine reliability trends earlier and alleviate hazards posed by pilot fatigue.

From Europe to Asia to Latin America, Mr. Shahidi said “everybody is now trying to copy the U.S.”

Recently, however, some red flags have appeared. Airlines and independent safety experts have warned that the manual flying skills of many pilots are eroding, primarily because most crews rely on autopilots for all but a few minutes of each trip. Experts believe that overreliance on autopilots can reduce the hand-eye coordination of pilots and their confidence in the unlikely event that automated systems go haywire.

For all its usefulness, data sharing remains vulnerable to abuse. Last year, the Transportation Department’s inspector general sharply criticized Southwest Airlines management for impeding FAA oversight. Management and agency lapses resulted in Southwest carrying roughly 17 million passengers on more than 150 jets with suspect maintenance records, the auditors found. The same report disclosed repeated hazardous landing attempts by a Southwest jet amid gale-force winds that ended with both wingtips striking a Connecticut runway in 2019. FAA investigators complained about the airline’s level of cooperation. A Southwest spokeswoman said the carrier maintains a culture of compliance and transparency with the FAA, including mechanisms to report concerns without fear of repercussions, “recognizing the safety of our operation as the most important thing we do.”



FAA chief Steve Dickson being quizzed during his May 2019 confirmation hearings about the Boeing 737 MAX airplane.

PHOTO: STEFANI REYNOLDS/BLOOMBERG NEWS

Other carriers have sought to keep FAA officials from fully participating in data exchanges or probes of potentially dangerous operational slip-ups. Outside safety experts contend that excluding regulators violates the spirit of voluntary reporting and could result in creeping industry complacency.

Despite the sterling record of U.S. airlines, FAA chief Steve Dickson has stressed the need to expand voluntary reporting to include the design and manufacture of jetliners in order to shore up public confidence in the wake of the 737 MAX tragedies. “I don’t think that you ever stop trying to earn the trust of the public,” he told reporters in September after personally test-flying the revamped MAX.

“No matter what we have done in the past, or what we are doing now,” he said “that’s never going to be good enough.”

*Mr. Pasztor, who is writing a book about the history of air safety, recently retired from The Wall Street Journal, where he covered aviation since the mid-1990s.*

---

SHARE YOUR THOUGHTS

---

*Have you felt safer flying on U.S. airlines in recent years than in the past? Join the conversation below.*

---

*Appeared in the April 17, 2021, print edition as 'The Airline Safety Revolution The Airline Industry's Long Path to Safer Skies.'*

Copyright © 2021 Dow Jones & Company, Inc. All Rights Reserved

This copy is for your personal, non-commercial use only. To order presentation-ready copies for distribution to your colleagues, clients or customers visit <https://www.djreprints.com>.