

Cabin Safety Research Technical Group:
An Historical Overview and International Research Update

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The evolution of transport aviation has been relatively short-lived, with the first scheduled passenger service flight occurring exactly one hundred years ago this past June. The flight was conducted by GELAD, the German Airship Travel Corporation, using a rigid airship - the LZ 7 Zepelin. Their safety record was a bust from the start, as that Zepelin crashed a mere 9 days after its maiden voyage. The next year saw GELAD introduce the first, very brave flight attendant... and the rest, as they say, is aviation history.

We have been honored this afternoon with the presence and perspectives of dignitaries from FAA and Transport Canada, two of the national aviation Authorities responsible for molding a large part of transport aviation history. They have painted, with broad strokes, accomplishments and successes that suggest an even brighter transport aviation future. Their words ring with the reality of experience, the successfully-met challenges of continuously evolving technologies and operations and, especially, the understanding that people are the payload.

They have recalled important events from our time in aviation history, reaffirming the worldwide reach of modern aviation and the international collaboration necessary for successful global air travel. Perhaps most importantly, they have reinforced the unswerving dedication we must demonstrate in our quest for perpetually-improving aviation safety.

We have been reminded, for example, that the transport airplane accident rate had begun to flatten out around 1980, as new generations of technologies were increasing aircraft performance and reliability. Airplanes were flying faster, higher, farther, and carrying greater payloads than ever, bringing the promise of much improved air travel... and enhanced safety.

At that time we were encouraged and confident in the success of a burgeoning new aviation reality... and yet, in the proverbial blink of an eye, our community was faced in June 1983 with a fiery Air Canada DC-9 in Cincinnati, soon followed by the flaming British Airtours B-737 at Manchester in 1985. Glowing promise had become trepidation.

As result of those tragedies, occupant safety and accident survivability soon received unprecedented mobilization of resources by the impacted Authorities... namely FAA, Transport Canada, and UK CAA.

In what now may be seen as precursors to the CSRTG, joint Authorities technical working groups were formed to refocus on development of protective breathing equipment and cabin water spray systems for protection from fire, and parallel research programs were established to find ways to accelerate emergency aircraft evacuations, especially with regard to egress through

the Type-III exit. The B-737 crash at Kegworth, in January 1989, highlighted the additional need for expanded research efforts in crashworthiness.

Such research had enjoyed long historical precedent, but in those three brief, conceptually-connected moments of aviation safety history, all aspects of occupant protection had been challenged anew, with the effect being a robust re-energizing of R&D on fire resistant materials and protection systems, passenger smoke hoods, crashworthiness of airplanes and cabin interior furnishings, brace-for-impact positions, and procedures for emergency escape.

Sister regulatory committees were established in parallel to accept and administratively incorporate potential new developments in technology and technique. Most notable was the Aviation Rulemaking Advisory Committee – i.e., ARAC, which was formed in 1990, and which chartered a number of working groups devoted to evaluating and proposing formal changes to regulations, standards, policies, and guidance relevant to occupant protection. Many of you served on those groups, as all quarters of transport aviation were invited to participate. No voice was left unheard.

The regulatory framework in which we worked, and the relatively circumscribed nature of the Cabin Safety technical community, meant that many of us participated on multiple technical and regulatory working groups, which facilitated the coordination necessary to provide integrated solutions to our common problems. However, the breadth of activities, the quantity of scientific and technological information to be applied, and the number of potential administrative avenues to be satisfied, demanded an organizing principle. Harmonization soon became the word of the day.

Within that context, the idea of a collaborating Cabin Safety Research coordinating group was being discussed in the early 1990's by research and regulatory associates from the FAA, TCCA, UKCAA, and JAA, including its Cabin Safety Study Group. The vision was to form an international research mechanism dedicated specifically to solving the most pressing Cabin Safety problems of the day. Approval to move ahead with such a formulation was granted by the cooperating Authorities' management in 1994.

The initial approach was developed and published jointly by those Authorities under the title, "Proposed Cabin Safety Research Program (Transport Category Airplanes) in October, 1995. The plan was scoped to address in-flight and post-crash safety and survivability, focusing broadly, yet selectively, on crash dynamics, emergency evacuation, water survival, and fire safety. The plan was also task oriented to set boundaries and provide milestones for gauging progress. The framework for the plan was a benefits/risk analysis designed to assess the likelihood of significant improvements to occupant safety that could be expected to flow from successful application of specific research findings.

Many of you were there when the plan was unveiled at the International Conference on Cabin Safety Research held here in Atlantic City, the following month. Twenty-nine technical presentations were made to an audience of over 300, and breakout sessions were held for

attendees to discuss the Program plan and provide suggestions for future projects. Final publication and dissemination of the conference proceedings were completed in March 1996, which coincided with the formal invitation, issued by Anthony J. Broderick, FAA Associate Administrator for Regulation and Certification, to establish the Cabin Safety Research Technical Group under the international auspices of those Authorities that had guided its formation.

During the 15-year interim since its founding, the CSRTG has literally flourished, initially expanding its membership to include individual national aviation Authorities with strong Cabin Safety programs, housed under the JAA umbrella, and Japan. Civil aviation Authorities in Australia, Russia, Brazil, and Singapore have also become members... and we continue to define a working relationship with EASA.

Dozens of research projects have been conducted by, and on contract to, individual CSRTG members, and cost-sharing among core members has extended our reach and effectiveness. Many of the projects have been vetted through application of the benefits/risk analysis designed by CSRTG, using the accident database it has developed and continues to expand as an ongoing concern. Benefits/risk analyses have been conducted on research projects for 16g seats, hidden fire and burn-through protection, fuel tank and cargo hold fire suppression systems, and a recently-renewed evaluation of cabin water spray systems.

The ever-expanding accident database now contains individual, searchable records of varying detail on almost 4,000 transport airplane accidents that have occurred worldwide. It is currently being hosted in operational form on the RGW Cherry & Associates website; however, plans are in motion to make it available as a stand-alone tool, downloadable from the website, with links being established to make it an extended resource of the FAA database of Lessons Learned from the most disastrously-instructive accidents in transport aviation history.

Cabin Safety Research projects falling within CSRTG purview have been published as Authority technical reports and in the open literature, but as we can see by our attendance here today, the most public displays of our work have come at the five Triennial Aircraft Fire and Cabin Safety Research Conferences, at which an average of 115 Cabin Safety Research presentations has been addressed to a cumulative total of more than 2,000 attendees. As a measure of success, these Triennial Research Conferences stand as a unique tribute to the dedication of a small band of aviation safety professionals. In fact, there is nothing else like this in all of transport aviation.

This record of achievement is one of which CSRTG is justifiably proud. The quality and quantity of research endeavors has far exceeded early expectations, and the results of these efforts have been applied across the entire domain of Cabin Safety to operational advantage.

The CSRTG mission has always been to act collectively as problem solvers, working tactically to advance the state of occupant safety. Group members have operated collaboratively, yet democratically, without the need or desire for hierarchical research administration, preferring instead to focus, without unnecessary distraction, on the research problems at hand. The CSRTG has traveled to almost every member location, with the host member serving as the titular head

of the technical group for that particular occasion, building knowledge of individual and collective capability, as well as consensus regarding specific needs and potential solutions. That model has served Cabin Safety well.

Past reporting of CSRTG activities to joint Authority R&D upper management has brought recognition of the value in this model of research management, and repeated suggestions that other spheres of aviation research could emulate our process with comparable success. Such assessments would appear to bode well for Cabin Safety Research, especially under continued problem-solving orientations.

The reality, however, is that while the approach is productive and well-received, the current climate for Cabin Safety Research is changing dramatically, as the traditional support from Authorities across the international spectrum has been undergoing contraction, as well as redirection. The world economy and its effects on transport aviation have limited the resources being applied to Cabin Safety Research, and both national and international aviation Authority research management structures have been realigned or even eliminated.

Among the CSRTG core member Authorities, the JAA is no longer in existence, and the research programs of its individual national Authorities are no longer viable. The remaining core Authorities have to a large degree reorganized research planning and adopted more long-term, strategic approaches best suited to basic science research or creating new technologies. The tactical, problem-solving model employing traditional applied research methods has been supplanted to a large degree by application of risk management paradigms, using Safety Management System approaches. Regarding the efficacy of those approaches, only time and newly-unfolding history will tell.

Future challenges to occupant safety will likely be no less demanding than those of our storied past, as transport aviation has once again been showered with the fruits of technological innovation that challenge the status quo. Air travel has also been blessed most recently with that perpetually-improving safety record, augmented by our many significant research achievements to date, and we all bask once again in that promising glow.

The message being shouted loudly, by such glorious occupant safety outcomes as those in the 2005 Air France A-340 crash in Toronto, the 2008 Continental B-737 crash in Denver, and the US Airways A-320 water landing on the Hudson, is that we've come along way baby... and we have... but we must continue to listen and respond to the whispers of the many more deadly events that continue to show us the way.

In many ways we stand at the edge of a universe parallel to that we experienced in 1980, facing our tomorrows with the same sanguine confidence born of invention, technological innovation, and belief in an inevitable destiny handed us by a hundred years of transport aviation. But yes, new challenges always come, and when they do, we problem solvers must stand ready.