

The Challenge of Emergency and Abnormal Situations in Aviation

Panel: Key Dismukes
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Referring to FedEx flight 1406, why didn't the passengers sitting in the back use fire bottles to fight the fire?

BB: The crew brought them into the cockpit. Once in the cockpit, they didn't think it was safe to return to the cabin.

Delta is interested in smoke / fumes checklists. We are wondering if we should combine smoke / fumes removal checklist with smoke / fumes identification, prioritizing identification versus removal of smoke and fumes? How much information is put into checklists versus tasking?

IB: All those different pieces work together. For example, how do we integrate this checklist with everything that is happening? When do we go back to different items? We want to be consistent with checklists, aircraft, crew positions (i.e., going from first officer to captain). Information - what do we present? So many displays: weather, radar, TCAS – too much information. There's a difference between data and information. For example, let's put in a new warning light. This is not always good. How do we present information? We are reaching information overload. What information (not data) to present and how to display it.

We don't get the opportunity to practice. However, flight crews can practice on long flights. Pick up the QRH and simulate an emergency. Whenever crews practice with different scenarios, they always learn something new. For example, what are you going to do when you have an engine failure? The crew starts spewing out the checklist. But, my question is what are you *really* going to do?

Is one goal of yours to standardize checklists in the industry? How about standardized language between the manufacturers? Do you think it's possible?

IB: Pilots are all the same, but we have different aircraft. Things need to be considered in respect to the cognitive capabilities of pilots as a whole. An example is, "Is it good to have memory items?" (IB refers to FedEx flight 1406 because the pilots were overloaded and they had difficulty getting through the memory items). The manufacturers give optimal checklists for optimal scenarios. From us (referring to NASA Ames Research Center), we hope to at the end of this study say, "Here is what we feel is a good way to do a checklist."

It seems like the airline industry has spent a lot of money on simulators. However, training is not conducted in real time. The FAA limits this by all its requirements. Very rarely can we conduct an emergency procedure in real time. Regulators are missing an opportunity to increase the proficiency of emergencies by doing them in real time.

IB: (Refers to outflow valve situation on FedEx flight 1406, the FE didn't open the outflow valve all the way. He didn't know that the switch needed to be manipulated 16 times instead of a couple of times- that is the way he practiced in the simulator). In the simulator, we have the emergency, we do the checklist, and we go on. But, in real life, after the emergency, the flight is not a normal flight. Usually you hear the instructor say, "Okay, let me reset that". We are becoming conditioned to continue normally after an emergency.

There is no regulatory rule that a flight simulator session needs to be done in 2 hours. The FAA doesn't require that.

Should we "dummy down" the checklists, i.e., lessen the memory items and be more familiar with the QRH?

BB: Memory items appear to be the most difficult to accomplish.

If training requirements are going down, and training is reduced, has anybody noticed more errors? Is anyone studying this?

IB: The current accident rate is not significantly different from zero accidents, in addition to this fact, the specific factors that effect accident rate are difficult to study. For example, we haven't taken a look to understand the crew function of the flight engineer when the industry went from a three to two person crew. We don't really know how this affected accident rates, and therefore cannot judge what the best balance between economic pressure and a two-person crew is regarding error and accident rates.

Can we measure the "what if" if we didn't make improvements? Is there a methodology to answer questions about "what if" we didn't make improvements?

IB: We have ASRS reports to help us look at problems. We can ask, "Are we seeing fewer incidents of this emergency?" The taxi scenario is neglected in the number of reports made. In our observational experience, there should probably be more since it's a two dimensional phase with issues involved like time pressure, leaving the gate, and take off time, then the pilot has to transition to a three dimensional phase.

People focus on checklists. Are you aware of any work on "non-repeatable" events. For example, an emergency situation that the checklist does not cover: how do you discipline the pilots to deal with a situation that has no checklist?

IB: This brings up the issue of global cognitive training, in that what kind of guidance can we give when there is no checklist? "Pilot discipline" may not be the correct term as very rarely pilots are not disciplined. These are highly trained people. However, they still have cognitive problems and limitations.

(Speaker refers to Swissair and Alaska accidents) Swissair and Alaska followed the checklist, but at what point do you drop the checklist? How do you train the people to think that way?

KD: It's a trade off, there's a middle ground.