

Small Details - Big Difference

Can Resilience Development change the future of aviation?

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In recent years, a new ghost emerged within the aviation industry. Training Managers and Operational Directors were whispering the name: resilience engineering. Was this the breakthrough we were so long waiting for? Was this the milestone to bring aviation safety to a new level?

Very often in aviation, the charm of scientific novelty is huge, however, the problem is to convey this new way of thinking to the front line practitioners, the pilots. Without the support and commitment of the pilot community, every effort, no matter how noble, would be fruitless. The scientific vanguard makes the first step but then it has to be transposed to the real world.

New Science and Old Aviation

“Nothing is more practical than a good theory.” Kurt Lewin

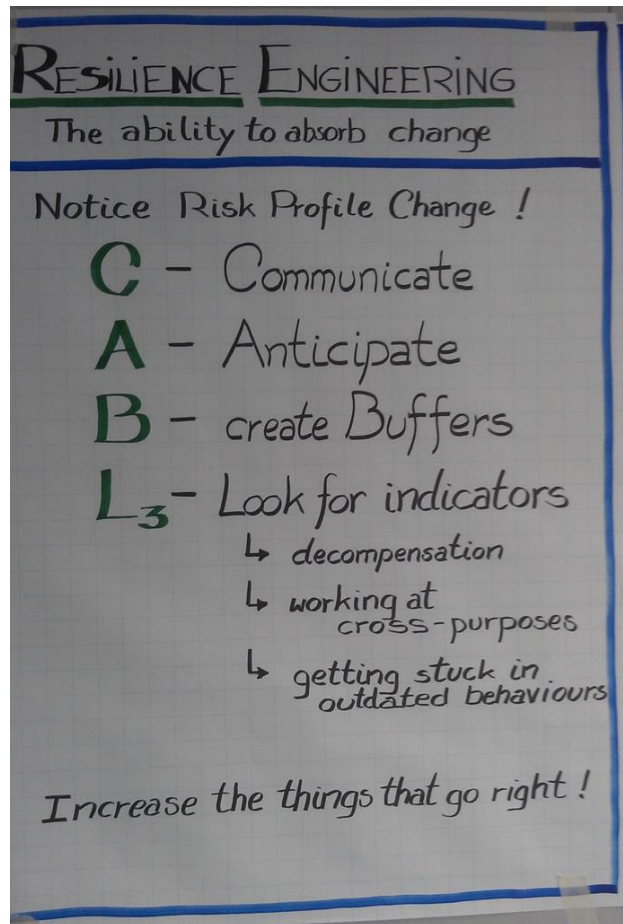
In 2013, the Luxair Human Factors Training Team decided to implement resilience engineering into their crew resource management training programs. After long discussions we came to the conclusion that the topic is too important to integrate it as a one shot event. We believed more time was needed. Therefore it was decided to follow a three step process, which would run over several years.

It had to start with theory. “Resilience engineering in Practice” by E. Hollnagel, J. Pariès, D. Woods et al (2011), is the figurehead of resilience development. It is the reference for this new theory and surely has the potential to change the aviation world. However, it will be quite challenging for front line practitioners in aviation or in any other high risk environment to implement these principles into their everyday life. It has to be transposed into easy to use intuitive principles.

We designed a CRM course where we initially explained the new theory of resilience engineering with special focus on “noticing change in risk profile” and “mitigating threats”. For us it was important to link resilience to the notion of change, changes in the environment, changes in plan of action due to foreseen or unforeseen, expected or unexpected events. In order to achieve this, we took the definition of resilience: the ability of a system to adjust its functioning prior to, during, or following changes and disturbances, so that it can sustain required operations under both expected and unexpected conditions, and segregated this definition into small chunks of information which we succeeded to convey more easily. We always tried to combine the new ideas with visual stimuli but also with examples from both the aviation and the everyday world. We used for instance memory metal frame eyeglasses to illustrate the ability to withstand external forces; let’s call it stress, and still guarantee basic operation. We related this to the pilot job. Pilots in the cockpit accommodate change and absorb disturbances without crumbling, without breaking down, without catastrophic failure as Professor Dekker says (resilience-engineering-association.org/resources/videos).

This action of resisting to external pressure, providing basic operation as long as the event persists and then returning to normal operation and integrating the change, is called resilience.

After intensive discussions within the CRM team in Luxair, we opted to create a tool - an acronym - to achieve this goal.



The Luxair Human Factors Training Team was convinced that the theoretical information must be strengthened with practical examples in order to create understanding and acceptance within our pilot community. Well knowing that this was only a first step, we chose the methodology of a case study to convey the information. We used the Air India Express flight 812 accident at Mangalore airport to show resilience engineering principles and how applied resilience principles could have changed the outcome of the situation (Report on accident to Air India Express Boeing 737-800 aircraft VT-AXV on May 22nd 2010 at Mangalore; Government of India; Ministry of Civil Aviation).

To allow the community of the aeronautical society to have a closer look at the course design (powerpoint and instructor guidance), the full content is available at resilience-engineering-association.org

Designed as a full day CRM course, the feedback of our participants was very positive. Initially pilots were vigilant about resilience engineering but as time passed, motivation was slowly vanishing. To mitigate this effect, we linked resilience to other CRM elements – e.g. situation awareness, leadership, decision making during following yearly recurrent courses. Furthermore we integrated resilience into our booklet: Luxair pilots' competencies framework. Here we highlighted behaviour markers which support resilience principles.

Nevertheless we were aware that a second step was necessary to strengthen the process.

Flying forward or flying backwards

“If you want truly to understand something, try to change it.” Kurt Lewin

In 2016, the Luxair Human Factors Training Team decided to develop resilience further. Again we opted for a case study to be treated extensively. We chose the Air Méditerranée accident at Lyon Saint-Exupéry airport in France (Report on accident on March 29th 2013 at Lyon Saint-Exupéry Airport to Airbus A321 registered SX-BHS; Bureau d’enquêtes et d’analyses pour la sécurité de l’aviation civile).

The final report of the French Authorities, as all reports, is progressing back in time, starting at the moment of standstill of the aircraft and then progressing backwards until discovering a safety barrier which collapsed. The crew of Air Méditerranée flight 7817, as most of us, was flying forward. They did not know that some safety barrier would not withstand the generated pressure. And this knowledge provides new insight into the accident. In the case study, we were able to identify numerous details which were precursors of a non-desirable situation. For the crew, however, these precursors were only visible as changes. Resilience is helping to catch these changes, increase awareness of the snake in the grass, thus improving safety at a very different level.

Do the right thing

“The only source of knowledge is experience.” Albert Einstein

The third step of our process will be the integration of resilience into LOFT, line oriented flight training in simulator sessions. It is important to generate appropriate situations, which will adequately deal with the notion of change to allow the pilots to recognize and mitigate threats.

Aviation has changed over all these years. It is no longer huge defects which become apparent like flying into a thunderstorm or the loss of all engines due to fuel contamination, but it is the small details which matter. It is the small details which can make the difference between a safe flight and a disaster. It is also these small details which are so hard to detect if flying forward and not backwards. Resilience engineering, resilience development makes these details visible. Resilience engineering, resilience development will help to make our job safer and more efficient.

Today we are the first generation of pilots to integrate the principles of resilience engineering into our behaviour. For us it is not natural and automatic. The development of resilience comes along with new effort and vigilance. For our children, the next generation of pilots, however, it will be all natural. Our effort will increase air safety now and for the future.

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