

# Barriers to Regulating Resilience: Example of Pilots' Crew Resource Management Training

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**Abstract.** Regulation in high risk industry is not considered as a characteristic for resilience. This article identifies issues surrounding the introduction of a new regulation in an ultra safe system that is designed to build more resilience into the system. The development and implementation of Pilots' Crew Resource Management regulation within the French Civil Aviation Authority is reviewed. Interviews and questionnaires form the basis for the analysis of the intent and practices of those in charge of high level decisions, those having the knowledge of human factors discipline, and those whose job it is to implement this regulation. However the gap between the regulation as imagined, and the regulation as implemented, illustrates the resistance of the system towards this approach to regulation and the potential drifts. The article presents the findings as characteristics of the regulatory process concerning the introduction of resilience. The lack of internal expertise and lack of implementation monitoring explain the present shortcomings of regulatory authorities and ultimately questions the role of regulation regarding the engineering of resilience. At a time when high profile regulations are enacted that aim for adaptive solutions in aviation, the presented retrospective offers insights into present and future issues.

## 1 RESEARCH CONTEXT

The resilience concept is discussed for high risk activities like medicine, aviation, or power production (Woods, Hollnagel & Leveson, 2006). However it is also informative to look at how those systems are regulated since they cannot thrive and reach a very high safety level without the constraints of regulation by national or international agencies (Amalberti, 2001). The safer the system, the less resilient it becomes because of the rigidity of the normative strategy. The central question of this article is to evaluate the potential of regulation to be used as a tool to introduce more resilience. The introduction of pilots' CRM training regulation by French Civil Aviation Authority (DGAC) is used to illustrate some barriers to building resilience via a regulatory process.

The onset of this research stems from formal and informal feedback received concerning Crew Resource Management (CRM) training of poor quality being delivered. The research question states as a formal hypothesis that CRM training is stabilizing the training at a low quality level, which is satisfactory for all interested parties (Deharvengt, 2007). Different viewpoints of individuals involved in the regulatory process are examined, both from an historical perspective and at the relevant levels of DGAC hierarchy. The initial intentions of those in charge of regulating CRM at the early stages are examined: on one hand the successive heads of the Direction du Contrôle de la Sécurité (Safety Oversight Authority) in charge of decision making in the rulemaking process

are interviewed, and on the other hand a human factors perspective is sought from the only people that actually possessed high level knowledge of the discipline within DGAC during the 90s. Consideration is then given to the implementation conditions from the perspective of the inspectors in charge of monitoring the airlines' Air Operator Certificate. Comparative research is conducted in parallel to investigate the airline industry and their perception of CRM delivery (Pariès & Mourey, 2006).

## **2 RESILIENCE THROUGH CRM REGULATION: LESSONS LEARNED**

### **2.1 A Promising Regulatory Initiative**

In the 90s, French civil aviation was under great stress. The context is that of an economical downturn for airlines as well as fear of increased competition European wide with the implementation of a European license (JAR FCL, Flight Crew Licensing) and common airlines' operating rules (JAR OPS1). The implementation of ICAO requirements for human factors threatened the validity of French pilots' licenses. Concurrently, the advent of glass cockpit and its early dramatic accidents (e.g. crash of A320 at the Mont St Odile in early 1992) brought into question the transforming role of the pilots in the cockpit.

International networking between leading human factor experts and the exchange of ideas enabled the importation of the CRM concept into Europe, as well as its subsequent adaptation to answer the airlines' needs of the day. Those experts offered a particularly welcome solution to the pressing issues that were confronting the DGAC management and industry (airlines and unions) (Pariès, Amalberti, 2000). Together they formulated the outlines of the CRM regulation as a human factors' response to airlines' safety needs and local issues. This regulation is therefore original in the sense that it does not set rigid requirements, but tries to provide flexibility or adaptive capacities for airlines to train their crews.

### **2.2 A Poor Lonesome Regulation**

For DGAC management this new training methodology is useful in the sense that, contrary to normal "individual" pilot training, CRM offers the pilots an opportunity to interact inside a group of professionals and discuss operational issues. The rationale is that this interaction leads to a positive change in operational behavior. Achieving this change and controlling it is perceived as particularly suited for monitoring airlines. CRM training is considered to be a tool to control individual behaviors acts, and as a leverage to control the behavior of the airline, hence improving visibility of the safety of the airline. This logic coincides with the changing way that the authorities monitor the activity of the airline, from a former field approach towards requiring, certifying, and monitoring airlines' organizational systems. This has resulted in a gain in resources and efforts. The first finding is that regulation that tries to regulate resilience corre-

sponds to the present regulatory approach as understood by the management of regulators by addressing the system's characteristics.

The final CRM regulation was officially enacted in 1997, but already in effect since 1993. The regional offices were initially supported by a few DGAC human factor experts. However, in a context of European harmonization, the incorporation of JAR OPS 1 into the French regulation scaled down the CRM requirements in form and substance in 1999. The amendment corresponding to the full French CRM regulation was expected to close the bridge of transition. It is not until 2001 that this amendment was approved in Europe, but the situation in France remained unchanged due to the absence of updating of the national regulation until July 2006. CRM was no longer important for DGAC in early 2000 and the regulatory process did not bridge the gap until very recently. Additionally an analysis of US NTSB (National Transportation Safety Board) and French BEA (Bureau d'Enquêtes et d'Analyses) recommendations over a recent period of 10 years shows that focus on CRM related issues is negligible. A second finding is that political pressure is required to initiate the critical momentum for the success of a regulation of resilient nature, but that even with momentum the success is very short lived.

### **2.3 And a Long Way from Implementation**

The initial intent of DGAC management when introducing the CRM regulation was to introduce a new organizational surveillance tool into the arsenal of the airline inspectors. The inspectors themselves often relate CRM training to experience feedback and flight operations safety analysis. However, the report from the field is very different.

Even though the inspectors have knowledge and appreciation of the CRM training and content, the evidence shows that they devote very little time on this topic during their surveillance of the airlines. Half of the inspectors queried recognized that they themselves have a lack of knowledge about what CRM training is and about how to evaluate a CRM program. As a consequence, their surveillance is limited to acknowledging the existence of a CRM program on paper. Feedback from other regulatory agencies around the world indicates a very similar trend worldwide regarding implementation of CRM. This also confirms the evolutionary trend of surveillance tasks towards more of a paperwork approval process and away from field interaction with the airlines. A third finding is the inadequate match between an adaptive regulation like CRM and the present regulatory oversight process.

The implementation of CRM regulation was never an opportunity to question its content (or lack thereof) nor the means to evaluate the airlines' training programs and trainers which validates the initial hypothesis that the state of CRM delivery was agreed by all interested parties. The rest of the hypothesis (stabilization towards a low quality level) is refined by the comparative research in the industry and postulates that CRM delivery has not transcended beyond the initial stages of concepts to become a risk management tool for the airline: CRM remains on the roadside. The final finding is that a drift occurs with adaptive regulations: when confronted with a concept the end-users do not know

how to manage, regulators and industry fall back on implementing the rule to the letter, thus missing the positive adaptive benefits originally intended by the regulation.

## **2.4 Lessons for Regulating Resilience in Ultra-Safe Systems**

Implanting adaptive regulations in ultra-safe systems is difficult. After initial acceptance with enthusiastic interest, the implementation eventually produces poor results in the field, along with disinterest or misunderstanding on the part of regulators. Efforts are invested, but compliance to the regulation is achieved with minimal resources on both sides. It follows that the usefulness of the effort is considered as wasted (“CRM has lost it”) since low quality products are approved. The positive benefits for the pilots and for the overall system safety are never realized, and other alternatives are sought.

The last two barriers on the road towards ultra-safe systems (Amalberti, 2003) may, in actuality, be “risks” of regulatory activity. One is the one-sided optimization of the rulemaking strategy at the management level (“we are protected because we have the word CRM in the regulation”) that does not make sense at operational level because the oversight that field inspectors perform is different from the oversight required for an adaptive system. The inspectors typically do not have any knowledgeable subject matter expert to consult when they have questions. Additionally, they receive typically very little CRM expertise or training beyond perhaps attending a CRM course. Their risk is increased and they protect themselves by defaulting simply to strict compliance to the CRM regulation.

The second barrier is the loss of visibility of the risk in the regulatory process: the CRM regulation continues till the end without any questioning of its value since no one understands the mechanism (“we don’t know how or why, but it must be useful somehow so we keep it”). The lack of internal feedback and drifts in manners of implementation of regulations is also demonstrated in research and experience in several other areas such as recreational aviation (Poirot-Delpech, Prévot, Raineau, 2006), helicopter first flight initiations (Soria, Hermann, Bestit, 2003) or internal DGAC working group for aerial work.

## **3 PRESENT PERSPECTIVE**

A number of regulations bearing a striking resemblance to CRM are being introduced: human factors cockpit certification rule, competency based training for multi crew pilot license (MPL) or Safety Management Systems. Whether they aim to analyze the coupling of man and machine, to train for competence rather than performance or to systematically identify risks in operations, each refer to an adaptive strategy, but also assumes an important knowledge in the area of human and organizational factors, and they are all largely under specified. The study on CRM shows that the rulemaking authority has a clear influence on the development of such strategies.

However, authorities presently bear a lot of pressure: cost and workforce reductions, litigation cases, justification of their activities, pressure from industry, and extensive reorganization in Europe with the creation of the European Aviation Safety Agency. In this context, strict application of regulations is often the result with a consecutive loss of flexibility, unrecognized drifts at the local level, or “tick in the box” syndrome. In a high risk industry adaptive regulations often translate into rigidity for the system. Rather than questioning the relevance of regulating or not, a more challenging question is how the regulators attempts to engineer resilience into the system. This relates directly into why the industry may resist or misunderstand resilient strategies.

#### 4 CONCLUSION

Resilience needs expertise and flexible and learning organizations. This raises a fundamental issue: are regulatory authorities able to introduce and monitor resilient tools in the industry they regulate if they are not themselves attuned to resilience? The findings in this article should prompt authorities to question their strategy of expertise and monitoring of their practices when trying to engineer resilience through regulation.

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