

# Chapter 16

## Analysis, Critique, and Proposed Revision of Crew Resource Management for Cockpit Automation: The R-MPM and ERICA

**Ronald John Lofaro**

*Embry-Riddle Aeronautical University, USA*

### **ABSTRACT**

*It is well over 30 years since the first (then called) Cockpit Resource Management (CRM) training, now called crew resource management was introduced. It is a shibboleth, a sacred cow as it were, despite many issues, concerns, and changes over the years. Some 21 years ago, 1992, an Air Transport Association (ATA)/Federal Aviation Association (FAA)-Sponsored Workshop was convened in an attempt to deal with some specific CRM issues. Yet the issues and needs as articulated in that workshop, and some newer ones, remain. Thus, this chapter is 21 years overdue, leading to the questions: Why now and is it still relevant? As said, some needs, issues, and concerns remain. The relevancy is that both a critique of civil aviation CRM on many levels and a comparison with current USAF, USCG, and USN CRM are presented. The proposed skeletal template for the long-overdue revision of civil aviation CRM, the R-MPM is shown. Next, a new model for an intelligent cockpit automated decision aid/advisory system, Event Response Integrated Decision Advisories (ERICA), is shown. ERICA came about from 2009-2012 work in automated decision-making tools for the cockpit and the realization that the Revised Mission Performance Model (R-MPM) and ERICA were interrelated.*

DOI: 10.4018/978-1-5225-0196-1.ch016

## **FORWARD**

While this Chapter may seem specific to US civil and military operations and training, it is doubly generalizable. First, much of foreign pilot training is modeled on the US and many pilots flying for other flag carriers were trained in US. Secondly, what we will present has generic aspects and can be modified to fit planes and types of operations/missions not in the US military and/or US flag carriers milieu.

## **INTRODUCTION**

This section will give a brief overview of why and how this Chapter came to be written. First, came a request by IGI Global to take a recently published article, up-date and expand on it. The strictures were to rewrite 20% of text; do a full update of data and appropriate update of conclusions; and do an exploration of future research potential. These were, as they say, a walk in the park; a serendipity as many of these tasks had already been done. In point of fact, more than 20% of the article has been re-written and there has been added approximately 40% of new material and, future research needs have been delineated along with the consequent potential of such research. With that said, let us look at the sequence of writing the article and this Chapter. Much of what is written in this Introduction will be expanded on and explicated in the Chapter itself.

Civilian CRM, by the mid-1990's, had continually encountered such problems that the "Big 3" (Delta, American and United Airlines) US flag air carriers almost completely revamped and re-named their CRM programs; basically focusing on human factors (McKenna, J.T., 1996). These sea changes received little publicity; we shall later look at some reasons why. Currently, CRM is now mandated in one Federal Aviation Regulations (FAR) for aircrew training using an optional training methodology while all the US military services have developed their own CRM, initially modeled on the civilian paradigm but significantly changed over the years. These changes reflect an emphasis on the skills and abilities needed for performance and mission success. The FAA's CRM model had been little changed.

Since 1993, Captain Smith and the author have worked together on developing, publishing and presenting a paradigm for flightcrew risk identification/management for operational decision making (ODM), the arena is most needed in terms of crew training, evaluation, performance... safety. At this point in time, much of Kevin Smith and the author's work on risk identification and management in flight are both in print and have been the subject of international participant Workshops. However, the author had a particular interest in the identification of CRM issues and flaws; for example, the author would often explicate and discuss these issues with military Instructor Pilots (IPs) from all services, in aviation human factors and aviation psychology classes that he taught from 2004 through 2011. It became clear that it was incumbent on him to provide both a cogent critique of the CRM model and, provide the CRM overhaul, based on a new model; this became the revised mission performance model (R-MPM). The original MPM being a product of a 1992 ATA-FAA Workshop wherein an attempt to develop a systematic method to integrate and evaluate CRM's role in flight control and safety. This Chapter completes a full circle and returns to what is acknowledged should have been done, circa 1992/3. Finally, as will be presented, there is new work on automated decision advisories/cockpit displays, based on decision-making algorithms, for the flightcrew. This is where the future of aviation safety seems to reside.

28 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:  
[www.igi-global.com/chapter/analysis-critique-and-proposed-revision-of-crew-resource-management-for-cockpit-automation/155279](http://www.igi-global.com/chapter/analysis-critique-and-proposed-revision-of-crew-resource-management-for-cockpit-automation/155279)

## Related Content

---

### Augmented Reality as a Tool to Enhance the Experiential Value of Online Shopping: The Future of Fashion Retailing

Tuçe Ozansoy Çadrcand irin Gizem Köse (2016). *Handbook of Research on Global Fashion Management and Merchandising* (pp. 280-304).

[www.irma-international.org/chapter/augmented-reality-as-a-tool-to-enhance-the-experiential-value-of-online-shopping/151739](http://www.irma-international.org/chapter/augmented-reality-as-a-tool-to-enhance-the-experiential-value-of-online-shopping/151739)

### Modelling of Critical Factors for Improving Logistics Performance of India Using Interpretive Structural Modelling

Amrita Jhawarand S. K. Garg (2018). *International Journal of Applied Management Sciences and Engineering* (pp. 29-51).

[www.irma-international.org/article/modelling-of-critical-factors-for-improving-logistics-performance-of-india-using-interpretive-structural-modelling/196585](http://www.irma-international.org/article/modelling-of-critical-factors-for-improving-logistics-performance-of-india-using-interpretive-structural-modelling/196585)

### Metaverse Dynamics: Exploring Industry Impacts and Educational Frontiers

Nidhi Malik, Komal Jindal, Shikha Vermaand Siddhant Gupta (2024). *Educational Perspectives on Digital Technologies in Modeling and Management* (pp. 195-218).

[www.irma-international.org/chapter/metaverse-dynamics/336519](http://www.irma-international.org/chapter/metaverse-dynamics/336519)

### Hotel Management Models: Case Study at Estoril in Portugal

Felipa Lopes dos Reis, Helena Pimenteland Francisco Perestrello (2024). *Technological and Managerial Approaches to Fostering Sustainable Travel* (pp. 413-428).

[www.irma-international.org/chapter/hotel-management-models/355549](http://www.irma-international.org/chapter/hotel-management-models/355549)

### Modelling of Critical Factors for Improving Logistics Performance of India Using Interpretive Structural Modelling

Amrita Jhawarand S. K. Garg (2018). *International Journal of Applied Management Sciences and Engineering* (pp. 29-51).

[www.irma-international.org/article/modelling-of-critical-factors-for-improving-logistics-performance-of-india-using-interpretive-structural-modelling/196585](http://www.irma-international.org/article/modelling-of-critical-factors-for-improving-logistics-performance-of-india-using-interpretive-structural-modelling/196585)