A Temporal Markers Framework for Analyzing ATC Operational Errors

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A commonly held view is that system and human vulnerabilities can form links in a chain of events and result in an undesirable outcome. However, this truism has led to only limited success in the development of better techniques to analyze this progression. In this study the evolution of air traffic operational errors (OEs) was of particular interest. While it is generally accepted that OEs evolve over time, the temporal characteristics of OEs have received little attention. By better understanding these temporal characteristics, we will be better able to understand how vulnerabilities become links in a chain so that resources can be allocated effectively to develop mitigation strategies.

To better understand how vulnerabilities become links in a chain, two activities were conducted. The first study developed a temporal markers (TMs) definition and sequencing framework. The second study provided an initial assessment of the framework using a small sample of OEs which were readily available in a local archive. Initial results suggest that temporal profiling of OEs may be useful in uncovering trends that are not currently being systematically examined. However, further validation of the framework using a larger set of OEs is required to achieve the goal of developing information that can be routinely used to mitigate OE occurrence.

U.S. Air Force in European Airspace: Planning Future CNS/ATM Capabilities

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The U.S. Air Force (USAF) relies on Communication Navigation Surveillance / Air Traffic Management (CNS/ATM) equipment for capabilities that allow its aircraft to use civil airspace and interact with air traffic control services. The resulting ability to interoperate with air traffic control systems around the world is critical to support the USAF’s global, multifaceted mission, but entails large expenditures in equipment acquisition, integration, and training. It is important to understand the trade-offs that the USAF must make in assessing the value of specific CNS/ATM capabilities. In this paper, we describe a model-driven analysis to assess operational impacts related to CNS/ATM capability. The analysis accounts for planned USAF CNS/ATM capabilities by aircraft type vis-à-vis airspace regulations and operational restrictions that are expected to be encountered in specific geographic regions. Two layers of interactions are investigated: first, within the USAF enterprise: between the Combat Air Forces (CAF) assets and the Mobility Air Forces (MAF) assets and, second, between the USAF and civilian ATM. The content is unclassified. The model-based analysis framework can support enterprise decision processes. It provides a means for addressing specific issues as the CNS/ATM roadmap evolves. This framework can extend current models for the area of operations by providing added realism for what is now assumed to be unhindered aircraft availability.
Airspace Configuration Concepts for the Next Generation Air Transportation System

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Future airspace should adapt to changes in traffic demand, equipage, and weather. In order to achieve this capability, the future airspace configuration must be flexible, adaptable, and able to accommodate new airspace elements such as highways-in-the-sky and generic sectors. This paper presents mid-term and long-term concepts for airspace configuration. These concepts were developed based on literature reviews, field observations, discussions with subject matter experts, and research workshops. The mid-term airspace configuration concept includes high altitude airspace, where user-preferred routes will be predominant, and low altitude airspace which is divided into regions for super density metroplex areas as well as for conventionally structured low altitude airspace. The long-term airspace configuration includes four primary regions: airspace for automated separation assurance, high altitude flexible airspace, super density metroplex operations in low-altitude airspace, and structured low-altitude airspace. These preliminary concepts are being matured using simulations and benefits assessments.