Who is responsible?

Communication, coordination and collaboration in the future Air Traffic Management system

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Abstract

International civil aviation has experienced a steady growth in the past decades that is foreseen to continue. To overcome capacity limits of the old Air Traffic Control systems, new technology is currently being developed and introduced. While the current way of conducting air traffic has evolved in a continuous manner, the new technologies are part of a new paradigm that has the potential to completely reform aviation. Under this paradigm, it is envisaged that pilots may engage in surveillance tasks, which poses new demands on coordination between controllers and pilots.

This thesis describes basic properties of current and new technology and procedures within civil aviation and the relation to distribution of tasks and responsibilities between pilots and controllers. It is recognised that the current distribution is largely based on the development of technological tools. As new technology allows information in the aviation system to be shared to much greater extent than in the present operational environment, it implies that the basis for present task allocation between controllers and pilots may be challenged. For new technology to be viable, appropriate procedures must be developed to assure safety within the air traffic system.

To gain wide insight into current aviation, a multitude of data-collection methods have been applied including interviews, observations, and simulations. Interviews have been performed with controllers from several European countries. Observations have been performed in operational Air Traffic Control as well as operational flight. Observations have also been performed in simulations where some applications of the new technology have been investigated. Questionnaires were distributed to both pilots and controllers in a real-time simulation investigating Free Flight issues.

Results show that operational activity is characterised by a large degree of flexibility. In some applications of new technology, certain tools and procedures have been identified that have been regarded inflexible. It is emphasised that continued development should be performed in international cooperation and introduced into operation gradually to minimise shortfalls of training.

Keywords
Air Traffic Management, Aviation, CNS/ATM, Controller-Pilot Communication, Responsibility, Future Air Navigation System