

Modelling co-ordination effects in complex work systems: the aviation maintenance case

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Abstract

This paper presents a model of co-ordination analysis, which enables verification of co-ordination systems and their relative impact on the performance of complex work processes. The area of application covers the hangar maintenance operations in commercial aviation. The new co-ordination analysis, called Co-ordination Audit Methodology (CAM), is a process-oriented audit designed for the EU funded research project ADAMS 2. This new analytical model measures the performance and economical impact associated with faulty co-ordination systems, and suggests new design solutions based on quantitative data. Two different case studies will bring together the results obtained in two different European maintenance companies, which tested the methodology on the same type of work process.

The aircraft maintenance environment

Aircraft maintenance work is a highly organised activity. Mostly, it revolves around tightly scheduled check operations, though allowing for unplanned maintenance when required. These operations are carried out at different times (day or night), locations (hangar or apron) and by deployment of multiple resources (tools, equipments, materials and specialised teams of technicians). Their co-ordination is available through a network of processes and management structures that rely mainly on *interdependent* teams and supports (Patankar & Taylor, 2003; Taylor & Christensen, 1998).

As shown in Figure 1 the maintenance operation process in a hangar requires timed interactions between and across several departments and units. Obviously, all such interdependencies and processes have to be timely organised, managed and monitored over time to balance system performance, productivity and safety (ICAO, 1993, 1995; Hackman, 1990). Every box in Figure 1 represents different work teams distributed across different work processes and events. The central box called *Check Operations* contains all those teams performing the actual maintenance tasks on the aircraft. A typical example of their daily business follows:

“A work team is assigned to remove a component from the main landing gear during an afternoon shift. This task should be completed on time in order to move