Real-Time simulation
–When it works and when it doesn't

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Real-Time Simulation has been used extensively in Air Traffic Control and in Aviation. It is an extremely expensive technique, and is highly regarded by controllers. Three main types of Real-Time Simulation can be distinguished.

'Training' simulators and simulations have shown themselves effective in aircrew training, and in basic training in aviation and air traffic control, not only because they allow trainees to familiarise themselves with the 'nuts and bolts' of equipment, and to practice pre-defined routines and drills that rarely occur in reality, but because they can be used to speed the process of team formation.

'Operational' simulations, where experienced controllers take part, both as operators and evaluators, can play a useful role in the evaluation of proposed incremental changes to an existing system, or the introduction of a new device. They should not be expected to provide qualitative estimates of 'improved capacity' or 'safety'. They are, however, extremely valuable in demonstrating to sceptical controllers or aircrew, who will be responsible for the new system, that it is feasible.

'Research' simulations are rarely effective tools. Time and cost factors do not permit the formation of working teams, formal experimental designs can rarely be maintained, simulated equipment breaks down in ways real systems do not, traffic does not appear realistic, and uncontrolled or uncontrollable intervening variables abound.

Introduction

Air Traffic Control (ATC), the ground-based element of the global air traffic system, has derived most of its traditions and practices from aviation. In many countries, Civil ATC developed from military Air Defence systems and, even in some European countries, was an Air Force responsibility until relatively recently. Much ATC technology (primary radar, Secondary Surveillance Radar (SSR)) derived from military equipment. Selection and training equally copied military methods, including strong male (even 'macho') and authoritarian biases. In spite of some pioneering work, such as that of Bisseret and Enard (1970), much ATC training involves the learning of regulations and routines, supplemented by individual and group training simulations, and completed by slow, wasteful and dangerous 'on-the-