Safety, Efficiency, Capacity, and Security—New FAA Research Priorities

In 1982 the Federal Aviation Administration embarked on a sweeping program to modernize the air traffic control system. Known as the National Airspace System (NAS) plan, the program involved purchasing new computers and software to increase the capacity of the system and to automate certain monitoring and control functions. The NAS plan also called for new surveillance and weather radar, communications networks, and auxiliary equipment to detect wind shear, disseminate weather information, aid in flight planning, and assist in navigation and landing.

Background

Between 1982 and 1988, NAS plan objectives dominated the FAA research, engineering, and development budget, and research activity was devoted almost exclusively to engineering design, prototype development, testing, and equipment evaluation. By 1988, when the NAS plan entered procurement and equipment installation, FAA had restructured its RE&D program to address four broad systems concerns: safety, capacity, security, and efficiency.

To reflect this shift in emphasis, RE&D was concentrated within a single component of the agency and is headed by an executive director responsible for system engineering, execution of the NAS plan, research and development, management and control, operations research, and activities of the FAA Technical Center in Atlantic City, New Jersey.

The essential features of FAA's approach to RE&D are an orientation toward specific goals in conducting research and a top-down planning process to ensure consistency between objectives and the actual research. The latter concept will also be used to allocate resources in the context of total aviation system needs.

Current Trends

A number of forces currently at work in the evolving aviation system were responsible for the selection of safety, capacity, security, and efficiency as research priorities. The ability of the aviation community to continue to ensure these factors in air commerce is being challenged by rapidly changing economic and technical forces. Increasing demand for air travel places additional pressures on airports and the air traffic system to add capacity. This boom in air travel has also resulted in growing use of aircraft and concerns about an aging aircraft fleet.

Advanced technologies, including improved propulsion systems, avionics systems, structures, and materials, as well as aerodynamic designs, will require new certification and maintenance procedures and methodologies. Heightened awareness of the role of human performance in aviation safety has raised questions about the training and certification of air crews, air traffic controllers, and maintenance personnel. The need to protect passengers from terrorist acts calls for continued emphasis on the development of systems to detect explosives and weapons carried by passengers and in carry-on and checked baggage and cargo.

FAA Response

In direct response to these forces, the FAA is pursuing several major RE&D activities. In cooperation with the Industry Task Force on Airport Capacity, FAA will complete runway programs that will increase system capacity by permitting independent operations on converging and closely spaced parallel runways under instrument flight rules. Funding is being increased for automation of terminal airspace and airport
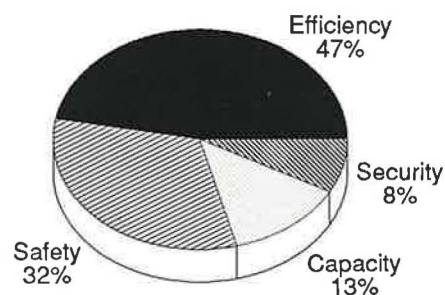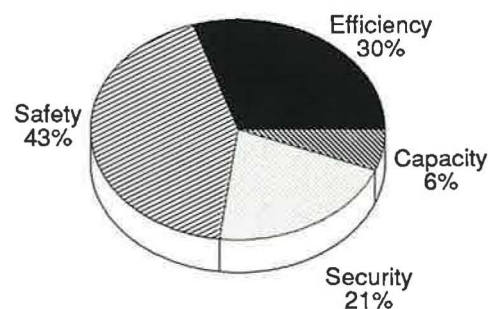

FIGURE 1 Distribution of RE&D resources.

surface traffic control, including computer-generated landing and departure sequencing, fuel-efficient descents, and final spacing aids. Work is under way on experimental use of cockpit traffic displays based on traffic alert and collision-avoidance systems information. Airport and airspace traffic modeling activities are being expanded, and site-specific capacity improvement plans are being developed by Airport Capacity Task Force Study teams. Emphasis continues to be placed on improved pavement development, lighting, marking, and runway exit location.

The Aloha Airlines incident, in which the fuselage of the aircraft tore away at 24,000 feet, focused national attention on the issue of aging aircraft. In response to this incident and the joint FAA/Industry Conference held in June 1988, FAA has begun a major program to resolve the problem of aging aircraft. Initial efforts are focusing on structural integrity and failure and fatigue mechanisms, new nondestructive inspection techniques, and human performance issues in aircraft inspection and maintenance.

FAA is also examining how people function in their jobs. In addition to the inspection and maintenance issue, research (in conjunction with the Air Transport Association) is directed at flight crew and air traffic controller performance with increased emphasis on the effects of automation on controller selection and training. A Human Factors Coordinating Committee has been set up to coordinate all FAA human factors research, the objectives of which will be to better understand the psychological factors associated with accidents and incidents and to develop corrective actions.

Shift in Resources

The new RE&D emphasis, the maturing of the NAS plan, and rapidly evolving issues in the air commerce system have resulted in changes in FAA RE&D resource allocations, as shown in Figure 1. In FY 1988 the RE&D budget was $153 million; in 1990 it will be $165 million. Figure 1 also shows the increasing allocation of resources to safety and capacity. This shift in resources reflects conclusions drawn from comments by members of the aviation community at the annual RE&D planning conference and from a number of studies by the Industry Task Force on Airport Capacity, the Air Transport Association, the Future Air Navigation Systems Committee, and the Office of Technology Assessment.