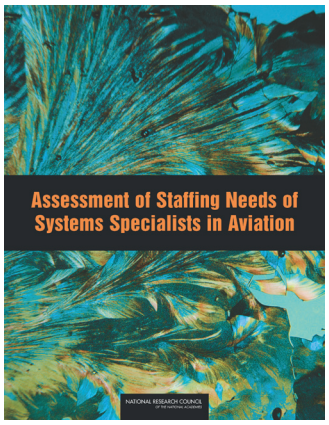
REPORT BRIEF • JULY 2013
BOARD ON HUMAN–SYSTEMS INTEGRATION

ASSESSMENT OF STAFFING NEEDS OF SYSTEMS SPECIALISTS IN AVIATION



The National Airspace System (NAS) is the integrated network of components owned and operated by the Federal Aviation Administration (FAA) necessary to manage the United States airspace effectively and safely. The maintenance and certification of the equipment in the NAS is the responsibility of the approximately 6,100 Airway Transportation System Specialists (ATSS) who work for the Technical Operations branch of the FAA Air Traffic Organization. ATSS personnel are employed at a variety of facilities throughout the United States and its territories, and all facilities need ATSS personnel trained in one or more technical disciplines to perform preventive and unscheduled maintenance on the equipment. This National Research Council (NRC) report examines the assumptions and methods used by the FAA to estimate staffing needs for ATSS personnel to ensure proper maintenance and certification of the NAS and identifies relevant factors and considerations necessary to create a model that will yield a staffing number by a reasoned, scientifically sound approach.

BACKGROUND AND INTRODUCTION

Technical Operations comprises ATSS workers at five different types of Air Traffic Control facilities which: (1) track aircraft once they travel beyond the terminal airspace and reach cruising altitude; (2) control air traffic as aircraft ascend from and descend to airports, generally covering a radius of about 40 miles around the primary airport; (3) provide service for the nation's busiest airports; (4) provide service for other facilities, including rural airports and equipment not based at any airport; and (5) facilities that coordinate maintenance work and monitor equipment for one of the Service Areas (Eastern, Central, Western) in the United States.

Each facility requires personnel in all five ATSS disciplines: (1) Communications, maintaining the systems that allow air traffic controllers and pilots to be in contact throughout the flight; (2) Surveillance and Radar, maintaining the systems that allow air traffic controllers to see the specific locations of all the aircraft in the airspace they are monitoring; (3) Automation, maintaining the systems that allow air traffic controllers to track each aircraft's current and future position, speed, and altitude; (4) Navigation, maintaining the systems that allow pilots to take off, maintain their course, approach, and land their aircraft; and (5) Environmental, maintaining the power, lighting, and heating/air conditioning systems at the ATC facilities. Because the NAS needs to be available and reliable all the time, each of the different equipment systems includes redundancy so an outage can be fixed without disrupting the NAS.

STAFFING FACTORS AND MODEL CRITERIA

At each facility, the ATSS execute both tasks that are scheduled and predictable (e.g., regular preventive maintenance, scheduled certification of equipment and facilities of the NAS, upgrading equipment) and tasks that are stochastic and unpredictable (e.g., detecting and responding to an outage). Staffing needs are fur-

ther complicated by the planned implementation of the Next Generation Air Transportation System which will continue to integrate new technology with current systems in the NAS. The committee identified nine factors related to staffing and human resources to include in the model: (1) the time required for both formal and on-the-job training, including completing certification and the increased workload on the ATSS personnel providing the on-the-job training; (2) the distance an ATSS must travel to some remote facilities and the time required to make the trip; (3) the challenges of maintaining equipment located near hazardous areas or during severe weather; (4) the time dedicated to serving in the military reserves or taking other forms of leave; (5) the need to minimize fatigue; (6) safety requirements that call for two or more workers in potentially dangerous situations; (7) problems with current time reporting systems that are deficient for estimating the time ATSS spend on daily tasks; (8) upcoming retirements; and (9) other time requirements like nontechnical training and administrative tasks.

CRITICAL STEPS IN THE MODELING PROCESS

In addition to identifying the factors to consider when building an accurate staffing model, the committee reviewed the three critical steps in the modeling process: (1) following a comprehensive study and design process that incorporates the major workload factors at an appropriate level of detail, links workload to the time required to complete the tasks, and completes the steps of a logical design process (feasibility, familiarization, measurement design, measurement, analysis and model selection, and implementation); (2) incorporating key model considerations, including choosing the right type of model that will utilize all relevant inputs and produce all required outputs; and (3) attending to quality factors, such as ensuring that the model is transparent, scalable, easy to use, relevant, and valid.

REVIEW OF EXISTING ATSS STAFFING MODELS

The committee used the above criteria to examine existing ATSS staffing models including the Windows Staffing Standards Analysis System (WSSAS) and the Tech Ops District Model. Although these models met some of the criteria, overall the committee found them lacking in some areas and recommended development of a new model using the steps and factors outlined in the report. The committee also reviewed recent efforts by FAA to examine its past modeling efforts and to assess its needs for future modeling. The FAA study team, facilitated by Grant Thornton, built on the deterministic WSSAS model and suggested improvements to the key data sources. Finally, the committee reviewed the steps necessary to successfully implement a new model, including estimating the time needed for each activity (e.g., development, testing, preparation, implementation, validation, and monitoring results), and considering the role of FAA staff, funding requirements, and other resources needed to determine the correct number of systems specialists.

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