

Task 3: Concurrent Validation of AT-SAT for Placement (Co-VATCH) (McCauley, Crutchfield)

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Project Start Date: October 2006

Anticipated End Date: December 2011

Requirements Statement
<p><i>Operational Shortfall or Knowledge Gap</i></p> <p>FAA places new controllers into options and facilities without assessing if they have the knowledge, skills, and abilities to certify at their assigned facility. Currently, FAA places newly hired controllers based only on where and when vacancies occur, and many of those vacancies occur at some of FAA's busiest and most complex facilities. The need to evaluate the effectiveness of the AT-SAT selection battery for placement by option and develop methods to match applicant skills with optimal placement is recognized at many levels within the Department of Transportation including the DOT Office of Inspector General and within FAA in Terminal Planning, Terminal Mission Support, ATO Administration, and Human Resources. Validation and calibration of the AT-SAT, specifically against tower controller performance, is needed to support an anticipated increase in the hiring of tower air traffic control specialists (ATCSs).</p>
<p><i>Benefit in Closing the Shortfall or Gap</i></p> <p>FAA needs to develop a process for identifying a new controller's potential to certify at a facility and use this information when determining where the new controller should be placed. This will increase the efficiency of placing candidates into jobs and reduce costs.</p>
<p><i>Description of the Desired Product</i></p> <p>A concurrent validation study will be conducted that documents the effectiveness of the AT-SAT selection battery for placement by option and recommends legally defensible methods to match applicant skills with optimal placement.</p>
<p><i>Schedule</i></p> <p>As soon as possible</p>

Research Objective

This research task will:

- 1) Update the 1989 CTA job/task analyses for ground, local, and clearance delivery/flight data tower control positions.
- 2) Develop and test tower controller job performance measures.
- 3) Conduct a concurrent, criterion-related validation study.
- 4) Analyze the predictor and criterion data and estimate the validity of AT-SAT as a tool for suggesting initial placement of new controllers into either en route, TRACON, or tower air traffic controller positions.
- 5) Analyze the predictor and criterion data and estimate the validity of AT-SAT as a tool for suggesting initial placement of new controllers by tower facility level.

Background

The FAA must replace controllers who attrite from the workforce through retirement. With increasing ATCS retirements, 12,500 new controllers will be needed over the next decade to maintain negotiated target workforce staffing levels and accommodate growth required to safely handle increased air traffic operations. To meet these hiring requirements, the FAA developed and implemented the Air Traffic Selection and Training (AT-SAT) test battery.

The evaluation, development, and validation of existing and future personnel selection procedures must comply with federal statutes, regulations, guidelines, executive guidance and interpretation, relevant case law, and accepted professional standards, principles, and practices. Therefore, to comply with this legal and professional framework, the agency must (a) evaluate current employee selection procedures for conformity with the Uniform Guidelines on Employee Selection Procedures (29 CFR 1607) and the Civil Rights Act of 1964, as amended (42 USC 2000 et seq.), (b) validate those procedures against relevant measures of job performance, (c) analyze existing jobs and likely future job and knowledge, skill, and ability (KSA) requirements, and (d) develop new or enhanced selection procedures for employees, managers, and supervisors in safety-critical occupations to support the operational evolution of the NAS.

The AT-SAT was developed and validated through extensive research. AT-SAT development and validation was carried out in several stages designed to comply with federal requirements. Computer Technology Associates, Inc. (CTA) performed job/task analyses for en route, TRACON, and tower control positions in the late 1980s and early 1990s that documented the tasks controllers performed on the job. The Separation and Control Hiring Assessment (SACHA) project, conducted in the mid-1990s, used information from the CTA job analyses to identify the general abilities needed to successfully carry out the tasks and developed predictor tests to tap the general abilities deemed most important. The final stages of AT-SAT development and validation involved the development of criterion performance measures linked to the en route controller job tasks and collection of both predictor scores and criterion performance measures from incumbent en route controllers. These data were compared and analyzed, and the information was used to identify the specific tests to include in AT-SAT and define their weightings. AT-SAT development and validation was completed in FY98 and the battery was operationally implemented in FY02 (June).

Although AT-SAT was validated for en route and terminal radar controllers, it had not been validated specifically for tower controllers. Therefore, questions remain about its use as a placement tool between the various controller options. The AT-SAT needs to be validated specifically for tower controllers. The validation method, in accordance with federal requirements, must be similar to the methodology used in the previous concurrent validation study. Furthermore, in light of changes to procedures and technologies used in the tower in the last 10 years, the validation methodology must begin with an update to the 1989 job/task analysis performed by CTA.

Previous Activity on this Task

Subtask 1 involved updating the existing CTA job/task analysis for tower control positions. American Institutes for Research (the selected contractor) performed observations of and interviews with controller subject matter experts to identify any new tower controller sub-activities or tasks that need to be added to the job/task analysis conducted by Computer Technology Associates Inc. in 1989. These observations and interviews were conducted with controllers at both busy (ATC grade 10 and above) and less busy tower facilities (ATC grade 7 and below) located throughout the United States. Facilities were chosen to represent as wide a variety of different operation types as possible. The newly identified tasks and sub-activities were merged with those from the 1989 job/task analysis and organized to complete an updated job/task analysis.

Subtask 2 involves developing job performance measures. As the first part of this subtask, PDRI used the updated job/task analysis and worked with tower control instructor subject matter experts at the FAA Academy to develop 51 appropriate performance measurement scenarios and 173 question items for use in the collection of criterion data.

Delays in getting the necessary access to subject matter experts and performance measure programming resources negatively impacted the completion date of all of subtask 2 and its associated performance measurement deliverables. New dates are provided in the tables below.

Proposed or Planned Research

Four phases must be completed to refine the AT-SAT tool for selection of tower controllers. These are: 1) update existing information regarding the activities and sub-activities of the tower cab ATCS; 2) develop criterion performance measures associated with the sub-activities; 3) collect both predictor AT-SAT scores and criterion performance data from incumbent tower ATCSs; and 4) compare and analyze the predictor scores and performance data to determine which AT-SAT subtests are relevant to tower cab controller performance and how they should be weighted.

Research Question(s)

1. How have the sub-activities that a tower controller performs changed in response to new procedures and technologies?
2. What are appropriate measurable job performance criteria for controllers in tower cab positions?
3. Can some combination of AT-SAT subtest scores be used to make valid placement decisions for applicants to tower controller positions by facility level or option?

Technical Approach

Current Year

Phase 2 will be completed in FY10. Multiple choice question items and answers, developed in FY08 as the first part of Subtask 2, will be evaluated and ranked by small groups of both tower supervisors and tower controllers from the NATCA bargaining unit. Software will be developed that will present the performance measure such that it can be taken out into the field where it will be pilot tested. The steps up to and including the pilot testing of the performance measure will require access to a total of 54 ATC field tower subject matter experts, including controllers who are part of the NATCA bargaining unit.

Work on Subtask 3 will begin in FY10. Subtask 3 involves the collection of predictor AT-SAT scores and criterion job performance measurement data from incumbent tower controllers. Each controller will spend up to a day and a half completing the AT-SAT test and the performance measure. The current estimate for the number of incumbent controllers needed for the concurrent validation study is 500. One hundred additional controllers were added to the estimate to allow for the analysis of placement by tower facility level. A more precise estimate will be possible after data from the pilot study are collected and the sponsors finalize options.

Data collection for Subtask 3 will be performed at 25 terminal hubs where groups of smaller towers are located in the same vicinity as a larger tower. The data collection will be conducted by employees of AIR or an AIR sub-contractor.

There are several tasks remaining for Subtask 3. Each must be dealt with before the project can continue successfully. While sponsor commitment is evident and NATCA involvement has been initiated, there remain critical issues as to the scheduling of large numbers of controllers and the timing of the data collection to impact normal operations as little as possible.

After the job performance measure of phase 2 has been rated and pilot tested, it will be presented to NATCA for endorsement. Since NATCA participation was provided in the rating and pilot testing activities, this process should be greatly facilitated.

Out-Years

Subtask 3 will be completed in FY11 with the delivery of the data collected from the field facilities.

Subtask 4 involves performing analyses to define rules for using AT-SAT scores to place candidate applicants in tower control positions. Analyses will be performed jointly by FAA, AIR, and PDRI personnel. Final determination of AT-SAT subtest weights will be performed by FAA only.

Air Traffic Resources Required

Twelve NATCA selected controllers will rate the answers and suggest improvements for the final version of the performance measures in order to complete the programming of the display software. A pilot test will also be conducted with 35 non-supervisor CPCs in order to finalize the performance measure for use in the field.

The research will require approximately 500 incumbent tower controllers to provide job performance measures and AT-SAT scores (for research purposes only). Therefore, formal coordination with employee bargaining units will be required. The research will be conducted in accordance with the Department of Health and Human Services *Federal Policy for the Protection of Human Subjects* (45 CFR 46) and the American Psychological Association *Ethical Principles of Psychologists* and *Code of Conduct*.

This project is at risk due to the large number of tower controllers needed to participate in the concurrent validation study, the length of time it will take them to participate, and the funding required to complete data collection involving 500 field controllers. Close coordination with NATCA representatives through Terminal Mission Support will continue to move the project forward.

Calibration

Not Applicable

FY10 Milestone Schedule		
Description	Proposed Start Date	Proposed Completion Date
Performance Measure Software Delivery	January 2010	January 2010
Perform pilot study on job performance measures and begin collection of criterion performance measures and AT-SAT scores from incumbent tower control specialists	April 2010	June 2010
Schedule Site visits for data collection	March 1010	March 2010
First Round of site visits, initial five facilities scheduled. Additional time added for seasonal scheduling requirements	May 2010	Sept. 2010
Second Round of Site Visits, second five facilities. Additional time added for seasonal scheduling requirement.	Oct. 2010	Feb. 2011
Third Round of Site Visits	March 2011	July 2011

FY10 Deliverables		
Description	Proposed completion date	Actual completion date
Hardware and/or software developed for use in the collection of performance measurement data. Continues	Jan. 2010 (current estimated completion	

to be delayed from 4th quarter FY07 both to obtain resources needed to evaluate the performance measure, rank question answers, and code scenarios into simulator.	date May 2010)	
Formal technical report describing the development of tower controller performance measures, documented links between the measures and tower controller job/task sub-activities, and the methodology for collecting the performance measures. Linked to above deliverable and, thus, is also delayed.	Jan. 2010 (current estimated completion date Sept. 2010)	
Raw criterion job performance measures and AT-SAT scores collected from incumbent tower control specialists. Delayed from March 2008.	Feb 2011 (current estimated completion date July 2011)	
Formal report documenting the results of the analysis of the predictor and criterion data and the estimates of the validity of AT-SAT scores as predictors of performance in the 3 tower positions. Delayed from June 2008.	July 2011 (current estimated completion date Dec. 2011)	
Supporting materials will be provided at the request of the AJP-61 Program Management. These include power point charts and briefing slides for TCRG meetings, abstracts for reports that don't already include them, quarterly reports, and text for the annual report summarizing the year's activities.	As needed	