Air Traffic Control Specialist (ATCS) Performance Measurement Database

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Resource Type: Tool
Abstract:

The ATCS Performance Measurement Database provides a compilation of performance measures and measurement techniques that have been proven effective for use in human factor research related to air traffic control. The database is a tool that can be used in conjunction with ATC simulators, generic sector configurations and scenarios, and other procedures used in assessing ATC system safety and effectiveness.

It is a compilation of attributes of air traffic control that may be measured to determine human/system performance.

References

Developer and source:


Year of development / publication, updates etc:

1999

General Description

Purpose:

Two important purposes are described for this database. 1) To compile effective ATCS performance measurement techniques into a single source. 2) To promote standardization of parameters across research projects and, therefore, enable comparisons of results across evaluations. This database will be particularly valuable for researchers with limited exposure to ATC research methods. The ATCS performance measure allow examination of the relationship between controller action and system performance and is useful across a range of activities including
1. mitigation of risk;
2. validation of operations concepts, operational requirements, and equipment specifications;
3. evaluation of ATCS/computer functional allocation;
4. assessment of the effectiveness of proposed procedures and ATCS/system interactions;
5. development of display design;
6. identification of design incompatibilities;
7. evaluation of information displays and ATCS interface usability;
8. diagnosis of usability and effectiveness issues to identify limiting factors;
9. determining benefits for cost-benefits analyses;
10. identifying sources of human error and methods to reduce them; and
11. selection and training of personnel.? (Hadley, Guttman and Stringer, 1999, p 1).

The authors assembled this database in Microsoft Excel rather than in a more complex database manager because of its near universal availability. Further, such software allows researchers to explore for measures appropriate to the experimental questions they are addressing.

Type (e.g. observation, questionnaire, interview, checklist, measurement instrument, etc.):

Database ? measurement instrument

Technical description of method or tool etc

Description of the content/study:

This set of measures with standardized parameters will increase the reliability of results across experiments, and enable comparisons of results across evaluations. Using standard database techniques, a researcher can search the database to select measures appropriate to the experimental questions under study.

This database is a tool for selecting appropriate performance measures that can be used for evaluation of airspace operations concepts, procedures, and new equipment. This database is intended to facilitate measurement of the impact of new concepts on controller performance. Using standard database techniques, a researcher can search the database to select measures appropriate to the experimental questions under study. With the selection of a particular measure(s), the database also provides citations for the primary source of the measure and additional references for further information. Having a set of measures with standardized parameters will increase the reliability of results across experiments, and enable comparisons of results across evaluations. Each element in the database relates to one of four measurement types [text adapted from Hadley, Guttman and Stringer (1999)].

1. Controller Performance Measures
   - Complexity
   - Conflicts
   - Errors
   - Communication
   - Taskload
   - Workload
2. Measures of Air Traffic Effectiveness
   - Safety
   - Capacity
   - Efficiency
3. Air Traffic Controller Cognitive Performance
   - Situation assessment
   - Planning and decision making
Filtering the database can be done by searching keywords, a specific reference, or measurement type. Probably the most efficient method of searching is by measurement type. (Hadley, Guttman and Stringer, 1999, p 6). The definitions for each measurement type are located within the database and can be easily accessed. For example, if a researcher is interested in what performance measures are associated with examining situation assessment in the en route environment, he or she can filter the database specifically for those items. The database then produces a listing of references of previous studies, the performance measures, and the measurement techniques associated with situation assessment and the en route environment. The researcher can then decide on which performance measure or measurement technique best suits requirements of the current research question. (Hadley, Guttman and Stringer, 1999, p 6).

Technical requirements for using the method, tool, etc:

Experience with MS Excel

Measure/Response Type:

Database

Results obtained and interpretation:

Provides information on previous studies and or measurement techniques that may suit the research question.

**Evaluation**

Advantages:

n/a

Disadvantages:

n/a

Alternative Methods:

None described

**Usability (ease of use, efficiency, effectiveness)**

Ease of use:

high

Efficiency:

high

Effectiveness:

high

Constraints concerning conditions of use:
Level of HF expertise needed (required user qualification)

HF knowledge required to interpret results of searches of the database.

Medium: limited level of expertise required, some training required
Other expertise needed (required user qualification):

Basic Microsoft excel skills

Cost Information

No cost, available from FAA see above

Experiences of use by SESAR partners (including references):
None

Reported and/or published experiences of use (including references):
None

Applicability to lifecycle phase (E-OCVM):

Can be used when a system is in development or following implementation, i.e. V2 onwards.

Application Area:

The database can assist in the following areas:

1. Functional Prototypes
2. ATC Simulation Evaluations.
3. Equipment Development.
4. Operational Test & Evaluation
5. Field Operations

Keywords:

Database, Air traffic Control, Human performance, performance

Short Description:
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Links