Integrated Task Analysis (ITA)

Submitted by superadmin on Mon, 10/22/2012 - 14:45
HP Activity Categories:
Task allocation between the human and machine [1]
Resource Type:
Method
Abstract:

The Integrated Task Analysis (ITA) is a task analysis method that covers different approaches addressing the behavioural and the cognitive aspects of the ATCO’s tasks in order to compare different positions and service provisions. ITA can be used in early phases and as a system evaluation process (before / after or previous / new system comparison) or for process outcome evaluation. The resulting ITA method will provide a generic framework, which enables the ATCO?s tasks and jobs to be viewed from a cognitively-oriented position.

The ITA is adjustable and adaptable for specific purposes and is applied within the real-time working environment of ATC, concurrently ensuring minimal interference with normal working procedures. Within the framework of developing the ITA a new concept, ?the cognitive profile? (cognitive aspects include memory, decision-making, evaluation, attention and action control), was established and investigated. This allows making comparisons from the cognitive point of view between the different types of Air Traffic Services provision.

Furthermore, the ITA accounts for different ATC services and for controllers from different geographical areas. The ITA can be used in early (scoping and planning phase) and late stages (evaluation) within a change process. Therefore it is a useful method to explore a successful transition towards new procedures from a human (behavioural and cognitive) perspective. Options to check the impact of critical situations are included in the set of task analysis tools that form part of the ITA toolset.

References

Developer and source:
Original version and development: Kallus, K.W., Dittmann, A. & van Damme, D. (Eurocontrol)

Websites with documentation:

http://www.eurocontrol.int/hifa/public/standard_page/Hifa_HifaData_Metho...
http://www.eurocontrol.int/humanfactors/gallery/content/public/docs/DELI...
General Description

Purpose:

The ITA is adjustable and adaptable for specific purposes and can be applied within the real-time working environment of ATC, concurrently ensuring minimal interference with normal working procedures, or during a transition period within a change process. Within the framework of developing the ITA a new concept, the cognitive profile (cognitive aspects include memory, decision-making, evaluation, attention and action control), was established and investigated. This allows making comparisons from the cognitive point of view between the different types of Air Traffic Services provision.

Furthermore, the ITA accounts for different ATC services and for controllers from different geographical areas. The ITA can be used in early (scoping and planning phase) and late stages (evaluation) within a change process. Therefore, it is a useful method to explore a successful transition towards new procedures from a human (behavioural and cognitive) perspective. Options to check the impact of critical situations are included in the set of task analysis tools that form part of the ITA toolset.

The reports also provide a description of the cognitive task process used by controllers in three domains of ATC; en-route, arrival and departure, and aerodrome

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

Observation and evaluation tool including a questionnaire and interview guide.

Technical description of method or tool etc

Description of the content/study:

ITA is described in a series of three reports published by EUROCONTROL. In the final report the basic cognitive processes that the ITA evaluates are described as consisting of:

Four Sub-processes

1. Updating mental picture / maintaining situational awareness
2. Checking
3. Searching conflicts
4. Issuing instructions

One Control Process

1. Switching attention

Five Task Processes
1. Taking over position / building up mental picture
2. Monitoring
3. Managing routine traffic
4. Managing requests / Assisting pilots
5. Solving conflicts

These ITA is performed using the following techniques

- The cognitive interview, which lasts about 60-90 minutes;
- The observation at the working position, which lasts 60-75 minutes;
- The post-observational interview and the flight progress reconstruction interview, which lasts 45-75 minutes;
- The stress and strain questionnaires, which takes about twenty minutes
- An organisational interview to supplement the information obtained from the other techniques.

Technical requirements for using the method, tool, etc:

none

Measure/Response Type:

See above

Results obtained and interpretation:

See above

**Evaluation**

Advantages:

Gives comprehensive description of the cognitive processes required with the ATCO role.

Disadvantages:

Time consuming and personnel intensive.

Alternative Methods:

Other forms of task analysis may complement the picture given by ITA.

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

Ease of use:
low

Efficiency:
medium

Effectiveness:
medium

Constraints concerning conditions of use:
A cooperative and motivated organisation and participants to the study is required. Some time may be required to get this buy-in.

Reliability:

Reliability is reported for some aspects of this study. These are not reported here as they relate only to specific elements in this rather complex study. It is necessary to obtain the reports, particularly Phase 3 to understand this information. [5] (HUM.ET1.ST01.1000-REP-05)%20Released.pdf

Validity:

Validity evidence is reported for some aspects of this study. These are not reported here as they relate only to specific elements in this rather complex study. It is necessary to obtain the reports, particularly Phase 3 to understand this information. [5] (HUM.ET1.ST01.1000-REP-05)%20Released.pdf

Required effort (to conduct & to analyse):

The required effort and resources are high

**Level of HF expertise needed (required user qualification)**

HF specialist needed for using the technique. Performing an ITA requires a lot of coordination and planning and is best undertaken by an experience human factors expert or person with similar expertise for example a psychologist or behavioural scientist.

High: high level of expertise required, only for experts, lots of training required

Other expertise needed (required user qualification):

Knowledge of statistical methods

**Cost Information**

The ITA described in the three EUROCONTROL reports are freely available from EUROCONTROL see references section.

Experiences of use by SESAR partners (including references):

None

Reported and/or published experiences of use (including references):

See references section

Applicability to lifecycle phase (E-OCVM):

Elements of ITA can be used from prototype development stage onwards, i.e. from V2/V3.

Application Area:
Air traffic control

Keywords:

Task analysis. Integrated task analysis, ATC task analysis, Action oriented task analysis, Cognitive task analysis, Cognitive interview, Flight progress reconstruction interview.

Short Description:

ITA covers different approaches addressing the behavioural and the cognitive aspects of the ATCO's tasks in order to compare different positions and service provisions. ITA can be used in early phases and as a system evaluation process or for process outcome evaluation. It is an observation and evaluation tool including a questionnaire and interview guide. The resulting ITA method will provide a generic framework, which enables the ATCO's tasks and jobs to be viewed from a cognitively-oriented position.

Source URL: http://webprisme.cfmu.eurocontrol.int/ehp/?q=node/1616

Links
[6] mailto:wolfgang.kallus@uni-graz.at
[7] mailto:info@begleitforschung.de