SARA-T: Validation of a real-time measurement tool for Situation Awareness

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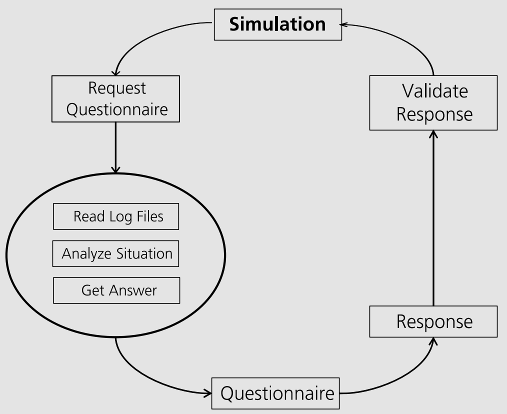

Figure 1. ***Schematic flowchart of SARA-T's procedure.*** **Correct answers for questionnaires are gathered through log file analyses (circle). Operator's responses are validated immediately after completing a questionnaire.**

SARA-T

- Situation Awareness Real Time Assessment Tool (SARA-T; Kraemer & Süß, in press)
- Present and validate Situation Awareness (SAw) online probe questionnaires in the NLR ATM Research Simulator (Narsim, ten Have, 1993)
- Analyses log files, assesses actual situation and compares it with operator's response (see Figure 1)
- Evaluate SAw during ongoing situation
- Automated real time validation makes time consuming post-hoc analyses for questionnaires obsolete

Objective

- Evaluate the use of SARA-T for SAw measurement
- All 3 levels of SAw positively correlated
- Better SAw should result in better performance
- SARA-T should not distract from primary task

Method

- 100 non-expert subjects
- Simulated approach air traffic control task
- Objective: Guide incoming aircraft while complying with safety regulations (see Figure 2)
- 3 scenarios, 30 minutes each
- 14 SAw questionnaires per scenario

Results

- Mean response times of all SAw-levels positively correlated (see Table 1)
- Significant correlations with performance in the main task
- Repeated measurement ANOVA showed no significant effect of the questionnaires on performance ($F < 1$)

Table 1

Spearman-Rho-Correlations of levels (L1-L3) of SAw and air traffic control performance (amount of time without violations against safety regulations).

	L1 Projection	L2 Comprehension	L3 Projection
L1 Projection			
L2 Comprehension	.57***		
L3 Projection	.59***	.67***	
ATC Performance	-.45**	-.28**	-.33***

Annotations. Asterisks indicate levels of significance (* p < .050, ** p < .010, *** p < .001). Spearman-Rho-Correlations were used due to non normality of the variables.

Discussion

- Results support use of SARA-T for real time measurement of SAw
- Especially Level 1 SAw (Perception) explains variance in performance
- SARA-T is non-intrusive
- In the future, SARA-T could help to guide adaptive human centered automation by operator's SAw during actual situation

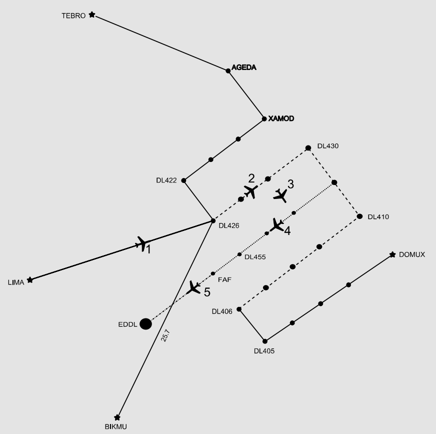

Figure 2. ***Conventional approach procedure at Düsseldorf airport, Germany.*** **Incoming aircraft (1) reaches Downwind (2) via STARS. Subjects were instructed to turn (3) all aircraft onto the Centerline (4) while complying with safety regulations. Aircraft reached the airport (EDDL) after passing point FAF (5).**

References

Kraemer, J. & Süß, H.-M. (in press). Real Time Validation of Online Situation Awareness Questionnaires in Simulated Approach Air Traffic Control. Proceedings of the 6th International Conference on Applied Human Factors and Ergonomics (AHFE 2015) and the Affiliated Conferences.

Ten Have, J.M. (1993). The development of the NLR ATC Research Simulator (Narsim): design philosophy and potential for ATM research. Simulation Procession Theory, 1, 31-39.

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