



EFFECTIVENESS OF CYBERSECURITY TRAINING ON IDENTIFYING CYBER THREATS IN AIR TRAFFIC CONTROL

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Introduction

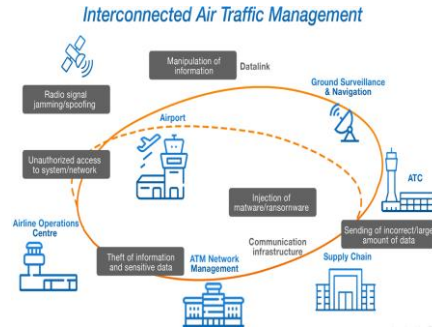
- Cyber threat is a critical issue that can potentially lead to catastrophic consequences in the aviation industry.
- The networking and interconnections of the air traffic management (ATM) system may make the system infrastructure prone to cyber-attacks (Figure 1).
- Air traffic controllers are at the front line of detecting anything unusual, but challenges remain in identifying a cyber threat accurately and responsively.

Background

- Advancements in technology have enhanced the efficiency and safety of the ATM (e.g., ADS-B, DataComm), but can make the ATM system vulnerable to cyber threats (Klenka, 2021).
- Possible outcomes of cyber threats in ATM system include traffic congestion and delays, loss of control of the aircraft, service termination, or even system shutdown, causing harm to aviation safety (Hird, 2021).
- Dattel et al. (in press) found that training in identifying cyber threats has improved the performance proficiency of midshipmen. However, little research has shown that training in cybersecurity for controllers.

Figure 1

Interconnections of ATM System



Significance

- Preparing ATC trainees for ensuring the system is resilient to cyber-attack and being able to recover to normal operation.
- Addressing the importance of cybersecurity in ATM and developing potential solutions to protect cybersecurity.
- Promoting cybersecurity can benefit many ATM stakeholders in the way of aviation safety, economic stabilization, national defense, etc.

Research Questions

- RQ1:** Will a cybersecurity-focused training program help air traffic control (ATC) trainees identify cyber threats?
- RQ2:** Is it possible to develop countermeasures to specific types of cyber-attacks?

Methodology

Research Approach

An experimental research design will be used to determine whether cybersecurity training (Figure 2) can help en route ATC students become more aware of cyber threats and gain the ability to identify cyber threats in the ATC simulation scenarios.

Population and Sample

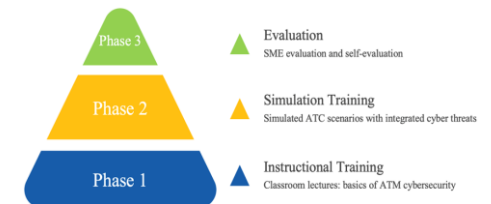
Students in the ATM program at ERAU who have had En Route Radar Operations course

Sources of the Data

ATC specialist evaluation and self-evaluation
Objective performance data

Figure 2

ATM Cybersecurity Training Phases



References

- Klenka, M. (2021). Aviation cyber security: legal aspects of cyber threats. *Journal of Transportation Security*, 14(3-4), 177-195. <https://doi.org/10.1007/s12198-021-00232-8>
- Hird, J. (2021). *Air traffic management: A cybersecurity challenge*. EUROCONTROL. <https://www.eurocontrol.int/sites/default/files/2021-12/eurocontrol-atm-cybersecurity-report.pdf>
- Dattel, A. R., Goodwin, T., Brodeen, H., Friedenzohn, D., Ochoa, O., Wang, H., Gao, P., Harris, S., Parkar, I. (in press). Using virtual reality for training to identify cyber threats in the bridge of a ship. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*.
- Scholten, U. (2022). *Cyber security in ATC – looking at threats, technology, teams, and training* [PowerPoint slides]. SkyRadar. <https://www.skyradar.com/webinar-cyber-security>