WISS White Paper

Fatigue Risk Prediction for Flight Controllers Unions: Protecting Air Traffic Controllers, Preventing Mistakes, and Strengthening Union Bargaining Power

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Introduction: Why Fatigue Risk Prediction Matters for Air Traffic Controllers

Air traffic controllers (ATCs) operate in high-stress, high-risk environments where split-second decisions affect thousands of lives daily.

Long shifts, rotating schedules, overnight duties, and high cognitive load contribute to severe fatigue, impairing decision-making, reaction time, and situational awareness.

Fatigue has been a factor in multiple aviation near-misses and incidents, making fatigue management a critical safety issue in the industry.

WISS Technology's Fatigue Risk Prediction System provides a scientific, data-driven approach to reducing fatigue-related risks and improving controller performance, operational safety, and fair scheduling in air traffic management.

NEW: Expanded Cognitive Impairment Detection – Beyond Fatigue

WISS Technology LLC, a leader in AI-driven fatigue risk prediction, has enhanced its system with an advanced **Wellness Feature** that detects **early signs of impaired cognitive function**.

This capability goes beyond fatigue detection by identifying indicators that may be caused by:

- Underlying medical conditions
- Neurological or cognitive impairment
- Alcohol use
- Drug use (prescription or illicit)

Using advanced **AI, machine learning, and voice pattern analysis**, the system can identify anomalies such as slurred speech, delayed response patterns, and cognitive inconsistencies—providing early warning signals before performance degradation leads to operational risk.

Why This Matters for Air Traffic Control

In an ATC environment, even subtle cognitive impairment can result in:

- Misinterpretation of pilot communications
- Delayed or incorrect clearances
- Loss of situational awareness
- Increased risk of near-misses or airspace violations

This enhancement provides a **critical additional layer of safety**, ensuring that controllers are not only rested—but also cognitively fit for duty.

Air Traffic Safety & Mistake Prevention

Fatigue is a Leading Risk Factor in Air Traffic Control

Cognitive fatigue reduces controllers' ability to process multiple aircraft movements simultaneously.

Tired controllers struggle with situational awareness, increasing the risk of miscommunication with pilots.

Delayed reaction times can result in near-misses, incorrect clearances, and airspace violations.

How WISS Technology Helps:

✓ Identifies fatigue risks before they lead to critical errors.
✓ Detects early signs of **cognitive impairment beyond fatigue.**
✓ Alerts controllers and supervisors in real time when unsafe conditions are detected.
✓ Optimizes shift scheduling to allow for strategic breaks and recovery.

Preventing Unfair Discipline for Fatigue-Related Mistakes

The Problem:

Controllers are blamed for near-misses or errors that stem from chronic fatigue caused by poor scheduling.

Investigations often hold individual ATCs responsible rather than addressing systemic fatigue risks.

Regulatory agencies demand accountability but do not always enforce proper fatigue management policies.

How WISS Technology Helps:

- ✓ Provides objective fatigue and cognitive performance data.
- ✓ Distinguishes between **fatigue, medical issues, and potential impairment factors.**
- ✓ Shifts focus from punishment to prevention.
- ✓ Creates a fair, data-backed system for evaluating controller performance.

Enhancing Aviation Safety & Public Trust

Fatigue and Cognitive Impairment Directly Affect Airspace Safety

Tired or cognitively impaired controllers are more likely to misinterpret pilot communications.

Fatigue-induced or impairment-related miscalculations increase collision risks.

Aviation safety depends on alert, cognitively sound controllers making split-second decisions.

How WISS Technology Helps:

- ✓ Ensures controllers are both **well-rested and cognitively fit.**
- ✓ Reduces fatigue- and impairment-related errors.
- ✓ Supports proactive intervention before safety is compromised.
- ✓ Strengthens public confidence in aviation safety systems.

Preventing Burnout & Long-Term Health Risks

The Reality of ATC Burnout & Mental Strain

Chronic fatigue increases the risk of anxiety, depression, and cognitive decline.

Shift work and sleep deprivation contribute to cardiovascular disease and other long-term health issues.

Underlying medical conditions may go undetected until performance is affected.

How WISS Technology Helps:

- ✓ Identifies early signs of fatigue, burnout, and cognitive decline.
- ✓ Flags potential **medical or neurological concerns impacting performance.**
- ✓ Supports early intervention and access to care.
- ✓ Encourages healthier, sustainable work schedules.

Ensuring Compliance with FAA, ICAO & Global ATC Fatigue Regulations

Legal & Compliance Issues in Air Traffic Control

FAA and ICAO guidelines require fatigue management, but enforcement is inconsistent.

Controllers are held accountable for errors even when systemic fatigue risks exist.

Substance use policies require strict enforcement but often rely on reactive testing.

How WISS Technology Helps:

✓ Supports compliance with fatigue and **fitness-for-duty standards.**
✓ Provides proactive monitoring rather than reactive enforcement.
✓ Helps unions and agencies ensure fair and consistent application of policies.
✓ Reduces liability related to fatigue or impairment-related incidents.

Protecting Older & High-Risk Controllers

Aging controllers face greater risks of fatigue-related and cognitive impairment.

Long shifts increase risk for those with underlying health conditions.

How WISS Technology Helps:

✓ Detects subtle cognitive changes early.
✓ Supports reasonable accommodation.
✓ Helps unions advocate for safer workloads.
✓ Ensures equitable treatment across the workforce.

Key Benefits of the Enhanced System

- **Increased Safety:** Detects fatigue and early cognitive impairment, including indicators associated with alcohol or drug use
- **Real-Time Alerts:** Immediate notification when unsafe conditions are detected
- **Improved Compliance:** Supports FAA, ICAO, and workplace safety standards
- **Better Worker Protection:** Identifies risks without relying on punitive measures
- **Cost Reduction:** Fewer incidents, investigations, and operational disruptions
- **Scalability:** Easily integrates into existing air traffic management systems

Final Thoughts

"Air traffic controllers guide millions of flights safely every year—fatigue and cognitive impairment should never put that safety at risk.

WISS Technology's Fatigue Risk Prediction System isn't about monitoring workers, it's about protecting them. With the addition of advanced cognitive impairment detection, we are giving unions and aviation authorities the tools to prevent fatigue-related mistakes, identify hidden risks, and ensure that every controller operating the system is truly fit for duty.

This is the future of air traffic safety—proactive, data-driven, and focused on protecting both controllers and the flying public."

— **Scott J. McCormick**