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PREDICTIVE RISK MANAGEMENT IN AIR TRAFFIC CONTROL



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INTRODUCTION

What is Predictive Risk Management (PRM)?

- PRM uses data analytics, machine learning, and AI to predict and prevent risks before they occur.
- The goal is to shift from reactive responses to predictive data-driven decisionmaking.

Why It Matters:

- As air traffic volume and complexity grow, traditional risk management methods may not suffice
- PRM enables air traffic services (ATS) to identify and mitigate potential risks in advance, enhancing both safety and efficiency.



TRADITIONAL VS. PREDICTIVE RISK MANAGEMENT

Reactive:

Responds to incidents after they occur, often through incident reports and evaluations.

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Predictive:

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Uses data analytics to forecast potential risks, allowing for proactive risk mitigation.

Focus of PRM:

 Combines proactive measures with advanced analytics to predict issues before they impact safety.

they result in incidents.

PRINCIPLES OF PREDICTIVE RISK MANAGEMENT



Predictive Modelling:

Expected Output

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 Machine learning algorithms analyse historical data to detect patterns and predict incidents such as runway incursions or near misses.

REAL-TIME MONITORING AND ALERTS

Continuous Data Feeds:

- PRM systems process real-time data from air traffic control, aircraft systems, and environmental sensors.
- Continuous data processing helps detect deviations or emerging risks.

Automated Alerts:

- When patterns indicate a heightened risk, automated alerts are triggered.
- These alerts allow air traffic controllers and other stakeholders to act immediately.



DECISION SUPPORT SYSTEMS

Purpose:

- PRM offers visual dashboards that display risk indicators, trends, and forecasts in a clear, interpretable format.
- This provides air traffic controllers with actionable insights for decision-making.

Example:

• Dashboards can present trends in runway incursion risk, aiding controllers in adjusting protocols as needed.



VFR INFRINGEMENT RISK EXAMPLE

VFR Infringement Risk:

• VFR (Visual Flight Rules) infringement occurs when aircraft unintentionally enter controlled airspace, which can pose serious safety risks.

PRM Application:

- PRM models assess various risk factors, such as visibility, local airfield events, and weather forecasts.
- The system produces a risk score, alerting air traffic controllers to potential infringement risks.

Decision Support:

• Based on the risk score, controllers can proactively allocate resources, like additional personnel, to manage and mitigate VFR infringement risks.

IMPLEMENTATION AND CHALLENGES

Building a Data-Driven Culture:

- Implementing PRM requires a shift toward data-driven decisionmaking at all organisational levels.
- Investment in analytics infrastructure and training is essential for success.

Developing Models & Overcoming Resistance:

- Accurate predictive models require high-quality data and regular validation.
- Engaging stakeholders from the beginning promotes collaboration and helps address resistance.



CONCLUSION

Benefits of PRM:

- Enhanced safety, operational efficiency, and cost savings are key benefits.
- PRM transforms air traffic control by enabling proactive, datadriven safety practices.

Final Thoughts:

- PRM is a transformative approach but requires a commitment to continuous improvement and adaptation.
- As air traffic grows, PRM becomes increasingly essential for a safer and more efficient aviation system.



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THANK YOU

