

Decision Risk in Airport Operations

Making Data-Driven Decisions Verifiable

The analysis builds on [previous work conducted on airport operational data](#), combined with direct experience in high-pressure operational environments.

Key Insight

The main risk is not missing data, but misaligned data representation.
Data can be formally correct and still lead to wrong decisions.

Context

In airport operations, delays are not just a metric, they drive decisions.

Resource allocation, flight prioritization, and operational responses depend on how delays are measured and classified.

Recent patterns show a shift from concentrated delay events to a broader distribution across total traffic, suggesting **systemic tension rather than isolated disruptions**.

Where the System Breaks

Misalignment in Delay Classification

Delay classifications may reflect the final operational constraint **rather than the originating cause**.

→ **Example**

A delay generated by internal operations may be recorded as a slot constraint.

→ **Risk**

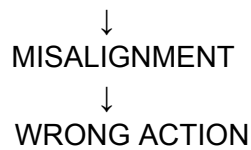
Decisions target visible constraints instead of underlying operational issues.

→ **Impact**

Operational inefficiencies are reinforced instead of resolved.

Decision Flow (Simplified)

DATA → KPI → CLASSIFICATION → DECISION



Control Design: Making Delay-Based Decisions Verifiable

To reduce the risk of decisions based on non-representative delay classifications, the following controls are proposed:

1. Trigger vs Root Cause Separation

Problem

Delay reflects final constraint

Control

Dual classification (Trigger Event / Root Cause)

Impact

Targets actual operational issues

2. Confidence Level on Attribution

Problem

Causes treated as certain

Control

Confirmed / Likely / Unknown

Impact

Reduces overconfidence in decisions

3. Data Validation Gate

Problem

Decisions based on incomplete data

Control

Flag output as non-actionable + require validation

Impact

Prevents unreliable operational actions

Conclusion

- Data can be correct but not representative
 - Decisions may target symptoms instead of causes
 - Simple controls make limits explicit and decisions verifiable
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A system is not reliable because it produces decision,
but because those decisions can be questioned and verified.

Although this analysis is based on a traditional data-driven system, the same risks apply to AI-based decision systems.

When models generate outputs without explicit control over data quality, attribution, and traceability, the gap between data and decision-making becomes even more critical.

This is why governance mechanisms must be designed at the system level, not added after deployment.

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Full project: [GitHub](#)