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AI Governance & Decision Systems

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
↓
MISALIGNMENT
↓
WRONG ACTION

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

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2. Confidence Level on Attribution

Problem
Causes treated as certain

Control
Confirmed / Likely / Unknown

Impact
Reduces overconfidence in decisions

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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