

Operational Complexity Indicators for TFM Decision Support

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FAA/MOIE

**MITRE
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Program**

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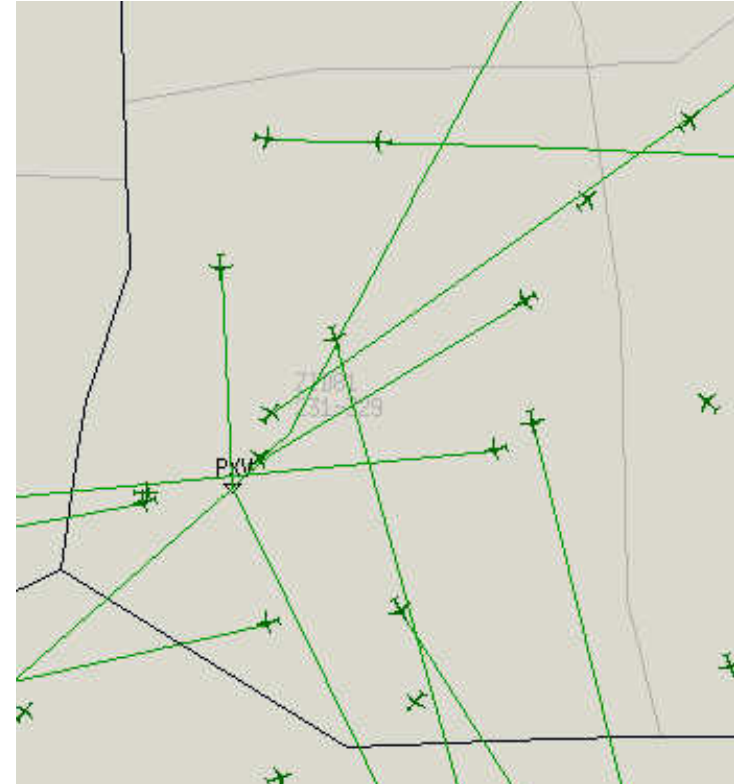
Problem

- FAA Traffic Flow Management personnel need additional real-time metrics of airspace manageability. Single number (traffic count) may not adequately characterize the problem and solution.
- Measures must be displayed accessibly and intuitively to support real-time decisions.
- Alternate metrics have been studied at MITRE/CAASD and elsewhere. So have alternate displays of traffic count. They are seldom looked at in tandem.

Background



***Low Complexity
(at this day and time)***



***Same Traffic Count,
High Complexity
(at this day and time)***

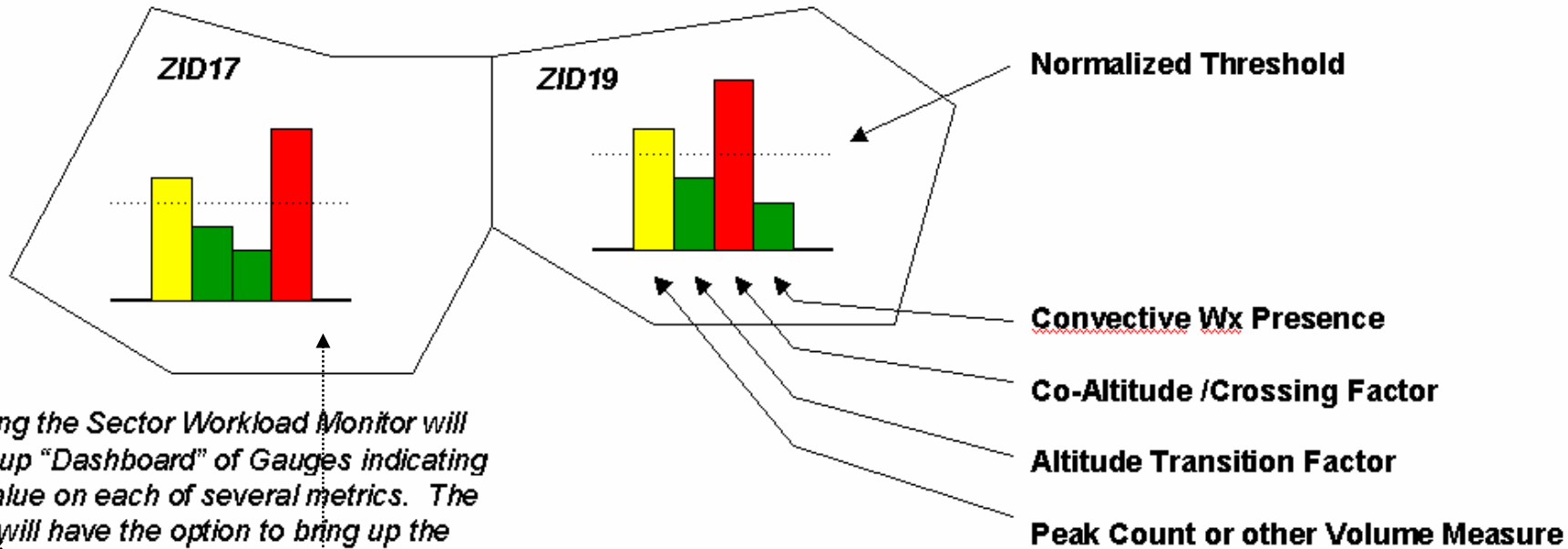
Objective

- **Predictable, operationally meaningful, and sensitive metrics for representing predicted sector complexity.**
- **Recommendations regarding how to display predictions about the metrics, to support real-time decisions for TFM.**

Activities

- Reviewed internal and external ATC complexity literature; categorized metrics and assessed pros and cons
- Interviewed former and current operational personnel to obtain feedback on metrics and displays
- Quantitative analysis underway to determine predictability and sensitivity of metrics
- Rough Concept of Operations under development

Highlight



Clicking the Sector Workload Monitor will bring up "Dashboard" of Gauges indicating the value on each of several metrics. The TMC will have the option to bring up the Dashboard only for one sector, or to have multiple sectors laid out geographically as shown here

TMC=Traffic Mgt.
Coordinator.
ZID17=Indianapolis Center,
Sector 17.

Next step: TMC clicks
on one of the bars to
drill down further.

This notional human-computer interface provides a geographical layout combined with multiple manageability indicators. This would be one of approximately three levels in a "drill-down" approach where the problem can be examined at the needed level of detail.

Demonstration

- **Weather is an aspect often neglected in past airspace complexity work.**
- **This demonstration, created using the “R” open-source statistical package, plots:**
 - **convective weather detections and one-hour predictions**
 - **airborne holding.**
- **Analyses have been conducted to characterize the association between weather (e.g., convection) and complex traffic patterns (e.g., holding).**

Impacts

■ Customer benefits

- Improved benchmarks supporting common situation awareness for collaborative decisions such as reroutes

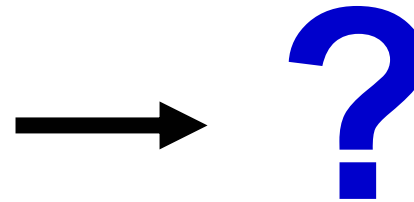
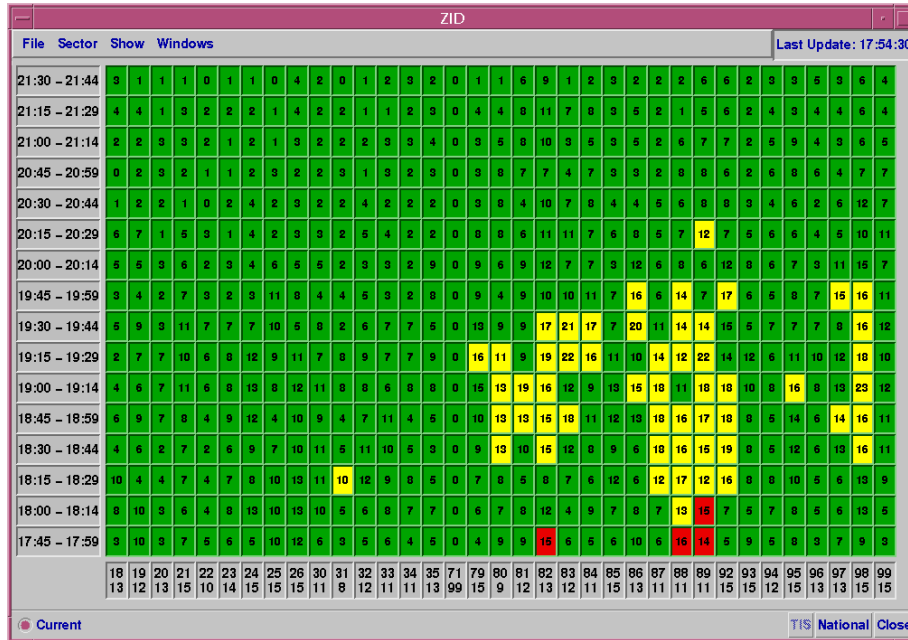
■ MITRE benefits

- Reuse of metrics for post-hoc analysis, airspace design, and future decision support research

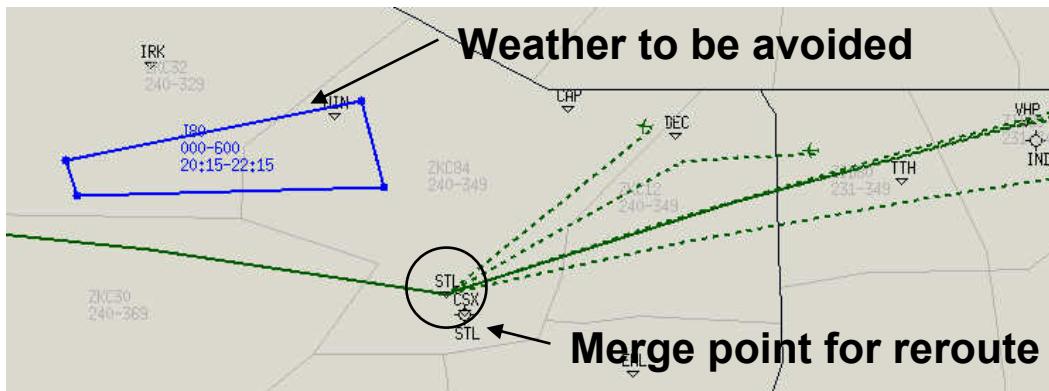
■ R&D Community

- Human Factors conferences (2/02, 9/02)
- Ongoing coordination with internal and external ATC complexity researchers

Future Plans



Investigate displays of enhanced traffic load information and human performance implications



Investigate how weather and traffic interact to produce complex operations