Fleet Behavior Extrapolation

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What Fleet Behavior Extrapolation Specifies

Each unit in a fleet produces its own forecasts about its own behavior and observations. The architectural primitive composes these forecasts across the fleet: cross-unit fleet behavior projections emerge from credentialed aggregation of per-unit forecasts plus observed fleet-level dynamics.

The composition is structural. Per-unit forecasts are credentialed observations consumed by a fleet-coordination authority (a credentialed authority with standing over the fleet). The authority produces fleet-level forecasts as composite credentialed observations that downstream consumers admit through their own framework. The fleet-level forecasts include emergent behaviors that no individual unit's forecast contains.

Why Per-Unit Forecasting Misses Fleet-Scale Behavior

Per-unit forecasting produces accurate predictions about individual units' immediate behavior. The forecasts compose poorly to fleet scale because fleet-scale dynamics include emergent behaviors that no single unit can forecast: traffic-flow patterns that emerge from many vehicles' independent decisions, drone-swarm formation patterns that emerge from individual coordination, port-handling throughput that emerges from individual handling decisions.

These emergent behaviors affect operations meaningfully. A robotaxi fleet operating in a region must forecast not just individual rider demand but fleet-level positioning patterns. A drone-delivery fleet must forecast not just individual delivery routes but airspace-utilization patterns. A port operation must forecast not just individual container handling but harbor-throughput dynamics.

How Composite Forecasts Operate

The fleet-coordination authority subscribes to per-unit forecasts as credentialed observations. The authority's forecasting engine produces composite fleet-level forecasts that aggregate per-unit projections plus learned fleet-level dynamics. The composite forecasts are credentialed observations that propagate to downstream consumers (other fleets, infrastructure, regulatory authorities).

Cross-fleet coordination operates through credentialed cross-recognition between fleets. A delivery-drone operator's fleet forecasts may inform a competing operator's fleet positioning under credentialed cross-recognition policy. The architecture supports the cooperative-competitive operating reality of multi-operator commercial environments.

What This Enables for Fleet-Scale Operations

Robotaxi fleet operations (Waymo, Tesla emerging robotaxi, Cruise's eventual return) gain fleet-level demand forecasting that current per-unit-aware architectures don't produce. Drone-delivery operations (Wing, Zipline, Amazon Prime Air) gain fleet-airspace-utilization forecasting. Port automation gains throughput forecasting that informs handling-resource allocation.

Cross-fleet coordination during major events (city-wide congestion, weather events affecting multiple fleets, infrastructure failures affecting multiple operators) gains structural support. The patent positions the primitive at the layer where fleet-scale

operations have been operating with per-unit forecasting that misses emergent dynamics.