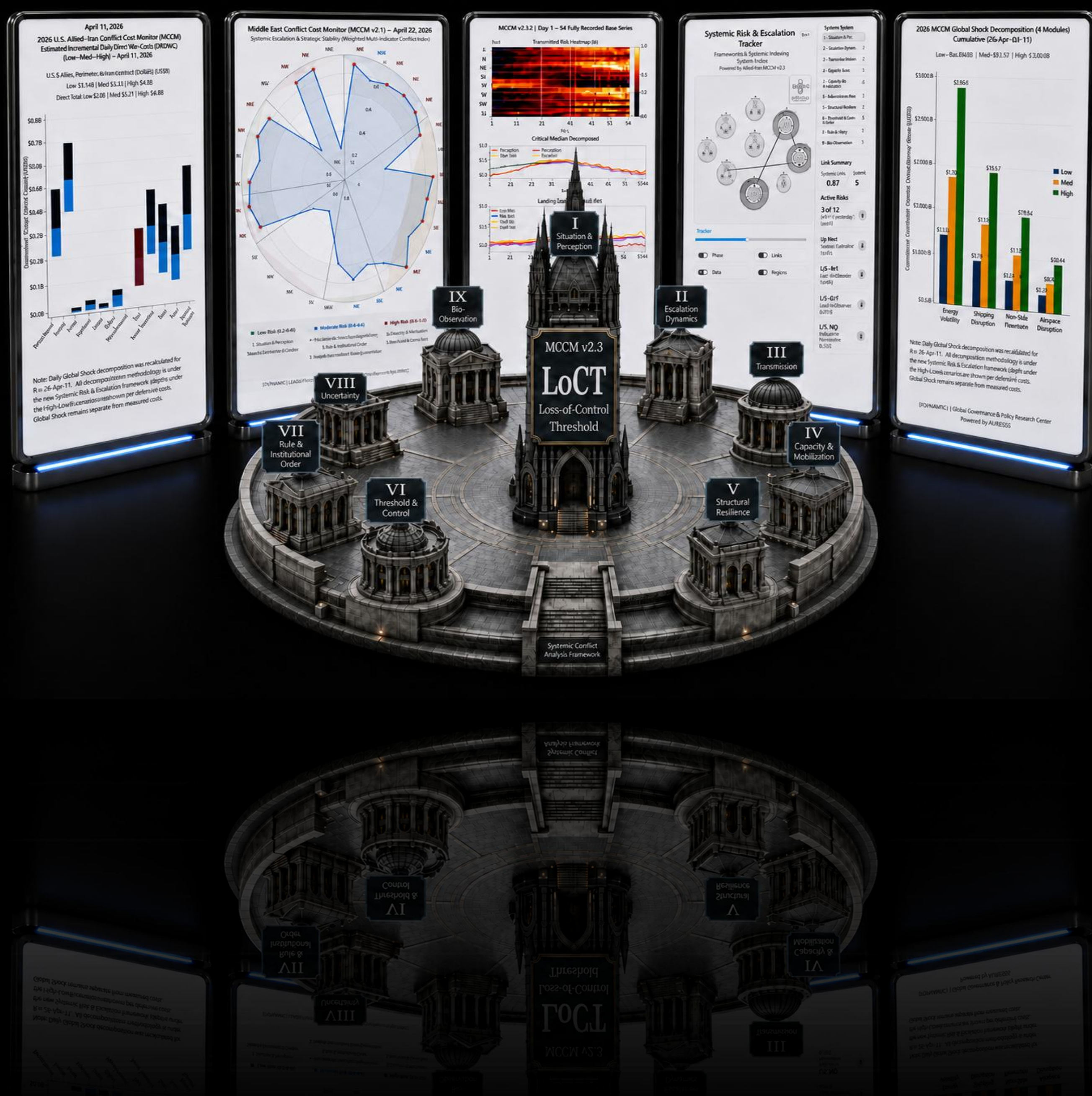


Multi-Layer Coupled Complexity Model (MCCM)

From Scattered Signals to Systemic Pressure

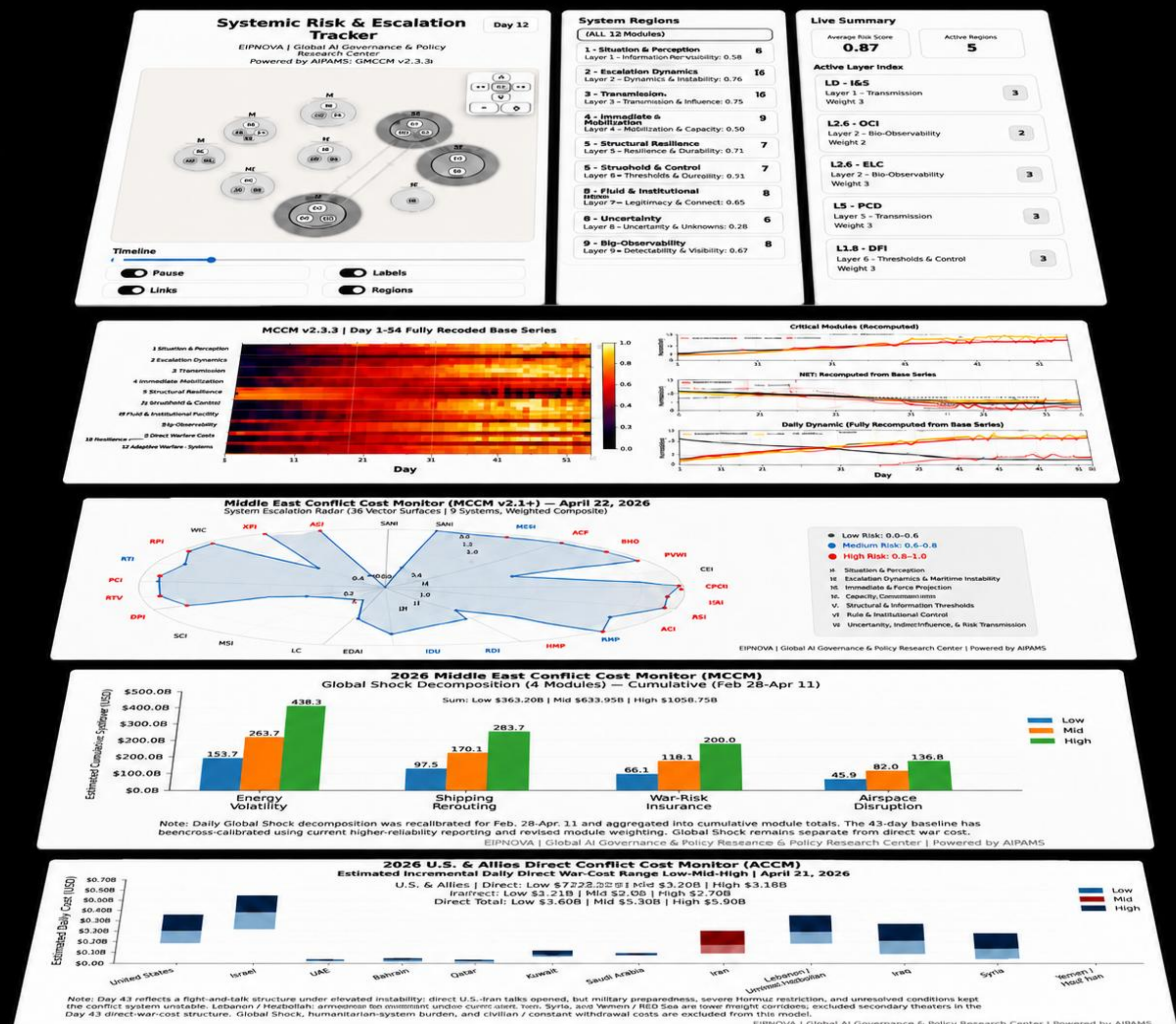
A LoCT-Centered Prototype Analytical System for Threshold-Risk Analysis and Human-AI Decision Support

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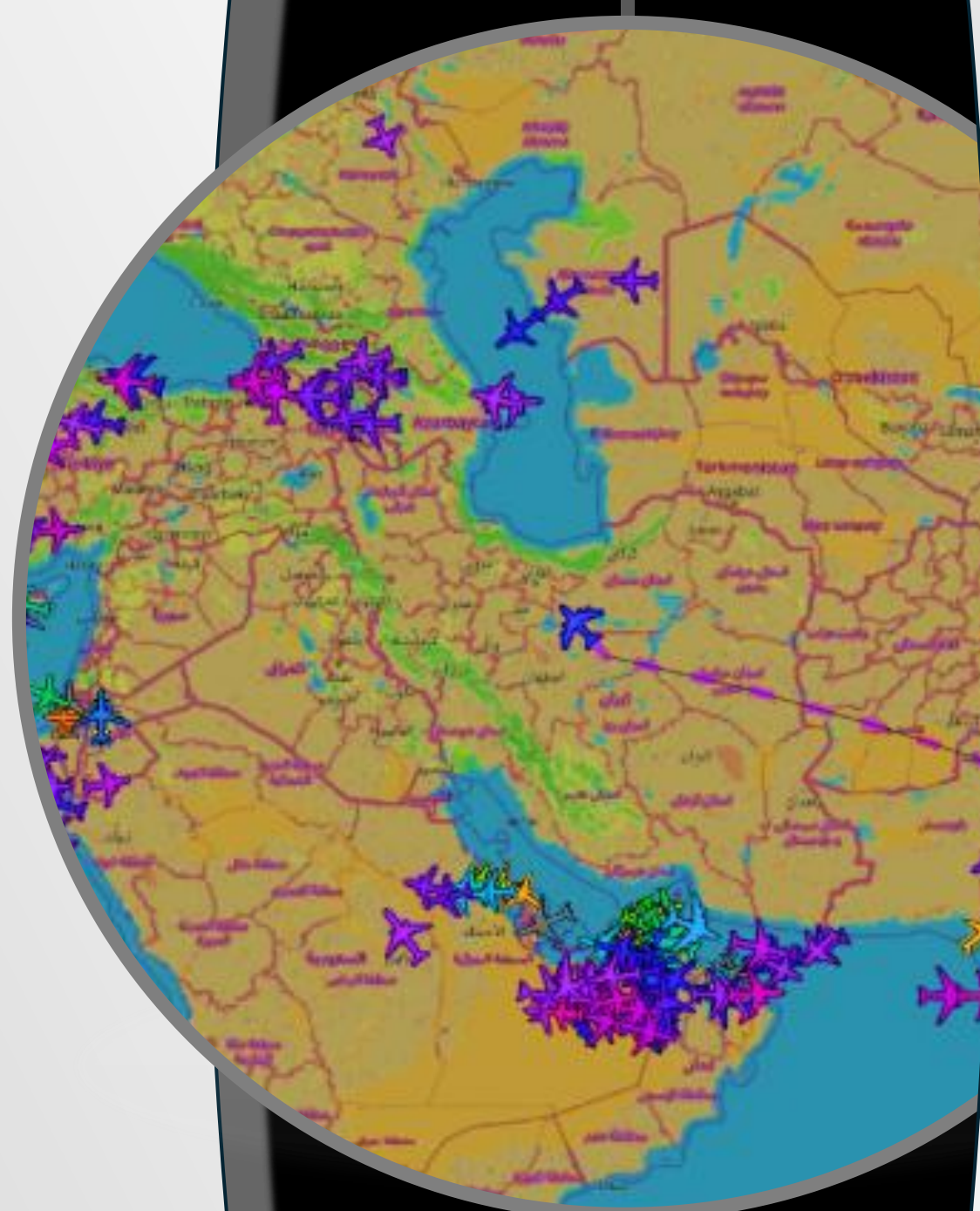
1. Project Overview

The **Multi-Layer Coupled Complexity Model (MCCM)** is a theory-driven analytical framework and prototype modeling system for interpreting systemic pressure in modern confrontation environments. Centered on the **Loss-of-Control Threshold (LoCT)**, it organizes fragmented signals into a nine-system and thirty-two-variable structure.

The showcase version uses the recent U.S.–Israel–Iran conflict to demonstrate how event-level observations can be converted into threshold-oriented system diagnosis.

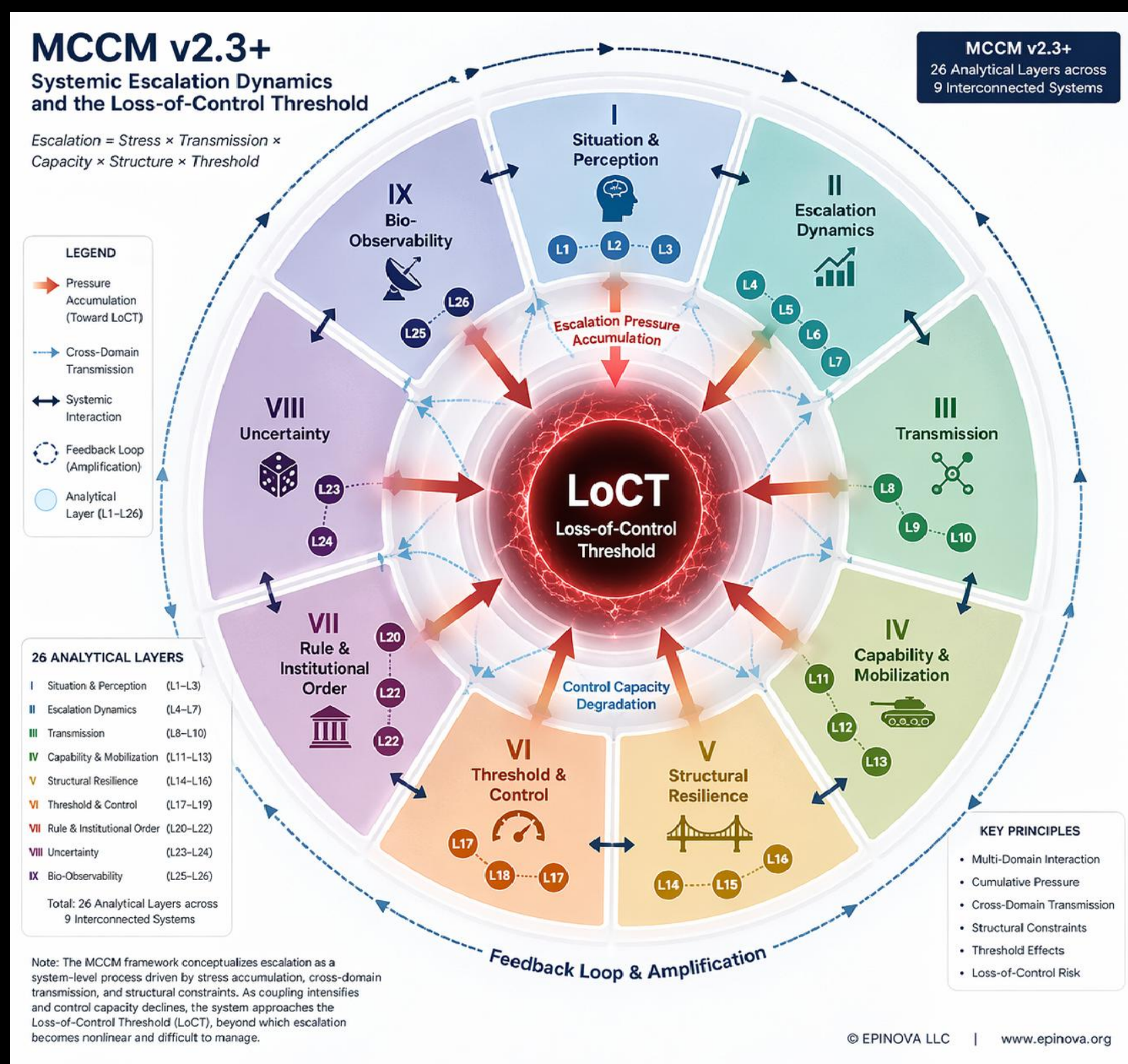
2. Pain Point

“How can we identify early when scattered signals are becoming systemic pressure?”



3. Goals

- **Systemic-pressure interpretation:** Identifies when scattered signals are forming broader pressure patterns.
- **Cross-domain transmission analysis:** Tracks how shocks spread across military, logistics, cyber, market, and information systems.
- **LoCT assessment:** Evaluates whether rising pressure is pushing the system closer to loss of control.



4. MCCM Framework

Centered on LoCT, MCCM uses a nine-system, thirty-two-variable architecture to analyze how pressure accumulates, transmits, and amplifies in modern confrontation environments.

It distinguishes isolated events from broader systemic-pressure patterns and shows whether scattered signals are pushing the system closer to threshold risk.

5. System Components

As a modular analytical system, each component of MCCM supports a different part of the analytical workflow, from scoring and diagnosis to visualization and policy interpretation.

Table 1. Core Components of MCCM

Component	Purpose / Value
MCCM v2.1	Provides multi-variable escalation scoring and risk tracking.
MCCM v2.3+	Provides the LoCT-centered nine-system escalation architecture.
MCCM v2.3.3	Operationalizes the framework through 32 variables for structured systemic-pressure assessment.
SHI — System Health Index	Assesses whether key systems remain functional, resilient, or increasingly fragile.
LoCT Logic	Evaluates whether accumulated pressure is moving a system closer to a loss-of-control condition.
Regional Submodules	Extends the model to specific regions and functional theaters, including Iran, the Persian Gulf, the Caspian region, China exposure, East Asia spillover, and global-shock dynamics.
Visualization Outputs	Produces heatmaps, time-series plots, threshold diagrams, system maps, regional comparisons, and dashboard-style analytical panels.

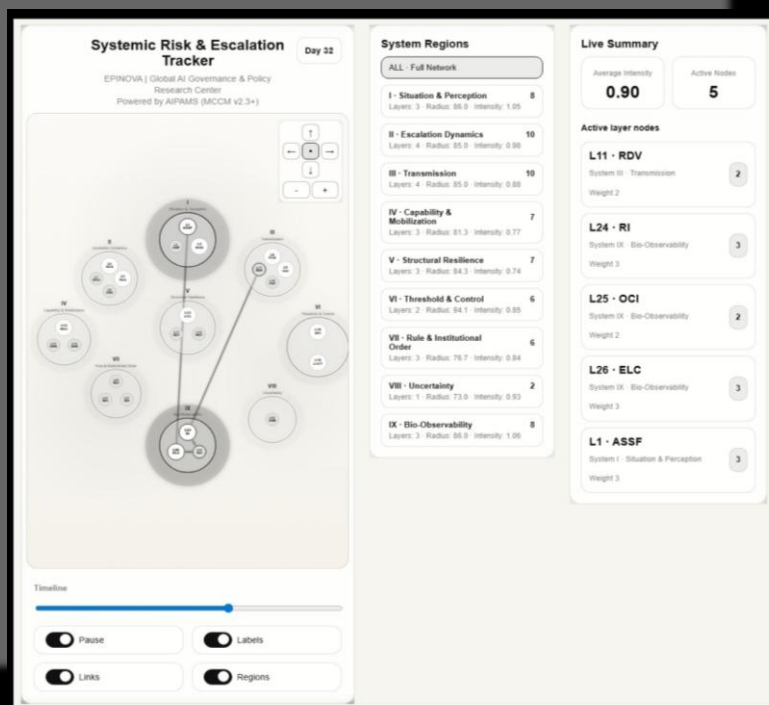
Together, these components allow MCCM to function as a prototype decision-support system for interpreting complex confrontation environments.

6. Demonstration Case

The 2026 U.S.–Israel–Iran geopolitical conflict serves as the main demonstration case. This case shows how MCCM can move beyond daily event tracking and identify broader systemic pressure across military, maritime, logistics, energy, proxy, information, diplomatic, and regional-spillover domains.

7. Selected Outputs

The showcase version includes several types of analytical and visual outputs:

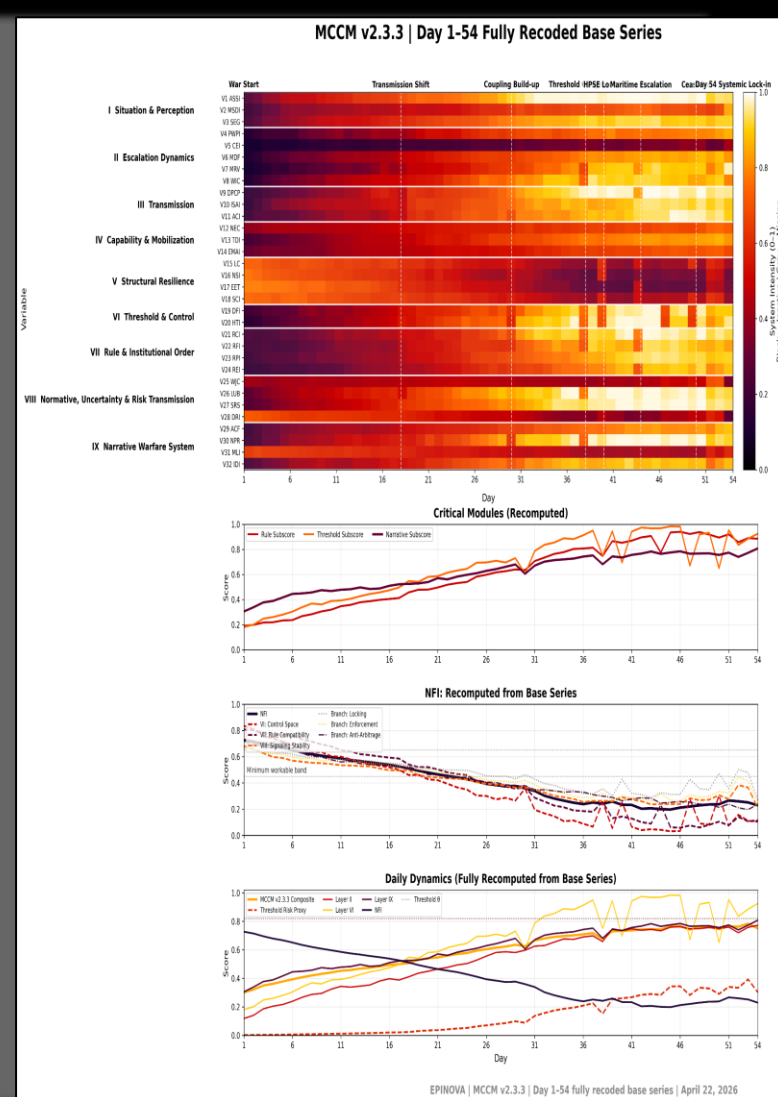


Threshold Visualizations

Track movement toward or away from LoCT

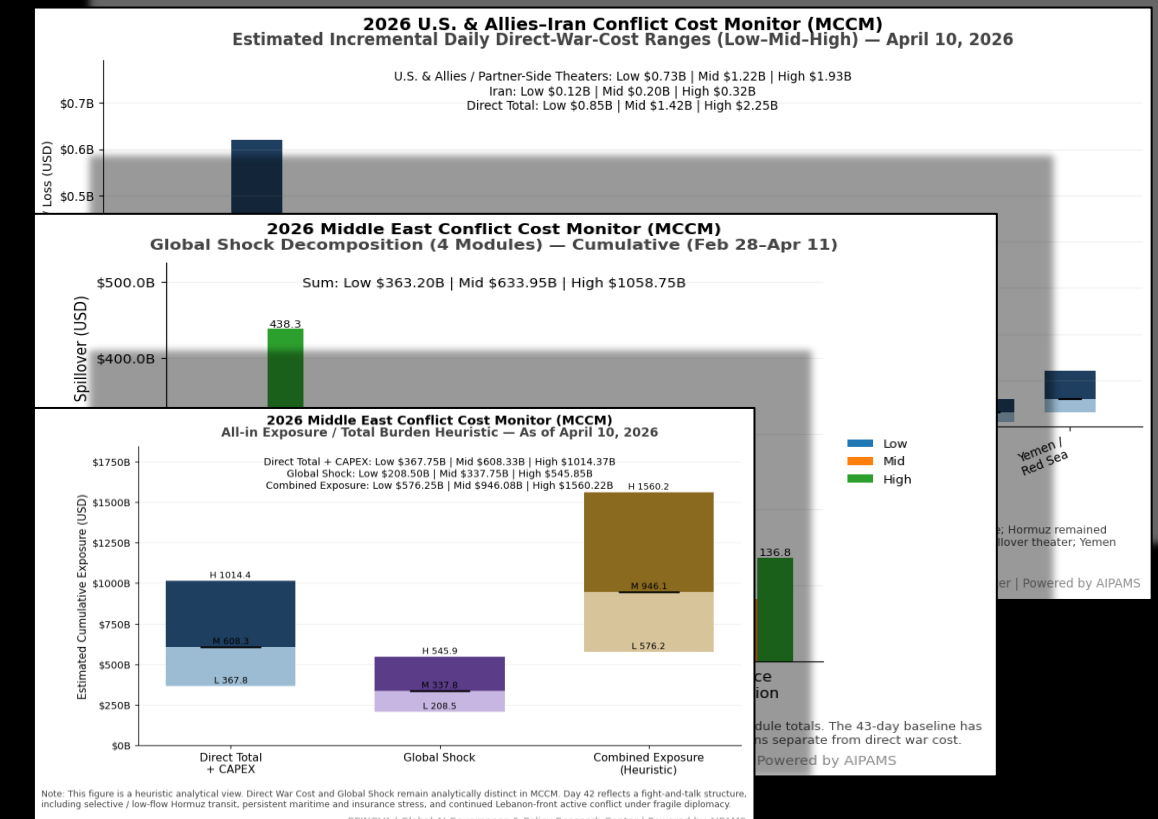
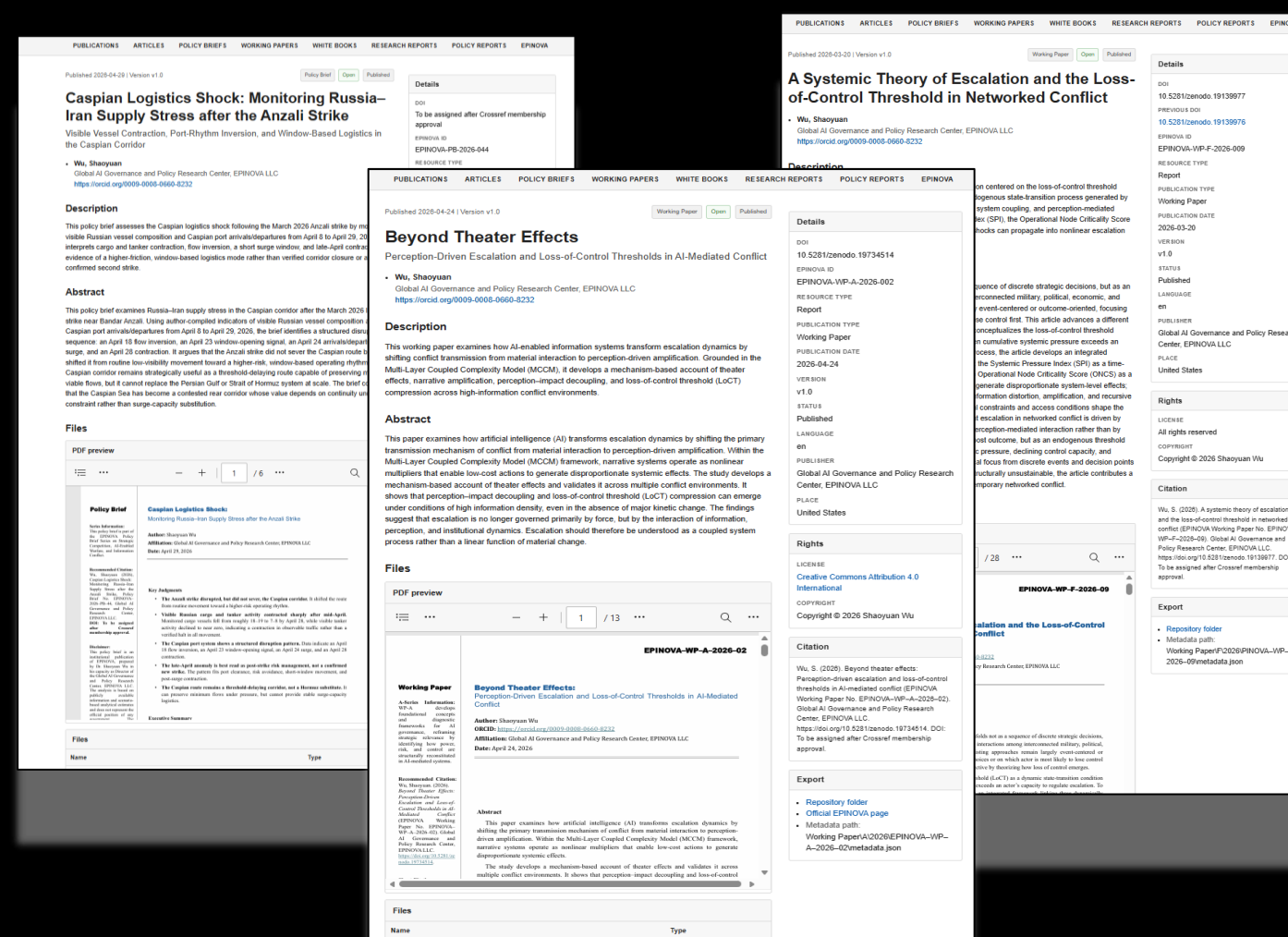
Escalation Heatmaps

Display pressure changes across time and variables



Policy Briefs / Working Papers

Translate findings into policy-relevant analysis

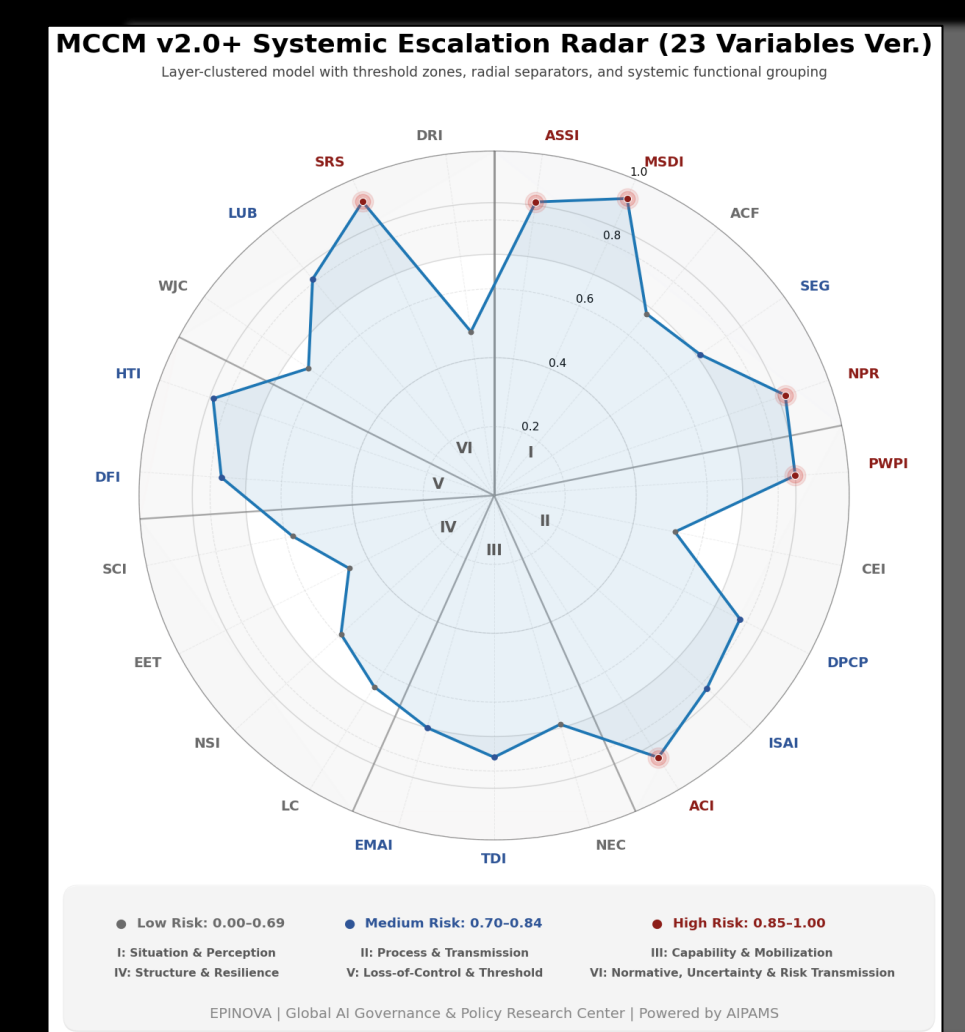


Regional Comparison Charts

Compare pressure across submodules

System Health Indicators

Assess resilience and fragility



These outputs help users see, compare, and interpret complex pressure patterns to support better decision-making.

8. Related Research Outputs

MCCM has generated a broader research-output pipeline, including **working papers, policy briefs, daily monitoring articles, framework notes**, and an **MVP demonstration page**. These outputs document the development of MCCM from conflict-cost monitoring to systemic escalation analysis, LoCT-based threshold assessment, logistics-shock analysis, ceasefire-recovery assessment, and cross-domain strategic-risk monitoring.

- **Project Page:** <https://epinova.org/mccm-v2-3>
- **Related Output Categories:** <https://epinova.org/mccm-outputs>

9. Transferability and Future Work

MCCM is designed as a portable framework. Its **LoCT-centered, nine-system, thirty-two-variable logic** can be adapted to maritime disputes, blockade scenarios, gray-zone operations, energy shocks, supply-chain disruptions, cyber-physical crises, business competition, and strategic decision-making.

Future development will focus on four areas:

- **Interactive Dashboards:** Supporting real-time monitoring, visual exploration, and scenario comparison.
- **Expanded Modules:** Applying MCCM to additional regional and sectoral confrontation environments.
- **Automated Data Streams:** Connecting open-source signals, structured event data, maritime indicators, policy signals, and market information.
- **Scenario Simulation:** Testing how shocks may propagate across systems under different conditions.

In the long run, MCCM aims to become a reusable human-AI decision-support framework for monitoring systemic pressure, assessing threshold risk, and supporting strategic decision-making in complex confrontation environments.



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