

OR-002

Authority and Amplification

Reading the SAG Case Studies Together

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Purpose

The Structural Authority Gate case studies appear as standalone analyses. Each examines a documented historical event through a single lens: whether authority over safety-critical decisions instantiated at the moment it mattered.

This note explains why the cases belong together.

The domains, timescales, and outcomes differ. The governing dynamic stays consistent.

The Shared Dynamic

Across all SAG case studies, a common pattern appears.

Early decisions condition what becomes possible later.

This conditioning unfolds through a probability chain. Each decision constrains or expands the set of viable future actions. Once a chain forms, later choices amplify what earlier authority decisions permitted.

Amplification itself is neutral. System behavior stabilizes or degrades based on whether any role possesses standing to steer it.

Authority as a Probability Constraint

SAG defines authority as a structural condition.

Authority determines whether probability chains receive early constraint, while options still exist.

When authority is explicit and exercised:

- Probability mass narrows toward viable outcomes
- Later decisions compound toward coherence
- Sensitivity becomes usable. The hazard recedes.

When authority is absent, delayed, or unusable:

- Probability mass diffuses
- Later decisions amplify uncertainty or false premises
- Systems drift toward failure without a single decisive moment

The cases differ only in how this dynamic unfolds.

Gates and Amplification

Systems that permit amplification depend on a gating mechanism capable of intervening once amplification reaches defined bounds.

In physical systems, such gates may operate automatically or through a designated human role, depending on design. The defining properties include pre-authorized legitimacy and speed. The gate exists before amplification begins, and authority to intervene already stands.

Structural Authority Gate expresses the same control principle in institutional systems. When early decisions condition probability chains, authority must instantiate explicitly to steer amplification while options still exist.

Whether exercised through automated constraints or a designated human role, the gate preserves system sensitivity while preventing runaway behavior.

When no such gate exists, amplification continues without steering. Sensitivity persists. Direction disappears.

How the Cases Relate

The SAG case studies illustrate distinct authority states acting on the same phenomenon.

Therac-25 shows a probability chain unfolding slowly across years. Authority over software safety never instantiated. Harm accumulated across institutions and time because no role possessed standing to intervene.

Knight Capital shows a probability chain collapsing at machine speed. Authority to halt trading existed in principle but could not operate quickly enough to matter. Human decision cycles failed to match system execution speed.

Three Mile Island shows formal authority present but unusable under signal ambiguity. Operators followed training while plant behavior diverged from procedural assumptions. No role possessed standing to suspend procedure during uncertainty.

Apollo 13 shows authority instantiated clearly before crisis, exercised during uncertainty, and used to impose binding constraints shaping every downstream decision. The Flight Director role possessed explicit standing to steer when amplification peaked.

Taken together, the cases demonstrate that outcome severity does not determine structure. Authority structure determines outcome.

What These Cases Are For

These case studies serve as diagnostic references.

They serve three purposes:

- Making authority states visible during real decision sequences
- Showing how amplification behaves when authority exists or fails to operate
- Supporting deliberate authority design before pressure arrives

The cases provide reference points for recognizing when probability chains begin to form and whether any role possesses standing to steer them.

From Diagnosis to Design

Read individually, each case diagnoses an authority condition.

Read together, the cases support design thinking.

High-stakes systems cannot eliminate sensitivity or amplification. Those properties persist.

System viability depends on ensuring that when sensitivity rises, authority to steer exists, is known, and operates without delay.

That insight unifies the cases.

How to Use This Note

This note supports reading before or after the SAG case studies.

The document introduces no new rules or frameworks. It provides orientation.

Each case stands independently. This note explains why the cases form a coherent group.

Closing

Structural Authority Gate centers on a single question:

Who has authority to act when uncertainty amplifies?

The case studies show what follows when that question receives a clear answer, an unclear answer, or no answer.

This note explains the consequences of those answers.