Autonomous Surgical Execution Under Governed Actuation

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What This Application Specifies

Surgical procedures decompose structurally into reversible setup, partial commitment with intermediate verification, and irreversible commit. Governed actuation supports each phase under declared admissibility; autonomous execution proceeds within the surgical-procedure structure rather than as monolithic permit-or-suppress.

Authority composition structures map to surgical reality: surgeon-of-record authority for procedure-class admissibility, hospital-credentialing authority for institutional admissibility, regulatory authority (FDA, EMA) for device-class admissibility. The architecture supports the multi-authority reality of surgical practice.

Why It Matters Operationally

Current surgical-robotics autonomy faces a binary regulatory challenge: full autonomy is regulatorily distant; teleoperated assistance is the current state; the path between them is architecturally underspecified.

Governed actuation produces the structural path. Procedure phases proceed at appropriate autonomy levels; reversible phases gain greater autonomy; irreversible

phases retain surgeon authority; the architecture supports gradual autonomy introduction without forcing the binary.

How It Composes With the Domain

Each surgical actuation admits through composite admissibility (surgeon, institution, regulatory). Reversibility classification determines autonomy level. Stage-gated commitment supports phase-by-phase autonomy decisions. Post-actuation verification produces credentialed outcomes for downstream audit.

Adverse events gain structural reconstruction. Post-incident audit traverses the full chain: which actuation, under what admissibility, with what verification, with what outcome. Liability and regulatory review proceed against architecturally-supported records.

What This Enables

Surgical-robotics autonomy gains a structurally-coherent path between teleoperation and full autonomy. Patient-safety outcomes gain structurally-supported audit. Regulatory bodies gain a framework that maps to the gradual-autonomy reality.

The architecture also supports surgical evolution. As new procedures admit autonomy, as new evidence supports autonomy expansion, as new regulatory regimes emerge, the architecture admits the changes through declared admissibility evolution.