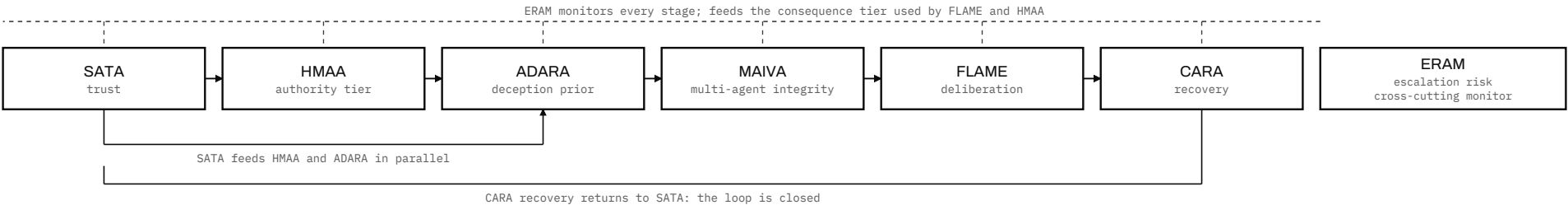


# AUTHREX CAPABILITY MATRIX

Runtime authority, assurance, and verification for AI-enabled and autonomous systems. Independent research portfolio; self-reported; not independently verified; not a government publication.

|            |                   |                  |             |               |              |                         |
|------------|-------------------|------------------|-------------|---------------|--------------|-------------------------|
| 7          | 1                 | 12               | 14          | 3             | 8            | 0                       |
| FRAMEWORKS | EXECUTABLE KERNEL | DESIGNS, 0 BUILT | SIM RECORDS | PEER-REVIEWED | PROVISIONALS | INDEPENDENT VALIDATIONS |



HMAA is the only component that issues an authority tier; every outcome (EXECUTE, DELAY, HANDOFF, ABORT) is issued from that one place.

| Capability         | Mission problem                          | Function                                    | Maturity (self)     | Strongest evidence                            | Government need                          |
|--------------------|------------------------------------------|---------------------------------------------|---------------------|-----------------------------------------------|------------------------------------------|
| SATA               | Sensor integrity under jamming, spoofing | Per-source trust scalar                     | TRL 3               | Peer-reviewed protocol (Springer Nature 2026) | Recorded sensor streams; TPM node        |
| HMAA               | Binary permit/deny cannot degrade        | Graded A3 to A0 tier, hysteresis            | TRL 3               | TLA+ 23,748 states depth 9 (bounded)          | Confirm-or-abort scenario; SIL stack     |
| ADARA              | Manipulated perception                   | Deception prior                             | TRL 3               | Simulation; faithful component model          | Deception scenarios; red team            |
| MAIVA              | Compromised agent carries outcome        | Byzantine trimmed median                    | TRL 3 (open defect) | Faithful quorum model                         | Compromise assumption; multi-vehicle SIL |
| FLAME              | Veto after the irreversible act          | Consequence-scaled window; abort on timeout | TRL 3               | Simulation; counterexample                    | Decision timeline; operators             |
| CARA               | Recovery short-circuited                 | GREP recovery; non-compensatory gate        | TRL 3               | Self-run enumeration                          | Recovery policy                          |
| ERAM               | Escalation cascades                      | Escalation-risk monitor                     | TRL 2 to 3          | SSRN paper; 600-run console                   | Exercise record                          |
| Governance Kernel  | Agents hold admin keys                   | Tier gating; approval; signed ledger        | TRL 3 to 4          | 83 container tests                            | Reviewer team; policy                    |
| AUTHREX-ABORT      | Fallbacks add capability                 | Authority lapse with latch                  | TRL 3               | 2 TLA+ modules; 105 tests; soak               | Safety-interface spec; T&E; adoption     |
| AUTHREX-DA         | Poisoned data admitted                   | Fail-closed admissibility                   | TRL 2 to 3          | 101 tests (WP-0 blocked)                      | Labeled poisoned records                 |
| BLADE designs (12) | Hardware enforcement per domain          | BOM-level nodes                             | TRL 2               | Deposits; sim; emulator                       | Bench, HIL, integration partner          |

|             |                                                                                                                                                                                                                                    |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| POSITION    | Authority is granted by a human as a bounded envelope and conditioned on evidence; on failure the admissible set narrows at once and widens only by authorization; timeout never creates authority; every outcome is hash-chained. |
| NOT CLAIMED | No HIL, field validation, independent replication, deployment, certification, or government adoption. One favorable AFRL white-paper evaluation on record (June 2026; not funded; not an endorsement).                             |
| ASK         | Phase 1 technical review (no hardware, no funding); Phase 2 government-defined scenarios; Phase 3 failure injection; then testbed and HIL with a sponsor.                                                                          |
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|                                                 |                                      |                                                  |                            |                            |                                |                                  |
|-------------------------------------------------|--------------------------------------|--------------------------------------------------|----------------------------|----------------------------|--------------------------------|----------------------------------|
| 1 Technical review                              | 2 Government-defined simulation      | 3 Failure injection                              | 4 Testbed / SIL            | 5 Hardware-in-the-loop     | 6 Relevant environment         | 7 Program integration            |
| No hardware, no funding; program executes alone | Sponsor scenarios on seeded consoles | Evidence lapse, spoofing, delayed human response | Requires sponsor interface | Requires laboratory or rig | Requires independent evaluator | Only after earlier gates succeed |

Gated evaluation path: each phase proceeds only after the prior one succeeds and its evidence is published. No phase implies that any organization has agreed to sponsor it.