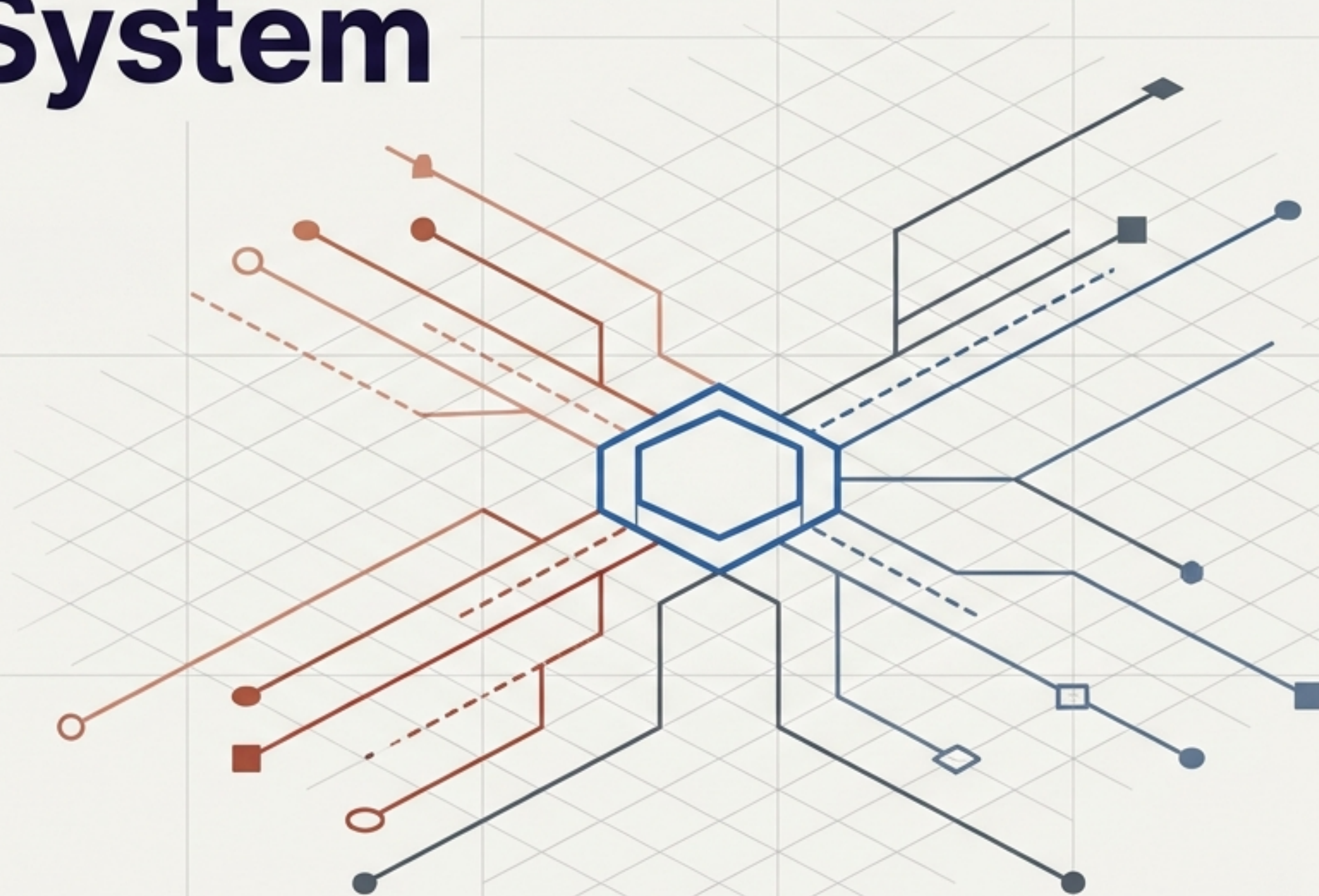


Blueprint for a Unified Care System

Integrated Aged Care &
Age Well SG Dashboard

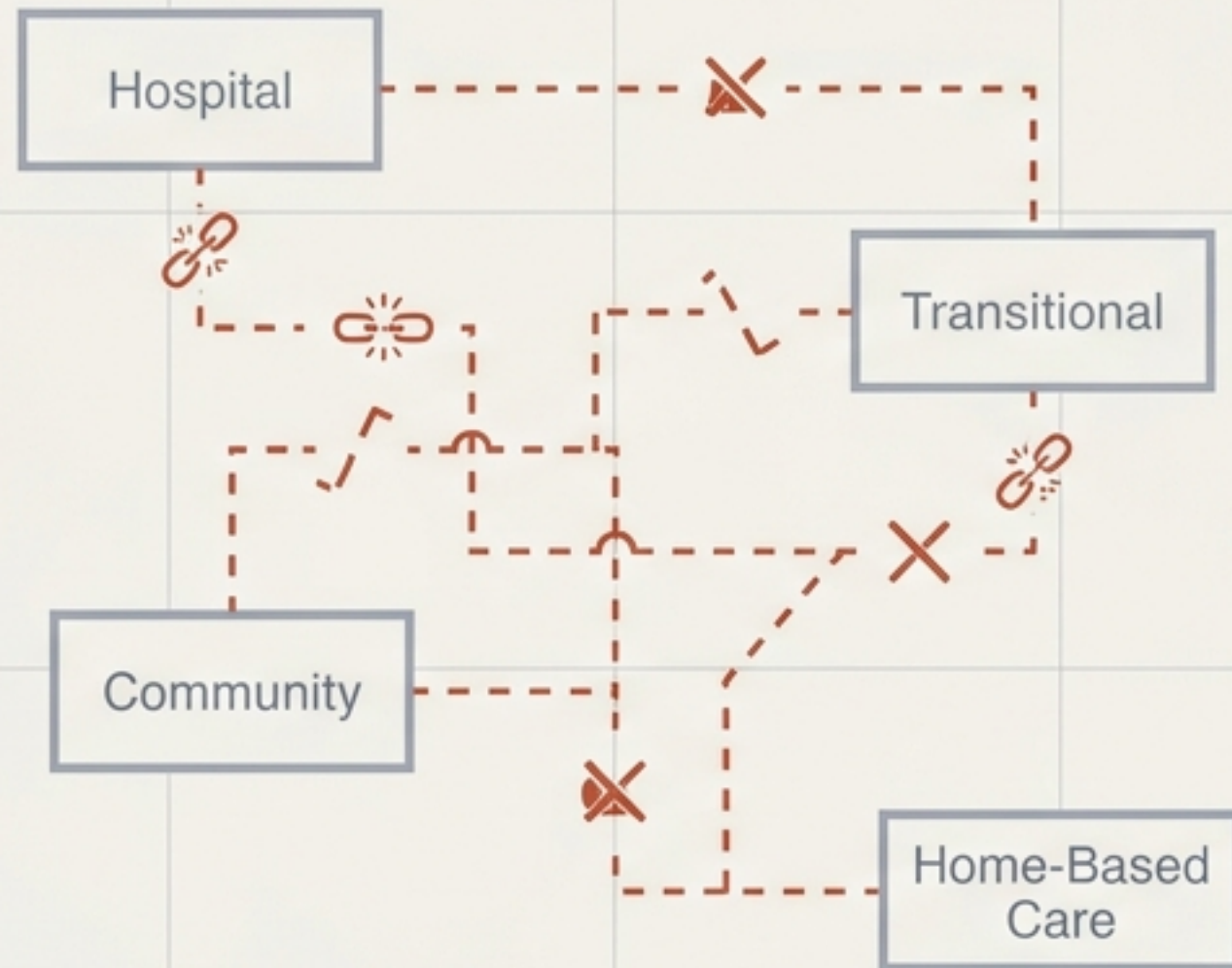


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CLASSIFICATION: Internal – Restricted
STATUS: Final Design Checkpoint

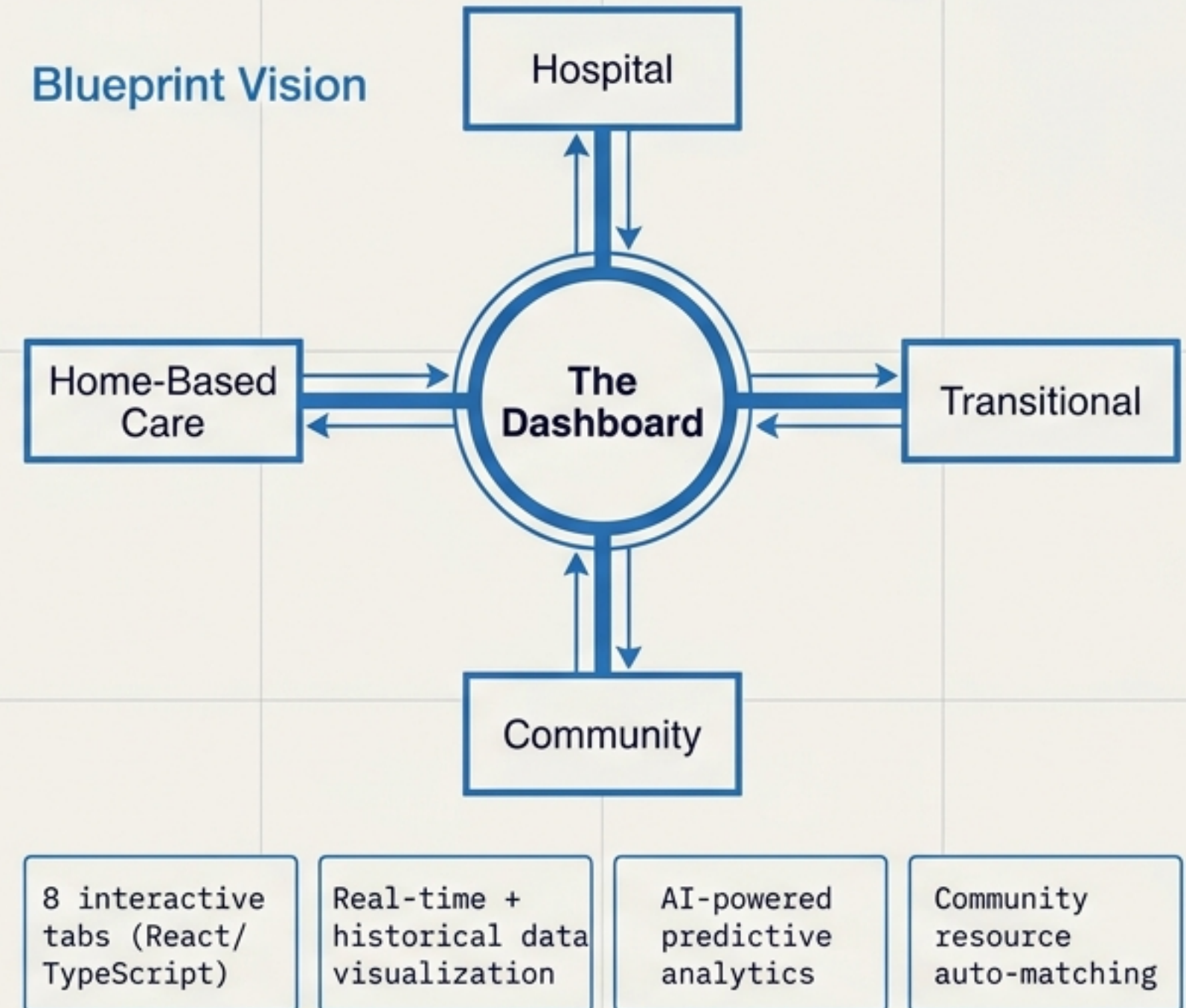
Collapsing Care Fragmentation

A unified care orchestration platform designed to eliminate silos across Singapore's elderly care continuum.

Legacy Reality

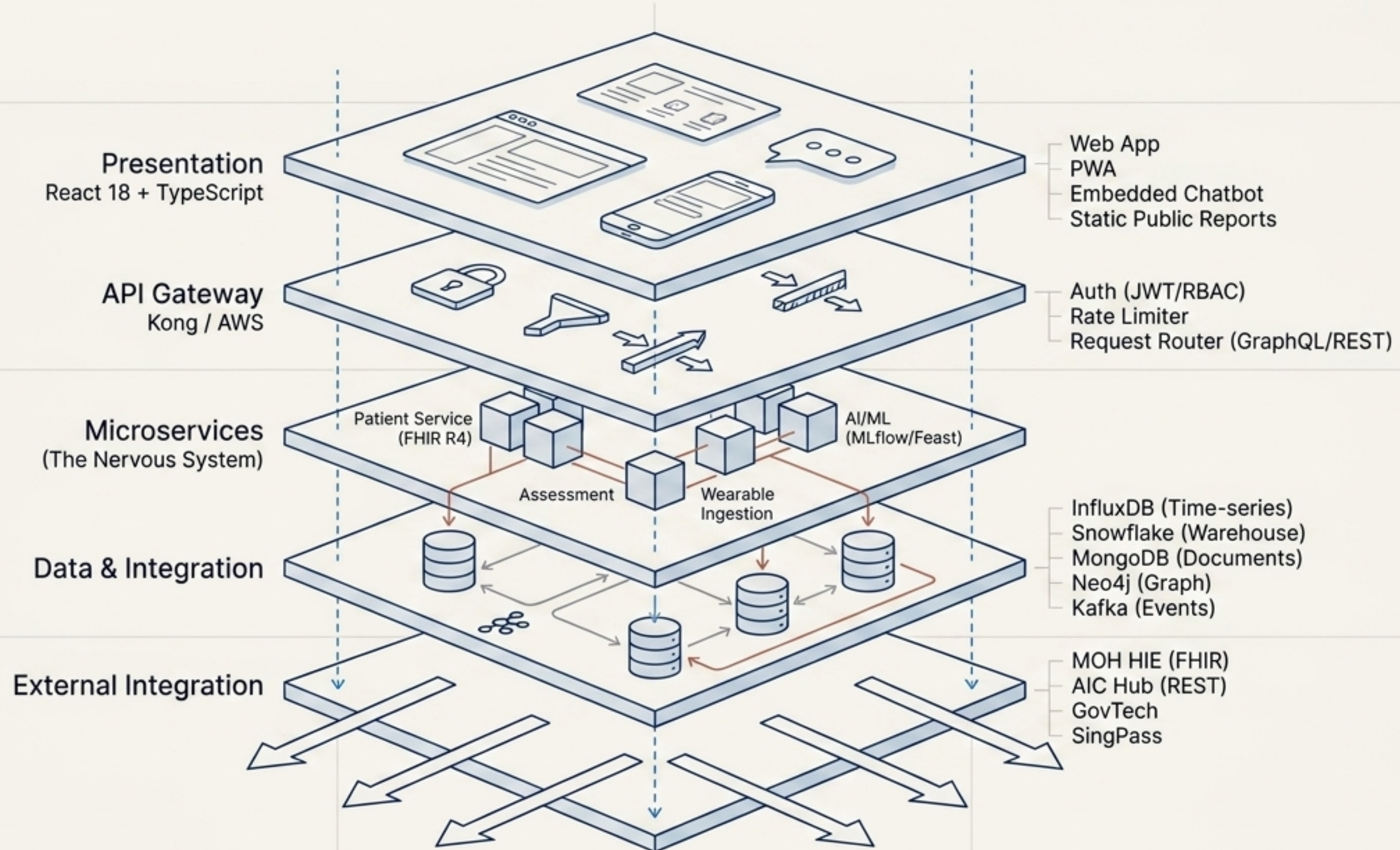


Blueprint Vision



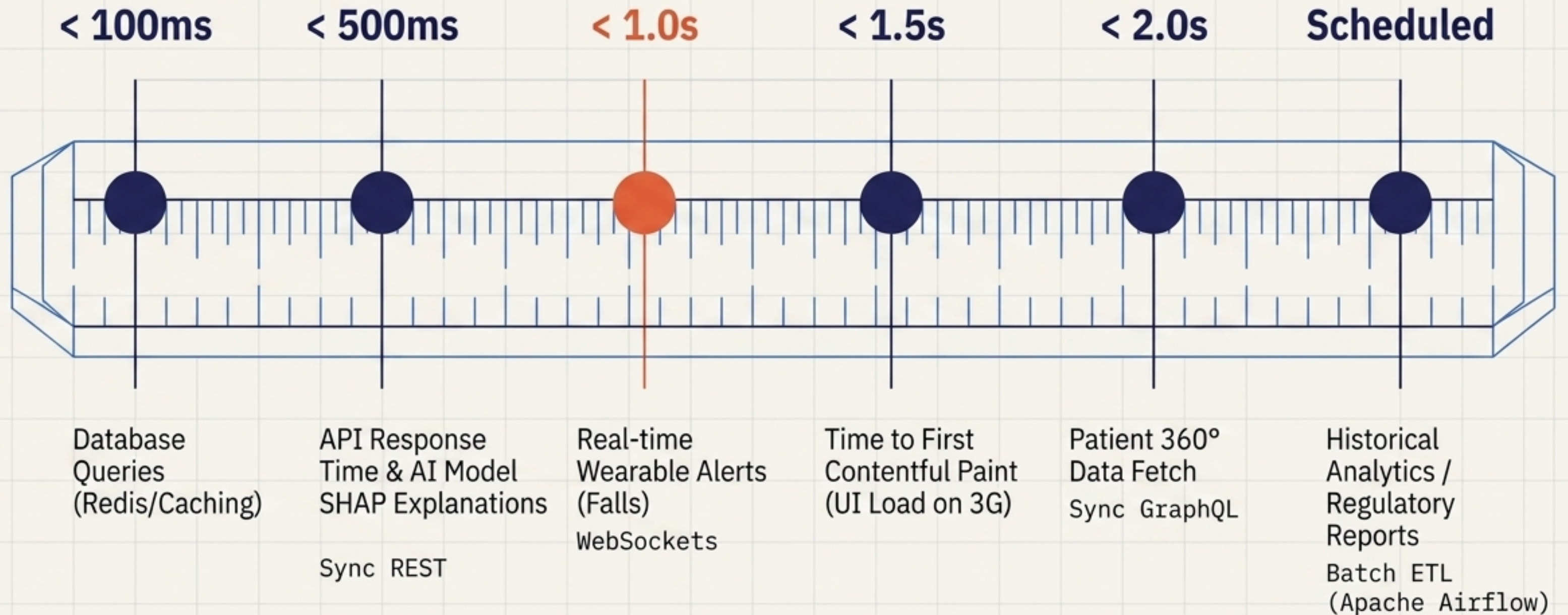
The Layered Anatomy of Care

Moving from React-driven presentation layers down to Kafka event streams and external MOH integrations.



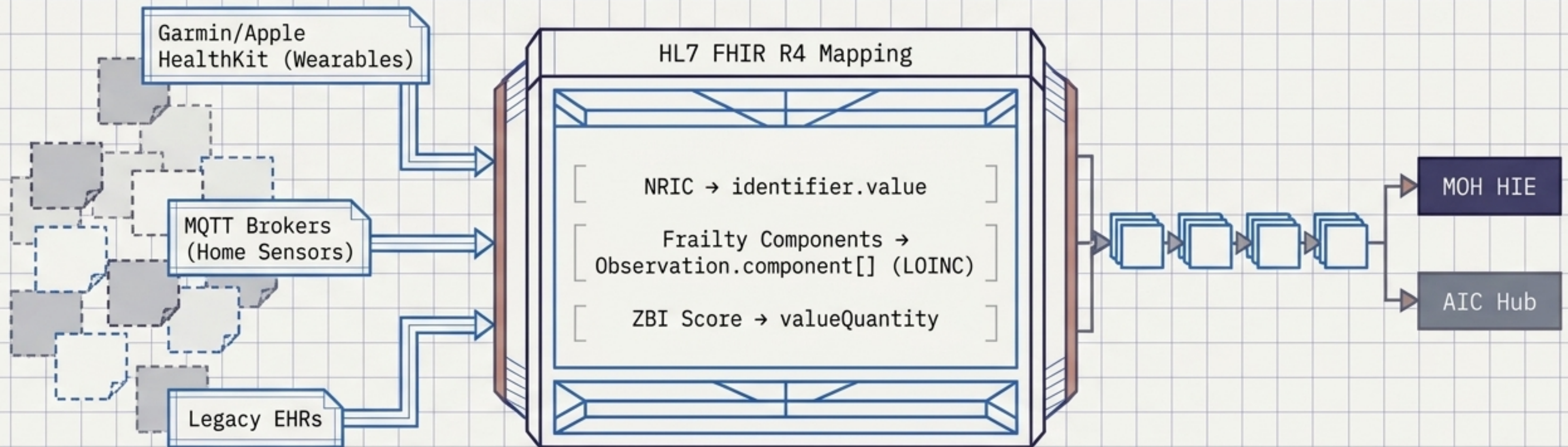
Engineering for the Speed of Care

Strict performance budgets guarantee that life-savi life-saving anomaly detection and websocket push notifications outpace UI rendering.



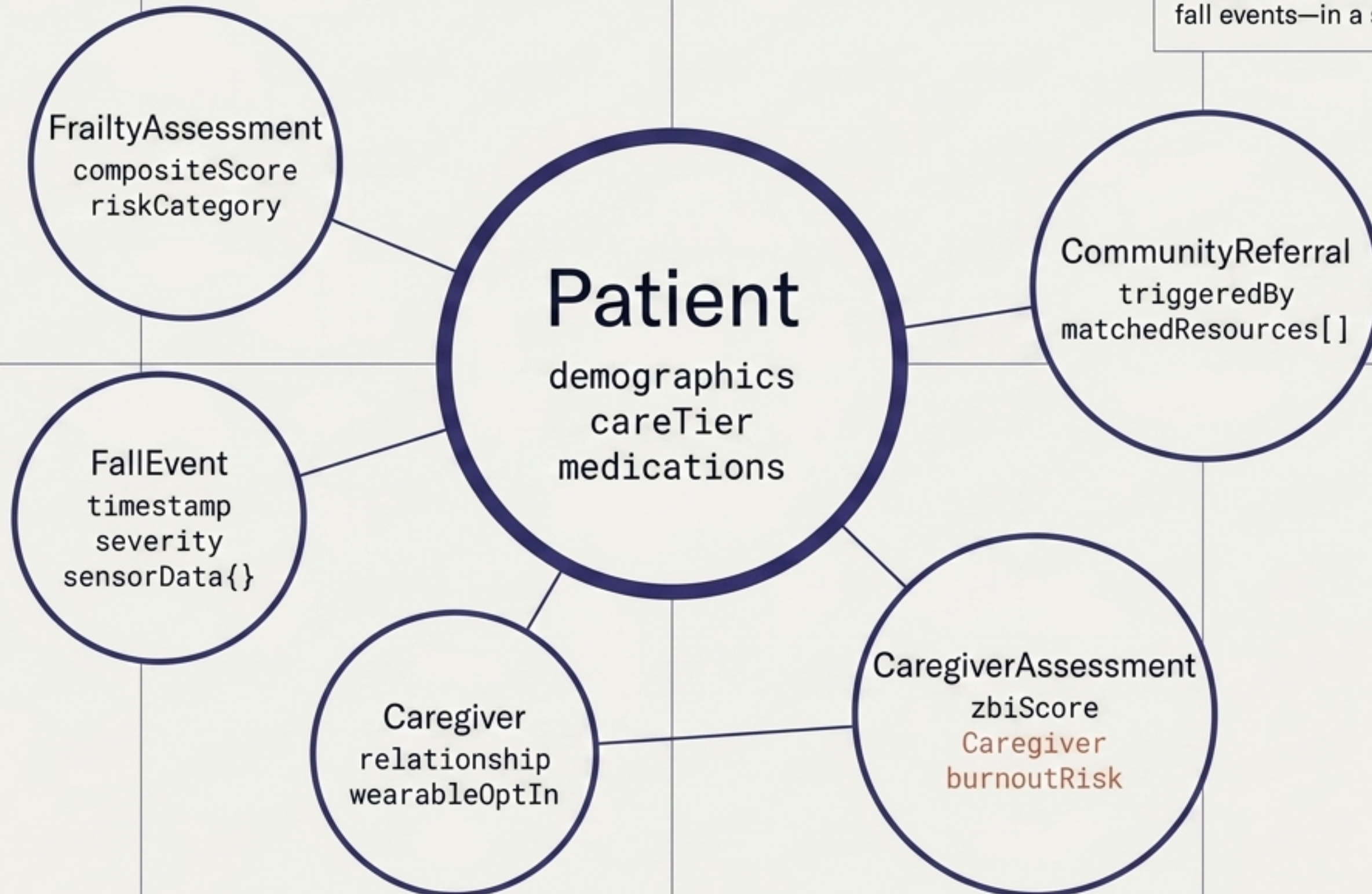
The Interoperability Bridge

Takeaway: All fragmented legacy data and raw sensor streams are standardized into HL7 FHIR R4 resources, future-proofing system interoperability with MOH systems.



Achieving the Patient 360° View

By utilizing a GraphQL schema backed by a Neo4j Graph DB, we map complex, nested patient relationships—from caregiver burnout scores to historical fall events—in a single optimized query.



The Predictive Intelligence Engine

Model	Input Vectors	Target Metric	Retrain Frequency
Fall Risk Predictor	Gait, cognitive, history, meds	AUC-ROC $\geq$ 0.85	Monthly
Caregiver Burnout Predictor	ZBI trend, sleep, HRV, respite	AUC-ROC $\geq$ 0.82	Monthly
Readmission Risk Predictor	Frailty, comorbidities, admissions	AUC-ROC $\geq$ 0.80	Quarterly
Resource Match Engine	Needs vector, capacity, distance	75% match acceptance	Weekly

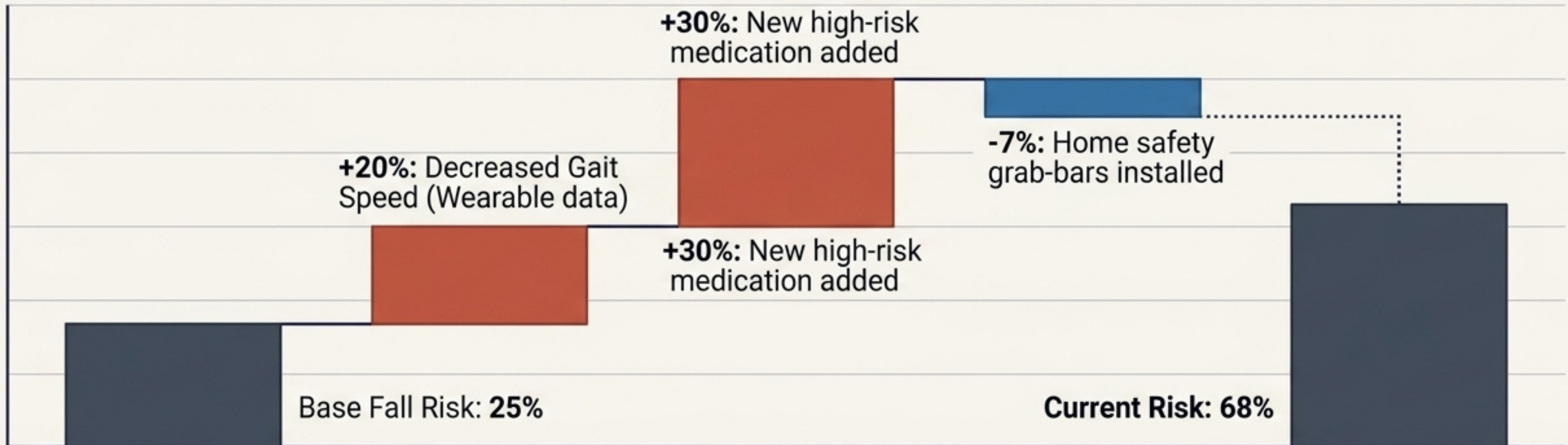
Model Registry managed via MLflow. Feature Store maintained via Feast. All classification models undergo automated fairness audits to ensure $\Delta\text{AUC} < 5\%$ across minority ethnicities.

Transparent AI for Clinical Trust

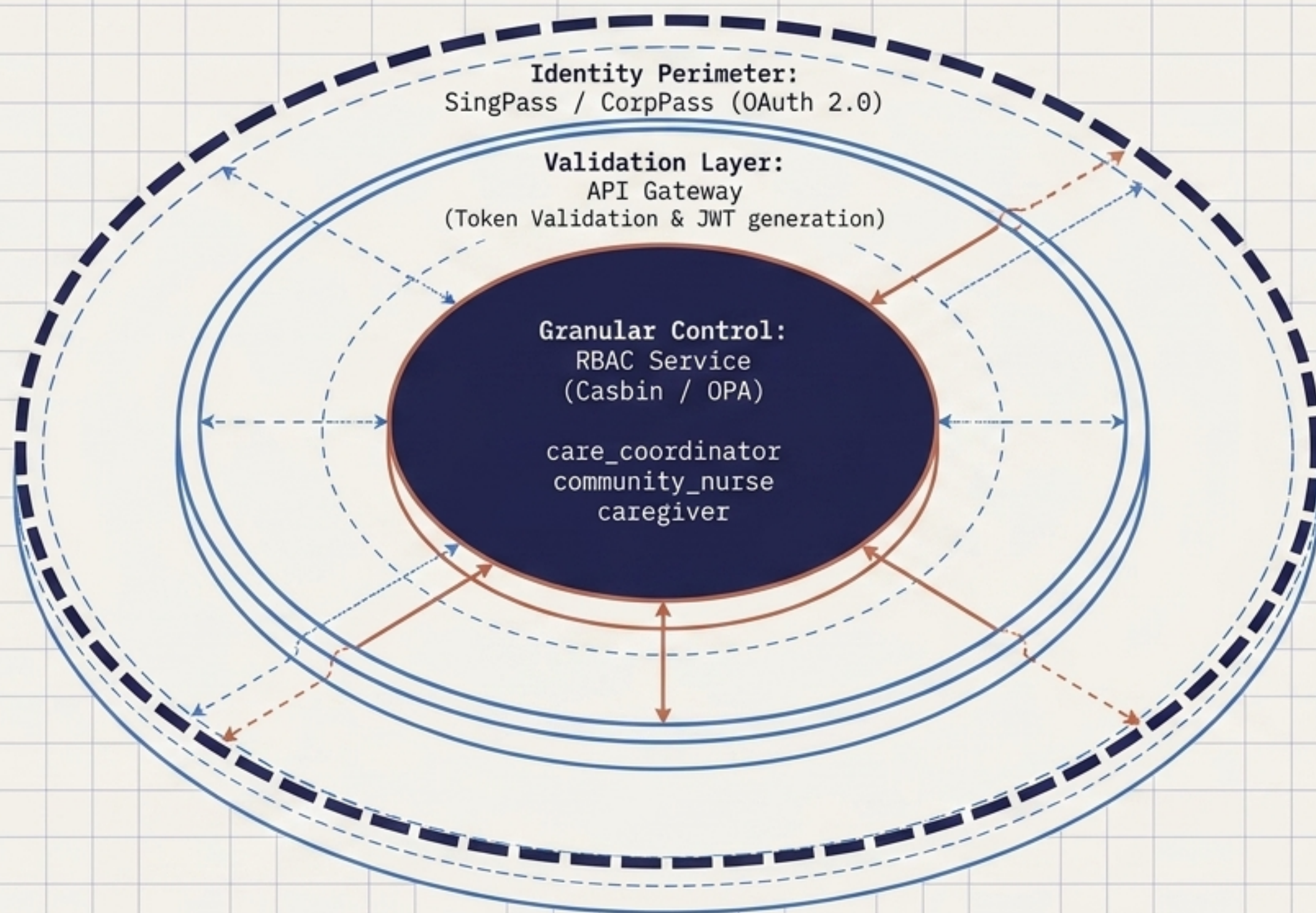
Methodology: SHAP (SHapley Additive exPlanations) + Counterfactuals.

Latency: Explanations generated in <500ms via API.

Clinical Empowerment: AI outputs include clear attention weights and manual clinical override buttons to ensure human oversight.



The Zero-Trust Security Perimeter



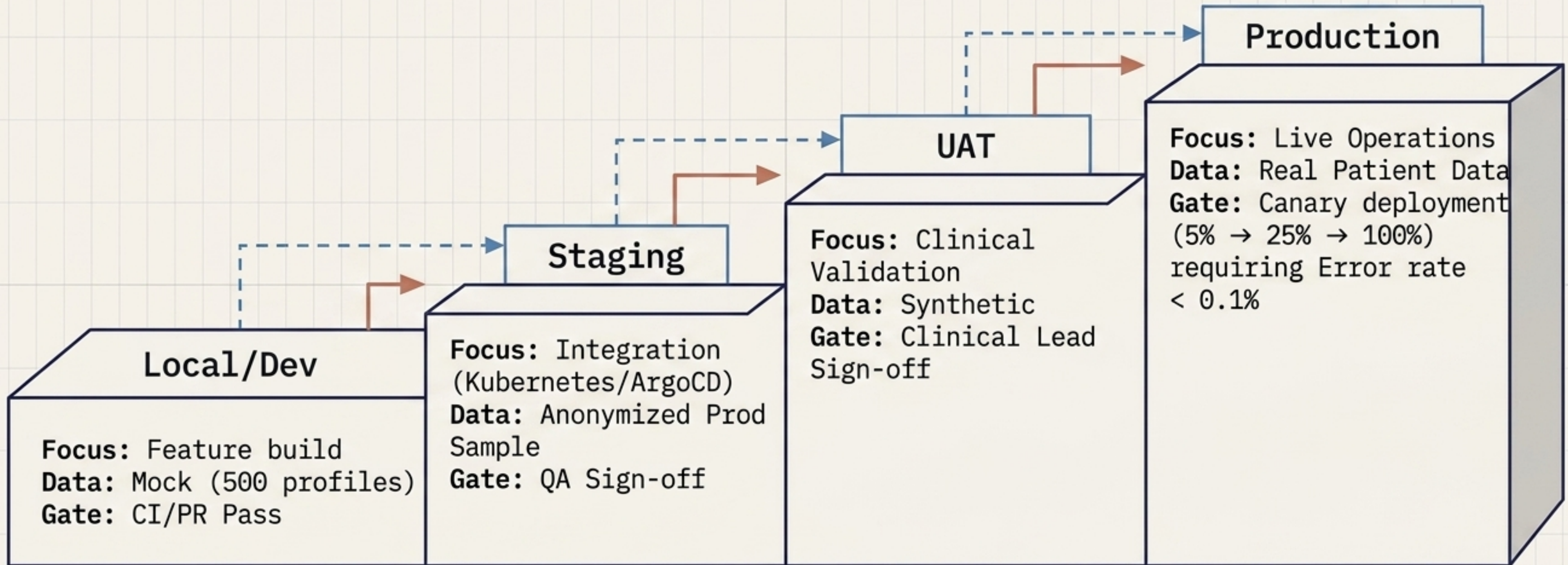
Data Privacy Controls

Anonymization:
K-anonymity ($k \geq 5$) applied to all aggregate regulatory reports.

Masking: NRIC restricted to last 4 digits;
unassigned patient names reduced to initials.

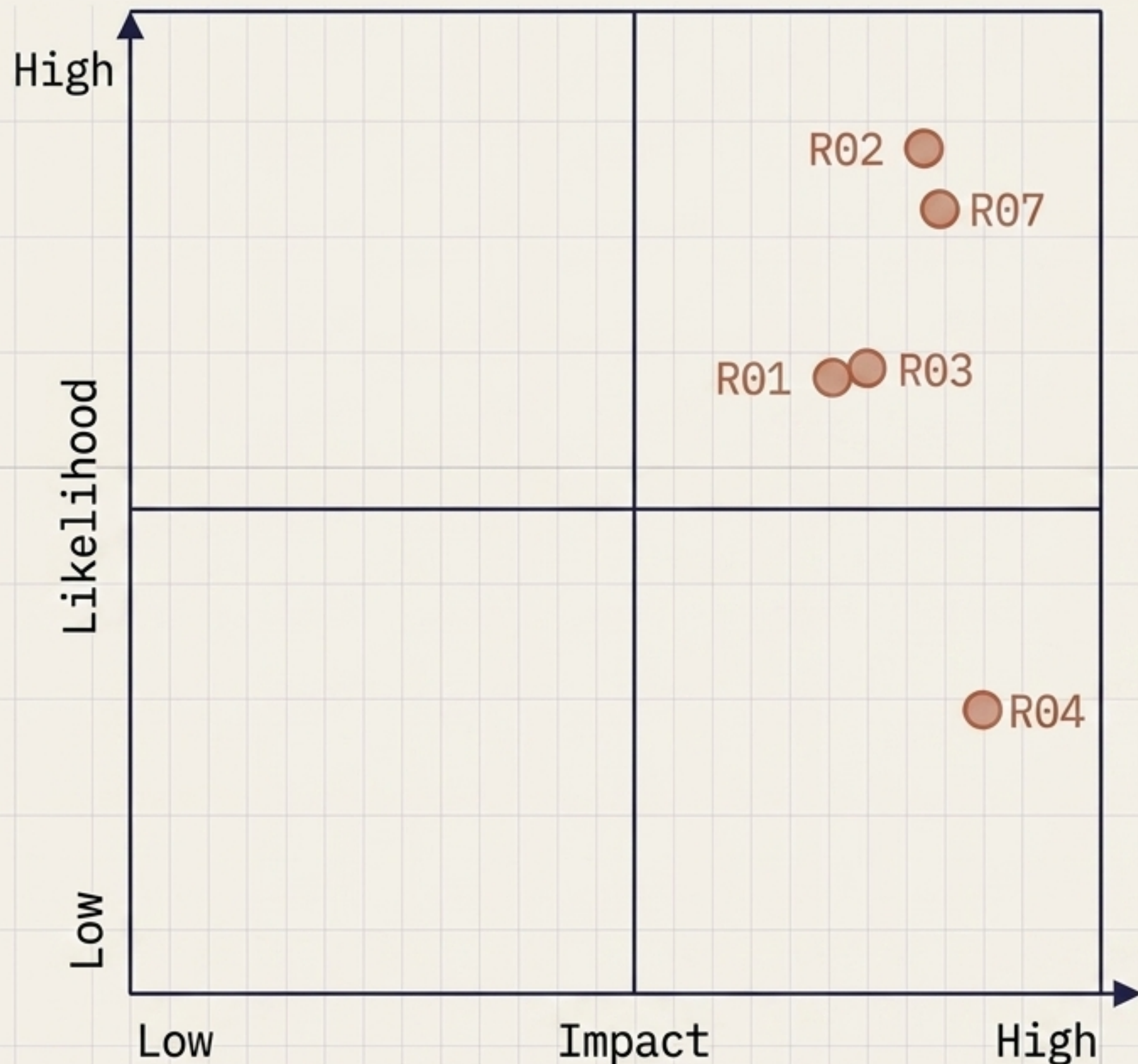
Audit & Erasure:
Immutable WORM storage for 10-year audit logs;
soft deletes trigger a 30-day automated purge queue.

The Pathway to Production Scale



Scalability Target: Architecture is budgeted to scale from a 500-patient MVP to 50,000 active patients and 1M AI inferences/day within 24 months.

Critical Risk Mitigations



R02: Caregiver App Adoption

Mitigation: Offline capability, voice interface.

R07: Wearable Data Gaps

Mitigation: Multi-source fusion, uncertainty quantification.

R01: AI Model Bias

Mitigation: Active fairness audits.

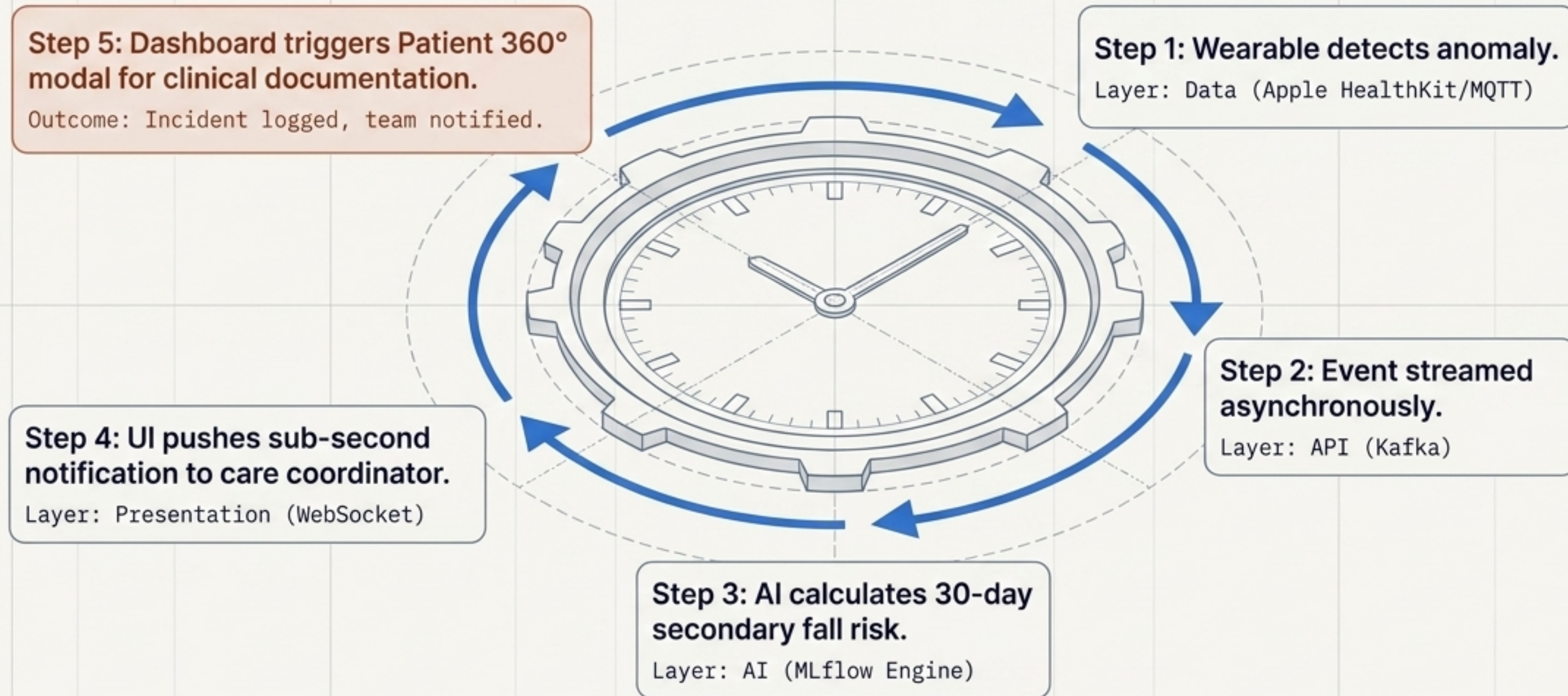
R03: EHR Integration Delays

Mitigation: FHIR adapters, manual fallback.

R04: PDPA Violation

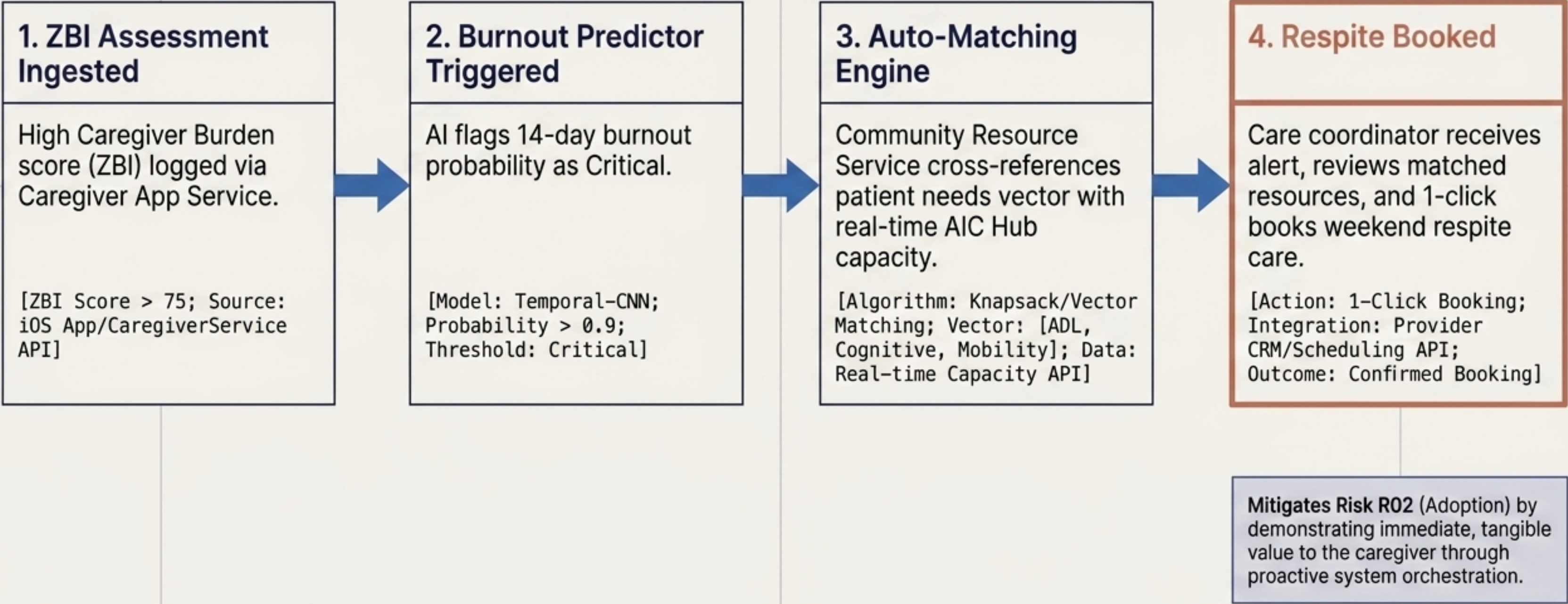
Mitigation: AES-256 encryption, DPO oversight.

Synthesis: The Fall Response Flow



The architecture collapses backend complexity into frictionless, sub-second frontline action.

Synthesis: The Caregiver Crisis Intervention



Checkpoint Validation & Sign-Off Readiness



Technology & Scalability (CTO)

Kubernetes-orchestrated, strictly budgeted for <1.5s latency, scaling to 50k patients.



Privacy & Governance (DPO)

Granular RBAC, K-anonymity ($k \geq 5$), and PDPA-compliant immutable audit trails.



Clinical & Patient Safety (Clinical Lead)

Frailty/Fall/Burnout models tuned for high AUC-ROC with mandatory clinical override capabilities.



Operational Feasibility (Operations)

Automated FHIR R4 interoperability and real-time AIC resource matching.

Design Document AGEWELL-DD-2024-001 is submitted for final governance approval to proceed with Phase 1 development.