



ZAPX LABS

Thalix

The hospital's operating system. Every system, device and sensor becomes one replayable stream, served to people, apps and AI agents under one policy.

Layer 1 · Fabric

Layer 2 · Kernel

Layer 3 · Agents · Workflows · Apps

Layer 4 · Canvas

Pilot · synthetic data only · not for clinical use · September 2026

THE PROBLEM

Every dashboard and every AI assistant rebuilds the same plumbing

Data that disagrees

HL7 feeds, FHIR servers, PACS, monitors and spreadsheets each carry their own idea of who the patient is. Nobody links them, so every consumer guesses.

Messages that vanish

An integration engine that cannot map a message drops it or parks it where nobody looks. The ward finds out when a result never arrives.

AI with no boundary

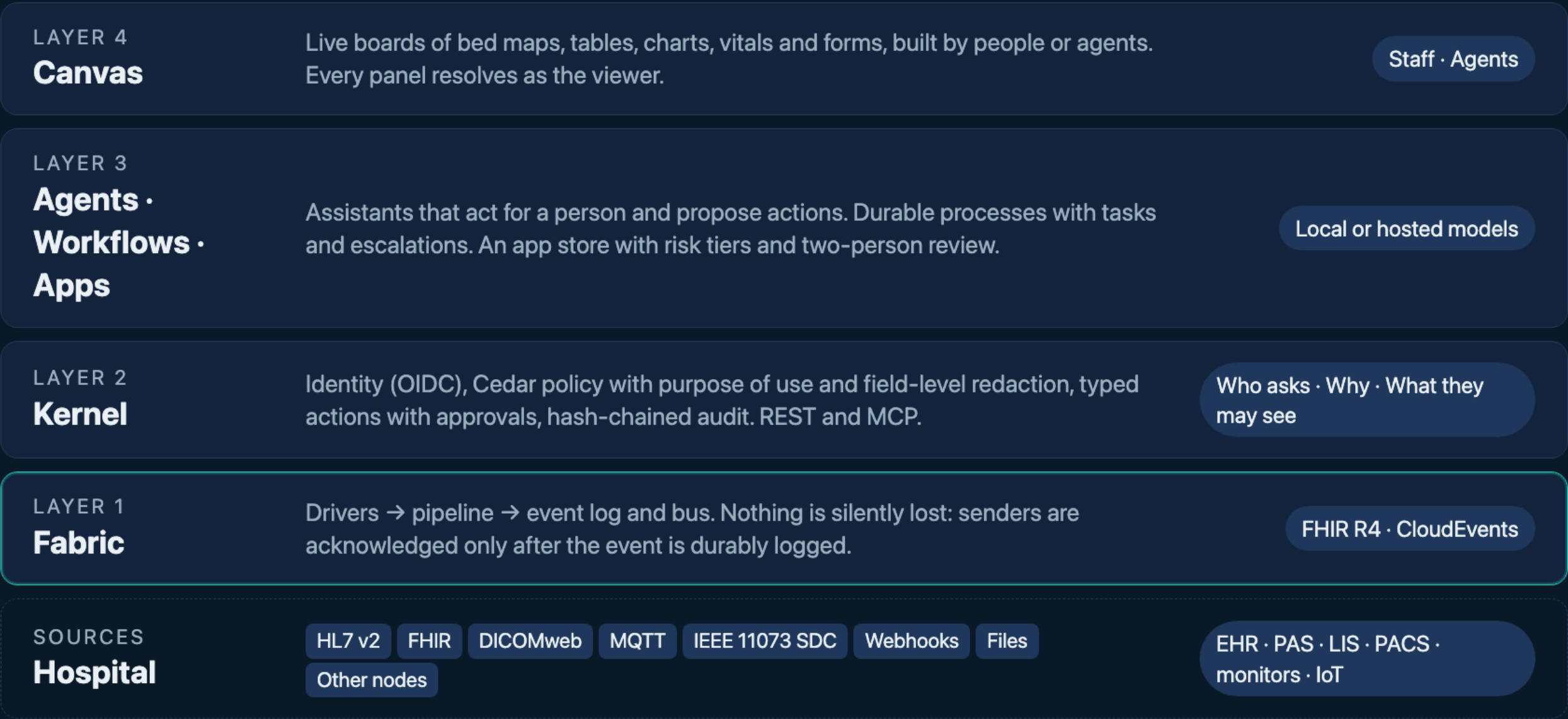
Assistants bolted onto the EHR see everything or nothing, cannot say why, and leave no record of what they read or what they proposed.

Thalix answers all three with one node: a fabric, a kernel and agents that work through it.

HOW IT IS BUILT

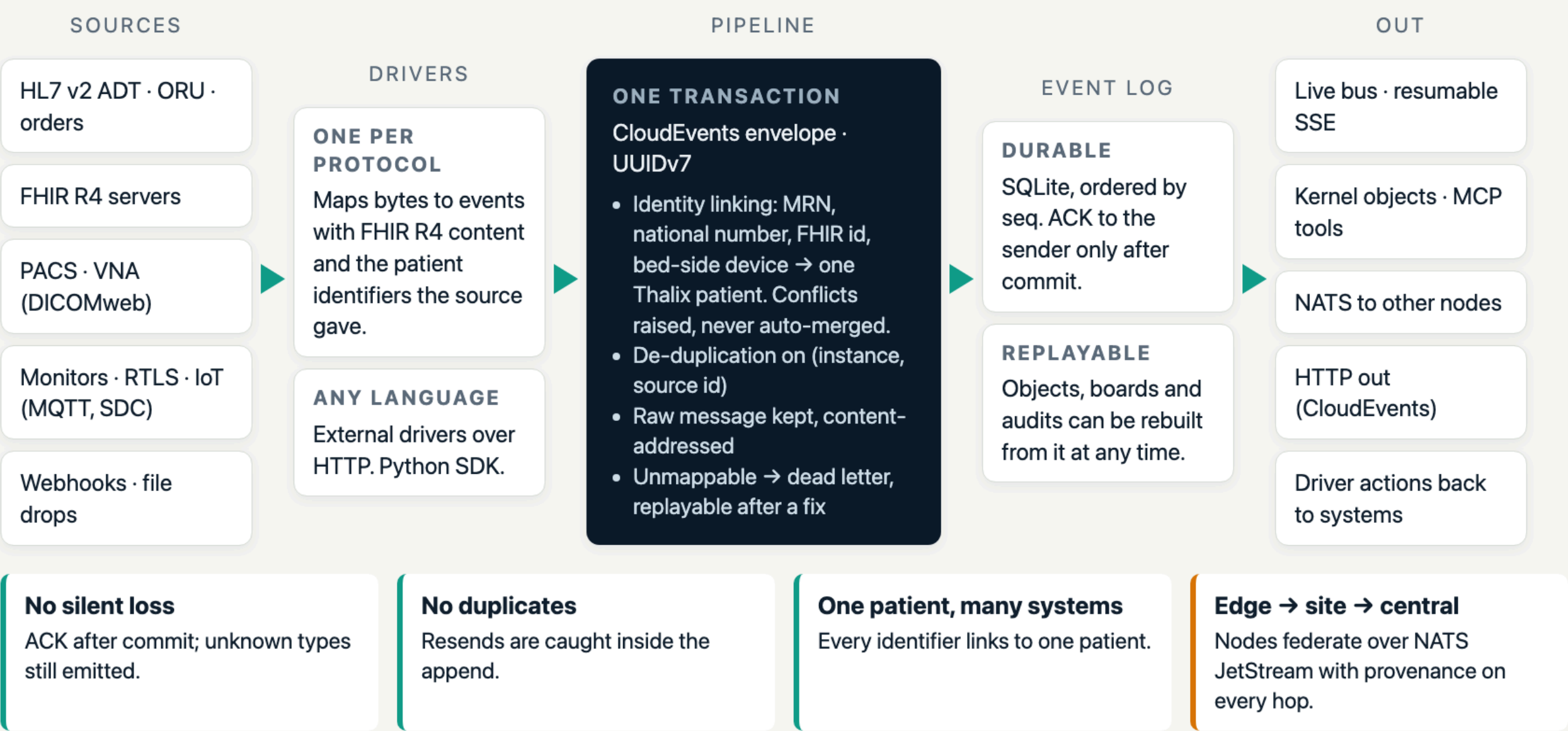
Thalix is built like a computer

One node. Every system, device and sensor in the hospital becomes one replayable stream, and everything above it works through one policy.



The path of a message

An HL7 frame, a FHIR resource, an MQTT publish or a webhook body. Each one ends up as an ordered event you can replay.



Nothing is silently lost

Property	How the node keeps it
No silent loss	The sender is acknowledged only after the event is committed. Unmappable messages become dead letters with the raw bytes; unknown types are still emitted.
No duplicates from resends	De-duplication on the instance and source id runs inside the append transaction.
Ordered, replayable history	Every event has a sequence number. SSE resumes from Last-Event-ID; delivery drivers keep cursors; objects can be rebuilt from the log.
One patient, many systems	MRN, national number, FHIR id and bed-side device assignment link to one Thalix patient. Conflicts are raised for review, never merged automatically.
Survives the network	Edge, site and central nodes each keep their own log and federate over NATS JetStream. An outage delays data; it never loses it.

Source: docs/ARCHITECTURE.md, "Guarantees". SQLite in WAL mode with batched commits sustains thousands of events per second on commodity hardware.

One policy for people, apps and agents

The kernel answers three questions on every request, then audits the answer in a hash chain.

WHO IS ASKING

Hospital SSO or a kernel token

user

service

agent, acting for a user

```
authorization: Bearer <OIDC or token>
X-Thalix-Delegation: nurse.ward4
purpose: treatment
```

An agent never sees more than the person it acts for, and never more than its model is approved to receive.

WHAT MAY THEY SEE, AND WHY

Cedar policy · purpose of use · field-level redaction

Porter

Bed 12/B: occupied,
clean needed
Patient: redacted

Nurse, Ward 4

Bed 12/B: J. Doe, 64
Results: visible

Doctor, other ward

Bed 12/B: denied
break-glass · reason ·
timed

explain shows the policy that decided. Special categories stay restricted even from staff who can see the rest.

WHAT CAN THEY DO

Typed actions, not raw writes

tier 1 · bed states, tasks

tier 2 · clinical information

tier 3 · clinical decisions, two-person rule

```
doctor requests repeat troponin (tier 3)
consultant approves
kernel → HL7 order out through the feed
agent cannot run clinical orders; it proposes a card
```

WHAT EXACTLY HAPPENED

Every read, search, stream, action and denial

```
seq 41 823 read Patient/... nurse.ward4 treatment
seq 41 824 deny Result/... porter.b no clinical access
seq 41 825 agent_run handover-helper for nurse.ward4
hash e3b0...c442 chain verified
```

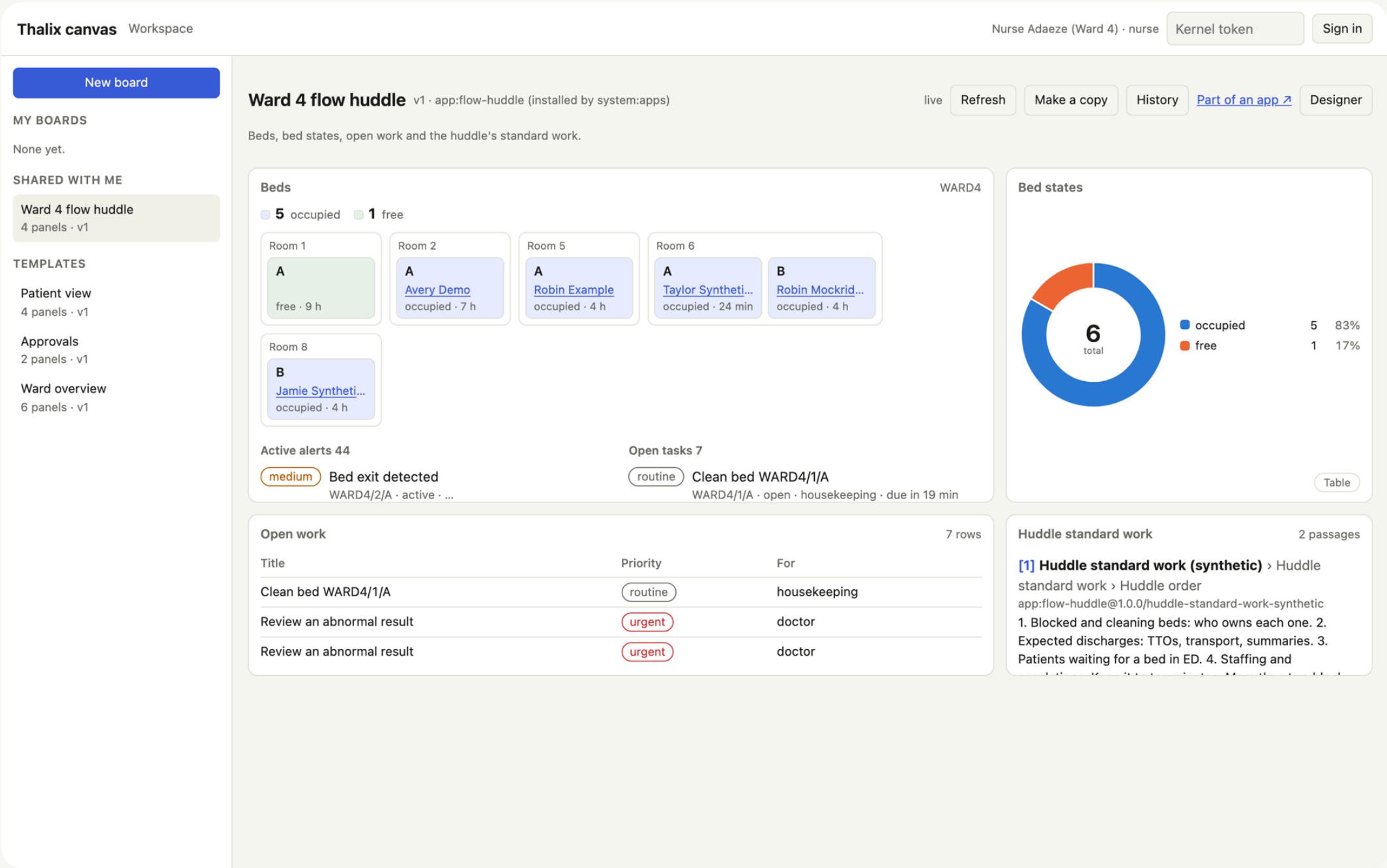
SHA-256 hash-chained and verifiable. Objects are projections of the log and can be rebuilt; the audit trail is the one record that is not.

One board, resolved as the viewer

The Ward 4 flow huddle is an installed app: beds, bed states, open work and the huddle's standard work, live from the log.

Sharing the board shares its design, never its data. A porter opening it sees the beds and not the names. Every panel read is audited.

Ask the canvas designer agent to "add a chart of open tasks by priority" and the board changes for everyone viewing it, as a version you can restore.



Screens from the running node with the synthetic hospital simulator. Names are synthetic.

Agents assist. People decide.

Everything in layer 3 works through the kernel, so a badly written agent, workflow or app cannot exceed the person it works for.

AGENTS

"Summarise bed 12/B for handover"

Local Ollama, Claude or any OpenAI-compatible model. Each model declares the data classes it may receive; the kernel enforces that ceiling on every tool call. Hospital documents are cited. Memory is scoped to a person, unit or agent.

- 1 Nurse asks in the workspace or over MCP
- 2 Agent reads only what the nurse may read, audited as agent + person
- 3 Proposes an action as a card
- 4 Nurse confirms; it runs as the nurse, approvals still apply

WORKFLOWS

Bed turnaround · Result follow-up · Discharge

Declarative JSON processes: tasks for roles with forms, due times and escalation ladders; typed actions; agent drafts; waits and branches. Instances survive restarts. Triggers start one per bed or per result.

- 1 Patient leaves the bed (event)
- 2 Workflow sets the bed to "clean needed" (tier 1, on its own)
- 3 Task for housekeeping, escalates after 40 min
- 4 Nurse in charge confirms "ready"; bed opens on the board

APP STORE

Packages of boards, workflows, agents, actions and documents

Risk tiers are computed from the contents, with the reason shown. Nobody approves their own app. Tier 2 needs the clinical safety officer. Tier 3 lives only on the certified shelf: Ed25519-signed, locked, never edited by agents.

- tier 0 · views

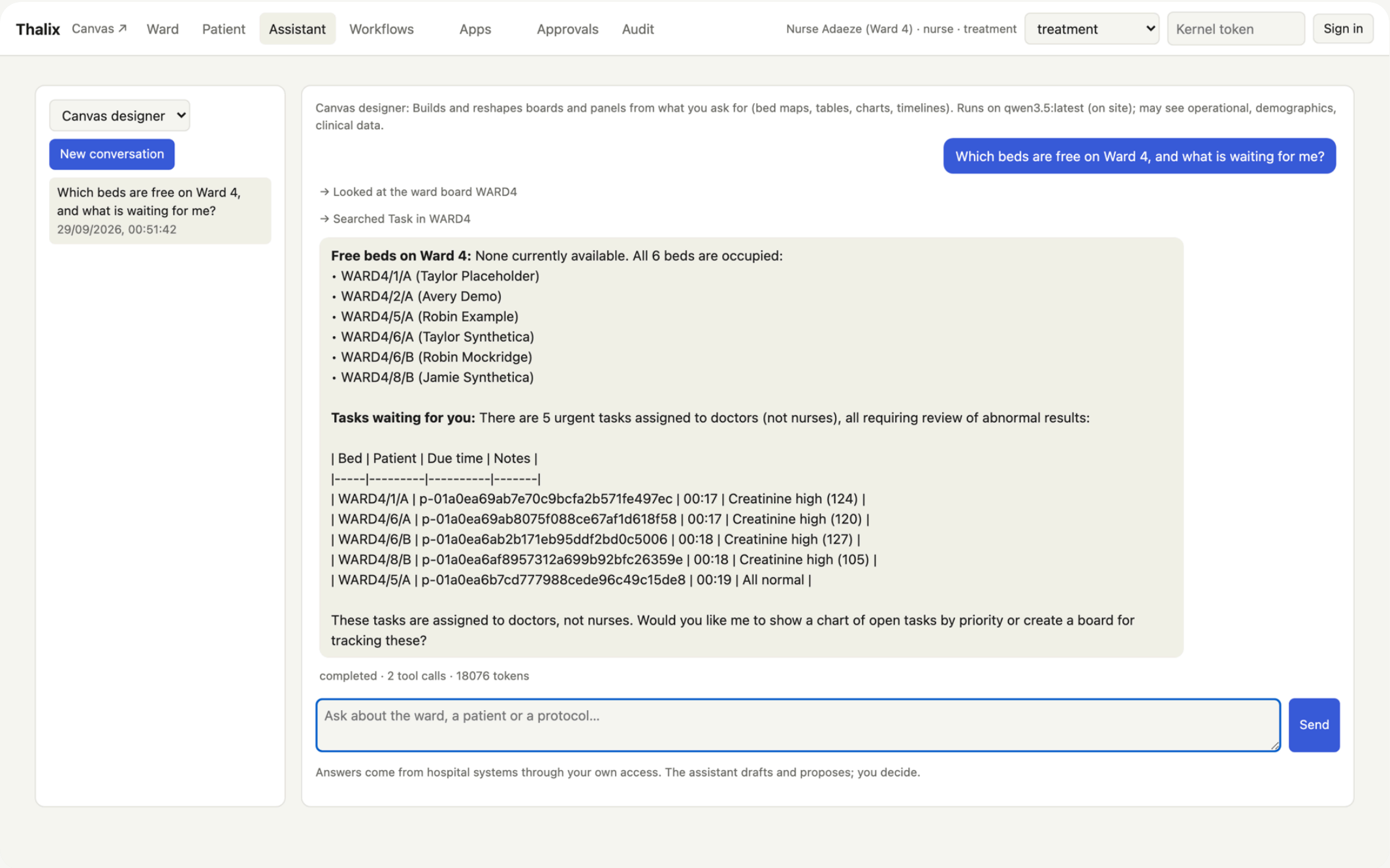
tier 1 · operational

tier 2 · clinical information

tier 3 · clinical decisions
- 1 A nurse builds a board with the canvas designer
 - 2 Publishes it as an app to the generated shelf
 - 3 Admin installs, upgrades or rolls back like an app

Ships with Ward flow huddle (installed), Handover helper (tier 2, in review) and a signed AKI response pathway (tier 3). Synthetic data only.

THE DEMO · ASSISTANT ON A LOCAL MODEL



It reads what the nurse may read, and shows its work

"Which beds are free on Ward 4, and what is waiting for me?" Two tool calls, both audited as agent plus person, answered by a 9.7B model running on the same machine.

The agent noticed the urgent tasks belong to doctors, not the nurse, and offered a board instead of a decision.

completed · 2 tool calls · 18076 tokens

Model: qwen3.5 on Ollama, on site. Hosted models can be added and are limited to the data classes they are approved for.

The privacy officer can verify the chain

Every read, search, stream, action and denial is a hash-chained entry. The workspace verifies the chain on demand.

Partial disclosures are recorded too: a bed-turnaround workflow was shown operational and clinical fields on a bed, and the entry says so.

Agent runs appear with the person they ran for.

Thalix

Canvas ↗

Ward

Patient

Assistant

Workflows

Apps

Approvals

Audit

Privacy officer Rae · privacy-officer · audit

audit

Kernel token

Sign in

principal	patient	Search	Verify chain	chain intact · 208 entries			
#	When	Who	Event	Object	Decision	Shown	Purpose
209	2026-09-28T23:51:48.360Z	privacy.1	admin		permit		audit
208	2026-09-28T23:51:45.903Z	privacy.1	admin		permit		audit
207	2026-09-28T23:51:44.332Z	nurse.ward4	read	Unit/WARD4	permit		treatment
206	2026-09-28T23:51:43.921Z	agent:results-watch	agent_run	Agent/results-watch	permit		treatment
205	2026-09-28T23:51:42.819Z	agent:canvas-designer for nurse.ward4	agent_run	Agent/canvas-designer	permit		treatment
204	2026-09-28T23:51:40.415Z	workflow:bed-turnaround	action_execute		permit		operations
203	2026-09-28T23:51:40.412Z	workflow:bed-turnaround	action_request		permit		operations
202	2026-09-28T23:51:40.388Z	workflow:bed-turnaround	read	Location/ICU/2/A	partial	operational, clinical	operations
201	2026-09-28T23:51:40.379Z	workflow:bed-turnaround	workflow	WorkflowInstance/wi-01a0ea6e6c5b7797b00b6079ef52a696	permit		operations
200	2026-09-28T23:51:11.143Z	workflow:bed-turnaround	action_execute		permit		operations
199	2026-09-28T23:51:11.142Z	workflow:bed-turnaround	action_request		permit		operations
198	2026-09-28T23:51:11.139Z	workflow:bed-turnaround	read	Location/ICU/1/A	partial	operational, clinical	operations
197	2026-09-28T23:51:11.137Z	workflow:bed-turnaround	workflow	WorkflowInstance/wi-01a0ea6dfa207002b7e0599776b6bf0b	permit		operations
196	2026-09-28T23:51:00.372Z	nurse.ward4	read	Unit/WARD4	permit		treatment
195	2026-09-28T23:50:56.267Z	workflow:bed-turnaround	action_execute		permit		operations
194	2026-09-28T23:50:56.265Z	workflow:bed-turnaround	action_request		permit		operations
193	2026-09-28T23:50:56.261Z	workflow:bed-turnaround	read	Location/WARD4/1/A	partial	operational, clinical	operations
192	2026-09-28T23:50:56.258Z	workflow:bed-turnaround	workflow	WorkflowInstance/wi-01a0ea6dc001723286d82e9be2f32f58	permit		operations
191	2026-09-28T23:50:51.030Z	workflow:result-follow-up	action_execute	Patient/p-01a0ea6bb92c700ebc34fc2abb72829f	permit		treatment
190	2026-09-28T23:50:51.029Z	workflow:result-follow-up	action_request	Patient/p-01a0ea6bb92c700ebc34fc2abb72829f	permit		treatment

Chain intact · 208 entries at the time of capture. The audit trail is the one kernel record that is not a projection of the event log.

WHERE IT STANDS

A working node, ready for a pilot on synthetic data

15

Rust crates in one workspace

8

Protocol drivers, plus a Python SDK and an SDC gateway

55k

Lines of Rust, 85 files with tests, CI on every push

1

Binary with SQLite inside. No database to install.

Deployment	What ships
Docker Compose stack	The node with HTTPS, Ollama with pinned models, the demo simulator, optional MQTT and NATS. Certificates made on first start.
Offline bundle	One archive with images, model weights, Docker Engine for Linux, an installer and checksums, for sites without internet.
Federation	Edge, site and central nodes over NATS JetStream, provenance kept on every hop.

Not yet: a clinical safety case, information-governance approval and a security review. All demos run on synthetic data.

A PILOT

Start with one ward and the feeds it already has

Week 1 · Connect

A node on a ward PC or a hospital VM. HL7 from the PAS and LIS, FHIR where it exists, bedside devices over MQTT or SDC. Synthetic data until governance clears.

Week 2 · Sign in

Hospital SSO, roles from directory groups, the Cedar policy reviewed with information governance. The audit chain shown to the privacy officer.

Weeks 3 to 6 · Use

The flow huddle board, bed turnaround and result follow-up workflows, and the assistant on a local model. Measure what the ward stops doing by hand.