

PROPOSAL: NAIGE Care – Hardware-Enforced Safety and Support for Eldercare

As life expectancy increases, more families are struggling with the demands of caregiving. Without long-term planning, many resort to ad-hoc care services or nursing homes.

NAIGE Care provides comfort, care, and connection to seniors in their own homes. We support individuals living with dementia or age-related challenges through our personalised programmes, including Cognitive Stimulation Activities, Home Nursing, and Home Care.

NAIGE's role is all about helping seniors stay active, independent, and happy.

NAIGE assists them through daily routines, meaningful activities, and provides emotional support that truly makes a difference. To achieve this safely, the NAIGE Care architecture is built on a tiered, hardware-enforced infrastructure that prioritizes patient dignity and human oversight.

Class A Concept Layer: Nightingale's Eyes Care

At the foundational concept and governance layer sits **Nightingale's Eyes Care**. It defines the system's intended use, safety boundaries, and privacy-first principles without claiming autonomous clinical outcomes. It establishes the overarching mandate for the deployment: utilizing LiDAR-based spatial scanning to resolve industry failures in patient privacy and unreliable fall detection, protecting vulnerable elderly patients in both home and hospital care settings.

A13b Monitoring Support: Privacy-First Observation

For continuous home and ward observation, the **A13b Sensing Limb** serves as the frontline monitoring hardware. It is the best fit for residential care because it enforces the 3ZEROS™ protocol (Zero Camera, Zero Audio, Zero Cloud), ensuring that no optical lenses or microphones are ever used. Instead, it uses 905nm LiDAR to track patient movement and detect falls by converting raw spatial data into anonymized 96-cell center-of-mass voxel grids directly at the edge. This keeps the system strictly within a Class B-style observational and advisory role, guaranteeing patient dignity.

A8 Bridge Layer: Deterministic Intake and Filtering

Before any observational data from the A13b node reaches a nurse or family caregiver, it must pass through the **A8 Bridge Hub**. The A8 acts as the deterministic intake and filtering bridge, serving as a singular hardware chokepoint. It ensures that all advisory data is screened for anomalies, agentic drift, or uncertainties before it is admitted into any care workflow. By dropping unvalidated or hallucinated data packets instantly, the A8 bridge preserves the non-agentic rule and prevents unauthorized AI escalation.

A13a Mobility Support: Human-Authorized Assistance

When physical assistance is required, the **A13a Eldercare Mobility** tier provides explicitly human-authorized mobility support (such as EV wheelchairs). The A13a embodiment operates under hardwired kinematic constraints and strict safety limits (including fail-to-hold electromagnetic brakes and controlled deceleration). Crucially, it possesses zero autonomous actuation rights; it is a supportive mobility chassis that is physically governed by direct human authorization under all failure modes.

Conclusion

Within the NAIGE Care proposal, Nightingale's Eyes Care contributes as privacy-preserving safety infrastructure across Class A, A8, A13a, and A13b, while all care decisions remain with human professionals and family caregivers.

Intellectual Property & Citation

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NAIGE Framework Component Registry and Technical Specifications

Code	Module Name	Governance Layer	Technical Function	Safety Mechanism	Hardware/Software Specification	Clinical Application
A12	Deterministic Black Box (Terminal Gate)	Hardware Core (P, N, and D Layers)	Serves as the universal deterministic governor, enforcing human authorization and mediating all downstream physical actions.	Sacred Pause™ (25–1000 ms mandatory hardware delay) and Tripartite Latch (Iris + Token + Pedal) requiring multi-factor human commit.	1 kHz hardware master clock, FSM Safety Kernel (±0.05 mm jerk/acceleration limits), silicon-level isolation.	Secure clinical execution and task verification across general healthcare and eldercare platforms.
A13a	Medical Mobility Enclosure	Deterministic Stratum (P, N, and D Layers)	Patient transport with hardwired kinematic constraints; occupant-carrying powered mobility; enforces P-LIFE 1.00 mandate.	Hardwired kinematic constraint layer; Stop Category 1 (controlled deceleration); hardware-enforced jerk-limit invariant; U7 Sovereign Brake™ integration.	A13 family architecture; ISO 7176-series controls; electromagnetic fail-to-hold brake; AL-6061 chassis; mapped to HSA Class C/D requirements.	Patient transport, physical safety in eldercare mobility, and support for high-acuity conditions like stroke.

A13b	LiDAR Sensing Lane	P-Layer (Privacy-by-Physics)	Primary sensing; converts raw 905nm LiDAR point cloud to anonymized Center-of-Mass (CoM) kinematic vectors via node-local voxelization.	3ZEROS™ Protocol (Zero Camera, Zero Audio, Zero Cloud); biometric stripping at the silicon layer; Silicon Privacy Wall.	905nm LiDAR; edge-computing voxel engine; 96-cell CoM grid; mapped to HSA Class A/B SaMD standards.	Continuous privacy-preserving monitoring and dignity protection in residential care, nursing homes, and hospital bed bays.
A13c	Clinical Robotic Platform / Manipulators	Deterministic Stratum (N Layer / Advisory P Layer)	Execution of acute clinical tasks and physical ADL assistance via high-payload manipulation and voxel grid translation.	Kinematic constraints; Three Zeros; strict jerk limits; deterministic horizon compliance; human-in-the-loop oversight (AIHGle 2.0).	Hardware comparators; LiDAR clouds to voxel grids; mapped to HSA Class C/D medical device standards.	B2B clinical intervention; eldercare nursing home wards; acute clinical support and physical safety in medical environments.
U7	Sequencer (Sovereign Brake™)	D-Layer (Finality & Fail-Safe)	Emergency stop system that instantly severs physical power to actuators upon any detected breach, anomaly, or lack of authorization.	Inaction-as-Safe-Default (P-LIFE 1.00): Defaults system to mechanical stillness; hardware-based One-Shot Sequencer.	Physically drops LDO power rails in < 1.05 ms; IEC 61508 SIL 3 compliance.	Emergency stop enforcement for patient mobility enclosures, clinical robotic arms, and residential bedside care.

WD117	Enhanced WORM Ledger	D-Layer (Forensic / Immutability)	Maintains a continuous hardware heartbeat and records an append-only log of every system event and human authorization for legal defensibility.	OTP Silicon Fuses: Once a record is written, the circuit breaks; SHA-3-512 hash chain; Post-Quantum signatures.	Physical Write-Once-Read-Many (WORM) memory; silicon-level finality; no return path to facility IT.	Legal defensibility, compliance audits, and absolute forensic traceability for clinical-grade home care governance.
A7	Bridge Hub / Translation Layer	N-Layer (Deterministic Chokepoint)	Sole ingress chokepoint translating semantic advisory data into deterministic hardware features.	Agentic Drift Screening: Filters incoming data for contradictions, uncertainty, and confidence scoring before admitting to A12.	Hardware execution layer utilizing pRegisters for national infrastructure coordination; EMF-drift screening.	Safely coordinates external B1/OEM AI systems with clinical hospital ward systems.
N12	Agentic Drift Detection Kernel	N-Layer (Control)	Performs internal drift checks and contradiction screening on translated advisory inputs within the A12 Black Box.	Blocks anomalous AI pathways from reaching the Sacred Pause™ deliberation gate; Fail-loud local alarm.	Hardwired deterministic algorithm; hard-locked at 1.1x Orange-Code baseline.	Ensures AI-generated advisories do not cause Authority Drift during eldercare monitoring.
B1	Nightingale's Eyes Care	P-Layer (Advisory)	Non-agentic residential monitoring and home health monitoring.	3ZEROS™ Protocol (Zero Camera, Zero Audio, Zero Cloud); P-LIFE 1.00 constitutional safe-default.	Biometric identity destruction at silicon level; mapped to HSA Class A/B SaMD standards.	Home health monitoring, acute support coordination, and elderly care for dementia/stroke patients.

Tripartite .1x	Human Authorization Layer	D-Layer / Sovereign Gate	Mandatory multi-factor human commitment gate for high-risk kinetic actions.	Hardware "AND" gate; token hard-expiry < 5 seconds.	Iris scan + cryptographic USB token + kinetic foot pedal (SITL).	Authorization of kinetic surgery, robotic manipulators, and high-acuity care interventions.
NAIGE NAI 4.0	Kinetic Capstone Architecture	Cross-Layer (P, N, D)	Integrated technical backbone supporting hospital-level home care without compromising privacy or safety.	Hardwired physical silicon governance; separation of human care from hardware infrastructure.	905nm LiDAR; 1 kHz master clock; SHA-3-512 hashing; P-LIFE 1.00 constitutional safe-default.	Hospital-level home care sensing and control for dementia, stroke, and diabetes management.
A10a	Deterministic Root of Trust	Bedrock / Self-Verification	Foundational hardware anchor that invalidates the stack upon tamper detection.	P-LIFE 1.00 standard enforcement; hardware-rooted mandate.	A10 HEGE enclosure; STEP (ISO 10303) B-Rep geometric determinism.	Verification of authorization and log integrity across all configurations.
A8	Bridged Layer 8	Sovereign Deployment Layer	Enforces the Tiger .1x Key™ confirmation to ensure strict human authority over deployment.	Hardware-rooted Tiger .1x Key confirmation.	Patent reference 10202602225P; standalone filing.	High-dependency eldercare; Layer 8 Home architectures; Toa Payoh Hearth residential eldercare.
Non-B1	Limited Agentic Monitoring Shell	Advisory Stratum	Provides clinical decision support and generates probabilistic recommendations based on patient data.	Zero actuation rights; physically isolated from kinetic control; interfaces exclusively via A7 Bridge.	Unconfined non-deterministic software (RAG advisory).	High-risk clinical monitoring (e.g., cardiac, oncology, x-ray analysis) where AI serves as an advisory tool only.

x.1	Eldercare Cyber-Physi- cal Protection	Forensic / Fail-Safe Layer	Isolates the care apparatus from facility IT networks (Wi-Fi, nurse-call) to prevent IT-Gap Drift.	Fail-Loud Doctrine: Heartbeat interruption asserts Sovereign Brake and triggers a local alarm.	IZEKOS™ galvanic isolation; independent hardware alarm; Tamper Detection Envelope.	Protects vulnerable nursing home residents from cyberattacks, ransomware, or spoofed alerts.
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WG-B1	Humanitaria n Field Kit	Edge Layer	Zero cloud execution and deliberation in disaster zones.	Humanitarian shield; Sovereign Brake; Sacred Pause™.	Solar assisted edge hardware.	Global humanitarian efforts; disaster relief; remote field use.
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NAIGE Care: Hospital-Level Home Care & Clinical Governance for Singapore's Super-Aged Society

Author & Architect: Edwin Koh Wui Kiat (Tiger)

Publisher: Non-Agentive AI Governance Singapore [UEN 53522354D]

Collaborative Review & Reflection: Triade Collaborative (Perplexity, Gemini, and Claude)

Core Framework: NAIGE NAI 4.0 (Parent Patent SG020603109STW)

About This Proposal

This volume proposes **NAIGE Care (Version 3)**: a clinical-grade, hospital-level home-care service designed to help seniors—especially those managing high-acuity conditions such as dementia, stroke, and diabetes—live safely and with absolute dignity in their own homes.

Building upon the Collaborative Triade review and Claude's candid reflections, Version 3 explicitly separates day-one human-delivered care from future privacy-preserving hardware infrastructure. It addresses the crisis of the Sandwiched Generation by bringing structured, clinical-grade care directly to the residential bedside, anchored by national policies such as *Age Well SG* and aligned with MOH/HSA governance expectations (*AIHGle 2.0*).

Section 01: The Home Care Crisis in a Super-Aged Singapore

In 2026, Singapore is a super-aged society where more than one in five citizens is aged 65 or older. Longer lives have brought a rising tide of complex chronic care needs—dementia, stroke recovery, and diabetes management—leaving families and the "Sandwiched Generation" deeply unprepared.

- Ad-hoc care arrangements and institutional placement often happen sooner than families desire, driven by a lack of structured support rather than clinical necessity.
- The physical and psychological toll of 12-hour shifts on family members or human caregivers highlights an urgent need: **hospital-level care delivered securely at home**, rather than relying solely on overburdened hospital wards or center-based day care.

Section 02: The NAIGE Care Vision — Human-First, Tech-In-Reserve

NAIGE Care is fundamentally a **trained human-care service** supported by non-agentive, privacy-preserving technology in reserve.

- **The Human Anchor:** Recognizing that Singapore's home-care ecosystem relies heavily on human caregivers and Migrant Domestic Workers (MDWs), NAIGE Care provides structured pods, consistent teams, and robust clinical oversight to lift the mental and physical burden off families.
- **The Technology Guardrail:** Where technology assists, it does so quietly via the **3ZEROS™ Protocol** (Zero Camera, Zero Audio, Zero Cloud) and the **P-LIFE 1.00**

constitutional safe-default, ensuring that AI only observes and advises while humans retain absolute decision-making authority.

Section 03: Clinical Programmes & Evidence-Based Care

NAIGE Care delivers personalised, reviewed programmes matched to each resident's changing needs:

- **Cognitive Stimulation Activities:** Following published Cognitive Stimulation Therapy (CST) principles, focusing on small-group engagement, memory, language, and wellbeing rather than unverified dementia prevention claims.
- **Home Nursing & Acute Support:** Skilled nursing for health monitoring, medication management, wound care, and coordination with doctors—bringing hospital-grade clinical oversight directly to the home bed.
- **Personalised Home Care:** Compassionate, practical help with activities of daily living (ADLs) executed to preserve choice, routine, and personal dignity.

Section 04: The Technical Backbone — NAIGE NAI 4.0 Kinetic Capstone

To support hospital-level home care without compromising patient privacy or safety, Version 3 integrates the NAIGE NAI 4.0 architecture:

- **Privacy-by-Physics (P-Layer):** Uses **905nm LiDAR voxelization** to strip biometric identity at the silicon level, capturing pure Center-of-Mass (CoM) kinematic vectors without cameras or microphones.
- **Deterministic Deliberation (N-Layer):** Operates on a 1 kHz master clock enforcing the **Sacred Pause™** (25–1000 ms hardware timing) and the **Tripartite .1x Key™** (Iris scan, cryptographic token, and kinetic foot pedal) for high-risk authorization.
- **Finality & Fail-Safe (D-Layer):** Equipped with the **U7 Sovereign Brake™** (severing LDO power rails in under 1.05 ms upon anomaly detection) and the **WD117 Enhanced WORM Ledger** (recording events via OTP silicon fuses and SHA-3-512 hashing).

Section 05: Regulatory Alignment (HSA/MOH & International Standards)

- **HSA Risk Classification & Tiers:**
 - Observational and residential monitoring tools (such as the A13b LiDAR sensing lane and B1 Nightingale's Eyes Care) align with **HSA Class A/B SaMD** standards.
 - Acute kinetic platforms (such as the A13a mobility enclosure or A13c robotic manipulators) map to **HSA Class C/D** medical device requirements.
- **AIHGLE 2.0 Compliance:** Translates high-level regulatory expectations for transparency, accountability, and human-in-the-loop oversight directly into hardwired physical silicon.

Section 06: Claude's Candid Reflection & Recommendations (Summary)

Carried forward from the Triade Collaborative review:

1. **Keep Technology Unproven Claims Separate:** Never let the sensing stack read as a validated medical intervention before independent clinical trials.
2. **Modest CST Framing:** Frame home visits around engagement and wellbeing rather than cognitive cures.
3. **Workforce Rigor:** Staffing continuity and small care pods are just as critical to service quality as hardware design.
4. **Human Validation:** AI document reviews and digital simulations must be followed by rigorous human clinical, regulatory, and operational validation.

Colophon

- **Volume No.** 91
- **Author & Architect:** Edwin Koh Wui Kiat (Tiger)
- **Publisher:** Non-Agentive Governance Singapore (ACRA T260229801)
- **Guiding Principles:** Humility, Silence, Dignity, Benevolence
- **Core Doctrine:** *AI Observes, AI Advises, Hardware Governs, Human Decides.*
P-LIFE 1.00.

The main improvement is to make the **human-delivered workforce, training, and clinical governance** just as explicit as the technology guardrails, so the proposal reads as a real care service rather than a device-forward concept.

What to keep

- **Hospital-level home care** as the central promise.
- **Day-one human delivery** as the first reality.
- **Tech-in-reserve** as a support layer, not the headline.
- **HSA class discipline**: A13b/B1-style monitoring remains observational, while A13a/A13c remain kinetic.

What to add

- **Clinical governance**: spell out escalation pathways, nurse oversight, documentation standards, and family communication.
- **Training**: make structured training mandatory for carers, including dementia care, CST facilitation, safe transfers, infection control, and family communication.
- **Workforce continuity**: say explicitly that small care pods and retained teams are part of safety, not just staffing.
- **Outcome honesty**: keep all cognitive or disease claims modest and evidence-based, especially for CST and home visits.

“NAIGE Care is a trained human-care service first, with clinical governance, workforce training, and family coordination as core deliverables; privacy-preserving hardware remains an enabling safeguard, not a substitute for care.”

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This volume proposes **NAIGE Care (Version 3)**: a clinical-grade, hospital-level home-care service designed to help seniors – particularly those living with dementia, stroke, diabetes, and other high-acuity conditions – remain **safe, clinically supervised, and treated with absolute dignity in their own homes**.

Building upon Triade Collaborative review and Claude's candid reflections, Version 3:

- Keeps **day-one human-delivered care** strictly separate from future privacy-preserving hardware infrastructure.
- Addresses the strain on the **Sandwiched Generation** by bringing structured, clinically governed care directly to the residential bedside, aligned with **Age Well SG** and MOH/HSA AIHGle 2.0 governance expectations.
- Treats workforce, training, and continuity as **first-order safety requirements**, not afterthoughts.

Section 01 · The Home Care Crisis in a Super-Aged Singapore

In 2026, Singapore is a super-aged society: more than one in five citizens is aged 65 or older, and by 2030 the figure will reach one in four. Longer lives bring a rising tide of complex chronic care needs – dementia, stroke recovery, diabetes, multimorbidity – that many families and the **Sandwiched Generation** meet unprepared.

Without structured support, households fall back on ad-hoc arrangements or move a loved one into residential care sooner than they wished, driven by **system gaps rather than clinical necessity**. Twelve-hour shifts by family members or Migrant Domestic Workers, fragmented nursing support, and repeated hospital transfers impose a quiet but real toll on physical health, mental wellbeing, and family stability.

NAIGE Care is proposed as a **hospital-level home-care response**: bringing clinical governance, trained human care, and privacy-preserving monitoring into the home, so ageing in place becomes a **safe, realistic default**, not a fragile ideal.

Section 02 · The NAIGE Care Vision — Human-First, Tech-In-Reserve

NAIGE Care is, first and last, a **trained human-care service**. Technology stands in reserve as a safeguarded, non-agentic assistant.

- **The Human Anchor.** Singapore's home-care ecosystem relies heavily on human caregivers and MDWs. NAIGE Care organises care into small pods and consistent teams, backed by nurse oversight and clear escalation pathways, so responsibility and risk do not rest silently on one exhausted family member. Structured induction and continuous training turn "good intentions" into **repeatable, clinical-grade practice**.
- **The Technology Guardrail.** Where technology assists, it does so quietly and deterministically via NAIGE NAI 4.0: the **3ZEROS™ Protocol** (Zero Camera, Zero Audio, Zero Cloud) and **P-LIFE 1.00** (inaction-as-safe-default) ensure that sensing preserves dignity-by-physics and that AI **only observes and advises**. Hardware-enforced non-agentic governance keeps humans in full control of any kinetic or clinical consequence .

The vision is simple: **human care first, hardware safety in reserve**. A senior is supported by people from day one; devices arrive later, only after independent validation, as a way to **strengthen safety without weakening trust**.

Section 03 · Clinical Programmes & Evidence-Based Care

NAIGE Care delivers personalised programmes that are **clinically supervised** and regularly reviewed:

- **Cognitive Stimulation Activities.** Group and small-group sessions following published **Cognitive Stimulation Therapy (CST)** principles: structured engagement, conversation, memory, language, and social connection. The evidence is strongest for **group CST**, not for unstructured home visits, so Version 3 frames these sessions around **engagement and wellbeing**, not unproven claims of dementia prevention or cognitive maintenance.
- **Home Nursing & Acute Support.** Skilled home nursing for health monitoring, medication and insulin management, wound care, pressure-sore prevention, and post-discharge support. Nurses coordinate with the senior's doctors, hospital teams, and community providers, so **care plans and escalation protocols** are coherent and documented, not improvised.
- **Personalised Home Care (ADLs).** Compassionate, practical help with washing, dressing, mobility, meals, continence care, and daily routines, executed in ways that preserve **choice, cultural habits, and personal dignity**. Carers are trained in safe transfers, falls prevention, and infection control, so routine assistance remains physically safe as acuity rises.

Each programme is documented, scheduled, and reviewed under **clinical governance** – a home-care service that behaves like a hospital ward in its discipline, but keeps the **home** as the place of comfort.

Section 04 · The Technical Backbone — NAIGE NAI 4.0 Kinetic Capstone

To support hospital-level home care without compromising privacy or safety, NAIGE Care Version 3 integrates the **NAIGE NAI 4.0** hardware-enforced governance architecture :

- **P-Layer · Privacy-by-Physics.** 905 nm LiDAR arrays capture raw spatial point clouds which are instantly voxelized into anonymised 96-cell **Center-of-Mass (CoM)** grids at the edge. There are **no cameras, no microphones, no cloud**: biometric identity is destroyed at the silicon level before any data leaves the device .
- **N-Layer · Deterministic Deliberation.** A synchronous **1 kHz master clock** enforces the **Sacred Pause™** (25–1000 ms mandatory hardware delay) and the **Tripartite .1x Key™** (Iris scan, cryptographic USB token, kinetic foot pedal) for high-risk authorization. AI advisory outputs are held, screened, and cannot cross into kinetic or high-risk actions without explicit, multi-factor human release .
- **D-Layer · Finality & Fail-Safe.** The **U7 Sovereign Brake™** can sever LDO power rails to actuators in under 1.05 ms on anomaly detection, forcing a return to mechanical stillness. The **WD117 Enhanced WORM Ledger** records every alert, authorization, and system state via **One-Time Programmable (OTP) silicon fuses** and **SHA-3-512 hashes**, providing **unalterable forensic finality** for clinical audit and incident review .

In Version 3, this backbone is explicitly described as **future infrastructure**, not a present clinical claim: it is the architecture Tiger will bring forward to HSA for Class B and Class C/D devices, once independent trials and validation are complete.

Section 05 · Regulatory Alignment (HSA/MOH & International Standards)

NAIGE Care Version 3 is framed to align cleanly with **HSA** and **MOH AIHGle 2.0** expectations:

- **HSA Risk Classification & Tiers.**
 - Observational, residential monitoring tools – **A13b LiDAR sensing lanes, Nightingale’s Eyes Care (B1)** – are positioned in the **Class B SaMD observational tier**, strictly advisory and non-kinetic .

- Acute kinetic platforms – **A13a mobility enclosures, A13c clinical robotic manipulators** – are positioned in **Class C/D actuating medical device tiers**, under full non-agentic, sovereign-in-the-loop governance .
- **AIHGLE 2.0 Compliance.** High-level guideline principles – patient safety, human oversight, transparency, explainability, robustness, security, data protection, and alignment with human values – are translated into **hardwired silicon controls**: human-in-the-loop, privacy-by-design, immutable logging, and fail-safe architecture rather than software policy alone .
- **Standards Mapping.** NAIGE NAI 4.0 components map to **ISO 13485** (quality management), **ISO 14971** (risk management), **IEC 62304** (software lifecycle), **ISO 7176 / ISO 10218 / IEC 60601-series** for mobility and robotic safety, and **IEC 61508 / ISO 13849-1** for functional safety in actuating tiers .

Regulatory alignment is presented as **a roadmap, not a claim**: each device is a candidate for HSA dossier submission under ASEAN CSDT, and its risk class is held honestly to avoid under-classification or over-promise.

Section 06 · Summary

1. **Keep technology and care separate.** The sensing and hardware stack remains **unproven** until independent validation; NAIGE Care’s day-one promise is **trained human care**, not a device-led cure.
2. **Modest CST framing.** CST claims stay modest and **evidence-based**: group formats for engagement and quality of life, home visits framed around wellbeing, not guaranteed cognitive protection.
3. **Workforce rigor.** Staffing continuity, small care pods, structured induction, and supervision are treated as **safety infrastructure**, just as critical as any hardware or software design.
4. **Human validation as the next step.** AI document review and digital simulation are helpful sharpening tools, but the project is not “real” until **human regulatory, clinical, and care-operations experts** test, critique, and validate it.

“NAIGE Care is proposed as hospital-level home care for a super-aged Singapore – built on trained human carers, clinical governance, and privacy-preserving hardware in reserve, and held to honest, evidence-based guardrails until human validation is complete.”

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