

EON Universal

Facility-Agnostic Training & Field Intelligence for Healthcare

A composable equipment ontology for biomedical & clinical engineering.
For hospital device fleets — the biomed shop and the bedside.

Genesis shows the steps. EON Universal understands the work.
Understand the Work. Compose Any Device.



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Executive summary

EON Universal is a facility-agnostic field-intelligence layer for healthcare technology management. It understands medical devices at the level of process intelligence — not just the steps of a procedure — and uses that understanding to turn any worker into the equivalent of a multi-year expert, in the training center and in the field.

The industry has spent a decade building bespoke simulators one site at a time. That model never closes economically, because it treats the work as an infinite list of hospitals to memorise. EON Universal inverts the problem. It learns a bounded library of medical devices — about fifty device classes in a hospital fleet — and composes any device on any ward from them. Because the system understands the components, it can recognise them on sight, compose the correct procedure, branch a procedure on live conditions, inject faults, generate unlimited valid configurations, and certify a worker against a standard.

EON Universal is distinct from — and complementary to — **Genesis**, EON's engine for converting SOPs and photographs into simulations. The relationship is captured in a single line: **Genesis shows the steps; EON Universal understands the work.** Authored once, that understanding is delivered everywhere — on a phone or AR glasses, on a tablet on the real device, and inside an immersive CAVE. It is built on GMDN / UMDNS (ISO 15225), so its output speaks the customer's own data language, and it is a library the enterprise owns rather than a per-site cost that recurs forever.

The thesis in one paragraph. Don't model five hundred hospitals; model the fifty component classes they are built from. Give each class a six-layer competence record so the machine truly knows it. Then let the system recognise, guide, and escalate — turning hard-won field expertise into an owned, compounding asset that no general-purpose AI can replicate, because that knowledge has never left your sites.

SECTION 1 · THE PROBLEM

The expertise cliff

Across wards and biomedical shops, the senior clinical engineers who hold decades of judgment are retiring as device fleets grow, diversify, and connect. The knowledge that matters — how a ventilator behaves when a sensor drifts, why a capacitor must be discharged before service, what 'normal' looks like on a calibrated pump — lives in a shrinking number of heads and almost nowhere in the hospital's systems.

The standard response has been content: vendor courses tied to one make and model, expensive and of little help on the next device in the queue. The unit economics never close, because every new model is a new training effort and the permutations are effectively infinite.

EON Universal begins from the worker's reality instead. A competent system should let someone walk up to a device they have never seen and still do the job correctly. It should **recognise** the component on sight, **guide** the worker through the correct procedure step by step, and **escalate** — stop and hand off to a human — the instant it is unsure. The worker is green; the guidance is not.

SECTION 2 · THE CORE INSIGHT

Composition, not enumeration

A hospital is not a monolith to be memorised. It is a fleet assembled from a finite library of known device classes — the same infusion pumps, ventilators, monitors, defibrillators and analyzers, deployed differently from one site to the next. The decisive move is to model the vocabulary, not the device estate.

Think of learning a language. You could try to memorise every full sentence you will ever need — an endless, hopeless task. Or you can learn the words and the grammar, and then build any sentence on demand. Enumeration memorises sentences; composition learns words. EON Universal learns the components and composes any device on any ward from them.

Two cost curves

Enumeration — model every site. Effort scales with the number of hospitals, so it is unbounded; every new site is a fresh modelling project, and the combinatorics are hopeless. It is a cost that recurs forever.

Composition — model the vocabulary. Effort scales with a bounded set of component classes — about fifty to start. The system recognises nodes, infers topology, and composes the rest. Every job performed makes the shared library smarter. It is an asset that compounds.

You don't model every hospital. You model the device classes every hospital is built from.

SECTION 3 · THE BOUNDED LIBRARY

Fifty classes, not five hundred hospitals

In a hospital fleet, roughly 50 device classes cover the overwhelming majority of biomedical work. About 15 classes carry most of the daily value, and together the core library accounts for more than 80% of real work orders. This is what makes the problem tractable: a bounded, knowable set rather than an open-ended catalogue of makes and models.

Built on GMDN / UMDNS (ISO 15225) — the medical-device nomenclatures (ISO 15225) that clinical engineers already use. When EON Universal recognises a device, its output maps straight into the hospital's CMMS / asset register and the device's service history. It speaks their data language on day one.

Tier	Scale	What it covers
Tier 1	~50 classes	Core devices a biomed touches — 80%+ of work orders
Tier 2	~300 types	Makes & models — rarely surprised
Tier 3	1,000–2,000	Maintainable items: sensors, batteries, valves, boards

The tiers describe depth, not breadth of effort. Tier 1 is where the value concentrates; Tiers 2 and 3 extend the same records into variants and maintainable items so the system is rarely surprised in the field.

SECTION 4 · WHAT “KNOWING A COMPONENT” MEANS

The six-layer competence record

A class name is a label. Understanding is a structure. EON Universal carries a six-layer competence record for every class, and each layer earns its place:

1. **Identity** — the GMDN/UMDNS class, make and model, and common aliases. This is how the system names what it sees.
2. **Geometry** — a 3D model and multi-angle imagery, so the component can be recognised and rendered from any viewpoint.
3. **Anatomy** — subcomponents and the boundary of the asset: what is part of it, and where it ends.
4. **Function** — what the component does and its operating envelope: the normal conditions under which it works.
5. **Behavior** — how it responds to upsets and abnormal conditions. This is the layer that makes guidance safe.
6. **Procedure** — how to operate, inspect, isolate, and fix it, expressed as composable steps rather than a single fixed script.

Recognition keys on layers 1–2. Guidance composes from layers 3–6. A simulator that only stores geometry can show a part; a system that also stores function and behavior can reason about it. That is the difference between a recording and an understanding.

SECTION 5 · THE DIFFERENCE

Genesis shows the steps. EON Universal understands the work.

EON Universal does not replace **Genesis**. Genesis is EON's production-ready core engine: it converts standard operating procedures and ordinary photographs into interactive, hands-on simulators, compressing what used to take hours of authoring into minutes. Genesis is the on-ramp — it captures how a task is done and renders it as a simulation a worker can practice today.

EON Universal is the **understanding layer** that sits on top. It brings the component library, the configurator, and live recognition, and it knows *why* each step exists. Because it understands the equipment, it can do things a scripted simulator structurally cannot. The boundary between the two products is exact:

GENESIS — the core engine	EON UNIVERSAL — intelligence + library
Needs 3D models supplied to it	Brings the component library and the configurator
Runs sequential SOPs only — not conditional	Authors conditional SOPs that branch on live conditions
Knows what to show, but not why	Explains why each step matters
Cannot configure different capabilities	Generalises to devices it has never seen
Does not recognise equipment in real life	Recognises equipment on sight — feeds FieldIQ + Holodeck

This is the step nobody has taken — not even a simulator. Genesis gives you a faithful recording of a procedure; EON Universal gives you a system that understands the equipment well enough to adapt the procedure, generalise it to new devices, and recognise the real thing in the field. That understanding is the entire product.

SECTION 6 · IN THE TRAINING CENTER

What EON Universal makes possible

Understanding the equipment unlocks a class of capabilities that scripted content cannot reach:

- **Talking components.** Every part can explain what it is and how it works, and let the worker try it — turning a static model into an explorable teacher.
- **Conditional procedures.** Branching SOPs with safety gates — discharge the capacitor before opening — rather than a single straight line of steps.
- **Fault diagnosis.** Inject a fault and require the trainee to recognise and respond, building judgment instead of rote sequence memory.
- **Generative configurations.** Produce unlimited, valid device configurations from one component library.
- **Certification.** Generate defensible, scored evidence that a worker is ready, measured against the relevant standard.
- **Compounding.** Every session improves the shared library, so the next worker starts from a smarter system.

SECTION 7 · THE SEVEN TRAINING USE CASES

From exploration to certification

The first library ships with seven training use cases that move a worker from first contact to certified competence:

1. **Talking components** — free exploration: tap any part to learn it and try it.
2. **Guided & scored SOP** — step-by-step execution with live scoring and feedback.
3. **Conditional SOPs** — procedures that branch on live conditions, with safety gates.

4. **Fault injection** — recognise and respond to an introduced abnormality.
5. **Generative configurations** — unlimited valid layouts for varied practice.
6. **AR-only practice** — 1:1 rehearsal with no physical hardware.
7. **Certification** — scored, defensible evidence of readiness against the standard.

The proof: a conditional SOP that branches

A fixed SOP is a straight line. A conditional SOP is a decision tree with safety gates, where the next action depends on a live condition. Take servicing a defibrillator: power down and isolate, remove the battery, then ask — is capacitor charge still present? If yes, discharge it safely and re-check, looping until safe; if no, proceed to service. Anything abnormal stops the job and escalates to a human (Verdict).

Why this is the proof. The 'capacitor charge still present?' branch only exists because EON Universal knows, from the device's behavior layer, that a defibrillator's high-voltage capacitor holds a lethal charge after power-off. Genesis has no concept of stored charge, so it cannot branch on it. A conditional, safe procedure is something only a system that understands the device can author.

SECTION 8 · ONE SYSTEM, THREE SURFACES

Author once — deliver everywhere

Because a single understanding drives delivery, content is authored once and meets the worker on whichever surface fits the moment:

- **Anywhere — phone or AR glasses.** AR-only practice at 1:1 scale, off-shift, with no device on the bench.
- **In the shop — tablet or AR glasses on the device.** LiDAR overlays the digital twin onto the real device; every part is tappable.
- **Immersive — the CAVE (Holodeck).** LED walls and floor surround the trainee in a generated bay at full scale — a modern, reborn iCube, and the premium tier.

The progression is natural: practice on a phone off-shift, validate on a tablet against the real device, and rehearse the highest-consequence scenarios immersively in the CAVE — all from the same library, with the same understanding underneath.

SECTION 9 · HOW IT IS BUILT

The Pyramid — layer by layer

EON Universal is built from the bottom up, and you cannot skip a level. Each layer is a prerequisite for the one above it:

1. **3D model** — an accurate model is the base of everything.
2. **Label** — every component identified and tagged.

3. **Function** — what each labelled component does.
4. **Foundational skills** — the must-know basics, especially safety.
5. **SOPs** — standard procedures applied on that foundation.
6. **Field** — using everything in the field: the eventual goal.

The lower layers are about understanding *components*, not hospitals — which is precisely the bridge to a universal, facility-agnostic solution. Get the foundation right, and the field outcome follows.

SECTION 10 · BEYOND HEALTHCARE

The same engine, every heavy industry

Because EON Universal understands devices rather than memorising hospitals, the method transfers to any sector built from a finite parts vocabulary. Healthcare shares the same composition logic proven first in oil and gas. Aerospace MRO and power and energy each present their own bounded vocabulary and follow the same approach. The investment in the method — recognition, the six-layer record, the configurator, conditional procedures — is reusable across verticals. Learn the devices once; help every site built from them.

SECTION 11 · THE ARCHITECTURE & THE VALUE

Own the work, not the weights

The architecture is intentionally legible. **Genesis** is the core engine — it models, labels, and runs step-by-step SOPs. **EON Universal** adds the intelligence: the library, the configurator, and recognition. **FieldIQ and the Holodeck** deliver it — field recognition, on-the-spot guidance, and immersive scenarios. Capture flows up the stack; delivery flows back down to the worker.

Why it compounds

- **Every job makes the system smarter.** Usage feeds the shared library; the asset improves with operation rather than depreciating.
- **It works on hospitals it has never seen.** Recognise, infer topology, compose — no per-site rebuild required.
- **It is a library you own.** A bounded asset on your balance sheet, not a per-site modelling cost that recurs forever.

Own the work, not the weights. General-purpose AI models are a commodity that everyone rents. How your hospital actually runs is not on the public internet, so no foundation model can learn it. EON Universal turns that proprietary know-how into a structured, owned, compounding asset — the durable advantage as AI absorbs the commoditised work around it.

SECTION 12 · WHERE IT FITS

Work Intelligence and the Intelligence Flywheel

EON Universal is one engine inside a larger company architecture: **One System Human 2.0** is the vision, the **Intelligence Flywheel** is the engine, and **Work Intelligence** is the asset — the enterprise's missing system of record for how work is actually done. ERP holds your resources, CRM your customers, PLM your products; Work Intelligence holds your work. EON Universal is how that work becomes executable on the frontline: it converts the standard operating procedures captured by Genesis into living, adaptive guidance, and it carries that competence from the training center into the field through FieldIQ and the Holodeck.

SECTION 13 · ENGAGEMENT

Getting started

A typical engagement begins with a single high-value device family — infusion pumps or ventilators, say — and a defined set of service procedures, proving the recognised–guide–escalate loop on the hospital's own fleet and data. From there, the library extends class by class along the GMDN/UMDNS vocabulary, and delivery expands across phone, tablet-on-the-device, and the CAVE. Because the records align with GMDN/UMDNS, outputs integrate with existing CMMS and asset-management systems from the start.

The composition method is proven first in oil and gas and applies directly to the hospital's device vocabulary. A companion presentation accompanies this paper, and the EON AI Ventures team is available to scope a first library against a target operation.