EON Reality

EON Genesis 3.0

Interact & Multi-Platform Module
Complete Technical Specification

Create. Experience. Verify.

Module 1: EON Genesis Interact — Interaction & simulation layer
Module 2: EON Multi-Platform Publishing — Desktop, tablet & VR

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What Genesis 3.0 Adds

Two modules transform Genesis from a visualization platform into a full training simulator.

Module 1: EON Genesis Interact

- Complete interaction engine — click, grab, move, place, assemble, toggle
- 4-phase training loop: Show Me → Train → Let Me Try → Evaluate Me
- Behavior Engine with 14 reusable templates (9 core + 5 advanced)
- Safety Gating System preventing dangerous out-of-sequence actions
- Scoring & Evaluation Engine with oral assessment integration
- Conversational Authoring — build interactions by talking to the avatar

Module 2: EON Multi-Platform Publishing

- Desktop model — mouse, keyboard, microphone via web browser
- Tablet model — dual-mode Chopstick (laser) & Hand (direct grab)
- VR model — Meta Quest controllers + optional hand tracking
- Unified cross-platform input mapping — 12 abstract actions
- Publishing pipeline — hybrid WebXR + native strategy
- Performance targets — 60fps desktop/tablet, 90fps VR

Four Design Principles

Author Once, Run Everywhere

Creators build a procedure once. The platform automatically adapts the interaction model to each device. No platform-specific work.

Full Feature Parity Across Platforms

Every interaction type works on every platform. No desktop-only or VR-only features. Input adapts; capability does not degrade.

Conversational Authoring

Non-programmers create interactions by talking to the AI avatar. No code, no menus. Describe the procedure, the system builds it.

Reusable Behavior Library

Common patterns pre-built as templates. Creators apply with minimal config. AI generates new behaviors and saves them for reuse.

MODULE 1

EON Genesis Interact

Complete interaction and simulation layer for immersive training

- Training Loop Controller
- Interaction Runtime
- Behavior Engine
- Step Sequencer
- Scoring Engine
- Authoring Interface

The Four-Phase Training Loop

Every procedural training follows four phases. From guided observation to formal competency assessment.

SHOW ME	TRAIN	LET ME TRY	EVALUATE ME
5–7 min	7–10 min	5–7 min	6–10 min
Avatar-guided demonstration. Learner observes. Drone navigates to each component. Avatar narrates the WHY, not just the WHAT. Not evaluated.	Guided practice with hints. Visual guides, step text, drone assist. Progressive hint degradation across attempts. Errors counted but not penalized.	Independent practice. No guides, no highlights. Help on request only (recorded as assist). Safety gating still active. Full performance tracking.	Formal assessment. No assistance. Dangerous actions recorded, not blocked. Oral assessment follows. Full competency score generated.

Training Mechanics

Progressive hint degradation during Train phase and configurable progression logic between phases.

Progressive Hint Degradation (Train Phase)

MAX — **1st Attempt**

Full visual guide + step text + avatar verbal + drone points at target

MED — **2nd Attempt**

Reduced visual guide + step text + avatar on request only, no drone

MIN — **3rd Attempt**

No visual guide + step text only + avatar silent unless asked

Mode Transitions & Progression

- Linear (default): Show Me → Train → Let Me Try → Evaluate Me
- Flexible: skip phases, direct-to-evaluate for recertification
- Configurable min Train attempts before Let Me Try unlocks
- Configurable min score before Evaluate Me unlocks
- Auto-advance or manual phase progression
- Learner can repeat any completed phase

Evaluate Me — Key Behavior

No assistance available. Safety gating changes: dangerous actions NOT blocked but ARE recorded as critical failures. System allows the error to see if learner would make it. Oral assessment follows: 2–4 questions testing WHY, not just WHAT. AI evaluates completeness, terminology, safety awareness, reasoning quality.

Eight Interaction Types

Every interaction is categorized. Each defines user intent, triggers, system response, and cross-platform mapping.

1

Selection

Identify or choose a component. Highlight + avatar response.

2

Cause-and-Effect

Trigger action producing visible result. Cascading effects supported.

3

Manipulation

Physically move object in 3D space. Snap-to targets on release.

4

Assembly

Attach/detach components. Exploded view. Strict or flexible order.

5

State Change

Toggle component state (on/off, open/closed). Animation + sensor.

6

Sequence

Ordered actions completing a procedure. Safety gates between steps.

7

Decision

Judgment call at branch point. Options with consequences.

8

Voice

Verbal commands, answers, or explanations. Speech-to-text + AI eval.

Behavior Template Library

14 pre-built, reusable interaction patterns. Apply to any compatible 3D object with minimal configuration.

9 CORE TEMPLATES

- switch_toggle — Binary on/off: breakers, power buttons, toggles
- valve_operation — Rotary 0–100%: gate, ball, globe, needle valves
- door_panel — Hinged or sliding: cabinets, access panels, MCC doors
- lock_attach — LOTO lockout: breaker lockouts, padlocks, hasps
- tag_attach — Danger/warning tags attached to lockout devices
- meter_reading — Measurement: voltage testers, multimeters, gauges
- ppe_select — Select and don required PPE from cabinet
- button_press — Momentary/latching: E-stops, start/stop, reset
- cable_connect — Flexible connectors: electrical, hydraulic, grounding

5 ADVANCED TEMPLATES

- **multi_step_sequence**
  Chains core templates into ordered procedures with safety gates
- **conditional_branch**
  Decision point — next action depends on sensor, state, or choice
- **sensor_threshold**
  Monitors sensor, triggers alarm/warning at threshold crossing
- **tool_usage**
  Select correct tool from inventory, apply to component, validate
- **inspection_checkpoint**
  Visual inspection and report findings: normal, defect, hazard

Conversational Interaction Authoring

Non-programmers create interactions by talking to the AI avatar. Seven-step pipeline from description to saved behavior.

1	**Creator Describes**	*"When someone clicks the red valve, I want the pressure gauge to drop."*
2	**Avatar Confirms Target**	Drone flies to valve, highlights it. "You mean this valve?" Creator confirms.
3	**Avatar Confirms Effect**	Drone flies to gauge. "This gauge, 100 to 50 PSI?" Creator adjusts.
4	**Avatar Generates**	*"Pressure animates 100→50 PSI over 2 sec. Shall I demonstrate?"*
5	**Live Demo**	Avatar triggers behavior. Creator sees it execute in real-time.
6	**Refinement**	*"Make it slower." "Add hissing sound." Each change applied and shown.*
7	**Save**	*"Perfect, save that." Saved to registry. Optionally saved as reusable template.*

AI Pipeline: NLP Parse → Component Resolution → Template Match → Behavior Assembly → Validation → Demo → Persist

Safety Gating System

Prevents dangerous actions. Enforces correct safety habits from the first session. Behavior adapts by phase and severity.

Hard Block — Critical

Action prevented. Red flash. Avatar: "Stop. Cannot operate breaker until lockout applied." Explains what to do first. Life-safety steps.

Soft Warning — Best Practice

Action delayed 2 seconds with warning. Avatar: "Are you sure?" Override allowed but recorded. Non-critical procedures.

Log Only — Evaluation

Action proceeds. Violation silently recorded for scoring review. Used in Evaluate Me phase to test whether learner would make it.

Safety Behavior by Training Phase

Phase	Non-Critical	Critical Safety	Scoring
Show Me	Normal demo	Avatar emphasizes + warning	Not scored
Train	Red highlight + correction	Hard block + safety explanation	Tracked only
Let Me Try	Brief red flash	Soft warning (2s delay + caution)	Full tracking
Evaluate Me	Logged; score deduction	Logged as CRITICAL FAILURE	Auto-fail if critical

Scoring & Evaluation Engine

Weighted competency scoring combining hands-on performance (70%) with AI-evaluated oral assessment (30%).

Final Score = (Performance × 70%) + (Oral Assessment × 30%)

Performance Score (70%)

Action Accuracy	**40%**
Sequence Correctness	**25%**
Time Efficiency	**10%**
Error Count	**−5% / error**
Safety Violations	**Auto-fail if critical**
Assists Requested	**−3% / assist**
Hesitation Events	**Tracked, not scored**
Recovery Actions	**+2% bonus**

Oral Assessment (30%)

Avatar asks 2–4 procedure-specific questions via voice after Evaluate Me. Questions test WHY, not just WHAT. AI evaluates verbal responses.

- Completeness — 25 pts
- Terminology — 25 pts
- Safety Awareness — 25 pts
- Reasoning Quality — 25 pts

Outputs: Learner debrief • Competency PDF • Compliance documentation • Manager dashboard feed

MODULE 2

EON Multi-Platform Publishing

Desktop, tablet, and VR headset interaction models with unified input mapping and publishing pipeline

Author Once. Run Everywhere.

Three Target Platforms

Full parity, adaptive input. Interaction logic identical. Input mapping adapts. No degraded features.

DESKTOP

Authoring, admin, classroom, evaluation

- First-person WASD + mouse navigation
- Click/drag object manipulation
- Right-click inspect with context menu
- Keyboard shortcuts (Tab, V, Enter, H)
- Push-to-talk or always-listening voice
- Shift+drag for precision mode

TABLET (iPAD)

Field training, portable assessment

- Pinch-zoom, two-finger pan/orbit
- Chopstick Mode — laser pointer for distance
- Hand Mode — direct grab for manipulation
- Mode toggle button (48×48dp, bottom-right)
- 1.5× snap tolerance for finger precision
- Optional AR mode for real surfaces

VR (META QUEST)

Immersive training, assembly practice

- Teleport + smooth locomotion + snap turn
- Laser pointer (distance) + direct grab (0.3m)
- Hand tracking: pinch, grab, point, thumbs up
- Haptic feedback patterns per event type
- Always-listening voice + spatial audio
- Controller button map + hand gestures

Unified Action Model

12 abstract actions mapped across all input contexts. Platform Abstraction Layer translates at runtime.

Abstract Action	Desktop	Tablet (Chopstick)	Tablet (Hand)	VR Controller	VR Hand
POINT_AT	Mouse hover	Tap scene	—	Aim laser	Point finger
SELECT	Left-click	Tap component	—	Trigger pull	Pinch
GRAB	Click + hold	—	Tap + hold	Grip squeeze	Grab fist
MOVE	Drag	—	Drag	Move hand	Move hand
ROTATE	Mid-click drag	—	2-finger rotate	Wrist rotate	Wrist rotate
RELEASE	Release click	—	Lift finger	Release grip	Open palm
ACTIVATE	Left-click	Tap trigger	—	Trigger	Pinch
TOGGLE	Left-click	Tap toggle	—	Trigger / flip	Pinch / flip
INSPECT	Right-click	Long-press	Long-press	Hold trigger	Hold pinch
SPEAK	V key (PTT)	Mic button	Mic button	A/X or always	Always-on
CONFIRM	Enter	Confirm btn	Confirm btn	A button	Thumbs up
CANCEL	Escape	Cancel btn	Cancel btn	B button	Palm push

Publishing & Performance Targets

Hybrid WebXR + native strategy. Build once, deploy everywhere. Platform-specific performance budgets.

Platform	Primary	Fallback	Criteria
Desktop	WebXR (browser)	None needed	WebXR reliable on desktop
iPad	Web app + PWA	Native iOS app	Fallback if WebXR limits quality
Meta Quest	WebXR (Quest browser)	Native APK	Smoke test; native if 72fps not met

Desktop

- 60 fps (target) / 30 fps (min)
- < 50ms input latency
- < 10s scene load
- < 2 GB memory
- Chrome/Edge/Firefox 110+

Tablet (iPad Pro)

- 60 fps / 30 fps min
- < 30ms touch latency
- < 15s scene load
- < 1.5 GB memory
- < 15%/hour battery drain

VR (Meta Quest 3)

- 90 fps / 72 fps min
- < 10ms controller latency
- < 20ms motion-to-photon
- < 2 GB memory
- No throttle for 30 min

Reference: ExxonMobil LOTO Procedure

8-step Energy Isolation mapped to interaction types, behavior templates, and cross-platform input.

Step	Action	Type	Template	Desktop	Tablet	VR
1	Identify sources	Selection	(custom)	Click MCC panel	Chopstick tap	Point + trigger
2	Shut down	State Change	switch_toggle	Click handle OFF	Chopstick tap	Grab + flip
3	Isolate breaker	State Change	switch_toggle	Click OPEN	Chopstick tap	Grab + pull
4	Attach lockout	Assembly	lock_attach	Drag lock	Hand: drag	Grab + carry
5	Attach tag	Assembly	tag_attach	Drag tag	Hand: drag	Grab + attach
6	Verify zero	Manip + C/E	meter_reading	Click tester	Chopstick tap	Grab probes
7	Don PPE	Selection	ppe_select	Click items	Chopstick tap	Grab items
8	Confirm	Voice	(custom)	Enter / speak	Speak / btn	Speak / A btn

Seven-Layer System Architecture

Presentation Layer	3D Renderer, UI Framework, Audio System	*Platform-specific*
Platform Abstraction	Input Manager, Device Detector, Mapping Engine	*Platform-specific*
Interaction Runtime	Event Router, Behavior Engine, State Manager	*Platform-independent*
Training Logic	Loop Controller, Step Sequencer, Scoring, Safety Gating	*Platform-independent*
Content Layer	Scene Graph, Object Registry, Behavior Registry, Template Library	*Platform-independent*
Data Layer	Event Logger, Analytics Pipeline, Compliance, Sync Service	*Platform-independent*
AI Services	Avatar Controller, STT, NLP Pipeline, Response Evaluator	*Cloud-based*

Genesis Platform Integrations

Both modules integrate with every existing Genesis 2.0 component. Eight integration points.

1	**3D Environment Engine**	Collision detection, raycasting, spatial queries. Rendering adapts quality per platform.
2	**3D Object Generator**	Component metadata, part separation, interaction hints. Auto-adjusted mesh per platform LOD.
3	**Scene Composer**	Snap points, interactive regions, safety zone boundaries. Platform-specific scene configs.
4	**Train AI (SOP Extraction)**	Auto-generates steps, safety gates, and oral assessment questions from documents.
5	**Auto-Annotation**	Context-sensitive labels. Dynamic state updates. Hidden during Evaluate Me.
6	**Experience Layer (Avatar + Drone)**	Avatar narrates, coaches, assesses. Drone navigates to components. Coordination preserved.
7	**Gamification System**	XP awards, badges, leaderboards, daily challenges. Fed by Scoring Engine.
8	**Data Flywheel**	Every interaction logged. Hesitation analysis. Cross-platform comparison. Compliance reports.

EON AI VENTURES

Create. Experience. Verify.

Genesis 3.0 transforms Genesis from a visualization platform
into a full training simulator — authored once, deployed everywhere.

8 Interaction Types | 14 Behavior Templates | 3 Platforms | 4 Training Phases

Full feature parity across desktop, tablet, and VR.
Complete scoring, safety gating, and compliance documentation.
Conversational authoring — build interactions by talking.

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