

EON Control Room

Five customer advantages and detailed product specification



Concept illustration of a connected operation. The image does not depict a deployed customer installation.

The first application considered here is the BPCL pipeline training requirement. Its physical accuracy, offline deployment and acceptance obligations define the initial engineering standard. Connected immersive field roles and emergency-command rehearsal extend the product beyond the baseline trainer.

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Connected simulation for control-room operators, field teams and emergency command

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EON Control Room connects accurate control-room simulation to immersive field practice, emergency rehearsal and approved guidance at the real equipment. The product brings operator screens and engineering tools into the same operation as Genesis, EON Live, Situation Room and Field IQ. Its purpose is to improve the complete customer result while sharply reducing the effort needed to create and maintain it.

The proposition has five customer priorities: simulation depth, AI creation, team and emergency rehearsal, connected work, and speed and cost. Twenty comparison benefits and 24 engineering requirements turn that ambition into an accountable product. This paper explains the customer value first, then defines architecture, BPCL traceability, ownership and acceptance.

1 The mandate for industry leadership

EON Control Room shall compete as a complete industrial simulation product. The mandate is to meet the strongest relevant traditional capability in every buying dimension and create substantial advantages through AI-assisted engineering, rapid authoring, connected teams and Work Intelligence.

A buyer should be able to choose EON for physical accuracy, familiar operator controls, instructor depth and dependable delivery, then gain faster creation, lower lifecycle cost and a direct connection to the work performed at the equipment. The specification must make this complete proposition real.

Complete capability before competitive claims

The product shall cover process simulation, DCS and PLC integration, SCADA fidelity, engineering studies, instructor controls, replay, assessment, immersive field procedures, emergency rehearsal, enterprise integration, offline operation, security, service and customer ownership. Missing mandatory functions shall remain blocking defects for the relevant release. Lower cost cannot offset a failed physics or safety-logic case.

Existing EON work supplies the starting advantage

Universal and Model Inside supply equipment context. Genesis and XR Infinite supply authoring and field experiences. EON Live supplies the behavior framework. Situation Room provides incident rehearsal. Field IQ, Assess IQ, Tacit and the wider Work Intelligence system connect guidance, evidence and reviewed improvement. The expanded product binds those foundations to a complete, validated simulation stack.

Every ambition becomes an engineering obligation

The 24 leadership requirements L01–L24 define what must be built, who owns it and how it will be accepted. Section 2 maps them to five customer groups; section 37 traces all 20 benefits to the detailed requirements. Eight targets T1–T8 quantify the intended advantage. The BPCL obligations remain mandatory within their accepted scope.

Leadership is the intended result. The numbers in this revision are proposed design targets, not current comparative measurements. Product and engineering leaders should approve the target contract and resource the work, then publish achieved results by release and domain.

2 Five customer advantages and the specification

Customer group	Why customers choose it	Primary requirements
Simulation depth	Trust the model and test operating decisions	L01, L02, L03, L04, L18
AI creation	Build equipment and procedures with less manual work	L09, L10, L12, L13, L15, L16
Team rehearsal	Operators, field teams and command practise together	L05, L06, L07, L08, L14
Connected work	Carry approved guidance and lessons into the real job	L11, L17, L19, L20
Speed and cost	Reduce the effort to create, update and own the system	L21, L22, L23, L24

Simulation depth is the essential foundation. AI creation, team rehearsal and connected work explain the broader EON advantage. Speed and cost establish the business case. The grouped PowerPoint comparison appears on slide 4, with one page per group on slides 5–9. The 20 benefits remain individually traceable as B01–B20 in section 37.

The detailed specification retains 24 requirements with accountable roles, release stages and acceptance tests. The groups above provide a customer-oriented entry point; their underlying technical disciplines overlap. L21–L23 also impose performance, resilience, offline operation, ownership and support obligations across every group.

The customer comparison uses a future-release scenario. EON “Done” assumes completed delivery and acceptance. Done+ denotes tighter accuracy that must be demonstrated. The underlying engineering targets remain 80% fewer approved authoring hours, 90% fewer update hours and 60% lower five-year ownership cost. The ten-minute draft boundary and other targets retain the definitions in sections 30–31.

3 The purpose in plain language

A controller sees the operation through screens. A technician sees the equipment. An emergency coordinator sees the people and resources responding to a developing incident. Each may have only part of the information. The product gives them a practice version of the same operation so their decisions can meet before the real situation occurs.

A suspected pipeline leak

The controller notices an unusual pressure pattern and requests a field check. A field trainee sees the simulated equipment and reports an observation. The emergency team decides how to coordinate resources under the approved plan. The instructor can introduce a failed instrument, a late report or a communication interruption. Everyone later reviews the same timeline, including what each participant knew at the time.

The exercise teaches investigation and coordination. It must use the customer's approved procedure. A generic lesson must never silently substitute its own emergency instructions for site rules.

A restart after maintenance

The field team confirms the required readiness evidence. The controller checks the handover and operates the simulated process. The exercise records whether the right person had authority, whether the confirmation referred to the correct asset, and whether the team acted on stale information. This connects ordinary work preparation with process behavior.

Emergency coordination

The control room runs the process. Incident command directs the response at the incident. An Emergency Operations Center supports information, resources and wider coordination. The organization's own plan determines the exact roles. A practice center can be a physical classroom, a set of realistic consoles or a distributed team. During training, actions affect the simulated facility. [12]

What the user should feel

The learner has one role, a clear situation and understandable choices. Help explains unfamiliar terms. Experienced users can inspect tags, trends and model detail. The instructor can see the whole exercise, while each trainee sees only the information their role should receive. The debrief explains the relationship between decisions and outcomes.

4 Product structure and existing foundations

EON Control Room should be the product name. It fits within the broader Work Intelligence architecture rather than replacing Genesis or creating another field-training brand. EON Control already names a portfolio workspace in v20 and remains distinct from EON Control Room. [1]

Product or foundation	Responsibility in the proposed system
EON Control Room	Operator screens, alarms, trends, instructor controls and coordinated sessions.
Universal and Model Inside	Equipment identity, geometry, component knowledge and internal relationships.
Genesis and XR Infinite	Authoring, procedural learning and immersive field experiences.
EON Live	Equipment and process behavior within declared validation limits.
Situation Room	Incident rehearsal and the Emergency Command package.
Field IQ and Permit IQ	Approved work guidance, authority and evidence at the real job.
Assess IQ and Competence IQ	Assessment evidence and competency workflows with human responsibility.
Compound IQ and the Distillery	Reviewed learning and controlled reuse of permitted knowledge.

EON Tacit contributes captured expert knowledge, while Brainy supports communication practice. In the proposed integration, reviewed expert insights can inform scenarios and role-play can strengthen team handovers. [1]

These roles follow EON's supplied architecture. They do not establish that every application already shares production identity, state or release management. V20 explicitly identifies some sample experiences and integrations still in development. The product audit should distinguish mature code to reuse from interfaces and runtime behavior to complete.

Emergency Command can have its own buyer, interface and scenario library while sharing the same assets, event history and session infrastructure. Coordination-only exercises should be possible without a detailed process model. Combined exercises should attach to the selected validated model when physical consequences matter.

5 EON delivery history and current evidence

EON has already worked in connected operator simulation. ExxonMobil's May 2015 announcement identifies EON Reality as co-developer of immersive technology combining dynamic process training with functional 3D equipment. It describes a gas-processing facility simulator operating since 2013. This supports relevant delivery experience, not a claim that the present BPCL implementation is complete. [2]

Evidence	What it supports	What remains to establish
Historical delivery	Experience joining immersive equipment to process training.	Current code, interfaces and domain-model capabilities.
V20 product material	EON-reported authoring, component, assessment and work-loop functions.	Production readiness and integration depth for each reused service.
Supplied application images	The described user experience and specific demonstrated interactions.	Accuracy, scale, recovery and customer acceptance.
Public EON Live demo	A visible equipment-simulation experience.	Pipeline fidelity and coordinated sessions under BPCL conditions.

The public EON Live compressor demonstration was inspected at interface level. That inspection did not validate its solver, run the complete procedure successfully, or establish multi-user behavior. The Genesis repository was accessible for an initial read, but a full code and interface audit has not yet established reusable coverage. These are explicit engineering discovery tasks, not reasons to discard the existing foundation.

V20 reports more than 8,200 equipment components, rapid generation and major cost reductions. The count, validation depth and applicable conditions should be reconciled with a release inventory. V20 also says its scenario coverage assessment is a match to taxonomy rather than a count of already built, playable scenarios. Commercial wording should preserve that distinction. [1]

For each reused component, the audit should record repository and release, owner, license, supported inputs, interface contract, operating mode, tests, security dependencies and known limitations. The result is a reuse register that connects prior work directly to the BPCL delivery plan.

6 Competition and the product opportunity

Industrial competitors already combine field training and control-room simulation. Their strongest products are not simply panoramic tours. Emerson reuses CAD, scans, photographic surveys and component libraries. AVEVA provides immersive training and also describes maintenance guidance on real assets. Honeywell describes customizable joint console and field exercises. Yokogawa documents pump switching and device-disassembly training connected to OmegaLand. [3–7]

Supplier group	Relevant capability	EON's proposed response
AVEVA and Emerson	Dynamic immersive training, reusable assets and room-to-field exercises.	Reduce approved creation and change effort while preserving model fidelity.
Honeywell and Yokogawa	Customized equipment training, reusable lessons and operator coordination.	Make cross-role authoring and work-loop updates easier to manage.
Atmos and DNV	Pipeline hydraulics, SCADA interfaces and training records.	Meet pipeline acceptance first, then add connected field and work experiences.
SynergyXR and Uptale	Accessible procedural or 360-degree authoring.	Combine authoring ease with equipment semantics and validated process behavior.

Competitor materials establish overlap, not equal delivery cost or quality. Lack of a feature on a public page does not prove the vendor lacks it. A defensible comparison needs a common task, the same starting assets, equivalent fidelity and an agreed acceptance standard. [8–11]

The opportunity is a coherent workflow: create an exercise from approved knowledge, connect it to the operator model, guide the real job with the approved release, capture differences and publish reviewed improvements. Individual pieces already exist in the market. EON should prove that the combined workflow takes less effort and produces better traceability.

Panoramic media remain useful for orientation and visual recognition. Interactive 3D supports equipment actions. A process model predicts consequences. AR helps at the real job. EON's own Worlds Module supports 360-degree imagery, video and 3D. The product should choose the right representation rather than treating every task as a high-fidelity modeling project. [1]

7 The economics of AI based creation

EON's strategic advantage should be measured as the cost of an approved, usable result over its life. AI can reduce document extraction, asset matching, initial scene construction, procedural drafting, narration and repeated content updates. Reusable equipment behavior can also reduce engineering effort after a component has been validated for a defined use.

Clock	Definition	Cost included
First draft	A playable initial exercise with visible assumptions.	Input preparation, asset retrieval and generation.
Approved procedure	An exercise accepted by the responsible specialist.	Review, corrections, source reconciliation and tests.
Accepted site simulator	A deployed system meeting customer requirements.	Calibration, controls, integration, infrastructure and acceptance.

V20 reports more than 95% time and cost removal for digital-twin creation and a separate 92% Genesis comparison. These are EON-reported claims. The supplied material does not establish an equivalent saving for the complete BPCL trainer. The legacy-cost benchmark in its appendix is illustrative. A public comparison must identify the original scope, baseline, inputs, review burden and excluded costs. [1]

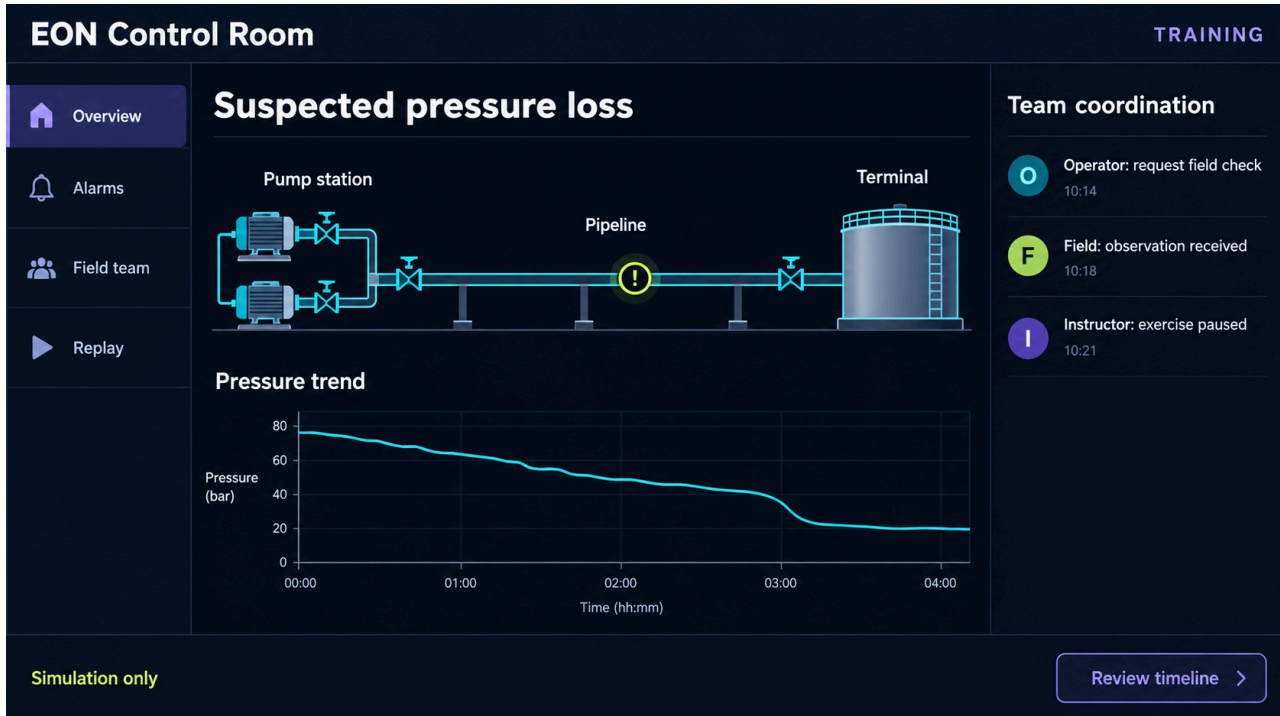
The strongest test has three assignments: create an approved pump procedure, connect it to a control-room event, and revise it after a controlled procedure change. Record person-hours by role, elapsed time, number of corrections, reuse rate, fidelity and yearly update effort. Test a new site separately from a repeat deployment with an established library.

Total cost includes software, content licenses, capture, compute, specialist engineering, review, integration, hardware, support and maintenance. Savings equal the baseline total less the EON total, divided by the baseline total. This arithmetic requires comparable boundaries. A generated visual scene and a commissioned pipeline simulator cannot serve as interchangeable endpoints.

The commercial objective can be ambitious: make site-specific simulation routine rather than an occasional expensive project. Numeric superiority and payback claims should follow measured evidence. Release pricing should separately identify the software package, site-model engineering, optional connected roles and ongoing services.

8 The proposed user experience

The creation journey begins with the site, equipment, approved procedure and learning objective. Genesis prepares a draft. The author sees the matched assets, inferred steps and unresolved questions. A specialist validates the procedure and model bindings, then approves a version for rehearsal. The learner should never have to understand the internal service structure.



Proposed EON Control Room interface concept. The process values and layout are illustrative, not BPCL data or an existing released interface.

The operator view contains the appropriate process schematic, alarms, trends and controls. Field trainees enter the corresponding equipment scene through Genesis. Emergency participants see tasks, reports and resource decisions in Situation Room. The instructor can inject faults, control time and review ground truth without exposing it to trainees.

For BPCL, the trainee interface must follow approved SCADA colors, screens, tags and navigation. The concept above explains the product; it does not replace screen emulation requirements. Simple explanations belong in help or learning modes so expert practice remains faithful to the customer's operational interface.

9 Runtime architecture and state

The proposed runtime has an authoritative session coordinator. Model services calculate equipment and process state. Control services execute logic. Procedure services track steps and objectives. Client applications render the role-specific view. All accepted actions refer to the same session and versioned asset identity.

Physical truth and reported information

Maintain separate values for physical state, instrument output and participant observation. A pressure sensor can fail while the process continues normally. A field report can be late or mistaken. The instructor knows the injected condition. The trainee sees the evidence available to the role. This distinction makes uncertainty a real learning objective.

Action and event contract

Each request contains session ID, actor, role, asset ID, action type, expected revision and an idempotency key. The server checks authority and preconditions before committing an action. Each resulting event carries an immutable ID, simulation timestamp, sequence, causal reference, value, unit and quality. Rejected attempts remain available for assessment without changing equipment state.

Time and independent sessions

Simulation time is separate from wall-clock time. The solver can step faster or slower while interfaces update at an appropriate display rate. Pausing an exercise must pause process, logic and scenario timers consistently. The five BPCL trainee instances must remain isolated even when an instructor monitors them together. A connected field or command role joins one explicitly selected session.

Snapshots and replay

A snapshot includes solver state, control state, procedure position, active faults, clock, random seeds and release identifiers. Replay reconstructs the accepted sequence and the information visible to each role. Restoring and branching creates a new event lineage. Screen recordings can supplement this record, but cannot replace state restoration or causal evidence.

Model adapters

An adapter exposes initialize, start, pause, step, speed, snapshot, restore, variable subscription and stop. It declares capability limits, units, determinism and snapshot support. FMI can support model exchange or co-simulation where available. OPC tag exchange can serve control interfaces but does not supply a complete simulation lifecycle. API and license rights require confirmation. [13]

10 Extending EON Live for pipeline behavior

EON Live provides the proposed behavioral foundation. The BPCL extension must represent long-distance liquid flow, the station equipment and executable control logic. A local equipment demonstration does not establish this operating envelope. The project should either validate a native model or integrate an appropriate licensed solver behind the same adapter.

Model area	Required detail	Validation evidence
Liquid hydraulics	Continuity, momentum, friction, elevation, boundaries and units.	Steady cases, conservation and independent references.
Transients	Wave speed, valve closure, pump inertia and surge relief.	Time-step convergence and pressure envelopes.
Slack line	Appropriate treatment of column separation and vapor behavior.	Relevant benchmark cases and declared limits.
Transport	Batch interfaces, products, pigs, DRA and temperature.	Mass/volume accounting and operating-event checks.
Equipment	Pump curves, valve Cv/stroke, tanks, filters and dosing.	Component tests and site-specific parameter review.

The method of characteristics is a candidate for liquid pressure transients. Selecting a recognized method is only the start. Calibration requires authoritative dimensions, elevations, properties, equipment curves, operating conditions and historian records. Thermal and additive models need their own parameters and limits.

Validation should use analytical cases, an independent reference model where appropriate and held-out operating events. Check convergence, conservation, stability and response across the requested envelope. Separate calibration data from final test events. Define acceptable errors near zero, reference-data uncertainty and event alignment rules before testing.

The future-expansion demand of four independent 1,500 km models at five times real time must be tested on the specified hardware and representative complexity. The local bid draft's performance statements are not measurements. A model with fewer devices or coarser numerics cannot silently stand in for the agreed workload. [14]

11 Controls and training functions

EON's historical integration work supplies a relevant foundation for control-room simulation. BPCL requires a particular implementation: fifty SCADA screens, its tag conventions, faceplates, alarms, control loops and cause-and-effect logic. The customer's approved register resolves contradictory trip values or obsolete screen examples. [2,14]

Control and safety logic

Model local/remote authority, permissives, operating modes, PID behavior, interlocks, station and pipeline shutdowns, voting, bypass delays and reset conditions. Test each against the approved cause-and-effect matrix. Emulating a safety instrumented system for training does not certify software to perform that function on real equipment.

Instructor control

The instructor selects models and initial conditions, starts or freezes sessions, changes speed, injects and clears faults, ramps deviations, performs simulated field actions and monitors hidden variables. Scenario logic supports time triggers, process conditions and repeatable branching. Context help and diagnostic alerts must be available without internet.

Trainee and engineering modes

Five trainees can run different scenarios independently. Guided self-training uses the same released model and scoring contract as instructor-led training. The engineering station works on versioned copies for studies and new model development. Changes cannot silently alter an accepted training baseline.

Evidence and assessment

Assess IQ and the existing EON assessment approach provide a foundation for scoring. The extension needs role-aware rubrics for equipment actions, communication, verification and escalation. Scores refer to observed evidence and the approved standard. Missing evidence and uncertain automated interpretation remain visible. An assessor can review or override a score with a recorded reason.

Reports should retain the scenario/model versions, participant roles, conditions, errors, outcomes and assessor decision. BPCL export formats and retention rules should follow its confirmed requirements. A training score supports competence assessment but does not automatically authorize a worker to operate equipment.

12 BPCL requirement traceability

The following mapping uses local bid drafts for GEM/2026/B/8062246. It is an engineering plan, not a declaration of completed compliance. The original buyer scope, annexures and amendments remain authoritative. [14]

Requirement from drafts	EON basis and BPCL extension	Acceptance artifact
Mumbai–Manmad 252 km and Bina–Kota 260 km	EON Live framework plus calibrated route, equipment and product models.	Approved site models and data register.
50 SCADA screens	Prior simulation integration plus exact screen/tag emulation.	Coverage register and operator review.
Interlocks, ESD and SIS	Executable logic bound to buyer cause-and-effect rules.	Witnessed logic test results.
Five independent trainees	Existing training clients plus isolated model instances.	Concurrent-session isolation and load tests.
0.1x to 5x speed	Session time coordinator and solver optimization.	Speed, response and numerical tests.
Snapshots and record/replay	Event history plus complete state capture.	Restore and replay verification.
Self-training and evaluation	Genesis / Assess IQ with customer rubrics.	Exercise completion and report tests.
Engineering station and expansion	Versioned model editor and study copies.	Model creation and four-model load demonstration.
OPC and isolated LAN	Agreed adapter profile and complete local runtime.	Interface, disconnection and security tests.

The baseline represents field actions through instructor controls. Human field trainees in immersive scenes and the Emergency Command package are product extensions. They should have separate scope, cost and acceptance criteria so they do not obscure the mandatory pipeline trainer.

13 BPCL accuracy and delivery acceptance

Criterion in local drafts	Proposed acceptance treatment
Critical steady variables within $\pm 2\%$, down to 25% load	Agree variable list, reference uncertainty, denominator and absolute tolerances near zero.
Non-critical variables within $\pm 10\%$ within one minute	Define the stabilization condition and the reference measurement interval.
Transient direction, magnitude and order; variables and time constants within 5%	Use held-out events with pre-agreed alignment, time constants and parameter restrictions.
Realism confirmed by experienced operators	Use structured expert review alongside quantitative tests.

Model Acceptance Testing checks the model and logic. Factory Acceptance Testing checks the integrated system on representative hardware. Site Acceptance Testing checks the installed system with the required stations. The subsequent trial should use the exact buyer conditions. The draft includes a 21-day run and restart conditions associated with ten days without functional failure; the definitive wording must be reconciled. [14]

Tests should cover normal operation, abnormal events, slow and accelerated time, independent sessions, missing assets, wrong units, bad tag mappings, duplicate and stale commands, client disconnection, power loss and recovery. Each result links to a requirement and the exact software/model release.

The project also includes hardware, licenses, local installation, training, manuals and support. The draft describes a seven-month supply-and-commissioning window, twelve-month warranty and five-year post-warranty comprehensive maintenance. These obligations need a staffed delivery plan and local prime-contractor responsibility. They cannot be met by software demonstrations alone.

Before commitment, obtain original procurement documents, approved drawings, tag and logic exports, pump and valve data, operating procedures, representative historian events, emergency plans and the definitive hardware schedule. Eligibility, local-content declarations and contractual acceptance require the appropriate bidder and commercial review. No BPCL award or endorsement is implied.

14 Offline operation and governed learning

Deployment boundary

BPCL training must run on the isolated local network described in the drafts. Package the model, scene assets, identity, help, scoring and reporting locally. If runtime AI cannot fit the target hardware or licensing, use reviewed pre-generated material or an approved local inference service. Cloud authoring can be a separate workflow only if the customer allows the data path. [14]

Audit every external dependency: license checks, asset URLs, speech, fonts, telemetry and authentication. The OCI architecture in v20 demonstrates a different deployment design and does not itself prove offline compatibility. Test the delivered system with the internet disconnected. Use signed imports, approved patching, local time services, backups and recovery tests.

Work Intelligence boundary

V20's governance principle keeps customer knowledge under the customer's control and permits broader engineering knowledge only through review and agreement. Preserve that principle when connecting Field IQ, Compound IQ and the Distillery. Customer procedures, worker evidence and operational histories must not automatically flow into another customer's content. [1]

A field observation can propose a change. A qualified owner checks the evidence and the operational consequence. Approval creates a new version with source lineage and a rollback path. Dependency analysis identifies the simulations, instructions and assessments that require regeneration. Accepted training baselines remain reproducible even after a new release.

Actual work and rehearsal

Shared knowledge does not mean shared control authority. Rehearsal actions target the simulator. Actual work guidance operates under its own permissions, permits and approved procedure release. Any future connection to operational control systems needs a separately defined and validated scope. The initial product does not require an AI-generated command path to live equipment.

Assessment records need access controls, retention rules and correction history. Record the limitations of automated recognition and speech interpretation. An absent observation must not become a fabricated successful step. Human responsibility remains explicit in competence and release decisions.

15 Core functional requirements across releases

These core requirements remain mandatory and are extended by leadership requirements L01–L24 later in this paper. Together they cover the full simulation product, its integrations and the measured advantages required to compete. Each release must trace its scope to this combined register.

ID	Required behavior	Acceptance principle
CR 01	Create isolated training sessions and join authorized roles.	No cross-session state or evidence leakage.
CR 02	Represent physical, instrument and reported states separately.	A sensor fault changes the reading without silently changing physics.
CR 03	Validate commands against role, asset and revision.	Reject unauthorized, duplicate and stale requests predictably.
CR 04	Control time consistently across all simulation services.	Freeze and speed changes preserve coherent behavior.
CR 05	Load immutable model, procedure, scene and rubric versions.	A prior exercise remains reproducible.
CR 06	Capture and restore complete runtime snapshots.	Replay reproduces accepted outcomes within agreed tolerance.
CR 07	Compile source-linked scenario drafts and flag missing bindings.	A critical unresolved dependency blocks release.
CR 08	Support instructor faults and self-training.	Both modes use the same scoring and evidence contracts.
CR 09	Provide offline identity, assets, help and reports.	Required functions survive disconnected operation.
CR 10	Connect reviewed field lessons to new training releases.	Approval and provenance precede publication.

The pipeline pack adds the numerical, equipment, control and scale requirements in the BPCL traceability section. Emergency Command adds incident roles, resource tasks, communications, scenario injects and decision review. These are separate acceptance packages over the same core.

16 Delivery strategy and proof of advantage

The first gate reconciles the original tender, existing code and intended product scope. It produces a verified reuse register and an implementation backlog. The second gate tests a representative pipeline event on the target hardware. If native physics misses the required accuracy or schedule, a licensed model can preserve the product architecture while reducing delivery risk.

The third gate connects an operator, a field role and an instructor in one exercise. It proves state, authority, faults, reconnect and replay. Emergency roles can then join that session. The final gate completes site models, control screens, logic, documentation and witnessed acceptance. A committed schedule depends on data access, specialist capacity and the actual results of these gates.

Workstream	Accountability	Exit evidence
Product and integration	Product lead and simulation architect	Approved scope, contracts and end-to-end demonstration.
Pipeline and control engineering	Process and control specialists	Calibrated model, logic register and acceptance results.
Experience and authoring	Application and XR engineers	Usable role clients and source-linked scenario release.
Quality and delivery	QA lead, local prime and site engineers	Traceability, hardware, tests, training and support plan.

The commercial benchmark measures creation, connection and update work at equal scope. It includes specialist review, content corrections and yearly changes. Learning assessment should examine missed handoffs and retention with comparable groups and independent review. Model fidelity remains an engineering pass condition rather than a marketing preference.

A repeatable component library, reliable model contracts and governed work evidence can become a durable advantage. The practical goal is lower effort each time a customer adds or changes a procedure while preserving trust in the result. The claim becomes stronger as the evidence accumulates.

The immediate decision is approval of the expanded leadership specification and target contract. Development follows that review. BPCL provides the first defined application; the complete product scope includes validated domain packs for additional plants, utilities and infrastructure.

17 The competitive acceptance contract

The specification shall maintain a capability register for every target domain and buying criterion. Every row shall record the reference supplier and offered configuration, documented capability, EON foundation, proposed extension, requirement identifier, owner, release stage, test method and observed result.

The strongest relevant comparison

Select the strongest relevant baseline for each dimension using current official material, demonstrations, customer requirements and lawful access to evaluation environments. AVEVA identifies Schneider Electric as the provider of its OTS solution from August 2023. Commercial configurations and licensing must therefore be confirmed with the actual provider. [A1]

Existing suppliers also offer engineering studies, online twins, APIs, reusable content and some AI or hybrid-model functions. EON must beat the actual offered workflow rather than an assumed manual-only competitor. Unknown functions stay marked unknown until a demonstration or other evidence resolves them. [A2, H1, E1, Y1]

No material regression

For each declared release, all mandatory capability and acceptance cases shall pass. Compare physics accuracy, controls fidelity, required instructor actions, failure handling, supported scale, deployment and customer support case by case. A weighted average shall not hide failure in a critical dimension. Comparative numerical non-inferiority margins must be agreed before the test.

A significant advantage in every buying dimension

For capabilities with a natural completeness limit, such as correct control logic, first require complete coverage and then compete on setup effort, verification depth, maintainability or usability. For numerical capability, pursue tighter error bounds and faster execution within the same valid envelope. For work and learning, compare evidence quality and measured task outcomes.

Status and ownership

Each requirement moves through design, implementation, verification and witnessed acceptance. None of the new comparative targets is marked achieved in this proposal. The foundation inventory identifies what can be reused, but only a test result can close an acceptance requirement. The accountable roles below are staffing responsibilities, not named employees or commitments already made.

18 Competitive matrix for process simulation and engineering

The EON column describes the target product. Baseline capabilities come from the named reference suppliers, not a claim that all suppliers provide the same functions.

Requirement	Reference capability	EON advantage to build
L01 Physics fidelity	First-principles process and pipeline models	Validated accuracy plus automatic regression evidence
L02 Equipment and domains	Unit-operation and property libraries	One component binds physics, geometry and procedure
L03 Controls and SCADA	DCS / PLC emulation and familiar HMI	Exact controls plus assisted mapping and change tests
L04 Engineering studies	What-if studies and control checkout	One model across study, rehearsal and work context

The success targets

L01 Physics fidelity — Meet every case; target half the BPCL error limits.

L02 Equipment and domains — 100% of released components have a validation manifest.

L03 Controls and SCADA — 100% of required screens and cause-and-effect cases.

L04 Engineering studies — At least 50% less analyst time for a matched study.

Reference suppliers and source basis

L01: AVEVA Dynamic Simulation, UniSim Design, Atmos, DNV. Sources: A2, H1, atmos, dnv.

L02: AVEVA, Honeywell, Emerson. Sources: A2, H1, E1.

L03: AVEVA / Schneider Electric, Emerson, Yokogawa. Sources: A1, A3, E1, Y1.

L04: AVEVA Dynamic Simulation, UniSim Design, DeltaV Mimic. Sources: A2, H1, E1.

19 Specification for process simulation and engineering

L01 Physics fidelity

The system shall model liquid hydraulics, transients, equipment, batches, pigs, DRA and thermal effects required by the accepted BPCL scope. Native EON kernels and licensed solvers shall use one adapter contract. Each model shall declare its equations, property sources, valid envelope and numerical limits.

Acceptance: Pass every buyer case and the comparable incumbent case set without a material regression. Internal stretch targets are 1% critical steady error, 5% non-critical error and 2.5% transient-variable/time-constant error. These are design targets, not measured results; reference uncertainty and near-zero tolerances must support the comparison.

Owner: Simulation lead. Delivery stage: P1.

L02 Equipment and domains

Every equipment class shall bind geometry, internal parts, ports, units, parameters, allowed actions, faults and tests to a common asset identity. The initial domain pack shall cover the BPCL liquids application. Planned gas, thermal, utility and process-plant packs shall have separate validation and release gates.

Acceptance: The asset inventory shall account for every in-scope device and scenario interaction. Each released component shall carry a reviewed behavior contract and provenance. A visual asset count shall never substitute for the count of validated simulation components.

Owner: Domain library lead. Delivery stage: P1 / P3.

L03 Controls and SCADA

The system shall support emulated or authorized virtual DCS/PLC interfaces, PID loops, modes, permissives, alarms, ESD and SIS behavior. BPCL shall receive the approved 50-screen implementation. AI may propose tag and logic mappings, but unresolved safety-critical bindings shall block release.

Acceptance: Witness screen, tag, timing and cause-and-effect tests, including bypasses, resets and failed instruments. Require zero unresolved safety-critical mapping defects. Third-party emulators shall declare time-control and snapshot limitations before integration.

Owner: Controls lead. Delivery stage: P1.

L04 Engineering studies

Engineers shall branch a released model into study copies, sweep parameters, test operating changes and compare outcomes. Software-in-the-loop control checkout shall support regression tests; hardware-in-the-loop shall require a declared timing profile and suitable isolated equipment.

Acceptance: Reproduce reference study outputs and compare analyst hours from inputs to reviewed report. The stretch target is at least 50% less analyst effort. Studies shall preserve the accepted training baseline and flag all parameter changes.

Owner: Engineering tools lead. Delivery stage: P2.

20 Competitive matrix for operator training and team performance

The EON column describes the target product. Baseline capabilities come from the named reference suppliers, not a claim that all suppliers provide the same functions.

Requirement	Reference capability	EON advantage to build
L05 Instructor control	Faults, exercises and trainee monitoring	Generate faults and branches from approved objectives
L06 Replay and recovery	Session recording, restore and evaluation	Causal replay of process, field and command decisions
L07 Team learning	Joint controller and field exercises	Operator, field and command roles share one event history
L08 Assessment and coaching	Scoring, diagnosis and competency records	Evidence-linked coaching across work and simulation

The success targets

L05 Instructor control — At least 80% less setup effort on matched exercises.

L06 Replay and recovery — No lost committed events; restore target under 60 seconds.

L07 Team learning — Target 30% fewer critical handoff errors.

L08 Assessment and coaching — Every scored decision links to observable evidence.

Reference suppliers and source basis

L05: AVEVA OTS, Honeywell, DNV. Sources: A1, H2, dnv.

L06: DNV and AVEVA PLC simulation. Sources: dnv, A3.

L07: AVEVA XR, Emerson Field 3D, Honeywell IFS, Yokogawa. Sources: aveva, emerson, honey, yoko.

L08: Honeywell Tutor, DNV. Sources: H2, dnv.

21 Specification for operator training and team performance

L05 Instructor control

Instructors shall initialize, start, freeze, resume, change speed, inject or ramp faults, perform field actions and monitor ground truth. They shall author condition-triggered branches and manage independent trainee sessions from one console.

Acceptance: Pass the complete instructor checklist at 0.1x through 5x. For pre-bound models, compare approved exercise-setup hours against the selected baseline and target an 80% reduction. Every generated fault shall use a reviewed behavior definition.

Owner: Training runtime lead. Delivery stage: P1.

L06 Replay and recovery

Snapshots shall capture solver, control, scenario, role and clock state. Replay shall reconstruct accepted actions and what each role could see. Branches shall keep independent lineages. A client reconnect shall apply a snapshot plus ordered subsequent events without duplicate execution.

Acceptance: Fault-inject process, network and client failures. Verify event integrity and declared numerical reproducibility. Target restoration within 60 seconds on the agreed reference configuration; commit acknowledgement must follow durable logging.

Owner: Distributed systems lead. Delivery stage: P1.

L07 Team learning

The product shall support synchronized human or scripted roles, private role information, delayed messages and instructor-controlled uncertainty. A field statement shall remain distinct from the physical asset state. The same exercise shall work for independent practice and team rehearsal.

Acceptance: Run equivalent scenarios with matched participant groups and independent scoring. Target a 30% reduction in critical handoff errors, with no degradation in individual operating competence. Report sample size, uncertainty and retention results.

Owner: Learning science lead. Delivery stage: P2.

L08 Assessment and coaching

Assess IQ shall support objective rubrics, decision and communication scoring, remedial exercises and assessor review. Coaching shall cite the approved procedure and session evidence. Competence records shall preserve versions, corrections and the assessor decision.

Acceptance: Test blinded cases with qualified assessors. Require complete evidence links and visible uncertainty. Unsupported successful-step inference shall fail the test. Test retrieval accuracy, correction history and export to the agreed learning or competence system.

Owner: Assessment lead. Delivery stage: P1 / P2.

22 Competitive matrix for AI creation and content economics

The EON column describes the target product. Baseline capabilities come from the named reference suppliers, not a claim that all suppliers provide the same functions.

Requirement	Reference capability	EON advantage to build
L09 Scenario creation	Templates, editors and procedure builders	SOP to a bound exercise with visible source evidence
L10 Asset creation and reuse	CAD, scans, photographs and component libraries	Reuse the equipment meaning as well as its appearance
L11 Procedure changes	Content and model maintenance services	One approved change updates every affected experience
L12 AI engineering	Modeling tools, APIs and hybrid model support	Astra-assisted implementation with independent verification

The success targets

L09 Scenario creation — Draft in 10 minutes; 80% fewer approved authoring hours.

L10 Asset creation and reuse — 80% of repeated class bindings reused without recoding.

L11 Procedure changes — At least 90% fewer update hours on reference changes.

L12 AI engineering — Target 50% less engineering cycle time at equal quality.

Reference suppliers and source basis

L09: AVEVA XR, SynergyXR, Uptale. Sources: aveva, synergy, uptale.

L10: Emerson Field 3D and EON v20 foundations. Sources: emerson.

L11: Emerson digital twin refresh and established XR authoring. Sources: E1, aveva.

L12: Honeywell UniSim Design and AVEVA Dynamic Simulation. Sources: H1, A2.

23 Specification for AI creation and content economics

L09 Scenario creation

Genesis shall ingest approved SOPs, equipment data and learning goals, draft role-specific steps, bind actions to validated components, generate rubrics and flag unresolved inputs. Authors shall publish through specialist review with a preview of every role.

Acceptance: For the reference ten-step procedure on pre-bound equipment, target a first playable draft within ten minutes and at least 80% fewer total authoring hours through approval. New geometry, missing source data and model development shall be measured separately and included in total project cost.

Owner: Genesis authoring lead. Delivery stage: P2.

L10 Asset creation and reuse

The ingestion pipeline shall reuse licensed CAD, scans, photographs and Universal / Model Inside assets. It shall separate visual approximation from verified dimensions and process connectivity, then attach equipment semantics and behavior to the accepted representation.

Acceptance: On an agreed repeat-site equipment mix, at least 80% of class-level bindings should be reused without custom code. Site parameters still require review. Check fidelity, units, hidden connectivity and rights for every released asset.

Owner: Asset pipeline lead. Delivery stage: P2.

L11 Procedure changes

A dependency graph shall connect procedure steps, asset models, control logic, role scenes, guidance and rubrics. An approved source change shall identify affected packages, regenerate drafts, run regression tests and publish a version with rollback.

Acceptance: Use an agreed corpus of procedure and equipment changes. Target at least 90% fewer end-to-end update hours, including review. Require complete critical-dependency detection and zero stale critical instructions in the released package.

Owner: Release platform lead. Delivery stage: P2.

L12 AI engineering

The engineering workflow shall use advanced coding assistants, including Astra, to draft numerical kernels, adapters, scenario compilers, test harnesses and documentation. Engineers shall review changes and compare behavior against analytical cases, held-out events and independent reference implementations.

Acceptance: Track effort, review time, escaped defects and delivery time on comparable work packages. Target at least 50% shorter engineering cycles without increased escaped defects. A model and its own generated tests shall not be the sole evidence of correctness.

Owner: Engineering director. Delivery stage: P1 onward.

24 Competitive matrix for immersive field and emergency command

The EON column describes the target product. Baseline capabilities come from the named reference suppliers, not a claim that all suppliers provide the same functions.

Requirement	Reference capability	EON advantage to build
L13 Field realism	Immersive equipment and procedure training	Internal equipment knowledge tied to real consequences
L14 Emergency command	Abnormal-event and emergency operator training	Command tasks and resource decisions join the process exercise
L15 Access and localization	Desktop, mobile and XR delivery options	One released procedure across devices and languages
L16 Usability and collaboration	Separate role interfaces and authoring tools	One launch flow with role-specific views and shared review

The success targets

L13 Field realism — Every critical field action changes the correct model state.

L14 Emergency command — Target 30% less time to complete critical coordination tasks.

L15 Access and localization — All critical instructions retain approved meaning.

L16 Usability and collaboration — Join a prepared exercise in 3 user actions or fewer.

Reference suppliers and source basis

L13: Emerson, Honeywell, Yokogawa. Sources: emerson, honey, yoko.

L14: Integrated OTS suppliers. Sources: A1, honey, Y1.

L15: AVEVA XR and Emerson Field 3D. Sources: aveva, work, emerson.

L16: EON proposed cross-product design benchmark. This row is an EON product or buyer-selected benchmark, not a sourced vendor capability claim.

25 Specification for immersive field and emergency command

L13 Field realism

Genesis and Model Inside shall support internal views, manipulation, procedure sequencing, local/remote authority and physically meaningful equipment actions. Rendering and collision physics shall remain distinct from process models. Optional haptic or physical props shall serve skills that need tactile practice.

Acceptance: Verify the complete critical-action mapping with a field specialist, including wrong-asset attempts and failed components. Evaluate task completion and usability against the selected immersive baseline on comparable devices.

Owner: XR and behavior lead. Delivery stage: P2.

L14 Emergency command

Situation Room shall provide roles, incident boards, maps, communications, resource requests, staged injects and debrief. Exercises shall support coordination-only and coupled process modes. Qualified customer staff shall define incident authority, emergency plans and evaluation criteria.

Acceptance: Demonstrate operator, field, instructor and command roles in one scenario. Target 30% less time to complete predefined coordination tasks while preserving required decisions and procedure compliance. This is a training package, not a live emergency dispatch system.

Owner: Emergency exercise lead. Delivery stage: P2.

L15 Access and localization

The product shall support desktop and suitable XR clients, keyboard navigation, readable text, captions and customer-approved terminology. Device and language variants shall share procedure identity and assessment semantics. Offline voice shall use approved local models or a text equivalent.

Acceptance: Test task completion, accessibility and terminology on the supported matrix. A translated safety-critical instruction requires qualified approval. Target at least 95% unassisted completion of the reference onboarding task by representative first-time users.

Owner: Experience lead. Delivery stage: P2.

L16 Usability and collaboration

A learner shall select the exercise, choose the authorized role and join. The instructor shall see readiness and connection state without exposing ground truth to trainees. Authors shall see a guided creation workflow and expert controls when required.

Acceptance: Count task actions and time in representative user sessions. Target a prepared-session join in three actions or fewer after authentication, with no training baseline altered for UI convenience. Preserve the customer's required SCADA interaction conventions.

Owner: Product design lead. Delivery stage: P2.

26 Competitive matrix for actual work and enterprise integration

The EON column describes the target product. Baseline capabilities come from the named reference suppliers, not a claim that all suppliers provide the same functions.

Requirement	Reference capability	EON advantage to build
L17 Guidance during work	AR maintenance guidance and work tools	The approved training procedure becomes job guidance
L18 Operational decision support	Online twins, state estimation and lookahead	Read-only operating context feeds rehearsal and field explanation
L19 Enterprise interfaces	Control interfaces and simulation APIs	Reusable adapters with automated contract tests
L20 Knowledge improvement	Competency libraries and knowledge capture	Reviewed field lessons regenerate future practice

The success targets

L17 Guidance during work — Zero critical version mismatches across training and work.

L18 Operational decision support — 100% provenance and data-quality marking on imported state.

L19 Enterprise interfaces — At least 70% less repeat-integration effort.

L20 Knowledge improvement — Every published lesson traces to evidence and approval.

Reference suppliers and source basis

L17: AVEVA Connected Worker. Sources: work.

L18: Yokogawa MIRROR PLANT, DNV, UniSim Design. Sources: Y1, dnv, H1.

L19: AVEVA PLC, UniSim API and FMI ecosystem. Sources: A3, H1, fmi.

L20: Honeywell Tutor and EON Work Intelligence foundation. Sources: H2.

27 Specification for actual work and enterprise integration

L17 Guidance during work

Field IQ shall resolve asset identity, approved procedure version, work authority and permitted evidence capture. Training and work shall share released knowledge while retaining different permissions and control endpoints. The product shall integrate Permit IQ and customer permit processes as required.

Acceptance: Change a procedure, release it and verify every affected work and training view. Block outdated critical guidance according to customer policy. Exercise offline evidence capture and conflict resolution without silently overwriting an approved record.

Owner: Field IQ lead. Delivery stage: P2.

L18 Operational decision support

A separately authorized operational module shall ingest historian or read-only telemetry, identify model drift and create isolated what-if branches. It shall explain assumptions, quality and uncertainty. Operational predictions shall use validated models and shall not write simulated actions into plant controls.

Acceptance: Run in shadow mode against historical and held-out events before operational use. Publish the prediction envelope, stale-data behavior and decision limits. Compare relevant prediction error to the selected incumbent before any superiority claim.

Owner: Operations integration lead. Delivery stage: P3.

L19 Enterprise interfaces

Publish versioned session, model, asset, event and assessment APIs. Support the buyer's required OPC profile and FMI where appropriate. Add historian, learning and maintenance-system adapters through explicit contracts. Proprietary emulation and model export shall respect licenses and API rights.

Acceptance: Test identity, units, time control, subscriptions, reconnect, permissions and version compatibility. Target 70% less effort on repeat integrations using the same supported profile. Unsupported protocols shall stay visible in the coverage register.

Owner: Integration lead. Delivery stage: P1 / P2.

L20 Knowledge improvement

Tacit, Assess IQ, Compound IQ and the Distillery shall connect expert knowledge and work observations to proposed improvements. Reviews shall preserve customer ownership, evidence lineage and approved operating procedures. Approved changes shall trigger affected-content tests.

Acceptance: Trace a real or consented test observation through review, scenario revision and a new assessment. Require complete approval and source lineage. Test tenant isolation, retention, corrections and rollback. Measure recurrence of the targeted work error after rollout.

Owner: Knowledge governance lead. Delivery stage: P2.

28 Competitive matrix for performance and commercial delivery

The EON column describes the target product. Baseline capabilities come from the named reference suppliers, not a claim that all suppliers provide the same functions.

Requirement	Reference capability	EON advantage to build
L21 Runtime performance	Concurrent sessions and accelerated simulation	Elastic sessions with bounded latency and visible model quality
L22 Deployment and resilience	On-premise and cloud offerings	The same released exercise works on isolated LAN or cloud
L23 Ownership and support	Engineering delivery and lifecycle services	Customer portability plus repeatable local delivery
L24 Total ownership cost	Complete comparable delivered solution	AI creation and reuse reduce full lifecycle cost

The success targets

L21 Runtime performance — BPCL floor plus 10x-speed and 100-role stretch tests.

L22 Deployment and resilience — Disconnected acceptance plus tested backup and recovery.

L23 Ownership and support — Complete export, handover and service coverage.

L24 Total ownership cost — Target at least 60% lower five-year TCO.

Reference suppliers and source basis

L21: DNV and established OTS. Sources: dnv, A1.

L22: AVEVA Dynamic Simulation and OTS. Sources: A2, A1.

L23: AVEVA, Emerson and established OTS suppliers. Sources: A1, E1.

L24: Buyer-selected incumbent offers. This row is an EON product or buyer-selected benchmark, not a sourced vendor capability claim.

29 Specification for performance and commercial delivery

L21 Runtime performance

The runtime shall isolate five BPCL trainees and support the draft expansion test of four independent 1,500 km models at 5x on the specified hardware. Separate cloud-scale targets shall include 100 active roles across at least 20 sessions, with declared model complexity and output rates.

Acceptance: Treat BPCL scale as mandatory. Stretch tests target 10x speed on the same reference workload and p95 accepted-command acknowledgement within 250 ms on the specified LAN. Report solver lag and state age separately; correctness and fault-free operation take precedence over throughput.

Owner: Runtime performance lead. Delivery stage: P1 / P3.

L22 Deployment and resilience

Package assets, models, identity, licensing, help and reports for offline operation. Cloud deployments shall add tenant isolation, SSO and elastic orchestration. All deployments shall include role permissions, signed releases, audit logs, dependency inventory, backup and controlled rollback.

Acceptance: Run the buyer's trial disconnected from the internet and perform fault, restore and access-control tests. Cloud service targets are 99.9% monthly availability and an agreed recovery profile. These are proposed service objectives, not existing SLAs or certifications.

Owner: Platform and security lead. Delivery stage: P1 / P2.

L23 Ownership and support

Deliver editable customer-owned scenarios, documented interfaces, agreed exports, administrator training and model change procedures. Define specialist support, local installation responsibility, severity response and patching. The BPCL package shall cover its confirmed warranty and CAMC obligations.

Acceptance: Have customer engineers execute a supported change and restore a prior release. Witness an export/import round trip for contractually portable data. Agree support SLAs, data rights, model licenses and exit assistance before commercial commitment.

Owner: Delivery and service lead. Delivery stage: P1 onward.

L24 Total ownership cost

Measure software, model licenses, compute, capture, content, specialist engineering, review, hardware, integration, training, support and updates within one boundary. Separate first-site and repeat-site economics, and show base versus optional connected-work scope.

Acceptance: Target at least 60% lower five-year total cost against an executable comparable offer, while meeting all mandatory capabilities and accepted fidelity. Use documented assumptions, volume, labor rates and sensitivity ranges. Do not infer this target from a fast scene-generation demonstration.

Owner: Product and commercial lead. Delivery stage: P2 onward.

30 Commercial target definitions

These targets define the intended superiority of the proposed product. They are not achieved measurements or quoted competitor results. Freeze the task, baseline, environment and measurement rules before execution.

T1 Creation

≤ 10 minutes to a first playable draft and $\geq 80\%$ fewer approved authoring hours.

A ten-step reference procedure, pre-bound equipment and complete inputs. Include specialist review, corrections and failed drafts in the approved-hours measure.

T2 Updates

$\geq 90\%$ fewer end-to-end update hours.

A frozen corpus of SOP and equipment changes. Count impact analysis, regeneration, review, regression testing and release.

T3 Integration

$\geq 70\%$ less repeat-integration effort.

The same supported adapter profile and comparable asset/tag volume. Record first implementation separately.

T4 Economics

$\geq 60\%$ lower five-year total ownership cost.

Equivalent fidelity, mandatory functions, scale and support. Include all software, hardware, specialist work, maintenance and third-party licenses.

How to report the result

Retain raw runs, hardware and software versions, failure counts, labor by role and review effort. Report first-site and repeat-site results separately. Cost reduction equals baseline cost minus EON cost, divided by baseline cost. Report unresolved failures and sensitivity ranges alongside the headline number.

31 Engineering and learning target definitions

These targets define the intended superiority of the proposed product. They are not achieved measurements or quoted competitor results. Freeze the task, baseline, environment and measurement rules before execution.

T5 Physics

1% critical steady, 5% non-critical, 2.5% transient error stretch limits.

Half of the corresponding draft BPCL limits. Agree variables, reference precision, near-zero tolerances and operating envelope. Buyer requirements remain the contractual floor.

T6 Learning

≥30% fewer critical handoff errors.

Matched scenarios and cohorts, independent scoring and retention measurement. Report confidence intervals and any regression in individual skills.

T7 Performance

10x simulation speed and p95 command acknowledgement ≤250 ms.

Same representative model and reference hardware for the speed test. Measure LAN acknowledgement, solver lag and display state age independently.

T8 Engineering

≥50% shorter engineering cycles without more escaped defects.

Comparable work packages including review and verification. AI-assisted implementation must pass independent references and held-out cases.

How to report the result

Retain raw runs, hardware and software versions, failure counts, labor by role and review effort. Report first-site and repeat-site results separately. Cost reduction equals baseline cost minus EON cost, divided by baseline cost. Report unresolved failures and sensitivity ranges alongside the headline number.

32 Astra assisted implementation and verification

Advanced coding assistants, including Astra, shall be part of the engineering workflow. Their purpose is to accelerate implementation across the whole product, including traditional simulation technology. The workflow must make generated code reviewable, reproducible and independently testable.

Workstream	AI assisted implementation	Independent evidence
Numerical models	Network solvers, component models, profiling and optimization.	Analytical results, conservation, convergence and an independent reference.
Controls and adapters	Tag mapping tools, emulation interfaces, importers and contract tests.	Approved logic and external interface conformance cases.
Scenario and experience	Scenario compiler, role clients, authoring workflow and reports.	Specialist procedure review and end-to-end user tasks.
Reliability and delivery	Fault injection, regression generation, packaging and documentation.	Recovery tests, security review and witnessed acceptance.

Engineers shall break work into modules with explicit inputs, outputs and invariants. The continuous-integration system shall run unit, integration, property, numerical, security and performance tests appropriate to each change. Reproducible builds shall pin code, model, data and dependency versions.

AI-generated tests are useful for coverage but cannot be the sole correctness oracle for AI-generated physics. The test set must also include independent equations or implementations, qualified engineering review and customer operating cases withheld from calibration. Unexpected results remain visible and block release where required.

The proposed T8 goal is at least a 50% reduction in engineering cycle time with no increase in escaped defects. Measure the complete reviewed work package, not only the time spent generating code. Where a licensed solver meets the product gate faster or with stronger evidence, use it behind the same adapter while native development continues against the same tests.

33 Physics leadership beyond the first application

The product shall develop a reusable simulation platform rather than a collection of visual demonstrations. The initial liquid-pipeline domain pack anchors BPCL. Broader equipment, gas, thermal and process-plant coverage remains in the product scope and receives separate engineering and validation gates.

Model architecture

Separate network topology, numerical integration, thermophysical properties, equipment equations and control logic. A model capability manifest shall record supported phases, operating ranges, assumptions, parameters, failure modes, calibration data and validation evidence. Geometry may inform dimensions, but it cannot silently supply unknown connectivity or material properties.

Validation hierarchy

Start with component and analytical cases, then coupled network benchmarks, independent solver comparisons and held-out operating events. Examine steady behavior, fast transients, abnormal states and recovery. Verify conservation and convergence. Record the effect of time step, spatial discretization, solver tolerances and boundary uncertainty.

More accuracy and greater speed

Pursue the T5 accuracy stretch targets without making the model unstable or unreasonably expensive to run. Profile representative networks and optimize bottlenecks. Parallel execution, sparse methods and safe caching can reduce compute effort. A reduced-order or machine-learning surrogate requires its own error envelope, drift detection and fallback to a validated model.

A model for training and engineering

The same released physics should support operator training, field consequences and controlled engineering studies. Studies branch from the baseline and preserve all changes. A future operating twin runs behind a separately authorized read-only data boundary and must pass shadow validation before it informs operational decisions.

No domain is declared covered merely because the architecture can host a model. A shipped domain requires the equipment inventory, physics envelope, reference tests, calibrated parameters and supported customer workflows to pass its release gate.

34 Delivery stages and release accountability

Stage	Release scope	Acceptance gate
P1 BPCL core	Required physics, controls, instructor, offline runtime, engineering station and service.	Buyer acceptance plus full regression coverage for the declared domain.
P2 Integrated leadership	Connected field and command, AI authoring, work guidance, learning and repeat integration.	L01–L24 coverage for the release and completed comparative target tests.
P3 Domain and scale expansion	Additional physics packs, operating-context modules and broader cloud workloads.	Domain-specific validation, shadow tests and declared service objectives.

The stages preserve the complete ambition while making delivery accountable. Later-stage items must remain funded or explicitly scheduled backlog decisions, rather than disappearing from the product. A dated commitment requires confirmed data access, licenses, staffing, hardware and scope.

The seven-month BPCL window in the bid drafts is not a schedule for all P2 and P3 ambitions. The integrated leadership program needs its own capacity and dependency plan. The process and controls leads own domain acceptance, while product leadership owns coverage across every buying criterion.

The release decision

Before a release is described as superior, the review must see the complete capability register, passed mandatory cases, measured results, known limits and customer support readiness. If a target is missed, keep the product capability and improvement plan explicit. Do not silently lower the baseline or trade away a critical requirement to preserve a marketing claim.

What the team should do next

Approve the expanded product mandate and target definitions. Audit reusable EON components against L01–L24. Establish the reference cases and competitor configurations. Assign the accountable roles, estimate the work and choose native versus licensed model components. Start implementation only after the scope and evidence plan are agreed.

35 Sources and evidence basis

Source numbers refer to the claims in this paper. Vendor sources establish advertised capabilities, not independent comparisons. The EON reference and BPCL bid drafts are supplied project material. Research reviewed on 27 September 2026.

- [1] EON Work Intelligence v20 — supplied PDF, pages 6–31, 37–42, 57, 67–72
- [2] ExxonMobil — EON simulator license announcement, 4 May 2015
- [3] AVEVA — XR Studio for Training
- [4] AVEVA — XR for Operations and Maintenance
- [5] Emerson — DeltaV Mimic Field 3D
- [6] Honeywell — Immersive Field Simulator, 2020 announcement
- [7] Yokogawa — JCCP virtual field training implementation
- [8] Atmos International — Atmos Trainer
- [9] DNV — Synergi Pipeline Simulator Trainer
- [10] SynergyXR — Procedure Builder release documentation
- [11] Uptale — platform and production services
- [12] FEMA — National Incident Management System course
- [13] Modelica Association — FMI 3.0.2 specification
- [14] BPCL project basis — local Technical Bid and Partner Brief for GEM/2026/B/8062246
- [15] Omega Simulation — OmegaLand V3.4, 18 November 2020

The original BPCL buyer documents were not included in the reviewed local sources. Draft clause references, tolerances and delivery obligations therefore require reconciliation before a compliance commitment. New-product availability, benchmark savings, current integration completeness and pipeline performance remain subject to their stated evidence gates.

36 Additional sources for the expanded benchmark

[A1] AVEVA OTS and Schneider Electric delivery

[A2] AVEVA Dynamic Simulation

[A3] AVEVA PLC Simulation

[E1] Emerson DeltaV Mimic

[H1] Honeywell UniSim Design

[H2] Honeywell UniSim Tutor

[Y1] Yokogawa OTS and MIRROR PLANT

Short source keys in the matrices map to the original bibliography as follows: aveva [3], work [4], emerson [5], honey [6], yoko [7], atmos [8], dnv [9], synergy [10], uptale [11], fmi [13]. EON foundations refer to supplied v20 material [1].

Official source pages were reviewed on 27 September 2026. Product pages establish advertised capabilities; they do not establish comparative performance. Honeywell's IFS launch reference is historical. Vendor configurations, licenses and present availability require confirmation for an actual procurement comparison.

All numerical improvements introduced in this revision are proposed EON product targets. No external source is represented as evidence that these targets have already been achieved.

37 Customer benefits and engineering traceability

The 20 customer benefits form five buying groups. Each benefit below links to detailed requirements and, where relevant, a quantified target. Acceptance requires the complete referenced tests, including the shared deployment, resilience and service obligations.

ID	Customer benefit	Group	Requirements and targets
B01	Physics and operator simulation	Simulation depth	L01, L03, L05, L08, L21 / T5
B02	Engineering studies and control checkout	Simulation depth	L04
B03	Reuse of 3D assets or component libraries	Simulation depth	L02, L10
B04	Online process models for operations	Simulation depth	L18
B05	No-code interactive 3D authoring	AI creation	L09, L15, L16
B06	AI-assisted training creation	AI creation	L09, L12
B07	Documents to interactive training	AI creation	L09
B08	AI equipment twins from photos or P&IDs	AI creation	L02, L10
B09	AI internal equipment knowledge	AI creation	L02, L13
B10	AI procedures linked to validated models	AI creation	L09, L13
B11	Field and control-room joint exercises	Team rehearsal	L07, L13
B12	Command joins the field and operators	Team rehearsal	L07, L14
B13	Shared replay of roles and process state	Team rehearsal	L06, L07, L14
B14	AR guidance at real equipment	Connected work	L17
B15	Rehearsal linked to permits and evidence	Connected work	L17, L19
B16	Work evidence improves approved training	Connected work	L11, L20
B17	10-minute playable procedure draft	Speed and cost	L09 / T1
B18	80% fewer approved authoring hours	Speed and cost	L09 / T1
B19	90% fewer content update hours	Speed and cost	L11 / T2
B20	60% lower five-year ownership cost	Speed and cost	L24 / T4

Owners and release stages remain attached to L01–L24 in sections 19, 21, 23, 25, 27 and 29. L21–L23 apply across all five groups. A future-release “Done” label becomes a delivery claim only when its evidence package is accepted.

38 Simulation depth

Trust the model and test operating decisions

Customer benefit	EON	AVEVA	Emerson	Honeywell	Yokogawa	Atmos	DNV	SynergyXR	Uptale
B01 Physics and operator simulation	Done+	✓	✓	✓	✓	✓	✓	—	—
B02 Engineering studies and control checkout	Done	✓	✓	✓	✓	—	—	—	—
B03 Reuse of 3D assets or component libraries	Done	—	✓	—	—	—	—	✓	✓
B04 Online process models for operations	Done	—	—	✓	✓	—	—	—	—

Future-release comparison. Done assumes delivery and validation. ✓ means vendor documented; — means unverified, not absent. Beta is a vendor beta.

Customer value. Familiar controls and credible process behavior give the team a dependable place to practise, test changes and investigate operating choices.

How EON delivers it. Control Room and EON Live connect operator screens to validated models. Reusable components preserve equipment meaning. A separately authorized online module adds read-only operating context.

Example. An engineer tests a revised pump sequence in a study copy. The controller then rehearses it through familiar screens before the approved change reaches the site.

Specification and acceptance. L01, L02, L03, L04, L18. Pass every required physical and control case. Demonstrate the tighter accuracy envelope independently. Validate online predictions in shadow mode before operational use.

Established suppliers already provide strong physics and operator training. The premium offer must earn its accuracy claim on the same reference cases. Asset reuse varies by product and does not imply identical industrial component coverage.

Evidence keys: AD, ED, HD, YD, AT, D, E, SP, U. Full source register in section 44.

39 AI creation

Build equipment and procedures with less manual work

Customer benefit	EON	AVEVA	Emerson	Honeywell	Yokogawa	Atmos	DNV	SynergyXR	Uptale
B05 No-code interactive 3D authoring	Done	—	—	—	—	—	—	✓	✓
B06 AI-assisted training creation	Done	—	—	—	—	—	—	✓	✓
B07 Documents to interactive training	Done	—	—	—	—	—	—	—	Beta
B08 AI equipment twins from photos or P&IDs	Done	—	—	—	—	—	—	—	—
B09 AI internal equipment knowledge	Done	—	—	—	—	—	—	—	—
B10 AI procedures linked to validated models	Done	—	—	—	—	—	—	—	—

Future-release comparison. Done assumes delivery and validation. ✓ means vendor documented; — means unverified, not absent. Beta is a vendor beta.

Customer value. Authors start with equipment information and approved procedures. AI helps turn those inputs into an interactive exercise that specialists can review and release.

How EON delivers it. Genesis creates the procedure. Universal and Model Inside attach equipment knowledge. EON Live supplies accepted behavior. Authors review uncertain data, bindings and role views before publication.

Example. An author supplies an approved valve procedure and equipment data. The system drafts the field steps, connects actions to the right simulated component and prepares an assessment.

Specification and acceptance. L09, L10, L12, L13, L15, L16. Trace every critical action to an approved source and validated component. Check dimensions, connectivity, translations and review effort. Test the same accepted output against the baseline.

SynergyXR and Uptale already offer no-code and AI assistance. Uptale identifies document-to-experience creation as beta. EON's exact equipment-to-procedure-to-process workflow is the intended distinction, not AI or 3D alone.

Evidence keys: S, SP, U, E, EU. Full source register in section 44.

40 Team and emergency rehearsal

Operators, field teams and command practise together

Customer benefit	EON	AVEVA	Emerson	Honeywell	Yokogawa	Atmos	DNV	SynergyXR	Uptale
B11 Field and control-room joint exercises	Done	✓	✓	✓	✓	—	—	—	—
B12 Command joins the field and operators	Done	—	—	—	—	—	—	—	—
B13 Shared replay of roles and process state	Done	—	—	—	—	—	—	—	—

Future-release comparison. Done assumes delivery and validation. ✓ means vendor documented; — means unverified, not absent. Beta is a vendor beta.

Customer value. Each person practises their own responsibility while seeing how their decisions affect the whole operation. One replay exposes missed information and weak handoffs.

How EON delivers it. A shared session joins Control Room, Genesis and Situation Room. The instructor controls faults and uncertainty. Assessment links decisions to the procedure and to what each participant could know.

Example. A pressure alarm triggers a field check. A delayed report changes the command team's coordination decisions. The debrief reconstructs every role's information and the simulated process response.

Specification and acceptance. L05, L06, L07, L08, L14. Demonstrate controller, field, command and instructor roles in one session. Reconstruct the causal timeline. Measure handoff errors with independent scoring on matched exercises.

Control-room and field exercises already exist in the major industrial suites. The comparison distinguishes the exact command-role and shared-replay combination. Unverified cells do not imply that competitors lack emergency scenarios or replay.

Evidence keys: A, E, H, Y, D, HT. Full source register in section 44.

41 Connected work

Carry approved guidance and lessons into the real job

Customer benefit	EON	AVEVA	Emerson	Honeywell	Yokogawa	Atmos	DNV	SynergyXR	Uptale
B14 AR guidance at real equipment	Done	✓	—	—	—	—	—	—	—
B15 Rehearsal linked to permits and evidence	Done	—	—	—	—	—	—	—	—
B16 Work evidence improves approved training	Done	—	—	—	—	—	—	—	—

Future-release comparison. Done assumes delivery and validation. ✓ means vendor documented; — means unverified, not absent. Beta is a vendor beta.

Customer value. Training stays connected to the procedure people actually use. Reviewed job evidence improves the next exercise and the next approved work instruction.

How EON delivers it. Field IQ resolves the asset, procedure version and work authority. Permit IQ and enterprise adapters supply authorized context. Reviewers approve changes before regression tests and release.

Example. During a maintenance handover, a technician records a mismatch. A reviewer corrects the approved procedure, checks the affected simulation and publishes the update to training and work.

Specification and acceptance. L11, L17, L19, L20. Trace one observation through approval, a tested training revision and updated guidance. Verify permissions, tenant isolation, offline conflicts and rollback. Block stale critical instructions.

AVEVA already documents AR maintenance guidance. EON's proposed distinction is a consistent reviewed workflow from rehearsal through authorized work evidence to the next approved exercise.

Evidence keys: AW, EU. Full source register in section 44.

42 Speed and cost

Reduce the effort to create, update and own the system

Customer benefit	EON	AVEVA	Emerson	Honeywell	Yokogawa	Atmos	DNV	SynergyXR	Uptale
B17 10-minute playable procedure draft	Done	—	—	—	—	—	—	—	—
B18 80% fewer approved authoring hours	Done	—	—	—	—	—	—	—	—
B19 90% fewer content update hours	Done	—	—	—	—	—	—	—	—
B20 60% lower five-year ownership cost	Done	—	—	—	—	—	—	—	—

Future-release comparison. Done assumes delivery and validation. ✓ means vendor documented; — means unverified, not absent. Beta is a vendor beta.

Customer value. Customers can afford to train more procedures and keep them current. The commercial test includes the complete accepted system and the effort required to maintain it.

How EON delivers it. Reuse equipment bindings, automate drafts and identify every experience affected by a change. Measure specialist review, software, models, hardware, integration and support within one cost boundary.

Example. A revised SOP updates the affected role views and tests. Specialists review the change once before release, and the cost record includes every correction and approval hour.

Specification and acceptance. L21, L22, L23, L24. Verify T1, T2 and T4 at equivalent scope, fidelity, scale and support. Preserve offline operation, session isolation, resilience and customer ownership. Publish first-site and repeat-site costs separately.

The figures are future-release engineering targets until measured. Competing vendors also claim fast creation and cost savings. Dashes indicate no verified like-for-like benchmark, not an inability to save money.

Evidence keys: EU. Full source register in section 44.

43 The release evidence for each customer group

The customer story and engineering program share the same five groups. The delivery team shall assemble an evidence package for each group before using the future-release comparison as a statement of delivered capability. A checked competitor feature establishes documented scope, not independently verified quality.

Simulation depth

Pass every required physical and control case. Demonstrate the tighter accuracy envelope independently. Validate online predictions in shadow mode before operational use.

Accountable coordination. Simulation lead with controls and operations integration leads.

AI creation

Trace every critical action to an approved source and validated component. Check dimensions, connectivity, translations and review effort. Test the same accepted output against the baseline.

Accountable coordination. Genesis authoring lead with asset, XR and experience leads.

Team and emergency rehearsal

Demonstrate controller, field, command and instructor roles in one session. Reconstruct the causal timeline. Measure handoff errors with independent scoring on matched exercises.

Accountable coordination. Learning science and emergency exercise leads.

Connected work

Trace one observation through approval, a tested training revision and updated guidance. Verify permissions, tenant isolation, offline conflicts and rollback. Block stale critical instructions.

Accountable coordination. Field IQ, integration and knowledge governance leads.

Speed and cost

Verify T1, T2 and T4 at equivalent scope, fidelity, scale and support. Preserve offline operation, session isolation, resilience and customer ownership. Publish first-site and repeat-site costs separately.

Accountable coordination. Product and commercial lead with platform and delivery leads.

One demonstration of the complete product

Create an exercise from approved inputs, bind it to the validated process model and run controller, field and command roles together. Publish the approved work guidance under separate authority. Capture a discrepancy, review the change, test every affected package and show the updated exercise. Record all effort and cost through acceptance.

Savings require an executable comparable baseline at equal scope and quality. BPCL compliance additionally requires reconciliation with original buyer documents and witnessed acceptance. The full technical specification remains the authority for release boundaries, domain coverage and mandatory tests.

44 Evidence register for the customer comparison

The grouped comparison reuses the researched named product scope. It does not audit every acquisition, partner or product in each corporate portfolio. Dashes remain research questions. Product configuration, licensing and availability require confirmation before customer disclosure.

A AVEVA XR Studio for Training

AD AVEVA Dynamic Simulation

AW AVEVA XR Connected Worker

E Emerson DeltaV Mimic Field 3D

ED Emerson DeltaV Mimic

H Honeywell Immersive Field Simulator announcement 2020

HD Honeywell UniSim Design

HT Honeywell UniSim Tutor

Y Yokogawa JCCP virtual field training case 2021

YD Yokogawa OTS and MIRROR PLANT

Honeywell's IFS announcement dates to 2020. The Yokogawa JCCP implementation dates to 2021. They establish historical scope, not current orderability. The grouped presentation does not claim competitors lack field simulation, AI, AR work guidance or replay as general categories.

Evidence register continued

AT Atmos Trainer

D DNV Synergi Pipeline Simulator Trainer

S SynergyXR Procedure Builder release

SP SynergyXR platform

U Uptale platform including AI beta functions

EH ExxonMobil and EON historical delivery

EU Supplied EON Work Intelligence v20. The equipment, procedure, EON Live, Situation Room and Field IQ descriptions support the intended product architecture. They are not independent acceptance evidence for the integrated Control Room release.

The ExxonMobil reference establishes EON's connected-simulation history. It does not establish a completed BPCL implementation. SynergyXR and Uptale already provide modern authoring. Uptale identifies document-to-experience generation as beta.

The comparison is a future-release sales scenario. Done+ and the ten-minute, 80%, 90% and 60% statements remain subject to their stated test boundaries. Detailed source scope and row definitions are also retained in the PowerPoint speaker notes.