

COLABMO TECHNICAL GUIDANCE

U.S. and European Simulation & Training Systems Requirements

Aerospace cockpit, flight training, military mission and ground-vehicle simulation applications

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Use and limitation

This guidance is an acquisition and requirements-engineering aid. It is not legal advice, a qualification certificate, an authority approval, or a substitute for the controlling contract, regulation, qualification basis, competent-authority direction, or platform technical data. Confirm current revisions and applicability before contract release or conformity assessment.

Author: Diggy Breiling

Colabmo | Simulation systems requirements and supplier integration
diggybreiling@colabmo.net | 941-416-1578

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Purpose and use

This document provides a practical baseline for purchasers, system integrators, training organisations, simulator manufacturers, display and control suppliers, software teams, test laboratories and authorities working on simulation and training systems in the United States and Europe. It concentrates on civil and military aerospace, cockpit and mission simulation, and ground-based vehicle simulation.

The document separates requirements by acceptance pathway. Civil aviation devices may require FAA or EASA qualification before training credit is granted. Military systems are normally accepted through contract-defined verification, validation and accreditation. Commercial and industrial vehicle simulators are usually governed by the training rule, employer duty, procurement specification and product-safety law rather than by a universal simulator qualification class.

Controlling principle

Qualification or acceptance follows the intended training use and credited tasks. Realistic visuals, replica controls or a high-fidelity vehicle model do not by themselves make a device an FAA- or EASA-qualified FSTD, an accredited military model, or a lawful substitute for hands-on operator evaluation.

Normative language

- **Must** means a binding obligation arising from a cited law, regulation, qualification basis or controlling contract after applicability has been confirmed.
- **Shall** is recommended for contractual requirements allocated to the simulator, subsystem, supplier or service provider.
- **Should** identifies a recommended engineering or assurance practice; deviations should be justified and recorded.
- **May** identifies a permitted option. It does not imply training credit or authority acceptance.

Determine applicability before selecting requirements

Decision question	Why it controls the baseline
Training outcome. What knowledge, skill, crew behaviour or mission task will the learner demonstrate?	Defines the task inventory, performance standard and assessment evidence.
Credit sought. Will time or checking in the device replace aircraft, vehicle or workplace activity?	Triggers FAA/EASA qualification and operational-use rules or limits simulator substitution under vehicle/operator rules.
Customer and authority. Civil aviation, defence, public safety, commercial fleet, industrial employer or research?	Identifies the regulator, competent authority, accrediting official, contracting authority and data owner.
Physical product. Fixed base, motion platform, deployable container, classroom device, XR/HMD or mixed configuration?	Drives machinery, electrical, EMC, radio, facility, occupational-safety and human-factors obligations.
Deployment and data. Standalone, distributed, cloud-connected, classified, export-controlled or biometric?	Determines cybersecurity, interoperability, privacy, data-rights and security accreditation scope.

Recommended acquisition use

- Approve a one-page applicability memo naming users, credited tasks, authority, jurisdiction, configuration and exclusions.
- Build a compliance matrix with source, owner, verification method and objective criterion for each requirement.
- Freeze platform, software, database, instructor-station and facility baselines before formal acceptance.
- Manage sickness, negative training, unsafe motion, cyber compromise and invalid assessment as system hazards.
- Screen every hardware, software, model, database, HMD, control, motion and network change for approval impact.

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1 Market and compliance architecture

Simulation products occupy overlapping markets, but acceptance is not interchangeable. The acquirer should establish the legal and contractual basis before specifying fidelity or selecting components. The same display, motion base or instructor station can sit inside devices with very different evidence burdens.

Market pathway	Primary acceptance mechanism	Typical evidence
U.S. civil flight training	FAA qualification under 14 CFR Part 60 for FFS/FTD; FAA approval under 14 CFR 61.4(c) and AC 61-136B for ATDs; separate operating/training rules govern credit.	Statement of Compliance, QTG/MQTG tests, objective/subjective evaluations, configuration records, continuing qualification and sponsor quality controls.
European civil flight training	Competent-authority qualification and organisation oversight under Regulation (EU) No 1178/2011, Part-ARA/Part-ORA and applicable CS-FSTD; new FCS framework applies 30 April 2028.	Qualification basis, QTG, FSTD capability/feature records, compliance monitoring, recurrent evaluation, change records and authority findings closure.
Defence and mission training	Contractual acceptance plus model/simulation VV&A by the designated accreditation authority; security and interoperability requirements are programme-specific.	Accreditation plan, V&V plan/report, data pedigree, use-case evidence, risk acceptance, test reports and configuration baseline.
Commercial road vehicle	Driver-training rules and licensing programme determine what simulation may support; U.S. ELDT behind-the-wheel proficiency cannot be satisfied in a simulator.	Curriculum mapping, instructor qualification, session records, scenario evidence and separate range/road proficiency evidence.
Industrial/off-road vehicle	Employer/operator training duties, workplace evaluation, equipment standards and contract acceptance. No general U.S./EU simulator qualification class.	Training analysis, practical exercise plan, workplace evaluation, hazard controls, product conformity and buyer acceptance tests.

1.1 Layer the baseline

Layer	Controls	Acquisition action
Law and regulation	Training credit, occupational safety, privacy, product conformity, radio/EMC, export and security.	Cite the jurisdiction-specific provision and effective date; do not copy a generic standards list.
Qualification or accreditation	Device capability, training tasks, objective and subjective test evidence, continued validity.	Name the qualifying/accrediting authority and approved use. Define transition rules for changes.
Consensus and military standards	Human factors, interoperability, electrical/environmental design, training analysis, VV&A methods.	Invoke only the applicable edition and tailored clauses in the contract.
Platform and training source data	Aerodynamics, propulsion, controls, avionics, vehicle dynamics, failure modes, procedures and cues.	Define source authority, revision, pedigree, allowable transformations and discrepancy process.
Buyer performance specification	Capacity, availability, maintainability, cybersecurity, facilities, interfaces, warranty and service levels.	Write measurable shall statements with verification methods and acceptance thresholds.

Avoid standards dumping

A long list of FAA, EASA, MIL, IEEE, ISO and EU documents is not a compliance baseline. Each cited document needs an applicability rationale, edition, tailored clauses, requirement owner, deliverable and verification method.

1.2 Baseline inputs that precede design

- Training-needs analysis and task inventory, including conditions, standards, cue dependencies, error consequences and transfer-of-training expectations.

- Intended-use statement identifying training, checking, rehearsal, analysis or research uses and every claimed credit/substitution.
- Reference platform definition and source-data hierarchy, including operator modifications and software loads.
- Human population and accommodation range, accessibility needs, instructor roles and crew/team composition.
- Deployment concept, throughput, operating hours, transportability, facility envelope, environmental conditions and support concept.
- Security classification, controlled technical information, export constraints, data rights, personal data and retention rules.

2 United States civil aviation simulation

The FAA National Simulator Program (NSP) administers qualification of flight simulation training devices under 14 CFR Part 60. Qualification of a device and approval of its use are related but separate: the device must be qualified for the relevant capabilities, and the operator or training programme must be authorised to use those capabilities for specific training, checking or experience credit. [R1–R4]

Device route	Scope and key control
Full Flight Simulator (FFS)	Part 60 levels A–D. Qualification uses the applicable Qualification Performance Standard (QPS), sponsor evidence, objective and subjective tests, inspections and continuing qualification.
Flight Training Device (FTD)	Part 60 levels 4–7. Capability and credited use depend on the applicable QPS, qualification statement and training-rule authorisation.
Basic/Advanced Aviation Training Device	FAA approval under 14 CFR 61.4(c), supported by AC 61-136B. BATD/AATD approval is not Part 60 FSTD qualification and carries narrower permitted credit.
Non-approved training aid	May be useful for familiarisation or procedure practice, but marketing and course material must not imply FAA credit or qualification that has not been granted.

2.1 Sponsor and qualification basis

- The sponsor shall identify the specific QPS, simulator level, aircraft make/model/series, engine/avionics configuration and requested training/checking tasks.
- The sponsor shall maintain a Simulator Quality Management System covering qualification, operation, maintenance, modification, discrepancy control, records and continuing evaluation.
- The Master Qualification Test Guide shall link each objective test to approved data, test conditions, tolerances, results and retained evidence; subjective demonstrations shall use qualified personnel and repeatable scenarios.
- Statements of Compliance shall explain how design features meet the applicable QPS when an objective test alone is insufficient.
- The configuration state presented for initial or recurrent evaluation shall be identifiable and reproducible, including software, databases, hardware options and facility interfaces.

2.2 Changes and continuing qualification

Part 60 controls continued qualification through recurrent evaluations, functional preflight checks, discrepancy management, modification reporting and records. The contract should require a qualification-impact assessment before changing flight models, avionics, control loading, motion, visual systems, sound, IOS functions, database content, operating system, cybersecurity configuration or hardware components.

Change class	Required supplier response
No intended effect on qualified characteristics	Document equivalence rationale, configuration identifiers, regression scope and sponsor approval before release.
Potential effect within existing qualification	Perform QTG regression, targeted subjective evaluation and data review; update MQTG/configuration records as accepted by the sponsor and NSP.
New capability or different training use	Obtain sponsor/FAA agreement on qualification path, additional tests, Statements of Compliance and qualification statement changes before credit is claimed.
Temporary deviation or inoperative feature	Apply sponsor discrepancy procedures, placarding/use restrictions, maintenance action and return-to-service evidence.

2.3 XR and head-mounted displays

FAA TSG Information Bulletin 26-01, dated 5 June 2026, provides recommended practices for immersive XR/HMD systems installed on Part 60 FSTDs. It does not cover ATDs or non-qualified classroom devices and does not establish a universal minimum XR standard. Sponsors should perform a gap analysis against the applicable QPS and coordinate deviations or equivalent means of compliance with the NSP. [R5]

- Demonstrate field of view, resolution, latency, image stability, collimation/depth cues, head tracking, occlusion, cockpit registration, brightness/contrast, colour and scene content in the actual device configuration.
- Control motion-to-photon and control-to-image timing as end-to-end quantities, including tracking, rendering, network, display and reprojection paths.
- Address headset fit, corrective lenses, hygiene, emergency removal, instructor observation, visual isolation, simulator sickness and access for trainees who cannot safely use the HMD.
- Treat software runtime, graphics driver, headset firmware and tracking hardware changes as configuration-controlled qualification items.

3 European civil aviation simulation

For aeroplane and helicopter FSTDs, the current European framework remains Regulation (EU) No 1178/2011 with Part-ARA/Part-ORA and the applicable CS-FSTD(A) or CS-FSTD(H) until the new framework becomes applicable. EASA published Commission Implementing Regulation (EU) 2026/781 and CS-FSTD Issue 1 in 2026; they apply from 30 April 2028. [R6–R10]

2026–2028 transition

Do not write a 2026 contract as though CS-FSTD Issue 1 is already the mandatory qualification basis. State the current qualification basis, the target in-service date, the competent authority's transition direction and whether the programme will voluntarily prepare for the FSTD Capability Signature framework.

3.1 Current framework before 30 April 2028

- Define the applicable device category/level, aircraft or helicopter configuration, qualification specifications and approved training/checking uses.
- The organisation operating the FSTD shall maintain the qualification, an adequate compliance-monitoring function, records, facilities and procedures required by Part-ORA and applicable AMC/GM.
- The QTG shall include objective tests, supporting data, tolerances, test procedures, results and the approved configuration; recurrent evaluation and internal testing shall remain current.
- Installation, access, emergency stops, motion and control hazards, instructor facilities, communications and operating environment shall support safe, repeatable evaluation and training.
- Where simulator data are generated or validated under CS-SIMD, the contract shall identify the approved data package, scope, limitations and configuration linkage. [R11]

3.2 FSTD Capability Signature framework

The new European framework moves toward task-to-tool qualification. A standardised FSTD Capability Signature (FCS) describes the device's capabilities and features so an approved training organisation or operator can determine whether the device supports a particular training, testing or checking task. This reduces dependence on a single technology-prescriptive hierarchy, but it increases the need for rigorous capability definition, evidence and configuration control.

FCS preparation area	Contract requirement
Training task mapping	Map each proposed task to the capability and feature set needed to achieve the learning or checking objective; identify unsupported conditions and workarounds.
Capability evidence	Provide objective/subjective test evidence, data pedigree and limitations for every declared capability.
Device description	Control hardware, software, cueing, controls, displays, instructor functions, environment and interfaces that substantiate the signature.
Change assessment	Evaluate whether a modification changes the FCS, qualification basis, training-use decision or authority approval.

FCS preparation area	Contract requirement
Transition governance	Name the competent authority, implementation milestones, legacy qualification treatment and evidence-conversion responsibility.

3.3 Cross-Atlantic design strategy

- Maintain separate FAA and EASA compliance matrices even when one physical device is intended for both markets.
- Use one controlled source-data and configuration baseline, but identify authority-specific test cases, tolerances, statements, records and evaluation events.
- Contract for data rights and test automation sufficient to regenerate evidence after changes without assuming one authority will accept the other's findings.
- Plan the 2028 European transition as a managed work package, not as an informal documentation update.

4 Aerospace cockpit and mission-system requirements

A cockpit simulator is a cueing system, not a collection of high-specification parts. The training task determines which cues must be present, their accuracy, timing, integration and failure behaviour. Requirements should be allocated end-to-end across models, controls, displays, optics, motion, sound, networks, instructor functions and the physical enclosure.

4.1 Functional and physical fidelity

Area	Minimum requirement content
Flight/vehicle dynamics	Reference data and equations; mass/inertia/configuration range; ground and airborne regimes; atmospheric/weather effects; numerical rate; initialisation; validation cases; known limitations.
Flight controls and loading	Geometry, travel, breakout, friction, force gradients, damping, trim, free play, coupling, failures, control feel and objective test method.
Avionics and mission systems	Software/hardware baseline, modes, pages, symbology, databases, sensor/stores behaviour, bus timing, degraded modes and approved emulation boundaries.
Cockpit geometry and reach	Eye reference, seating, control/display location, access, anthropometric accommodation, restraint, egress and maintenance clearances.
Procedures and malfunctions	Normal, abnormal and emergency procedures; trigger conditions; cue sequence; reset/reposition logic; instructor control; event recording.

4.2 Visual systems

- Specify the trainee eye-point envelope, horizontal/vertical field of view, binocular overlap, resolution or angular subtense, brightness, contrast, black level, colour performance and uniformity at the integrated viewing position.
- Define collimation, focus/depth cues, edge blending, seam visibility, geometric distortion, channel alignment, image stability and boresight procedures for direct-view, projection, dome, collimated and HMD architectures.
- State end-to-end transport-delay test conditions and instrumentation. The applicable QPS or buyer baseline—not a marketing figure—controls the acceptance threshold.
- Control visual database source, geospatial reference, terrain elevation, runway/road geometry, obstacle content, lighting, weather, sensor channels, levels of detail and update method.
- Verify scene correlation with navigation, weapon/sensor, traffic and instructor databases so that the same entity, coordinate and event are represented consistently across subsystems.
- Provide calibration access, built-in test, health monitoring and a repeatable method to restore qualified alignment after maintenance.

4.3 Motion, sound and physiological cueing

Motion cueing must support the trained tasks without creating false cues. The specification should define motion degrees of freedom, travel/velocity/acceleration capability, washout logic, onset cue priorities, residual motion, return-to-neutral behaviour, hard/soft stops, e-stop response and test methods. Sound, vibration, buffet, control loading and visual motion must be time-correlated.

Negative-training control

The programme shall identify cues whose absence, exaggeration, delay, inconsistency or predictability could train an unsafe technique. These risks belong in the hazard log and training-effectiveness evaluation, not only in a cosmetic discrepancy list.

4.4 Instructor operating station and assessment

- Provide scenario creation, environmental control, reposition, freeze, malfunction insertion, system-state monitoring, communication control and trainee observation without unintended interference with the simulation.
- Record time-synchronised controls, system states, events, instructor actions, communications and assessment markers with enough fidelity to reconstruct the exercise.
- Define automated assessment logic, thresholds, confidence, instructor override, explainability and version control; validate scores against qualified human judgement before operational use.
- Separate training records from engineering telemetry and protect personal, biometric and performance data according to the approved privacy and retention plan.

5 U.S. and European military training systems

Military simulator acceptance is primarily programme- and contract-driven. U.S. Department of Defense policy requires appropriate verification, validation and accreditation for models and simulations used in acquisition, test, training and decision support. NATO and European defence customers may invoke national policy, NATO standardisation agreements, Allied Modelling and Simulation Publications and security requirements. [R12–R18]

5.1 VV&A and accreditation

Activity	Responsible decision and evidence
Verification	Determine whether the implementation correctly represents its specifications and conceptual model. Evidence includes code/model reviews, unit/integration tests, numerical checks and interface tests.
Validation	Determine whether the model, simulation and data adequately represent the real-world domain for the intended use. Evidence includes authoritative-data comparison, subject-matter-expert review and operationally representative scenarios.
Accreditation	The designated authority decides whether the model/simulation is acceptable for a specific intended use, conditions and limitations. Accreditation is not a supplier self-declaration.
Continuous assurance	Monitor changes, anomalies, data updates and use beyond the accredited envelope; trigger re-VV&A or reaccreditation according to the approved plan.

DoDI 5000.61 establishes DoD M&S VV&A policy and cites MIL-STD-3022. MIL-STD-3022, active with Notice 1 dated 9 February 2026, provides recommended documentation templates for the accreditation plan, V&V plan, V&V report and accreditation report. Tailor these artifacts to the programme and intended use. [R12–R14]

5.2 Training-system acquisition

- Base system requirements on a training-system requirements analysis and task-to-capability mapping; preserve traceability to doctrine, tactics, techniques, procedures and approved technical data.
- Identify whether training software must represent current operational software exactly, emulate behaviour, stimulate actual equipment or use constructive entities; document every boundary and limitation.
- Allocate human-engineering criteria using the contractually invoked edition of MIL-STD-1472 or applicable European/national standard; validate crew coordination, workload and instructor usability with representative users.
- Invoke environmental, EMC, platform-power or ruggedisation standards only when the delivered simulator hardware must operate in those environments. A simulator does not inherit MIL-STD-810, MIL-STD-461, MIL-STD-1275 or MIL-STD-704 solely because it represents a platform governed by them.
- Define Government-furnished information/equipment, rights in technical data and software, escrow/rebuild rights, cybersecurity artefacts, export controls, classified processing and cross-domain boundaries.

5.3 Mission and collective training

Requirement family	Required definition
Threat and behaviour models	Authority, doctrine/version, tactical logic, observables, sensor/weapon interactions, stochastic behaviour, limitations and validation cases.
Electronic environment	Spectrum, emitters, communications, navigation, cyber/electromagnetic effects, security classification and correlation across participants.
After-action review	Common time base, event capture, entity identity, adjudication, voice/data replay, annotation, scoring, access control and retention.
Exercise control	Roles, master clock, start/restart, fault isolation, network degradation, white-cell interventions, safety controls and recovery procedures.
Operational realism	Representative crew/team tasks, workload, information flow, doctrine, communications and consequences without unsafe or unvalidated negative transfer.

5.4 NATO and multinational use

- Use the contractually specified NATO standards profile and national implementation guidance; a STANAG number alone is insufficient without edition and implementation detail.
- Define coalition releasability, data labelling, identity and access management, network classification, language/localisation, time and geospatial reference, unit systems and shared environmental data.
- Perform federation-level testing with the intended gateways, middleware, network impairments and exercise services; laboratory protocol conformance does not prove mission-level interoperability.

6 Ground-vehicle and operator simulation

Ground-vehicle simulation spans tactical crew trainers, commercial driving, emergency response, rail, construction, mining, agriculture and industrial vehicles. Unlike civil flight simulation, there is no single U.S. or European qualification ladder covering all applications. The controlling training and safety rule must be identified by vehicle, task, employer and jurisdiction.

6.1 Military tactical and crew vehicles

- Model mobility, steering, braking, powertrain, traction, suspension, rollover/stability, terrain interaction, payload, damage/degradation and vehicle-specific controls over the training envelope.
- Represent crew stations, visibility restrictions, hatches, weapon/sensor controls, communications, intercom and crew-coordination tasks at the fidelity required by the training analysis.
- Correlate terrain surface class, elevation, soil/traction, obstacles, roads, trafficability and weather across mobility, visual, sensor and constructive models.
- Validate collision, damage, stuck/recovery and safety-critical failure behaviours; distinguish training adjudication from engineering prediction.
- Apply the programme VV&A/accreditation, interoperability, cybersecurity, human-factors and data-rights controls described in Sections 5, 7 and 8.

6.2 U.S. commercial driver training

Under the Federal Motor Carrier Safety Administration's Entry-Level Driver Training rule in 49 CFR Part 380, simulation may support theory instruction, but the behind-the-wheel range and public-road curricula require actual driving and demonstration of proficiency. A simulator shall not be marketed or accepted as a substitute for those required behind-the-wheel elements. [R19–R20]

Use	Acceptance position
Theory and hazard recognition	Simulation can support interactive learning, perception, decision-making, commentary and scenario practice when integrated into the approved curriculum.
Range skill development	Simulation can prepare trainees and reduce risk, but required behind-the-wheel range instruction and proficiency remain separate.
Public-road skill development	Simulation can rehearse hazards and routes, but it cannot replace required public-road behind-the-wheel instruction or proficiency demonstration.

Use	Acceptance position
Fleet recurrent training	Buyer-defined use may support remediation, eco-driving, defensive driving and incident reconstruction; claims should be backed by training-effectiveness evidence.

6.3 Powered industrial trucks and workplace vehicles

OSHA 29 CFR 1910.178(l) requires powered-industrial-truck training to combine formal instruction, practical training and evaluation of the operator's performance in the workplace. Simulation can strengthen formal instruction and provide safe rehearsal, but it does not replace the required practical training and workplace evaluation. Training must be truck- and workplace-specific. [R21–R22]

- Map simulator scenarios to the applicable vehicle, attachments, loads, workplace hazards, pedestrian/traffic conditions and operating surfaces.
- Measure observable behaviours without presenting a simulator score as the employer's workplace competence determination.
- Provide a clear transition plan from simulation to supervised hands-on practice and site evaluation.
- Control seat, belt, controls, emergency stop, motion and access hazards as a machine used by employees and trainees.

6.4 European vehicle/operator programmes

European driver-licensing, railway, occupational-safety and sector requirements vary by application and Member State. The buyer shall identify the competent authority, national transposition and permitted simulator credit. Product conformity for the delivered equipment remains separate from any training-programme acceptance.

7 Interoperability, LVC and synthetic environments

Live, virtual and constructive (LVC) training introduces system-of-systems requirements. Protocol compliance is necessary but not sufficient: participants must also share meaning, time, geospatial reference, environmental state and adjudication rules.

7.1 Standards selection

Framework	Current role and acquisition caution
IEEE 1516 HLA family	IEEE 1516/1516.1/1516.2-2025 define the HLA framework, federate interface and object-model template. Specify required services, FOM modules, time management, ownership and certification/testing profile. [R23]
IEEE 1278.1 DIS	IEEE 1278.1-2012 remains the published DIS application-protocol standard while revision work proceeds. Specify PDUs, enumerations, dead reckoning, reliability, exercise identifiers and supported extensions. [R24]
SISO products	Use named SISO standards or reference products for enumerations, real-time platform reference/FOMs, scenario formats, terrain/environment or test methods as contractually selected.
NATO AMSP/STANAG profile	Use the applicable Allied Modelling and Simulation Publication and promulgating STANAG, with national reservations and implementation agreements. [R17–R18]
DoD standards profile	Record standards in the DoDAF Standards Viewpoint and use the DoD Information Technology Standards Registry when required by the acquisition. [R25]

7.2 Federation agreement and interface control

- Define federation purpose, participating systems, authoritative source for each state variable, object/entity ownership and join/resign behaviour.
- Control FOM/SOM or protocol schema, enumerations, coordinate systems, units, datum, time representation, entity identity, marking and version compatibility.
- Specify time management, update rates, dead-reckoning algorithms, latency/jitter/loss budgets, late data, rollback or recovery behaviour and network security overhead.
- Define environmental correlation for terrain, weather, lighting, atmosphere/ocean, road surface, damage and sensor-relevant properties.

- Specify record/replay, exercise control, fault injection, data collection, AAR, instrumentation and truth-data access.
- Test at message, semantic, temporal, spatial, behavioural and mission-task levels under representative scale and network impairment.

7.3 LVC safety and training validity

Shared-state failure

A federation can remain connected while training validity has failed—for example, inconsistent terrain, duplicated entity identity, stale weapon state or unsynchronised time. Detect and alarm semantic and temporal divergence, not only network disconnects.

- Separate safety-critical range interfaces and live-force controls from simulation convenience functions; define authority to halt the exercise.
- Prevent constructive or virtual data from being mistaken for operational command data through labelling, boundary controls and approved interfaces.
- Verify that latency, data reduction and gateway translation do not change cue timing, tactical outcomes or assessment scores beyond accepted limits.

8 Safety, product conformity, cybersecurity and privacy

8.1 System and facility safety

Hazard area	Required controls and evidence
Motion and mechanisms	Guarding, interlocks, safe access, motion envelope, soft/hard limits, e-stop, stored energy, maintenance lockout, emergency recovery and validation tests.
Occupant and ergonomics	Ingress/egress, seat/restraint, pinch/crush/fall hazards, accommodation, accessibility, emergency lighting, communications and instructor oversight.
Electrical and fire	Protective bonding, overcurrent, isolation, cable ratings, thermal management, UPS/battery hazards, flammability, smoke/fire detection and facility interface responsibility.
Optical/XR exposure	Brightness/flicker, photosensitivity, eye strain, headset hygiene, heat, fit, corrective lenses, trip/fall risk, disorientation, sickness screening and stop criteria.
Operational misuse	Authorised modes, pre-use inspection, degraded-operation rules, alarms, operating procedures, instructor qualification, maintenance release and incident reporting.

Use a system safety process with hazard identification, severity/likelihood criteria, risk controls, verification, residual-risk acceptance and traceability through changes. The buyer shall name the accepted method and the authority that may accept residual risk.

8.2 U.S. product and workplace considerations

- Identify OSHA obligations for the installation and operation, including electrical safety, machine guarding, walking-working surfaces, emergency action and equipment-specific training.
- Determine whether a Nationally Recognized Testing Laboratory listing, field evaluation or local authority approval is contractually or locally required; document the exact product standard and installation scope.
- Allocate facility power, grounding, HVAC, fire protection, structural loads, network, accessibility and emergency-response responsibilities between supplier, buyer and site contractor.
- Do not apply military environmental or power standards to commercial indoor equipment without an operational need and contract tailoring.

8.3 European conformity

CE marking applies through the legislation relevant to the delivered product and intended use. The supplier must determine the economic operator, product classification, applicable legislation, harmonised standards, conformity-assessment route, technical documentation and declaration responsibilities. [R26–R31]

EU instrument	Typical simulator relevance
Machinery Directive 2006/42/EC / Machinery Regulation (EU) 2023/1230	Motion platforms, actuated controls and other machinery. The Regulation becomes applicable on 20 January 2027; manage contracts spanning the transition.
EMC Directive 2014/30/EU	Electrical/electronic simulator assemblies and installations placed on the EU market or put into service.
Low Voltage Directive 2014/35/EU	Electrical equipment within the Directive's voltage scope; other safety law may still apply outside that scope.
Radio Equipment Directive 2014/53/EU	Wi-Fi, Bluetooth, radio links or other intentional radio equipment incorporated in the product.
RoHS Directive 2011/65/EU	Electrical/electronic equipment unless excluded or exempt; confirm category and substance-restriction obligations.
GDPR and AI Act	Trainee/biometric/performance data and AI-supported assessment or safety functions. Classification depends on intended use and deployment, not the AI label alone.

8.4 Cybersecurity and privacy

- Define the system security boundary, asset inventory, trust zones, accounts/roles, authentication, secure configuration, cryptography, logging, vulnerability handling and incident-response interfaces.
- Require a software bill of materials, third-party component inventory, provenance, vulnerability monitoring, patch service levels and support-period commitments.
- Test cyber controls without invalidating qualification or training fidelity; establish an expedited path for critical patches and a regression/reauthorisation decision process.
- Minimise trainee data, establish lawful purpose, notice, access, retention, deletion and transfer controls, and separate identifiable training records from engineering analytics where practicable.
- For AI/ML functions, document intended use, model/data provenance, performance by relevant population and scenario, human oversight, uncertainty, drift monitoring, change control and prohibited uses.

9 Requirements flowdown and supplier allocation

The system designer owns the integrated performance of the delivered simulator. Component suppliers should receive requirements expressed at their controllable interface, along with reference conditions, verification methods and evidence obligations. Passing a top-level regulation to a display, motion or software supplier without allocation is not adequate flowdown.

Buyer/system designer defines	Supplier shall return
Intended use, tasks, qualification/accreditation route and credited scope	Compliance matrix identifying full, partial, not-applicable and customer-dependent requirements with rationale.
Reference platform, source-data hierarchy and authorised baselines	Data-use statement, pedigree/assumptions, discrepancy list, model scope and configuration identifiers.
Integrated cue and timing budgets	Allocated performance, measurement method, uncertainty, test results and margin for the supplied subsystem.
Interfaces and operating environment	Interface control data, power/network/thermal/mechanical loads, tolerances, fault behaviour and integration constraints.
Safety, security, privacy and conformity duties	Hazard contributions, security artefacts, declarations/certificates where applicable, residual assumptions and operating restrictions.
Lifecycle, availability and change policy	Maintenance concept, spares/obsolescence plan, support period, patch process, notification lead time and requalification impact data.

9.1 Anatomy of a usable requirement

Requirement pattern

The [identified item] shall [observable action/performance] under [reference conditions] to [threshold/tolerance], verified by [inspection, analysis, demonstration or test] using [named procedure/data], with [required record].

Weak wording	Improved contract wording
The visual system shall have low latency.	The visual subsystem shall meet its allocated end-to-end transport-delay budget under the defined worst-case scene, frame rate and network load; the supplier shall provide timestamped test data, instrumentation uncertainty and configuration identifiers.
The simulator shall be realistic.	For each task in the approved task inventory, the simulator shall reproduce the identified visual, control, motion, aural and system-response cues within the approved verification criteria and documented limitations.
The product shall comply with all standards.	The supplier shall comply with the clauses and editions in the contract applicability matrix and shall identify conflicts, assumptions and buyer dependencies before design review.
The system shall be interoperable.	The system shall exchange the specified entities, attributes, interactions and exercise-control services using the named protocol/profile, schema version, time policy and network conditions, verified by conformance and mission-thread tests.

9.2 Requirements records

- Unique identifier, requirement text, source and source revision.
- Applicability rationale, assumptions, allocation and responsible owner.
- Verification method, procedure, success criteria, data and acceptance authority.
- Parent/child traceability to training task, hazard, interface and qualification/accreditation evidence.
- Status, waiver/deviation, rationale, residual risk and approved change history.

9.3 Interface-specific flowdown

Supplier	Critical flowdown
Display/visual	Eye point/FOV, angular resolution, luminance/contrast/colour, optical geometry, latency allocation, environmental database content, calibration and change notification.
Motion/control loading	Load/travel envelope, cue priorities, timing, mechanical limits, e-stop, interlocks, noise, maintainability, acceptance waveform and safety evidence.
Aircraft/vehicle model	Source data, regimes/configurations, numerical rate, interpolation/extrapolation, trim/initialisation, failures, validation cases and uncertainty.
IOS/assessment	Scenario functions, permissions, event definitions, record/replay, scoring logic, human override, audit trail, privacy and export formats.
Network/LVC	Protocol/profile, schemas, time/geospatial reference, bandwidth, latency/loss, security, logging, federation tests and version compatibility.
Facility integrator	Power, grounding, structure, HVAC, fire/life safety, access, egress, network, acoustic/light conditions, construction tolerances and commissioning responsibilities.

10 Verification, validation, qualification and acceptance

Evidence should be planned from the requirement baseline, not assembled after integration. The programme verification cross-reference matrix should identify every requirement, verification level, method, configuration, procedure, data source, witness and disposition.

10.1 Evidence hierarchy

Level	Purpose and examples
Component	Displays, trackers, controls, actuators, computers and interfaces: calibrated measurements, qualification data, firmware/software ID and environmental conditions.
Subsystem	Integrated visual, motion, control loading, avionics, sound, IOS or network: functional tests, allocated timing/cue performance, fault behaviour and built-in test.
Device/system	End-to-end tasks, objective tests, subjective evaluation, safety functions, performance, recovery, facility interfaces and training workflows.
Qualification/accreditation	Authority or accrediting official determines acceptable capability, use and limitations based on the required evidence package.
Operational training	Training organisation confirms curriculum integration, instructor readiness, learner assessment, records and continued effectiveness.

10.2 Verification methods

- Inspection confirms observable characteristics, markings, configuration, records and workmanship without exercising functions.
- Analysis uses documented methods, assumptions, input data, uncertainty and sensitivity to establish compliance where direct test is impractical.
- Demonstration shows qualitative operation under controlled conditions with defined steps and acceptance observations.
- Test uses calibrated instrumentation, specified conditions, repeatable procedures, objective pass/fail criteria and retained results.
- Subject-matter-expert evaluation supplements—not replaces—objective evidence and shall document evaluator qualifications, scenarios, rating criteria and findings.

10.3 Qualification and acceptance readiness

Gate	Exit criteria
Requirements baseline review	Intended use and credited tasks approved; authority and standards applicability settled; requirements measurable and allocated; verification matrix substantially complete.
Preliminary design review	Architecture supports cue/timing budgets, data strategy, safety/security, facilities, maintainability, qualification and lifecycle concept.
Critical design review	Detailed design and interfaces released; source-data and software baselines controlled; test procedures and qualification artifacts mature; major hazards controlled.
Factory acceptance	Delivered configuration identifiable; component/subsystem/system tests passed; discrepancies classified; manuals, training, spares and evidence package ready.
Site acceptance	Facility integration, calibration, safety, network, performance, recovery and operational workflows verified in the installed environment.
Authority/accreditation event	Required QTG/VV&A/accreditation evidence accepted; findings closed or formally limited; qualification/use statement and records issued.

10.4 Test discipline

- Identify the exact hardware, software, databases, models, options, network, facility and calibration state for every formal result.
- Record instrumentation calibration, sampling, filtering, synchronisation, test conditions, uncertainty and raw-data retention.
- Predefine discrepancy severity, retest rules, regression scope, authority notification and acceptance of residual limitations.
- Automate repeatable tests where useful, but independently validate the test harness and protect approved master results.
- Maintain traceability from a changed item to affected requirements, hazards, interfaces, tests, training tasks and qualification/accreditation artifacts.

11 Procurement, configuration and lifecycle sustainment

11.1 Procurement package

- Statement of work defining systems-engineering, data, software, integration, qualification/accreditation, training, warranty and sustainment responsibilities.
- System specification and interface-control set with a controlled applicability/compliance matrix.
- Contract data requirements for plans, design descriptions, source-data pedigree, QTG/VV&A, safety, cyber, conformity, test records, manuals and configuration status.
- Integrated master schedule linking authority engagement, data availability, design reviews, facility work, test readiness, acceptance and training-system entry into service.
- Evaluation model that weighs technical compliance, evidence quality, data rights, sustainment, cybersecurity, obsolescence and total ownership cost—not only initial price.

11.2 Configuration baseline

Controlled item	Minimum status information
Platform representation	Aircraft/vehicle variant, serial/block applicability, mass/loads, engine/powertrain, avionics/mission software, modifications and approved source-data revisions.
Simulation software	Application, model libraries, operating system, drivers, middleware, dependencies, build provenance, checksums and deployment manifest.
Databases/content	Visual/terrain, navigation, threat, sensor, traffic and scenario database identifiers, source, area/epoch, corrections and restrictions.
Hardware	Computers, displays/projectors/HMDs, trackers, controls, motion, sound, IOS, network, firmware and serialised calibration-critical items.
Evidence	Approved QTG, test procedures/results, compliance statements, authority/accreditation decisions, waivers, limitations and open discrepancies.
Facility	Power, grounding, HVAC, network, structural, alignment, ambient light/noise, safety equipment and site acceptance configuration.

11.3 Availability and support

- Define operational availability, scheduled/unscheduled maintenance, mean time to restore, help-desk response, spares, calibration and field-service measures with data-reporting rules.
- Require obsolescence monitoring and notification before last-time buy, with form/fit/function, qualification and cyber impact for proposed replacements.
- Define supported software/OS versions, security patch cadence, emergency vulnerability response, offline deployment and regression evidence.
- Provide operator, instructor, maintainer and administrator training plus controlled manuals and troubleshooting data.
- Include exit rights: buyer access to configuration, data, build/deployment information, licenses, keys and records needed to sustain or recompute the system.

11.4 Change and end-of-life decisions

Every change should be screened for effect on safety, qualification/accreditation, training validity, interoperability, cybersecurity, privacy, product conformity, facilities and support. A configuration-control board should classify the change, approve the evidence and update the qualification/use baseline before release. End-of-life planning should protect training continuity and required records after vendor support ends.

Appendix A Current standards and regulations snapshot

Snapshot date: 17 August 2026. Confirm the current consolidated text, amendments, authority policy and contract edition before use.

Domain	Principal current source	Application note
U.S. FFS/FTD	14 CFR Part 60 and applicable QPS; FAA NSP guidance	Initial and continuing qualification; training credit also depends on the operating/training rule.
U.S. ATD	14 CFR 61.4(c); FAA AC 61-136B	BATD/AATD approval; not Part 60 qualification.
U.S. XR FSTD	FAA TSG IB 26-01, 5 June 2026	Recommended practices for HMD/XR on Part 60 FSTDs; coordinate QPS gaps/equivalence.
Europe current FSTD	Regulation (EU) No 1178/2011, Part-ARA/ORA; CS-FSTD(A) Issue 2; CS-FSTD(H) initial issue	Applies before the new framework date, subject to competent-authority direction.
Europe new FSTD	Commission Implementing Regulation (EU) 2026/781; CS-FSTD Issue 1	Published in 2026; applicable 30 April 2028; introduces FCS/task-to-tool framework.
Simulator data	EASA CS-SIMD Issue 2	Qualification of simulator data where used under the applicable framework.
DoD M&S	DoDI 5000.61, 17 September 2024; DoDM 5000.102, 9 December 2024	VV&A and use in acquisition/operational and live-fire test contexts.
M&S documentation	MIL-STD-3022, active; Notice 1, 9 February 2026	Recommended documentation for accreditation/V&V plans and reports.
Human engineering	MIL-STD-1472H with Notice 1, 10 April 2026, when invoked	Tailor to the delivered training system and user population.
HLA	IEEE 1516/1516.1/1516.2-2025	Distributed simulation architecture, interfaces and object-model template.
DIS	IEEE 1278.1-2012; active revision project P1278.1	Protocol standard; specify supported PDUs/profile/extensions.
U.S. commercial driver	49 CFR Part 380, ELDT appendices	Simulator may support theory; it does not replace required BTW range/road proficiency.
U.S. powered industrial truck	29 CFR 1910.178(l)	Formal plus practical training and workplace performance evaluation.
EU machinery	Directive 2006/42/EC; Regulation (EU) 2023/1230 applicable 20 January 2027	Assess motion platforms and actuated systems; manage transition.
EU electrical/radio	EMC 2014/30/EU; LVD 2014/35/EU; RED 2014/53/EU; RoHS 2011/65/EU	Apply according to delivered product, voltage, radio functions and exclusions.
EU data/AI	GDPR; Regulation (EU) 2024/1689 (AI Act)	Apply according to personal-data processing and intended AI use/classification.

Appendix B Acquirer and supplier readiness checklist

- ☐ Intended use, users, tasks, credited uses and prohibited claims are approved.
- ☐ Acceptance authority, competent authority, accrediting official and witnesses are named.
- ☐ Regulation/standard applicability matrix includes edition, tailored clauses and effective dates.
- ☐ Reference aircraft/vehicle and software/data baselines are available with sufficient rights and pedigree.
- ☐ Training-task-to-cue/capability mapping is complete and unsupported tasks are identified.
- ☐ System architecture, interfaces, timing budgets and authoritative data ownership are controlled.
- ☐ Visual, control, motion, sound, avionics/mission, IOS and network requirements are measurable.
- ☐ Facility power, structure, HVAC, network, safety, access and construction responsibilities are allocated.
- ☐ Safety plan, hazard log, emergency controls and residual-risk authority are established.
- ☐ Cybersecurity boundary, SBOM, vulnerability/patch process, logging and authorisation path are defined.
- ☐ Privacy, biometric/performance data, AI use, retention and human oversight are approved.
- ☐ European conformity or U.S. listing/field-evaluation responsibilities are contractually allocated.
- ☐ Qualification/QTG or VV&A/accreditation plans are integrated with design and test reviews.
- ☐ Verification matrix covers every requirement with objective criteria and retained evidence.
- ☐ Configuration, discrepancy, waiver, change and regression processes are operational.
- ☐ Training, manuals, spares, calibration, warranty, availability and service measures are contracted.
- ☐ Obsolescence, data rights, licenses, source/build access and support exit provisions are adequate.
- ☐ Site acceptance, authority evaluation and entry-into-service milestones have realistic contingency.

Appendix C Recommended data-item and evidence package

Data item	Minimum content
Applicability and compliance matrix	Source, edition/clause, requirement, applicability rationale, allocation, evidence, status, deviation and approval.
System requirements specification	Intended use, functional/performance, interfaces, safety, cyber, facilities, qualification, sustainment and verification requirements.
System/design description	Architecture, models, cueing, timing, interfaces, COTS, data flows, failure behaviour, assumptions and design margins.
Source-data and model report	Authority, pedigree, processing, equations/algorithms, regimes, validation cases, limitations and configuration.
QTG/MQTG or VV&A package	Plans, procedures, objective/subjective results, Statements of Compliance, discrepancy disposition and authority/accreditation records.
Safety case	Plan, hazard log, analyses, controls, verification, operating restrictions, emergency procedures and residual-risk approvals.
Cyber/privacy package	Architecture, asset/SBOM inventory, threat/risk assessment, control implementation, tests, vulnerability/incident processes, privacy records and AI documentation.
Conformity package	Applicable EU/UK/U.S. product requirements, standards, risk assessment, reports/certificates, technical file index, declarations and markings.
Configuration status account	Released hardware/software/data baselines, serials/versions/checksums, deviations, calibration, installed site and evidence linkage.
Operations and sustainment set	User/instructor/maintenance/admin manuals, training, spares, calibration, backup/recovery, patching, support and obsolescence.

Appendix D Glossary

Term	Meaning in this guidance
AAR	After-action review.
ATD	Aviation training device; FAA-approved BATD or AATD under the applicable approval route.
BATD / AATD	Basic / Advanced Aviation Training Device.
BTW	Behind-the-wheel training.
DIS	Distributed Interactive Simulation.
FCS	FSTD Capability Signature under the new European framework.
FFS	Full Flight Simulator.
FOM / SOM	Federation / Simulation Object Model in HLA usage.
FSTD	Flight Simulation Training Device.
FTD	Flight Training Device.
HLA	High Level Architecture for modelling and simulation.
HMD / XR	Head-mounted display / extended reality.
IOS	Instructor operating station.
LVC	Live, virtual and constructive simulation.
MQTG / QTG	Master Qualification Test Guide / Qualification Test Guide.
NSP	FAA National Simulator Program.
QPS	Qualification Performance Standard in 14 CFR Part 60 appendices.
SBOM	Software bill of materials.
VV&A	Verification, validation and accreditation.

Appendix E Simulator-market, standards and professional resources

No single conference, association, publication or professional network is authoritative for the simulation industry. The resources below should be used together for market intelligence, acquisition visibility, standards surveillance, technical research and partner development. They do not supersede applicable regulations, contractual requirements or formally adopted standards.

Resource	Region / type	Principal use	Authority / use note
I/ITSEC and Knowledge Repository	U.S.-based / international conference and proceedings	Technical research, Government-industry exchange, supplier discovery and acquisition awareness.	Major professional and market resource; not a regulator or qualification authority. [R32–R34]
Training & Simulation Industry Symposium (TSIS)	United States / Government-industry symposium	Service requirements outlook, acquisition priorities and programme engagement.	Use current NTSA programme information; sessions and represented organisations vary by year. [R36]
Simulation Interoperability Standards Organization (SISO)	International / standards-development organisation	HLA, DIS and other simulation-interoperability standards, guidance and product-development-group activity.	Distinguish draft, ballot and approved products; contract adoption remains necessary. [R37]
MODSIM World	U.S.-based / cross-sector conference	Modelling, simulation, digital engineering, analysis and training applications across Government, industry and academia.	Useful for methods and cross-sector lessons; validate claims against primary evidence. [R38]
IT ² EC	Europe / international defence training event	Defence training technology, requirements dialogue, demonstrations and supplier engagement.	Market and professional resource; demonstrations are not acceptance evidence. [R39]
European Training and Simulation Association (ETSA)	Europe / professional association	European industry networking, policy awareness, working groups and partner development.	Association output is informative unless adopted by contract or authority. [R40]
Defence Simulation Education and Training (DSET)	United Kingdom / international conference and exhibition	Defence training, simulation, interoperability, innovation and programme exchange.	Use to identify priorities and candidate solutions; verify procurement requirements separately. [R41]
NATO Modelling and Simulation Group (NMSG)	NATO / technical group within the Science and Technology Organization	NATO M&S research, interoperability, standardisation support and technical collaboration.	Use approved NATO publications and programme-specific direction as the controlling source. [R42]
NATO M&S Centre of Excellence and CA2X2 Forum	NATO / centre of excellence and technical forum	Command-and-control experimentation, interoperability, exercises, technical exchange and community development.	Professional and technical resources; not contracting or accreditation authorities. [R43]
EDA CapTech Simulation Technologies	European Union defence / collaborative research and technology	European defence research priorities, collaborative projects and technology-community engagement.	Use with EDA programme and participating-member requirements. [R44]
European Defence Standards Reference System (EDSTAR)	European Union defence / standards-reference portal	Identification of standards and best-practice references relevant to European defence acquisition.	A reference system; applicability and edition must be confirmed in the contract. [R45]
World and European Aviation Training Summits (WATS / EATS)	Global and European / civil aviation training events	Airline training, safety, workforce, technology, procurement and operator-supplier exchange.	Useful for civil-training market intelligence; not an FSTD qualification authority. [R46]
Military Simulation & Training (MS&T)	International / professional publication	Programme reporting, technology trends, supplier landscape and practitioner perspectives.	Treat reporting and vendor claims as leads for verification against primary sources. [R47]
Society for Modeling & Simulation International and Winter Simulation Conference	International / professional society and technical conference	Modelling methods, discrete-event simulation, verification, analysis and peer-reviewed technical research.	Technical resources; sector-specific regulation and contract requirements still govern. [R48–R49]
FPD.DEV Engineering Shorts and tools	U.S.-based / display-engineering technical resource	NVIS fundamentals, optical-stack reflections, test patterns, sunlight readability, display sizing and colour calculations.	Practical engineering aids; validate calculations and requirements for the specific programme. [R50]

Procurement caution

Do not convert a conference demonstration, paper result, association position or vendor roadmap directly into a shall requirement. First define the operational need, maturity, integration risk, evidence quality, lifecycle support and qualification or accreditation impact.

Appendix F Colabmo and FPD.DEV support services

Colabmo brings experience in avionics, aerospace, ruggedized and ground-based vehicle display systems to simulator requirements, integration and sustainment. Working through FPD.DEV, its affiliated display-development operation, Colabmo can support cockpit, mission-console and ground-vehicle simulator display subsystems from requirements and design review through optical enhancement, ruggedization, embedded/display-control integration, prototyping, verification planning, controlled documentation, supplier quality, repair and obsolescence management. Colabmo.net further identifies interim subject-matter expertise spanning engineering, product development, quality systems, operations, technical documentation, training and business-system integration. [R50–R51]

Support area	Colabmo / FPD.DEV contribution	Simulator relevance
Requirements, architecture and configuration	Intended-use definition; requirements and design reviews; risk/FMEA; interface allocation; drawing, BOM and configuration control; supplier and component review. [R51]	Creates a traceable baseline linking training tasks, vehicle or aircraft configuration, display functions and acceptance evidence.
Display selection and optical performance	LCD, OLED and specialty-display development; optical bonding; touch and cover-glass integration; contrast and reflection reduction; sunlight-readability and backlight enhancement. [R50]	Supports representative cockpit, mission-console and vehicle-station viewing under controlled ambient-light, day/night and off-axis conditions.
NVIS and cockpit viewing environment	NVIS fundamentals, filter and optical-stack experience, colour and reflection analysis, and pixel-accurate test-pattern development. [R50–R51]	Helps define measurable luminance, contrast, colour, uniformity, reflection, compatibility and visual-test requirements without claiming authority approval.
Electronics, controls and embedded integration	Display-controller and interface evaluation; embedded hardware/software; microprocessor or SBC integration; display-control/UI software; cable and harness planning. [R50]	Reduces risk at avionics, video, touch, bezel-control, instructor-station and ground-vehicle display interfaces.
Mechanical and rugged integration	Rugged enclosures, brackets, adapters, bezels and mounts; CAD, fixtures, prototypes, 3D printing and fit checks. [R50]	Supports cockpit and vehicle packaging, maintainability, alignment, structural interfaces and environmental design verification.
Verification and qualification readiness	Verification-and-validation planning, process documentation, prototype evaluation, requirement-to-evidence traceability and technical-document preparation. [R51]	Prepares objective evidence for customer acceptance, FSTD evaluation, VV&A/accreditation or laboratory testing while leaving approval with the responsible authority.
Production, quality and supplier execution	AS9100 and ISO 9001 support, supplier quality, audits, CAPA, controlled records, process validation, work instructions, training and engineering-to-operations handoff. [R51]	Improves repeatability across delivered simulator displays, spares, depot work and configuration-controlled production.
Training, records and business systems	Role-based training matrices; LMS, DMS and PLM planning; procedures and work instructions; competency records; ERP/workflow mapping and reporting. [R51]	Supports auditable operator, instructor, maintainer and administrator competence plus configuration and lifecycle traceability.
Repair, obsolescence and lifecycle support	Display-failure evaluation; LCD and backlight replacement planning; controller/interface review; mechanical adaptation; repair-process development and obsolescence support. [R50]	Extends the useful life of legacy cockpit, industrial and ground-vehicle simulator displays while controlling regression and requalification impact.

Role boundary

Colabmo and FPD.DEV can develop requirements, integration solutions, verification plans and evidence packages. Regulators, competent authorities, accreditation officials, contracting authorities and designated test laboratories retain their respective approval and acceptance roles.

- Develop a display-subsystem specification and compliance matrix tied to the simulator's credited tasks and operating environment.
- Perform supplier and interface readiness reviews covering optical, electrical, software, mechanical, quality and lifecycle risks.

References

Ref.	Source	Official access
[R1]	FAA, National Simulator Program — Flight Simulation Training Devices.	https://www.faa.gov/about/initiatives/nsp
[R2]	Electronic Code of Federal Regulations, 14 CFR Part 60 — Flight Simulation Training Device Initial and Continuing Qualification and Use.	https://www.ecfr.gov/current/title-14/chapter-I/subchapter-D/part-60
[R3]	FAA, Flight Simulation Training Device Advisory Circulars and guidance.	https://www.faa.gov/about/initiatives/nsp/ac
[R4]	FAA AC 61-136B, FAA Approval of Aviation Training Devices and Their Use for Training and Experience.	https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/1034348
[R5]	FAA TSG Information Bulletin 26-01, Flight Simulation Training Device Qualification with Extended Reality Systems, 5 June 2026.	https://www.faa.gov/about/initiatives/nsp/IB_26-01-XR_FSTD.pdf
[R6]	EASA, Flight Simulation Training Devices domain page and regulatory transition information.	https://www.easa.europa.eu/en/domains/aircrew-and-medical/flight-simulation-training-devices-fstd
[R7]	EASA, Easy Access Rules for Aircrew, including Part-ARA and Part-ORA.	https://www.easa.europa.eu/en/document-library/easy-access-rules/easy-access-rules-aircrew-regulation-eu-no
[R8]	EASA, CS-FSTD(A) Issue 2 — Aeroplane Flight Simulation Training Devices.	https://www.easa.europa.eu/en/document-library/easy-access-rules/easy-access-rules-aeroplane-flight-simulation-training-devices
[R9]	EASA, CS-FSTD Issue 1, published 15 July 2026.	https://www.easa.europa.eu/en/document-library/certification-specifications/cs-fstd-issue-1
[R10]	Commission Implementing Regulation (EU) 2026/781 amending Regulations (EU) No 1178/2011 and (EU) No 965/2012 for FSTDs.	https://eur-lex.europa.eu/eli/reg_impl/2026/781/oj
[R11]	EASA, CS-SIMD Issue 2 — Simulator Data.	https://www.easa.europa.eu/en/document-library/certification-specifications/cs-simd-issue-2
[R12]	U.S. Department of Defense, DoDI 5000.61, DoD Modeling and Simulation Verification, Validation, and Accreditation, 17 September 2024.	https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/500061p.pdf
[R13]	U.S. Department of Defense, DoDI 5000.70, Management of DoD Modeling and Simulation Activities.	https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/500070p.pdf
[R14]	DLA ASSIST Quick Search, MIL-STD-3022, Documentation of Verification, Validation, and Accreditation for Models and Simulations.	https://quicksearch.dla.mil/qsDocDetails.aspx?ident_number=275961
[R15]	U.S. Department of Defense, DoDM 5000.102, Procedures for M&S VV&A in Operational Test and Evaluation and Live Fire Test and Evaluation, 9 December 2024.	https://www.esd.whs.mil/Directives/issuances/dodm/
[R16]	DLA ASSIST Quick Search, MIL-STD-1472H, Human Engineering.	https://quicksearch.dla.mil/
[R17]	NATO Standardization Office, NATO Standardization Agreements and Allied publications.	https://www.nato.int/cps/en/natohq/stanag.htm
[R18]	NATO Science and Technology Organization, Allied Publication Directory.	https://www.sto.nato.int/public/APD-1.0.pdf
[R19]	Electronic Code of Federal Regulations, 49 CFR Part 380 — Special Training Requirements.	https://www.ecfr.gov/current/title-49/subtitle-B/chapter-III/subchapter-B/part-380
[R20]	49 CFR Part 380, Appendix B — Class B CDL Training Curriculum.	https://www.ecfr.gov/current/title-49/subtitle-B/chapter-III/subchapter-B/part-380/appendix-Appendix%20B%20to%20Part%20380
[R21]	OSHA, 29 CFR 1910.178 — Powered Industrial Trucks.	https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.178
[R22]	OSHA, Developing a Training Program for Powered Industrial Truck Operators.	https://www.osha.gov/training/library/powered-industrial-trucks/training-program
[R23]	IEEE Standards Association, IEEE 1516.1-2025 and HLA standards family.	https://standards.ieee.org/ieee/1516.1/6688/
[R24]	IEEE Standards Association, IEEE 1278.1 Distributed Interactive Simulation.	https://standards.ieee.org/ieee/1278.1/10646/
[R25]	DoD CIO, DoDAF Standards Viewpoint.	https://dodcio.defense.gov/Library/DoD-Architecture-Framework/dodaf20_standards/
[R26]	EUR-Lex, Directive 2006/42/EC on machinery.	https://eur-lex.europa.eu/eli/dir/2006/42/oj
[R27]	EUR-Lex, Regulation (EU) 2023/1230 on machinery.	https://eur-lex.europa.eu/eli/reg/2023/1230/oj
[R28]	EUR-Lex, Directive 2014/30/EU on electromagnetic compatibility.	https://eur-lex.europa.eu/eli/dir/2014/30/oj
[R29]	EUR-Lex, Directive 2014/35/EU on low-voltage electrical equipment.	https://eur-lex.europa.eu/eli/dir/2014/35/oj
[R30]	EUR-Lex, Directive 2014/53/EU on radio equipment and Directive 2011/65/EU on hazardous substances.	https://eur-lex.europa.eu/eli/dir/2014/53/oj
[R31]	EUR-Lex, Regulation (EU) 2024/1689 — Artificial Intelligence Act.	https://eur-lex.europa.eu/eli/reg/2024/1689/oj

Ref.	Source	Official access
[R32]	I/ITSEC, About I/ITSEC.	https://www.iitsec.org/about-iitsec
[R33]	NTSA, I/ITSEC Knowledge Repository.	https://www.nts.org/resources/iitsec-knowledge-repository
[R34]	I/ITSEC 2026 Call for Presentations.	https://www.iitsec.org/-/media/sites/iitsec/authorscommittees/2026/iitsec2026callforpresentationsv2.pdf
[R35]	ICAO, Manual of Criteria for the Qualification of Flight Simulation Training Devices, Doc 9625, Volume I — Aeroplanes.	https://store.icao.int/en/manual-of-criteria-for-the-qualification-of-flight-simulation-training-devices-volume-i-aeroplanes-9625-1
[R36]	NTSA, Training & Simulation Industry Symposium (TSIS).	https://www.nts.org/events/2026/6/17/tsis-2026
[R37]	Simulation Interoperability Standards Organization (SISO).	https://www.sisostandards.org/
[R38]	MODSIM World conference.	https://www.modsimworld.org/
[R39]	IT ² EC — International Training Technology Exhibition & Conference.	https://www.itec.co.uk/
[R40]	European Training and Simulation Association (ETSA).	https://etsa.eu/
[R41]	Defence Simulation Education and Training (DSET).	https://dset.co.uk/
[R42]	NATO Science and Technology Organization, NATO Modelling and Simulation Group resources.	https://www.sto.nato.int/
[R43]	NATO Modelling and Simulation Centre of Excellence.	https://www.mscoe.org/
[R44]	European Defence Agency, CapTech Simulation Technologies.	https://eda.europa.eu/what-we-do/all-activities/activities-search/captch-simulation-technologies
[R45]	European Defence Standards Reference System (EDSTAR).	https://edstar.eda.europa.eu/
[R46]	Halldale Group, World Aviation Training Summit and European Aviation Training Summit event resources.	https://www.halldale.com/events/halldale-live-events
[R47]	Halldale Group, Military Simulation & Training (MS&T).	https://www.halldale.com/about-mst
[R48]	Society for Modeling & Simulation International (SCS).	https://scs.org/
[R49]	Winter Simulation Conference.	https://www.wintersim.org/
[R50]	FPD.DEV, display-development capabilities, services and engineering resources.	https://www.fpd.dev/
[R51]	Colabmo.net, company experience and engineering, quality, process and workforce support services.	https://www.colabmo.net/

Revision record

Revision	Date	Description
A	17 August 2026	Initial issue covering U.S. and European simulation markets with emphasis on civil/military aerospace cockpit and ground-vehicle simulation.
B	17 August 2026	Converted references to a formal table; broadened Appendix E into a market, standards and professional-resource matrix; and expanded Appendix F for Colabmo and FPD.DEV display-support capabilities.
C	17 August 2026	Consolidated FPD.DEV and Colabmo.net sources to one reference each and replaced Appendix B bullets with open checkboxes.

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