NEGASCOPE
by Neganthrope

NEGASCOPE V1 WHITE PAPER

AI-ASSISTED ART DIRECTION, 3D SPATIAL PREVISUALIZATION & NOETIC FILM DIRECTING

NEGASCOPE V1.0.0 (Production Master) solves the central impasse of contemporary generative AI: stochastic entropy. By subordinating SOTA multimodal diffusion models (Nano Banana 2.1 with 14 native references, Gemini Omni 1.1 Flash, FLUX 3, Local ComfyUI) to a deterministic 3D Euclidean soundstage, real physical cinema optics, and a deterministic 18-segment biomechanical rig (35 presets, Mix & Match, 2-bone IK & set snapping), NEGASCOPE restores the creative, technical, and legal sovereignty of the filmmaker.

14 REFS	567+ FILES	265+ SUITES	4.85 / 5.0
NANO BANANA 2.1	TS / REACT 19 CORE	2,370+ VITEST TESTS	NEGANTHROPY SCORE
Native Multimodality	Three.js 0.185 & Electron 41.7	100% Governance	SHA-256 Human Proof

WHITE PAPER EXECUTIVE SUMMARY (11 CHAPTERS OF ARCHITECTURE & DOCTRINE)

I. FOUNDATIONS, HYBRID BYOK ARCHITECTURE & AI ECOSYSTEM (Pages 2 to 4)

Neganthropic Manifesto, React 19 / Three.js / Electron Core & Multimodal Routing

Breaking free from Prompt-and-Pray, Human-Machine sympoiesis (Stiegler), BYOK economics (Hybrid free Ollama + Cloud Fal.ai or 100% Offline ComfyUI), predictive budget telemetry, and SOTA catalog (Nano Banana 2.1, Gemini Omni 1.1, FLUX 3).

II. THE 7 AI AGENTS, NLP BREAKDOWN, BIBLES & 360° 3D SET STUDIO (Pages 5 to 7)

Collaborative AI Crew, NLP Breakdown, 4-View Casting, 3D Forge (.glb) & 360° Stitching

Strict role isolation across 7 AI agents, 3-tier aesthetic inheritance, automatic 4V Turnaround & Moodboard slicing, portable .negacard.zip archives, 3D Set Studio (Shell, Backplates, Furniture, Sun) and 360° Seam Inpainting.

III. 3D VIRTUAL SOUNDSTAGE, DETERMINISTIC KINEMATICS & POST-PRODUCTION (Pages 8 to 10)

Physical Optics, Multi-Cue Parity T0->T_inter_k->T1, 18-Segment Rig, A1-A4 Mixer & Exports

Audio-First lock, 14-200mm lenses, 35 presets + Mix & Match + 2-bone IK, Multi-Cue Holistic Parity (sun/practical lights at every t_k), 48 kHz WAV Stems & Apple DTD FCPXML 1.10.

IV. SHA-256 LEGAL PROOF, 8 GB RAM GOVERNANCE, SECURITY & TESTING (Pages 11 and 12)

SHA-256 Ledger (ledgerRootSha256), Zero-Alloc WebGL, V8 Bytecode, Creem.io & Vitest

Opposable SHA-256 proof (300 DPI A4 PDF), .dispose() GPU lifecycle, sandbox: true + main.jsc + Fuses, HMAC Creem.io vault (4 tiers), and 265+ Vitest suites (2,370+ assertions).

01 From Stochastic Entropy to the Neganthropic Bifurcation

How deterministic 3D spatial grounding rescues narrative cinema from algorithmic proletarianization

1.1 THE INDUSTRIAL IMPASSE DIAGNOSIS

The Cinematic Failure of the "Prompt-and-Pray" Paradigm (Blind AI)

First-generation Text-to-Image and Text-to-Video generators destroy diegetic continuity

- **1. Spatial Amnesia & Systematic Continuity Errors**
  Lacking any underlying 3D Euclidean topology, standard diffusion generators reinvent room architecture on every draw. A basic 180° shot/reverse-shot causes walls to mutate, windows to vanish, and furniture to teleport.
- **2. Morphological & Identity Drift of Actors**
  From one shot to the next, facial structure, body proportions, and wardrobe textures drift across latent Gaussian noise, immediately breaking the viewer's suspension of disbelief.
- **3. Photometric Incoherence & Phantom Shadows**
  Light sources generated purely from text prompts obey no physical geometry (solar azimuth, window apertures, Kelvin color temperature), yielding contradictory shadows within the same scene.
- **4. Noetic Proletarianization of the Filmmaker (Bernard Stiegler Framework)**
  Stripped of directing instruments (lenses, framing, lighting, physical blocking), the auteur is reduced to a slot-machine operator frantically clicking "Regenerate" in hopes of a lucky statistical accident.

1.2 THE NEGASCOPE BIFURCATION (HUMAN-MACHINE SYMPOIESIS)

AI as the Photochemical Developer of a Deterministic 3D Space

Epistemological reversal: geometry, optics, and biomechanics precede and govern diffusion

- **Pre-Existence of the 3D Euclidean Soundstage (Three.js / WebGL 2.0)**
  In NEGASCOPE, metric room architecture, exact window openings, furniture placement, 18-segment actor postures, and the 4x4 [R|T] camera matrix are physically established by the human director prior to any AI inference.
- **14-Reference Native Multimodal Locking (Google Flow Nano Banana 2.1)**
  At shutter release, the engine simultaneously injects the 3D viewport capture (Previs/Clay), the OpenPose skeletal pass, the reference cardinal wall, the exact Turnaround views (0°/90°/180°/270°) of the actors, and prop anchors.
- **Restored Craftsmanship & Legally Protectable Singularity**
  By reintroducing deliberate directing choices (a 35mm lens at f/2.0, 3200K lighting, Look-At gaze), the work escapes statistical homogenization and generates a cryptographic SHA-256 proof of human authorship.

Evaluated Dimension (Stiegler / Simondon)	Standard Generative AI (Prompt-and-Pray)	NEGASCOPE V1.0.0 Architecture
Spatial Topology Mastery	None (2D latent space hallucinated on every draw)	**Total (Metric Three.js scene, 4x4 [R|T] camera matrix)**
Shot / Reverse-Shot Continuity	Impossible without losing the background set	**Guaranteed (4 anchored cardinal walls + exact 180° flip)**
Body Blocking & Eye-Line Gaze	Vague (subject to statistical prompt biases)	**Biomechanical (18 COCO joints, 35 Presets + Mix & Match + 2-Bone IK)**
Legal Copyright Status	Public domain / US Copyright Office rejection	**Protectable (Opposable SHA-256 Human Authorship Ledger)**
Neganthropy Score	1.2 / 5.0 (Semiotic entropy & standardization)	**4.85 / 5.0 (Sympoiesis & technical individuation)**

3-STAGE PHOTOCHEMICAL CAUSALITY CHAIN

How NEGASCOPE converts human noetic intent into a continuity-accurate cinematic shot

Stage 1 (Human Noetic & Euclidean Space): Screenplay, metric 3D architecture, cinema optics (14-200mm), Kelvin photometry, and 18-segment anatomical rig. -> Stage 2 (Multi-Reference Locking): Synchronous 3D Clay/Previs capture + OpenPose skeletal pass + up to 14 visual anchors (4V Actors + 4 Walls + Props). -> Stage 3 (AI Photochemical Revelation): Conditioned inference and SHA-256 cryptographic sealing.

02 Local-First Software Core, Reactive Stores & Hybrid BYOK Model

A Desktop (Electron 41) & Web (React 19 / Three.js 0.185) architecture built for sovereignty and 60 FPS fluidity

FRONTEND CORE & 3D ENGINE

React 19, Three.js 0.185 & WebGL Shaders

- **Real-Time 60 FPS Graphics Pipeline**
  Three.js 0.185 engine (WebGL 2.0) featuring custom GLSL depth (depthShader.ts) and outline (outlineShader.ts) shaders, paired with React 19, TypeScript 5.8, and Tailwind CSS 4.1.
- **Decoupled Anti-Re-Render Zustand 5 Stores**
  Strict separation between useProjectDataStore (project, entity, snapshot, ram slices), useSpatialCameraStore, useSpatialPropsStore, useSpatialRenderStore, assetStore, and useBudgetStore.
- **Full Bilingual UI & Interactive In-App Guide**
  Entire interface and 10-chapter interactive user guide (UserGuideView.tsx) localized in FR/EN, supporting film projects across 5 languages (FR, EN, ES, DE, IT).

DESKTOP RUNTIME & HYBRID PERSISTENCE

Electron 41, Express 5 & Bundled FFmpeg

- **Hardened Cross-Platform Desktop App (sandbox: true)**
  Compiled natively for macOS Apple Silicon (arm64), macOS Intel (x64), and Windows (x64) via Electron 41.7 (renderer sandbox: true, Fuses enabled) and an embedded Express 5.2 local server.
- **Offline Audio/Video Processing**
  Native integration of ffmpeg-static 5.3 for video audio demuxing, WAV stem baking, and media normalization with zero external dependencies.
- **Dual IndexedDB + Hard Drive Persistence**
  Coupling LocalForage with diskStorageService.ts: heavy HD media files are automatically written to ~/Documents/Negascope Projects/[Project_Name]/.

BYOK ECONOMIC MODEL (BRING YOUR OWN KEY)

Zero Captive Subscription, Zero Token Markup & 3 Execution Regimes

Users store their keys in the hardware-encrypted Vault (safeStorage) and switch modes on the fly

- **Ending Intermediary SaaS Rent-Seeking**
  Traditional AI video platforms resell API tokens with a 3x to 5x markup. NEGASCOPE enforces total transparency: you pay Cloud providers at raw cost, or 0.00 EUR/USD in Local Mode.
- **Automatic Clipboard Detection & Live Connection Ping**
  The QuickSetupModal automatically detects a Fal.ai key copied to the clipboard and immediately pings Cloud endpoints or local Ollama / ComfyUI servers to verify readiness.
- **Predictive Hover Budget Telemetry (pricingService.ts & useCostHover.ts)**
  Before clicking any generation button, hovering over it previews the exact estimated cost down to the cent in the top header widget (in EUR or USD) based on the active model and resolution.

AI Execution Regime	Compute Architecture & Marginal Cost	Target Production Use Case
1. Hybrid Mode (Default)	Free Text & 7 AI Agents (0 EUR/USD) locally via Ollama + Media (Image, Video, Voice) on Cloud (Fal.ai / ElevenLabs).	Ideal for daily production: unlimited screenwriting, breakdowns, acting coaching, and NLP structuring at zero cost + SOTA Cloud visuals.
2. Full Cloud Mode	100% of inferences (LLM, 4K Images, Video, Audio) executed on high-velocity remote servers.	Ideal on the go with a lightweight laptop (8 GB RAM MacBook Air): zero thermal throttling, zero local GPU load.
3. 100% Offline Local Mode	Text via Ollama + Images, Inpainting, and Video via ComfyUI (127.0.0.1:8188) on local GPU (0.00 EUR/USD).	Ideal for absolute industrial confidentiality (air-gapped workflow) and zero marginal cost on dedicated GPU workstations.

API KEY SECURITY & ZERO CLOUD CREDITS SOLD

OS Hardware Vault (safeStorage) & Optional Client-Side BYOK Connector

NEGASCOPE sells perpetual desktop software licenses only (zero cloud credits sold). All API keys (Fal.ai, Google Gemini, ElevenLabs, OpenAI, Anthropic) operate as an Optional Client-Side BYOK Connector encrypted via safeStorage (macOS Keychain / Windows DPAPI) with zero-relay downloadGuard.ts streams.

03

SOTA Multimodal Catalog & Prompt Translation Governance

Surgical assignment of the optimal engine to each of the film's 8 technical departments

Technical Department	Integrated Cloud SOTA Models	Local / Alternative Models	Role & Key Capabilities in the Pipeline
1. Image & 3D Framing	Nano Banana 2.1 (Google Flow), FLUX 3 Image, FLUX.2 Pro, FLUX 1.1 Ultra, Kontext Pro, GPT Image 2, SD 3.5 Large	ComfyUI Local (SDXL / FLUX ControlNet), FLUX Dev, FLUX Schnell	Nano Banana 2.1: 14 native references, configurable Spatial Thinking (minimal/medium/high), untiled 1K-4K resolutions.
2. Retouch & 360° Stitching	Nano Banana 2.1 Edit (14 refs), FLUX 3 Edit, FLUX Fill (v1/fill), ByteDance SeeDream v4 Edit	ComfyUI Inpaint (VAEEncodeForInpaint + SetLatentNoiseMask + KSampler)	Context-aware 0°/360° panoramic seam stitching and surgical brush inpainting with strict binary/feathered mask adherence.
3. Video Shoot (I2V/R2V)	Gemini Omni Flash 1.1 (R2V 14 refs, I2V, Edit), FLUX 3 Max Video, Kling 1.5 Pro, Wan 2.1	ComfyUI Video Workflows	Controlled interpolation across Start Frame (T0), intermediate Cues, and End Frame (T1), with native synchronized audio.
4. Screenplay, Agents & NLP	Gemini 3.7 Flash, Gemini 3.1 Pro, Claude 3.7 Sonnet, GPT-4o, Gemini Omni 1.1 Flash, Fal Any-LLM	Ollama / LM Studio (Gemma 2, Llama 3.3, Qwen 2.5)	Co-writing, structured JSON breakdown, NLP entity extraction, continuity auditing, and safety transmutation (The Alchemist).
5. Voices & Dubbing	ElevenLabs (Multilingual v2 / Turbo), Fal.ai F5-TTS / Kokoro	Local TTS / Web Speech synthesis	Voice catalog categorized by age/gender/temperament (voiceCatalog.ts), voice cloning, and stability, pitch, and speed sliders.
6. Lip-Sync Engine	Wav2Lip, Sync.so, LatentSync (lipSyncService.ts)	Conditional post-video pass	Triggered automatically and exclusively when the shot's vocal presence mode is set to synchronous on-screen dialogue (screen_sync).
7. Foley Studio SFX	MMAudio V2 (Synchronous Video-to-Audio & Text-to-Audio), ElevenLabs SFX	Procedural WebAudio fallback synthesizer	Multi-event sound effects assembly aligned to the millisecond on timeline Cue Points (stemBakerService.ts).
8. 3D Forge (.glb)	TripoSR / Trellis / Meshy (fal3DService.ts & textTo3DService.ts)	Procedural Three.js catalog (proceduralModels.ts)	Converts a 2D prop or furniture anchor image into a 3D .glb mesh scaled to exact real-world metric dimensions (X, Z, Y).

PAYLOAD ENGINEERING & INFERENCE SAFETY

Encoder-Aware Syntax Translation & Strict Ban on Blind T2I Fallback

Automatic adaptation of prompt grammar to the target model's neural text encoder

- **Encoder-Specific Syntax Adaptation (promptTranslator.ts & models.json)**
  The prompt translator inspects the text encoder declared in models.json: dense spatial cinematic prose for T5 encoders (FLUX / Nano Banana), weighted concise tokens for CLIP (SDXL / ComfyUI), and structured natural language instructions for unified multimodal models.
- **Strict Prohibition of Blind Text-to-Image Fallback Without References**
  Any operation requiring actor identity preservation (4V Turnaround), set geometry (3D Framing), or seam continuity (Seam Inpainting) enforces multimodal reference injection and logs any fallback attempt to a blind T2I engine.
- **Automatic Ban on Parasitic Background Music During Dialogue Takes**
  Whenever a shot contains synchronous dialogue or diegetic Foley, videoPayloadAdapter.ts injects strict negative acoustic constraints to prevent native-audio video engines (Gemini Omni 1.1 / FLUX 3 Max) from adding unwanted background music.

DETERMINISTIC HIERARCHY OF THE 14 MULTIMODAL ANCHORS (NANO BANANA 2.1)

Sequential Anchor Chaining & Strict Priority Allocation Across 14 Reference Slots

At each milestone T0 -> T_inter_k -> T1, the 14 slots are deterministically ordered: Slot 1 = 3D Clay/Previs capture (interpolated geometry & lighting) • Slot 2 = 18-segment skeletal map • Slot 3 = Visible cardinal room wall • Slots 4-9 = Turnaround views (0°/90°/180°/270°) & actor Moodboards • Slots 10-14 = Prop anchors and sequentially chained prior frame (T_inter_(k-1) or shot N-1).

04 The Virtual Crew of 7 AI Agents & the Vision / NLP Breakdown Studio

Strict creative role specialization and automated conversion of screenplay text into production entities

CHAPTER 04: COLLABORATIVE AI CREW (AGENTPANEL.TSX & AICONTEXT.TS)

The 7 Specialized AI Agents: Zero Cognitive Role Confusion

Each AI specialist has its own system prompt, operational scope, and 1-click actionable proposal cards

- **1. The Showrunner (Indigo) & 2. The Visual Art Director (Amber)**
  The Showrunner focuses exclusively on plot structure, sequence breakdown, and dialogue (generating normalized Synopsis / Master Screenplay proposal cards that can be applied partially or globally). The Visual Art Director governs cinematography, color palettes, and set materials.
- **3. The Sound Designer (Cyan) & 4. The Director (Emerald)**
  The Sound Designer crafts the sonic landscape, musical scores, and Foley cues. The Director translates each dramatic scene into a technical Shot List (framing scale, camera angles, focal lengths, camera moves, and durations).
- **5. The Acting Coach / Actor Director (Rose) - Macro/Micro Coaching & 8 Acting Schools**
  Directs performers across 8 foundational acting methodologies, steering both the sequence-wide emotional arc and climax shot (Macro) and per-line vocal delivery, presence mode, and physical posture (Micro).
- **6. The Continuity Inspector (Script Supervisor) & 7. The Alchemist (Prompt Safety Transmuter)**
  The Continuity Inspector audits raccord errors (180° axis, 30° rule, eye-line and lighting continuity). The Alchemist transmutes intense dramatic descriptions (thrillers, crime noir) flagged by Cloud safety filters into subtle plastic and visual descriptors (crimson liquid, machined steel glint, chiaroscuro tension) that render without censorship.

CHAPTER 05: STEP 1 - VISION, MASTER SCREENPLAY & NLP BREAKDOWN (SYNOPSISVIEW.TSX)

From Blank Page to Automated Screenplay Breakdown

Temporal calibration of the film, intelligent sequence structuring, and interactive semantic highlighting

- **Foundational Calibration: Frame Rate (24 / 25 / 30 fps) & Production Format**
  At project launch, choosing the frame rate standard (24 fps Cinema, 25 fps PAL/Broadcast, or 30 fps Web/NTSC) and format profile (Fiction, Music Video, Commercial, Documentary) locks the timebase for all timelines and NLE exports.
- **Automated Sequence Structuring & AI Entity Detection**
  In one click, the engine segments the Master Screenplay into numbered sequences (identifying INT./EXT. and DAY/NIGHT), then builds a complete production inventory by creating Bible cards for all Characters, Master Sets, and Props.
- **"NLP Breakdown" Mode: The Interactive Highlighted Screenplay**
  Switching to the NLP Breakdown view highlights every mention of a Character (amber), Set (blue), or Prop (emerald) directly inside the script text. Clicking any highlighted word opens its visual Bible card immediately!

Acting School / Methodology (actorDirectorService.ts)	Dramatic Principles & Physical / Vocal Direction Injected
1. Konstantin Stanislavski / 2. Stella Adler	Organic inner truth, the "Magic If", belief in given circumstances, and active sociological imagination.
3. Sanford Meisner / 4. Lee Strasberg	Moment-to-moment instinctive listening to the partner (Meisner) or visceral affective sensory memory (Actors Studio).
5. Robert Bresson / 6. Alain Robbe-Grillet	Melodic neutrality ("The Model" Bresson, zero theatricality) or hieratic, geometric white diction.
7. Jacques Lecoq / 8. Contemporary Realism	Physical economy and mechanics of gesture in space (Lecoq) or raw, hyper-immersive contemporary naturalism.

05

3-Tier Aesthetic Inheritance, 4-View Sheets & .negacard Archives

Locking down photographic direction alongside the morphological and vocal identity of every entity

6.1 THE VISUAL & SOUND BIBLE (AESTHETICBIBLE.TSX & AESTHETICRESOLVER.TS)

Deterministic 3-Tier Cascading Inheritance Law

Unified artistic direction across the entire film, modulable per sequence and overridden by the 3D soundstage

- **Tier 1: Global Film Charter (Cinema Presets & Lockable Directive Cards)**
  Gallery of pre-calibrated photographic looks (35mm Film Stock, Film Noir, Sci-Fi, Arthouse, Animation) and thematic directive cards (Cinematography, Color Palette, Grain, Optics, Sound Style) equipped with AI Magic Wand suggestions and Padlock locking.
- **Tier 2: Per-Sequence Local Modulations (Targeted Overrides)**
  Each sequence has its own tab to define 4 direct controls (Scene Lighting & Atmosphere, Camera Directives, Sound Ambience, Musical Direction) and locally override any Global Charter card without affecting the rest of the film.
- **Tier 3: Absolute Priority of the 3D Soundstage at Render Time**
  When compiling the final render prompt (spatialPromptGenerator.ts), physical shot parameters (real focal length, aperture, Kelvin temperature, 3D posture) systematically take precedence over generic directives.

6.2 THE CASTING BIBLE (CASTINGBIBLEVIEW.TSX & ENTITYMODAL.TSX)

4-Variant Forge Bench, 4-View Turnarounds, Moodboards & 3D Prop Forge (.glb)

Radical elimination of facial and material drift through multi-angle model sheets and portable archives

- **4-Variant Forge Bench & Automatic 4V Turnaround / Moodboard Slicing**
  Generate 4 simultaneous visual candidates (using up to 6 reference images). As soon as you lock a Character's Visual Anchor, turnaroundService.ts and characterMoodboardService.ts automatically generate and slice its 4 views (0° Front, 90° Right Profile, 180° Back, 270° Left Profile) and facial expression sheet.
- **Master Voice Configuration, 3D Prop Forge (.glb) & Scouting-to-3D**
  Assign each actor a vocal timbre (ElevenLabs / Fal) with stability, speed, and pitch sliders. For Props, set exact real-world dimensions (X, Z, Y in meters) and forge a 3D mesh (.glb). For Sets, extract a 3D architectural floor plan directly from a location photo (scoutingTo3DService.ts).
- **Self-Contained Cross-Project Archives (.negacard.zip via bibleCardExportService.ts)**
  Export any Character, Prop, or Master Set as a standalone .negacard.zip file to re-import it in 1 click into any future film complete with all 4V images, voice sample, 3D mesh, and lighting ambiences!

Bible Card Type	Reference Sheets Automatically Generated on Lock	Contents of the Portable Archive (.negacard.zip)
Character (Actor)	1:1 Anchor + 4-Angle Turnaround (0°, 90°, 180°, 270°) + Moodboard	Metadata, temperament, all HD 4V/Moodboard tiles, and vocal sample.
Master Set (Location)	Hero Photo + 4 Cardinal Walls (N/E/S/W) or 360° Cyclorama	Complete 3D room (dimensions, materials, openings, 3D furniture) + all child Ambiences.
Prop (Object)	1:1 Anchor + 4-Angle Sheet + Material/Texture Sheet	Physical dimensions (X, Z, Y in meters), HD sheets, and forged 3D mesh (.glb).

AUTOMATIC ANGULAR SELECTION DURING 3D SHOOTING

Trigonometric Matching Between Actor 3D Orientation and 4-View Turnaround Tiles

On the 3D soundstage, NEGASCOPE computes the relative angle between each mannequin's torso/gaze vector and the camera's optical axis. If the actor is framed in right profile, the engine prioritizes the 90° Turnaround tile; if framed from three-quarters or from behind, it injects the 180° or 270° tile, ensuring morphological fidelity from every camera angle.

06

3D Architectural Construction, Clay Purity & Panoramic Stitching

Building your filming location across 4 logical sub-tabs and generating a seamless 360° environment

SUB-TABS 1.1 & 1.2

Metric Architecture & 3D Backplates

- **1.1 Structural Shell, Materials & Openings**
  4-wall Interior or 360° Exterior mode. Exact meter dimensions (Width, Depth, Height), floor/wall/ceiling materials with agnostic tint and brightness controls, and AI or manual placement of doors, windows, bay windows, arches, stairs, and columns.
- **1.2 Window Backplates (Discoveries) & Set Linking**
  Behind every window or open doorway, place an exterior view (uploaded image, AI generation, or direct link to another Set in your Bible!) with 3D calibration of distance, scale, altitude, and Kelvin exposure.

SUB-TABS 1.3 & 1.4

3D Furniture, Sun Trajectory, Gobos & Ambiences

- **1.3 AI Furnishing, Catalog & .GLB Import**
  Automatic AI furniture layout (decorFurnitureAIService.ts), 1-click insertion of script-detected props, procedural 3D catalog, external .glb file drag-and-drop, and shelf dressing controls (books, files, clutter).
- **1.4 Sun Path, Practical Lamps, Blinds & Ambiences**
  Physical heliodon (0-360° Azimuth, Elevation, Dawn/Noon/Golden Hour/Night presets), practical 3D lamps, door leaf swing, window blinds/shutters casting gobo shadows, and child Ambience cards.

ARCHITECTURAL PROMPT GOVERNANCE & 360° STITCHING (DECORTURNAROUNDSERVICE.TS)

Narrative / Geometry Separation, Color Harmonization & Seam Inpainting

Guaranteeing absolute 360° architectural and photometric continuity for both interiors and exteriors

- **1. Strict Separation Between Narrative Space & Geometric Space (purgeFurnitureMentions)**
  Structural 3D Clay passes (isInteriorClay) are strictly purged of any narrative elements or acting props from the screenplay (character names, mattresses, organic items) so that pure architecture alone governs wall geometry.
- **2. In Interior Mode: 4 Cardinal Angles Console (North 0°, East 90°, South 180°, West 270°) & Color Transfer**
  When generating the 4 walls of the room from the 3D layout, colorTransfer.ts automatically harmonizes chromaticity and luminance across secondary walls to match the master wall.
- **3. 360° Continuity Table & Corner Seam Stitching (seamInpaintService.ts)**
  To seamlessly blend corners between adjacent walls, users trigger Corner Seam Stitching (Seam Inpainting) via Nano Banana 2.1 Edit (leveraging its 14 native references with 0° and 360° edges), FLUX Fill, or Local ComfyUI, complete with a Before/After comparison slider.
- **4. In Exterior Mode: Direct Continuous 360° Cyclorama in Ultra-Panoramic Ratio (8:1 / 4:1)**
  For exterior locations, Nano Banana 2.1 generates a continuous panoramic ribbon directly without splitting into 4 panels, guaranteeing an intrinsically seamless horizon line, sky dome, and solar collimation.

Architectural Set Mode	Panoramic Generation Method	Stitching Engines & Chromatic Continuity
Enclosed Interior (4 Walls N/E/S/W)	Clay + Previs capture of all 4 cardinal axes (0°, 90°, 180°, 270°) from the room center.	Reinhard statistical color transfer (colorTransfer.ts) + Corner stitching via Nano Banana 2.1 Edit / FLUX Fill / ComfyUI.
Open Exterior (360° Cyclorama)	Direct generation as a continuous ultra-panoramic ribbon (8:1 or 4:1 ratio) mapped onto a 3D cylinder.	Native horizon continuity via Nano Banana 2.1 (Spatial Thinking enabled) + optional 0° <-> 360° wrap-around seam stitch.

07 Consistency Studio, Scratch Track Frame-Lock & Real Optical Bench

Locking shot durations to spoken dialogue and framing through a viewfinder with real cinema lenses

7.1 CONSISTENCY STUDIO & "AUDIO-FIRST" TECHNICAL BREAKDOWN (DECOUPAGEVIEW.TSX)

Bible Health Auditing & Temporal Shot Locking via Scratch Voice Tracks

No dialogue shot can ever be cut mid-word thanks to automatic duration locking from synthesized speech

- **Consistency Diagnostic & 1-Click Reconciliation (ConsistencyStudio.tsx)**
  Computes a global health score across 4 pillars (Casting, Sets, Audio, Directives). If a contradiction is detected between the Master Screenplay and the Aesthetic Bible, clicking "Reconcile Contradictions" harmonizes the directives automatically.
- **Technical Shot Breakdown, Silent Shot Enrichment & Drag-and-Drop Reordering**
  Create or reorder shots within each sequence. The "Enrich Silent Shots" feature injects subtle physical acting beats and cinematic staging into non-dialogue shots.
- **"Audio-First" Golden Rule (Scratch Track Frame-Lock)**
  As soon as you click "Generate Voice" inside a shot inspector, NEGASCOPE measures the exact acoustic duration of the synthesized line and automatically locks the shot duration to the exact frame count according to the film's frame rate (24, 25, or 30 fps).

7.2 THE 3D VIRTUAL SOUNDSTAGE (SPATIALSTUDIO & VIEWFINDER3D.TSX)

Cinema Sensors, Physical Focal Lengths (14mm - 200mm), Focus Puller & "Wild Wall"

4 real-time viewport modes: Camera Viewfinder, 3D Orbit View, 2D Floor Plan, and Split View

- **Exact Optical Trigonometry (cinematicOptics.ts)**
  Select the camera sensor (Super 35, Full Frame 35mm, Large Format 65mm / IMAX) and focal length (from 14mm ultra-wide to 200mm telephoto). Vertical Field of View (FOV) and perspective compression are computed using exact geometrical optics.
- **Aperture (f/1.4 to f/16), Circle of Confusion & Dynamic Focus Puller**
  Dial in the f-stop to sculpt depth of field and choose between manual metric focus distance or continuous Auto-Focus dynamically locked onto a selected actor's eyes.
- **Instant 180° Reverse-Shot & Intelligent "Wild Wall" (Removable Studio Wall)**
  Flip the camera axis by 180° in one click. When pulling the camera back behind a wall to frame with a long telephoto lens inside a tight room, the intersected partition (Wild Wall) automatically becomes transparent to camera rays without altering light containment or cast shadows!

Cinema Focal Length Range	Optical Behavior & Perspective on the 3D Soundstage	Recommended Aperture & Use Case
14mm - 24mm (Wide-Angle)	Expands space, accentuates room depth and vanishing lines.	f/5.6 to f/11 - Establishing shots, architecture, spatial tension.
35mm - 50mm (Standard Lenses)	Organic perspective faithful to human vision.	f/2.8 to f/4.0 - Medium shots, cowboy shots, two-person dialogues.
85mm - 200mm (Telephoto)	Compresses depth planes, isolates faces, melts backgrounds (Bokeh).	f/1.4 to f/2.0 - Intimate close-ups, psychological inserts.

PLANCK LIGHTING CONSOLE & OPTICAL COMPOSITION GUIDES

Kelvin Calibration (2,200 K to 9,000 K), Window Solar Alignment & Viewfinder Reticles

Every shot features a dedicated lighting console allowing 1-click alignment of the solar beam through any room window, color temperature adjustment along the Planckian locus (2200K Candlelight, 3200K Tungsten, 5600K Daylight, 8500K Cool Neon), and viewfinder overlays (Rule of Thirds, Fibonacci Golden Spiral, Diagonals, and 2.39:1 Anamorphic, 16:9, 1.85:1, 4:3, 9:16 aspect masks).

08 35 Cinema Presets, Mix & Match, 2-Bone IK Solver & 3D Set Snapping

Directing actor bodies, hands, and eye-lines with zero LLM latency and millimeter mathematical precision

8.1 DETERMINISTIC ACTOR RIG ARCHITECTURE (ACTORPOSEENGINE.TS & ACTORINSPECTOR.TSX)

Catalog of 35 Postures, Upper/Lower Mix & Match, Proportional 2-Bone IK & Snapping

Zero LLM latency: a real-time 60 FPS kinematic pipeline combining cinema presets, locked anatomy, and analytical IK

- **1. Anthropometric Invariance & Smoothstep Quaternion SLERP 60 FPS Kinematics**
  Regardless of applied rotations or timeline transitions (Cues), the engine strictly locks bone lengths (1.75 m reference stature, locked proportional forearm) and interpolates postures via smoothstep Quaternion SLERP with zero gimbal lock or levitation.
- **2. Catalog of 35 Cinematographic Postures (5 Categories) & Modular Mix & Match (Upper / Lower)**
  Apply in 1 click 35 cinema presets (Standing & Dialogue, Combat & Weapons, Cockpit & Vehicle, Sitting & Furniture, Ground & Lying) or freely combine 8 lower-body bases with 15 upper-body attitudes (Mix & Match) + "Reset END = START" sync.
- **3. Hand Articulation (Analytical 2-Bone IK): Anatomical Targets & Metric X/Y/Z Sliders**
  For each hand (Right / Left), click an anatomical or furniture target (chin, temple, hip, pocket, chest, neck, table...) solved via proportional 2-bone IK (computeAnatomicalHandIkOffsetForPreset), or fine-tune X, Y, Z sliders (-0.40 m to +0.40 m).
- **4. 1-Click Environmental Snapping onto Soundstage Furniture and Walls**
  The "Snap to Set (furniture or wall)" dropdown instantaneously aligns the actor against any wall (North/South/East/West - Leaning) or onto any stage furniture prop (Hands resting on, Leaning against, Sitting on, Lying on) at exact real height (height3d)!

EYE-LINE GAZE & HEAD DIRECTION

Look-At, Eyes & 3 Head Sliders

- **Magnetic Gaze Targets (Look-At) & Eyes**
  Lock an actor's gaze onto the active Camera, the Sun, another Actor, or any Prop, and set the Eyelids State (Auto, Open, Closed, Half-Closed).
- **3 Additive Head Orientation Sliders**
  Three angular sliders (Pitch -45°/+45°, Yaw -60°/+60°, Roll -30°/+30°) layer cleanly and additively on top of the Look-At vector.

INTER-SHOT SPATIAL CONTINUITY

N-1 -> N Propagation & Divergence Detector

- **Automatic Preservation of Stage Furniture**
  Any furniture or acting prop placed on the floor in a shot (e.g., a mattress or armchair) is automatically propagated and preserved at its exact coordinates across subsequent shots in the scene.
- **T1 (Shot N-1) -> T0 (Shot N) Continuity Link**
  Project the ending position and posture of the previous shot as the starting state of the next shot in 1 click, with visual warnings whenever geometric divergence is detected.

IK / Snapping Target Family	Technical Identifiers Resolved by the Engine	Biomechanical & Geometric Behavior
Cephalic Targets (Head & Face)	face_eyes, chin_mouth, temple_ear, head_top, back_of_head	Exact wrist snapping onto the eyes, chin, temple, or nape of the neck (dynamically tracks head rotation).
Thoracic & Limb Targets	chest, stomach, hip, thigh_knee, opposite_shoulder, opposite_elbow, hands_together	Analytical Two-Bone IK resolution for crossed arms, hands on hips, hand over heart, or clasped hands.
Environmental Targets (Set)	prop_surface + bodyRelation (lean_back, stand_facing, sit_on, lie_on)	Automatic actor alignment in front of the target furniture/wall and palm placement at real prop altitude (height3d).

09 T0->T1 Camera Paths, Cue Timeline, A1-A4 Mixer & FCPXML / PDF Exports

From keyframe animation on the 3D soundstage to multi-track editing in DaVinci Resolve or Premiere Pro

9.1 TEMPORAL CHOREOGRAPHY & SHOOTING PIPELINE (GENERATION.TS)

Bezier Camera Trajectories, Multi-Track Cue Timeline & Multimodal Video Rendering

Guiding the video diffusion engine from keyframe to keyframe to eliminate motion hallucinations

- **Dual Start (T0) -> End (T1) Camera Rig, Bezier Splines & Camera Machinery Sequencer**
  Program dolly moves, pans, or crane shots by curving the path on the 2D Floor Plan (bezierUtils.ts), or apply a 1-click machinery preset: Dolly In/Out, Lateral Tracking, 360° Arc Shot, Crane Elevation, or Vertigo Effect (compensated focal/distance zoom).
- **Multi-Track Timeline & Real-Time Animation Cue Points**
  Place temporal markers (Cues) down to the tenth of a second to animate actor posture transitions (smooth skeletal interpolation), floor blocking, door/window openings, and light intensity ramps.
- **Multi-Cue Holistic Parity (T0 -> T_inter_k -> T1) & Lighting Interpolation**
  At every milestone t_k, NEGASCOPE interpolates sun position and practical lamps, re-renders the 3D viewfinder, and chains anchors sequentially (14-reference hierarchy) to eliminate video drift.

9.2 RUSHES ROOM, 4-TRACK MIXER (A1-A4), 48 KHZ STEMS & APPLE DTD FCPXML 1.10

Split A/B Monitor, RAM-Safe 48 kHz WAV Stems & FCPXML 1.10 (<media-rep>)

A complete post-production suite engineered to deliver industry-compliant NLE packages

- **3-Mode Director Monitor, Disk Streaming & 4K Video Mastering**
  Compare Video Rushes and Frame 0 in Split A/B, stream historical takes from disk (RFC 9110 Range), retouch locally with brush Inpainting, or upscale to 4K (videoUpscaleService.ts).
- **Persisted 4-Track Audio Console (A1-A4) & 48 kHz WAV Stems (stemBakerService.ts)**
  Per-shot/scene mixer with frame nudge (-5f to +5f). Exports 4 separated 48 kHz PCM WAV stems without RAM exhaustion, compliant with Apple FCPXML 1.10 DTD (<media-rep>).

Audio Track / Pro Deliverable	Technical Architecture & Content	Post-Production & Broadcast Integration
Track A1: Dialogue & Voices	Spoken actor lines and voice-over synced to the shot.	Independent gain, Mute, and frame-by-frame Nudge (-5f to +5f).
Track A2: Synchronous Studio Foley	SFX assembled to the ms on Cue Points + MMAudio V2.	Unified 48 kHz WAV buffer per shot with gain control and frame Nudge.
Track A3: Extracted Video Foley	1-click 48 kHz WAV demuxing of native video audio.	Allows mixing or muting the native ambience generated by the video engine.
Track A4: Continuous Scene Music	Original musical score composed for the entire sequence.	Seamless continuous playback (Cross-Beat) across all shots in the scene.
FCPXML 1.10 Timeline Export	Apple DTD XML (<media-rep>) + 48 kHz WAV Stems.	Direct import into DaVinci Resolve, Premiere Pro & Final Cut (V1 + A1-A4).
A4 Production Dossier & Storyboard	16:9 Landscape or A4 300 DPI, 6 sections (pdfExport.ts).	Includes script (3 formats), optical metadata, and SHA-256 root (ledgerRootSha256).

ACOUSTIC CONTINUITY & DUAL ARCHIVING (SAVE / ZIP)

Multi-Track Synchronization & Full Project Portability

During continuous sequence playback in the Rushes Room, Track A4 (Scene Music) plays uninterrupted across shot cuts while Tracks A1, A2, and A3 trigger at each shot's exact timecode (adjusted by their frame Nudge offset). Clicking "Save" updates the project on the local hard drive, while "ZIP" packages a self-contained archive with all media for collaborators.

10 SHA-256 Ledger, Zero-Alloc WebGL Governance, V8 Hardening & Licensing

Legal copyright protection for authors, memory stability on 8 GB RAM Macs, and industrial IP protection

10.1 HUMAN AUTHORSHIP PROOF (AUTHORSHIPLEDGERSERVICE.TS)

The SHA-256 Cryptographic Ledger: US Copyright Office 2026 & IP Law Compliance

Mathematically proving that every shot results from deterministic human directing rather than random chance

- **Deterministic Shot Canonicalization & Root Seal (ledgerRootSha256)**
  For every shot, NEGASCOPE canonically serializes and SHA-256 hashes the 4x4 [R|T] camera matrix, quaternion, focal length (mm), f-stop, Kelvin, solar/gobo state, and 18-segment pose, sealing the ledger with ledgerRootSha256.
- **Opposable Certificate Embedded in 300 DPI A4 PDF Production Exports**
  This ledger and its ledgerRootSha256 seal are rendered at 300 DPI at the end of A4 PDF production dossiers, offering material proof of human direction compliant with USCO 2026 & CPI Art. L.111-1.

10.2 8 GB RAM & WEBGL OPTIMIZATION

.dispose() Lifecycle & Zero-Alloc GPU

- **Zero VRAM Leaks & Capture Invariants**
  Systematic .dispose() release of geometries, materials, and textures. Mandatory restoration of setScissorTest(true) and setSize() inside the finally block of every capture.
- **Zero-Alloc Architecture on Selection & Rig**
  Selecting/deselecting an actor and adjusting Head/Hand sliders update bone matrices in place without ever destroying or recreating Three.js meshes.
- **Automatic Disk Eviction (diskStorageService)**
  HD media blobs are evicted from RAM and written to disk upon saving, keeping the project JSON footprint ultra-light.

10.3 ELECTRON HARDENING (BUILD-ELECTRON.MJS)

V8 Bytecode (.jsc), RC4 & Electron Fuses

- **Native V8 Bytecode Compilation (Bytenode main.jsc)**
  The Electron main process, Express server, and LicenseManager are compiled into native V8 bytecode (.jsc) with physical deletion of plain JS sources and total .map purge.
- **Selective RC4 + Control-Flow Obfuscation**
  The proprietary negascope-core-ip chunk is RC4-encrypted, while the three chunk remains untouched to preserve 60 FPS WebGL rendering.
- **Electron Fuses, sandbox: true & safeStorage Vault**
  Strict sandbox: true isolation, binary deactivation of RunAsNode/NodeCliInspect, and OS Keychain/DPAPI encryption (safeVault.ts + negascope_license.vault).

Creem.io License Tier	Activatable Seats	Commercial Rights & PDF Customization	Option A Policy (Perpetual + Update Pass)
1. STUDENT & ACADEMIC	1 Mac / PC	Non-commercial - Academic PDF watermark	Perpetual license + 1-Year Update Pass included
2. INDIE CREATOR	2 Macs / PCs	Commercial use permitted - No watermark	Perpetual license + 1-Year Update Pass included
3. STUDIO PRO	5 Macs / PCs	Commercial use + Custom Studio Logo on PDF	Perpetual license + 1-Year Update Pass included
4. SCHOOL / CAMPUS LAB	12 Macs / PCs	Educational use + Custom School Logo on PDF	Perpetual + 1-Year (Standard Lab) or 3-Year (Serenity)

CREEM.IO HMAC VAULT, 7-DAY OFFLINE GRACE & BYOK CONNECTOR

Signed Vault (negascope_license.vault), Build Eligibility & Zero Cloud Credits Sold

Every Creem.io license is sealed inside negascope_license.vault (safeStorage + HMAC anti-rollback maxObservedAt), granting a 7-day offline grace period and perpetual APP_BUILD_DATE <= updatePassExpiresAt eligibility. Zero cloud credits sold: external APIs run as an Optional Client-Side BYOK Connector.

11 Mathematical Invariants & Automated Vitest Suite (265+ Suites)

A strict engineering contract: 100% of geometric, optical, and logical invariants verified before every build

11.1 CONTRIBUTION CONTRACT & VERSION 1.0.0 CODEBASE METRICS

The Non-Regression Golden Rule (npm run check:governance)

Every bug fix or new capability is permanently sealed by a reproducible automated test

- **Industrial Coverage: 567+ TypeScript/React Files, 265+ Vitest Suites & 2,370+ Assertions**
  The NEGASCOPE V1.0.0 codebase is strictly typed under TypeScript 5.8 and validated by 265+ unit and integration test suites covering 3D matrix math, kinematic solvers, API payload adapters, and React UI components.
- **Permanent Runtime Geometric Guards (geometryInvariantGuard.ts)**
  In addition to static test suites, active runtime sentinels continuously verify that the interior camera never collapses to the floor (eye-level invariant ~1.65 m, Y != 0) and that effective floor dimensions (effectiveFloorW x effectiveFloorD) respect room bounds.

Tested Governance Domain	Reference Test Suites (src/__tests__/)	Locked Technical Invariants
Physical Optics & 3D Framing	cinematicOptics.test.ts, spatialFramingSolver.test.ts, wildWallOccultation.test.ts, apertureLighting.test.ts	Sensor/focal FOV math (14-200mm), directional Wild Wall culling, Kelvin exposure, and window gobo projections.
18-Segment Kinematics & Postures	actorPoseEngine.test.ts, lyingActorHeadGazeAndSunEnd.test.ts, quaternion SLERP tests	35 deterministic presets, Upper/Lower Mix & Match, proportional 2-bone IK solver, furniture/wall snapping, 60 FPS SLERP.
3D Set Studio & 360° Stitching	decorSurfaceEngine.test.ts, DecorAnglesConsole.test.tsx, spatialWallSynthesisSync.test.ts	Strict purge of narrative mentions in Clay passes, 4-wall color transfer, and 360° panoramic seam stitching.
Inter-Shot Continuity (N-1 -> N)	continuityPersistence.test.ts, shootPlateauDecorAndActorIntegrity.test.ts, endShotCharacterRetention.test.ts	Automatic propagation of stage furniture (mattresses, props) across scene shots and preservation of T0/T1 states.
Multi-Track Audio, Rushes & Exports	audioStudio.test.tsx, lotD2FcpxmlPdfAndBundles.test.ts, lotC1 & lotC2 Security/Vault/Creem	48 kHz WAV stems, Apple DTD FCPXML 1.10 (<media-rep>), 300 DPI PDF + ledgerRootSha256, HMAC vault & Creem.io licenses.

VERSION 1.0.0 SYNOPTIC SHEET

Master Reference Specifications

- **Version & Merchant of Record**
  NEGASCOPE v1.0.0 Production Master • Official Creem.io Store (creem.io/stores/neganthrope).
- **Deployment Targets**
  macOS Apple Silicon (arm64), macOS Intel (x64), Windows (x64) & Local Web/Studio Server.

INTEGRATED DOCUMENTATION & MANUALS

Bilingual User Onboarding

- **Interactive In-App Guide (10 Chapters FR/EN)**
  Accessible at any time with 1-click action buttons that directly open the target workshop or AI agent.
- **Official A4 PDF Manuals (FR & EN)**
  Automatically generated and synchronized with all V1.0.0 capabilities.

WHITE PAPER CONCLUSION - NEGASCOPE V1.0.0 PRODUCTION MASTER

A New Standard for AI-Assisted Cinematic Directing

By uniting in a single sovereign studio 7 specialized AI crew agents, 360° 3D architectural modeling, physical cinema optics, deterministic 18-segment biomechanics (35 presets, Mix & Match, 2-bone IK, and 3D snapping), frame-accurate 4-track audio mixing, and SHA-256 cryptographic proof of human authorship, NEGASCOPE V1.0.0 fulfills the promise of true sympoiesis between the filmmaker's mind and contemporary compute.