

The road beyond 3.0

Product and engineering roadmap

Go deeper, stay responsive, and bring every discovery to life.

Our ambition is to make Mandelbrot Metal the strongest combination of **speed, useful depth and creative control** on iPhone and iPad. The next releases build on the Infinity Engine with clearer 3D detail, expressive lighting, complete scenes and motion.

This is the intended direction, not a release calendar. Version 3.0 is available now. Versions after 3.0 describe future work; scope and order may change as features are tested. Later releases have no committed dates.

Deep exploration. Serious creative output.

Version 3.0 brings the Infinity Engine, a validated Mandelbrot navigation scale through **10^{25} points per complex-plane unit**, and the full rendering engine in Free. Julia uses its own direct renderer and does not inherit that Mandelbrot depth boundary.

Free includes all **156 built-in palettes**, 56 curated starter bookmarks, five personal bookmark slots and canvas-size PNG capture. Pro adds custom and photo-derived palettes, 3D Look, unlimited bookmarks and **4K, 6K, 8K and larger custom PNG exports**, within device memory and practical render time. [See the 3.0 features.](#)

3.1 Next priority

Faster exploration and clearer 3D detail

Keep the momentum of exploration, and make fine deep-zoom structures easier to see and shape.

A faster Infinity Engine

Reduce reference preparation time, reuse suitable work as you navigate, and tune sustained performance within the existing validated Mandelbrot range.

Deep-zoom 3D visibility

Improve relief sampling and scaling so resolved filaments, ridges and miniature structures retain visible form as you zoom. Aim for stable detail without noisy highlights or abrupt changes in apparent depth.

First 3D control improvements

Make relief strength and light direction easier to adjust, with clear defaults and a quick reset. Use this focused control pass to inform the fuller studio in 3.3.

More dependable large PNG exports

Improve memory estimates, progress reporting and cancellation for 4K, 6K, 8K and larger custom output. Show practical device limits before committing to expensive work.

What must be proven

Demonstrate faster completed renders on representative iPhones and iPads without losing fidelity. Check deep 3D scenes against unlit renders, across tile boundaries and in exported PNGs; test sustained heat, memory pressure and cancellation.

How it fits

Builds on the 3.0 engine and its current depth boundary. Precision research can run alongside this release without delaying useful performance and 3D improvements.

A deeper precision frontier

Reach farther into the Mandelbrot set while preserving trustworthy detail and practical rendering speed.

A qualified extension beyond 10^{25}

Extend coordinate and reference precision together, then publish a new boundary only after the renderer can resolve and export reliable detail there.

Acceleration for demanding scenes

Evaluate safe iteration skipping, including block-linear approximation, and stronger reference reuse to reduce repeated work at high iteration counts.

Better recovery and diagnostics

Improve detection and recovery when a reference becomes unsuitable. Make performance and precision problems easier to reproduce and diagnose.

3D that follows the new depth range

Qualify fine-detail relief at every newly supported depth. Investigate deeper Julia rendering separately; a Mandelbrot improvement does not automatically extend Julia.

What must be proven

Compare difficult scenes with independent high-precision references on physical devices. Require reliable navigation, recovery, bookmarks, 3D shading and exports, with a measured memory and time budget.

How it fits

A research milestone, not a promised numerical ceiling. If deeper precision needs more work, bring ready creative improvements forward instead of holding the whole roadmap.

The color and 3D creative studio

Shape the look of a discovery interactively, then save and share the complete composition.

Responsive color and lighting edits

Reuse suitable rendering results when changing color or lighting so creative adjustments can avoid repeating expensive orbit work. Keep caching within a clear memory budget.

A dedicated 3D control workspace

Target an intuitive light-direction control, light elevation, relief depth and detail scale, ambient fill, highlight strength and shininess. Offer simple controls first, with advanced adjustments when needed.

Looks that preserve fine structure

Add a small, useful collection of lighting and relief presets, an unlit comparison and one-tap reset. Keep small structures visible at deep zooms while preserving the intended palette.

Better gradient editing

Improve color-stop editing and palette adjustments, with responsive previews and consistent color handling.

Self-contained scenes and autosave

Save coordinates, rendering settings, embedded custom palettes and the complete 3D appearance together. Add recovery, migration and portable scene sharing.

What must be proven

Check control responsiveness, cache correctness and invalidation, saved-scene round trips, existing bookmark compatibility, color management, and matching appearance between the screen and tiled high-resolution output.

How it fits

Builds on the 3.1 relief work. Scene and appearance formats provide the stable foundation for animation in 3.4 and sync in 3.6.

Journeys and motion

Turn saved discoveries into controlled fractal films, with movement and lighting that serve the composition.

Journeys between saved views

Create paths from saved scenes, adjust timing and easing, and preview the route before a full render.

Animate the creative controls

Keyframe palette changes, light direction, relief strength and other supported 3D settings. Keep fine-detail shading stable from frame to frame.

Repeatable video export

Start with a dependable 1080p workflow and qualify 4K separately. Render frames from the saved project state with predictable timing and consistent settings.

Manage longer renders

Provide useful progress, cancellation, storage checks and recovery appropriate to the export workflow.

What must be proven

Test deep-coordinate interpolation, temporal flicker, frame order and timing, color consistency, thermal behavior, interruptions and audio-free video playback. Repeatability is qualified for a defined renderer and settings, not guaranteed identical pixels on every device.

How it fits

Depends on complete scenes and stable appearance controls. Video resolution remains separate from the existing 8K-and-beyond still-image capability.

More worlds to discover

Broaden the mathematical and visual range while keeping the same approachable exploration workflow.

Curated new fractal families

Start by evaluating Multibrot and Burning Ship, with clear formula-specific depth and rendering limits.

A coherent creative experience

Bring qualified formulas into navigation, color, 3D Look where appropriate, scene saving and export.

Better discovery

Add curated starting points, useful destinations and concise explanations to help people find compelling structures.

Consistent saved work

Record the formula and its parameters in each scene so discoveries reopen correctly and can be shared.

What must be proven

Qualify each formula independently for numerical correctness, navigation, performance, coloring and output. Do not imply that every formula inherits the Mandelbrot engine's depth or speed.

How it fits

Builds on the scene format and creative workspace. A curated set comes before an unrestricted formula language.

A connected creative library

Organize growing collections and keep discoveries available across your own devices.

Optional iCloud sync

Explore syncing scenes, palettes and collections while preserving a useful local, offline workflow.

A richer library

Improve browsing, organization, search and reusable collections as saved work grows.

Recovery and conflict handling

Make sync conflicts, offline edits, deleted items and recovery understandable and testable.

Batch still-image output

Queue multiple saved scenes for consistent PNG export, with storage estimates and clear progress.

What must be proven

Verify offline-first behavior, interrupted sync, conflicting edits, schema upgrades, deletion recovery, large libraries and batch-export resource limits.

How it fits

Requires stable scene and palette formats plus proven migration. Cloud collaboration and a hosted social network are outside this release's focus.

A native Mac workspace

Give the engine and creative tools more room on a desktop.

A workspace designed for Mac

Explore a native Mac interface for large displays, keyboard and pointer control, and longer creative sessions.

Continuity with mobile work

Investigate scene and palette compatibility, shared libraries and an output workflow suited to desktop use.

What must be proven

Assess demand, engineering capacity, desktop interaction and sustainable support before committing to this release.

How it fits

A possible next major direction after the mobile foundations mature, with no committed release date.

Let the fine detail catch the light.

The goal is a 3D Look that remains useful as the structures get smaller: visible ridges, filaments and depth cues in resolved deep-zoom detail, with controls that make the result easy to shape.

- **3.1 - improve the foundation.** Refine deep-detail relief, stability and the first light-direction and strength controls.
- **3.2 - carry it deeper.** Qualify relief alongside any extension of the trustworthy Mandelbrot range.
- **3.3 - put the artist in control.** Introduce the dedicated 3D workspace, light elevation, relief scale, fill and highlights, presets, comparison and reset.
- **3.4 - bring it into motion.** Animate supported lighting and relief settings without distracting shimmer or flicker.

3D Look is illuminated surface relief derived from a two-dimensional fractal image. This plan does not introduce volumetric 3D fractals. Stronger shading must reveal resolved structure rather than exaggerate numerical noise, and the intended appearance must carry through to high-resolution exports.

Every release earns its place.

Speed and depth together

Judge progress by responsive navigation, time to a completed image, useful resolved detail and sustained device behavior. A larger number alone is not a better exploration experience.

Reliability in every release

Numerical fidelity, old-file compatibility, export correctness, accessibility, localization and purchase restoration remain release requirements throughout the series.

The full engine stays in Free

Keep rendering precision and the core exploration engine available to everyone. Pro development focuses on creative control, organization and advanced output; final feature packaging will be confirmed as releases approach.

Deliver useful progress

Run deeper-precision research alongside practical improvements. If research takes longer, ship ready creative work first. Collect feedback from real scenes and real devices before broadening scope.

Tilt steering, an unrestricted formula language and a hosted social network are deferred. They should not displace engine performance, deep-detail 3D, creative tools or dependable output.

Looking for today's capabilities? Read the [User Guide](#), [FAQ](#) or [competitive comparison](#). For the current architecture, see the [technical white paper](#); this roadmap supersedes its earlier future-release sequencing.