

Brief on Feature Selection, Market, Models and Creator Impact

”Re-imagining Photoshop - The AI Editor of 2030” – Team 94

Two-page brief for Task 2: Market scan, manual vs. AI operations, workflow rationale, datasets, and creator impact.

1. Market Scan

The creator ecosystem has expanded rapidly: global estimates indicate over **300M active creators** by 2024, with more than **85% relying on mobile devices** for routine editing tasks. Mobile-first workflows have overtaken desktop usage for non-professional editors, yet most tools rely on single-shot enhancements or black-box functionalities. Meanwhile, Adobe reported **\$12.68B** revenue from creative products in FY 2024, demonstrating the continued dominance of professional-grade editing ecosystems. Firefly exceeded **12B image generations** and achieved a **10× faster adoption rate** than previous major feature launches, highlighting explosive demand for scalable, intent-driven AI editing.

However, the mobile ecosystem remains structurally limited. Apps like Snapseed, Lightroom Mobile, and Lensa excel at localized enhancements or stylization but lack a foundational structure for multi-layer editing, non-destructive pipelines, or harmonized compositing. Background replacement exists in many apps, but **none** offer professional-grade **foreground–background (FG–BG) harmonization**. Similarly, auto-enhancement features exist, but they rely on single-model inference (e.g., denoise-only or sharpen-only) rather than multi-stage pipelines capable of low-light correction, restoration, and deblurring in one pass.

Mobile creators consistently face friction when performing compositing tasks: mismatched lighting, noisy FG–BG boundaries, and inconsistent tone across elements. Given rising expectations for mobile-first, low-latency AI (latency targets ≤ 10 s for 1080p edits), there is a growing need for editors that blend Photoshop-like structure with lightweight AI workflows. Arclight addresses these gaps by combining **layer-based reasoning**, **automated multi-model pipelines**, and a **dual-workspace paradigm** that allows both quick automated edits and fine-grained model-level control.

2. Manual vs. AI-Automated Operations

Arclight introduces two workspaces with distinct interaction philosophies. **Flow Space** is designed for creators

who want high-level outcomes with minimal friction. The moment an image is uploaded, the system automatically performs FG–BG separation and constructs a two-layer workspace. This enables non-destructive editing and sets up the image for downstream AI pipelines such as enhancement or background replacement. The philosophy mirrors Photoshop’s intelligence layer: AI performs structural setup while the user guides aesthetic intent. Manual controls remain for layer visibility, opacity, and ordering, preserving professional editing logic.

By contrast, **Lab Space** exposes the raw model arsenal. Users who want precise control over individual transformations, like denoising, subject removal, or targeted style transfer, can trigger specific models on demand. Unlike Flow Space, Lab Space does not use layers; instead, it focuses on direct inference-based transformations. This duality reflects market reality: casual creators prefer automated pathways, while advanced users seek modularity and explicit control over transformations.

Flow Space : AI-Dominant Operations

AI-automated:

- FG–BG segmentation via U²Net
- Background replacement workflow (BG removal \rightarrow user-uploaded BG \rightarrow alignment)
- FG–BG harmonization via PCT-Net (lighting, color, shadows)
- Auto-enhancement pipeline:
 - Low-light enhancement (LYT-Net)
 - Denoise + deblur (NAFNet)
 - Facial restoration (CodeFormer)

Manual:

- Layer visibility toggles and opacity changes
- Reordering FG/BG and newly added layers
- Optional algorithmic adjustments (brightness, contrast, saturation)

Lab Space : AI On Demand

AI tools available:

- Background removal (U²Net)
- Subject removal (SAM + LaMa)

- Denoise / Deblur (NAFNet)
- Face correction (CodeFormer)
- Photorealistic style transfer (MobileNet PCA-based KD model)

Manual:

- Selecting which models to run and in what order
- Adjusting model parameters where applicable (e.g., style intensity)

3. Rationale for the Two Workflows

Arclight implements two core workflows in Flow Space:

(1) Auto-enhancement pipeline (2) Background replacement + harmonization

Our earlier approach focused only on isolated AI tools, which risked becoming “Snapseed with more models.” This lacked structural intelligence. The redesigned architecture introduces layer-based reasoning and multi-stage pipelines that reflect true Photoshop-like workflows. These two features were chosen because they solve some of the most universally reported mobile editing problems.

Background Replacement + Harmonization: Market data shows that over **65%** of mobile edits involve **object isolation or BG manipulation**. Yet almost no mobile app addresses harmonization, leading to unrealistic composites. The workflow uses U²Net for segmentation, PCT-Net for harmonization, and user-guided BG alignment: creating a professional-grade pipeline never seen on mobile editors. This directly fulfills Adobe’s vision for meaningful AI-human collaboration by 2030.

Auto-Enhancement Pipeline: Studies show that **over 70% of users rely on auto-adjust features** in mobile editors. However, single-step enhancements often fail in low-light or noisy scenarios. Arclight uses LYT-Net, NAFNet, and CodeFormer in a tightly integrated sequence, performing contextual improvement that rivals desktop editors. This showcases multi-model orchestration, compute budgeting, and the engineering depth expected in Task 3.

4. Datasets and Model Provenance

Arclight exclusively uses open-source pretrained models with full licensing disclosures.

Flow Space

- **Segmentation:** U²Net **Datasets:** DUTS, DUT-OMRON, ECSSD.
- **Low-Light:** LYT-Net **Datasets:** LOL, SID, LSRW.
- **Denoise/Deblur:** NAFNet **Datasets:** GoPro, DIV2K, SIDD.
- **Facial Restoration:** CodeFormer **Datasets:** FFHQ, CelebA-HQ.

- **Harmonization:** PCT-Net **Dataset:** iHarmony4.

Lab Space

- **Background Removal:** U²Net
- **Subject Removal:** SAM (SA-1B) + LaMa (Places2)
- **Style Transfer:** MobileNet PCA-based KD Datasets: WikiArt, curated content sets

These datasets collectively support segmentation, enhancement, restoration, and domain-consistent compositing. No model is finetuned, reducing computational cost and simplifying licensing transparency.

5. Expected Creator Impact

Arclight’s dual-workspace structure improves both speed and creative control for mobile editors. **Flow Space** reduces cognitive effort by automating technical steps, FG–BG separation, exposure correction, denoising, and enhancement: allowing users to focus on intent rather than manual cleanup. This benefits everyday creators who want quick, high-quality results without learning professional tools, while still preserving non-destructive controls such as opacity and layer visibility for advanced users.

Background replacement + harmonization directly addresses one of the most common creator tasks. Large segments of mobile users routinely edit or change backgrounds, but existing tools rarely provide realistic lighting and color consistency. With U²Net segmentation and PCT-Net harmonization, Arclight enables composites that visually match in tone, shadow, and illumination, lifting mobile edits closer to desktop-quality results.

The **auto-enhancement pipeline** helps creators salvage low-light or imperfect captures - a widespread challenge in mobile photography. The sequential use of LYT-Net, NAFNet, and CodeFormer restores clarity and detail in a single pass, reducing the need to manually combine multiple tools or apps. This is especially impactful for fast-paced content creation such as travel, social media, or small-business product photography.

Lab Space complements this by providing direct access to model-level transformations for users who want targeted control over denoising, subject removal, or style transfer. It offers professional flexibility without overwhelming beginners, aligning with Adobe’s emphasis on balanced, human-in-the-loop AI workflows.

Together, these capabilities deliver faster results, more coherent composites, and deeper editing flexibility, advancing what mobile-first AI editing can achieve by 2030.