

u3a Computing Group

Alan Hopwood, 5 March 2026

Agenda



Welcome

Current News, Issues and Questions

Topic Plan

Topic: Managing and Storing Photographs

Discussion

Current News, Issues and Questions

Anything to discuss?

Topic Plan

May Meeting
(no April
meeting)

Topic	Votes
Getting more from your smart phone, e.g. attaching keyboard and monitor broadening its use.	5
Managing and Saving Photos	4
Apple/MS Windows/Chromebook/Linux comparison	4
Home Security Systems and Devices	3
use of AI	3
AI Agents (an AI service focused on a particular purpose rather than being general)	3
Internet Connectivity and Networks	2
NAS (Network Attached Storage) Drives	2
Basics of Quantum Computing (inc. Bloch Sphere)	2
Email Clients and Servers (cover compatibility)	1
Raspberry Pi	0
What hardware have you made redundant and what did it do?	0



Managing and Storing Photographs

*File formats, storage options, organisation tools
and editing software across all platforms*

Agenda

01

Camera File Formats

RAW, JPEG, HEIF, DNG and what cameras produce

02

Storage Options

Cloud, local drives, memory cards – pros & cons

03

Organisation Software

Tools for Windows, Mac, Android & iPhone

04

Editing Software

From quick fixes to professional retouching

05

Use-Case Decisions

How intended use shapes your workflow choices

06

Best Practices

Backup strategies, metadata, long-term preservation

Camera File Formats

JPEG / JPG

Universal compressed format. 8-bit colour, lossy compression. Default for most cameras & phones. Ideal for sharing, web and everyday use.

HEIF / HEIC

Modern Apple default (iOS 11+). ~50% smaller than JPEG at same quality. Limited third-party support. Apple Pixel ecosystem standard.

TIFF

Lossless high-quality archival format. Very large files. Used in print and broadcast workflows. Rarely produced in-camera.

RAW

Unprocessed sensor data. Proprietary per brand (CR3, NEF, ARW...). Maximum quality and editing latitude. Requires post-processing before sharing.

DNG

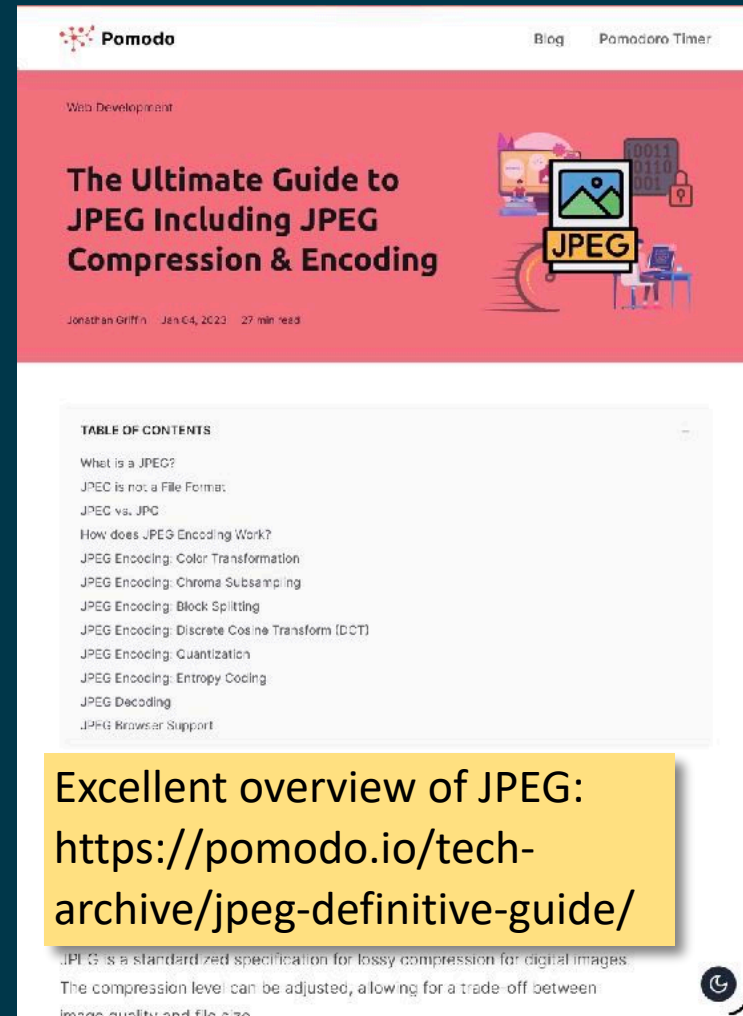
Adobe's open RAW standard. Used by Leica, some Androids & drones. Better long-term compatibility than proprietary RAW. Increasing adoption.

WebP / AVIF

Modern web-optimised formats. Produced by some Android devices. Superior compression. Growing browser and app support.

File Formats - JPEG

- JPEG is not a File Format!
it is a a lossy compression algorithm based on imperfections of the human vision.
- The wrapper that holds the compressed data for photographs is Exchangeable image file format (EXIF)
- The EXIF format embeds metadata into the image including Camera settings, Image metrics, Date and time, Location information, Thumbnail, Description, Copyright information



The screenshot shows a Pomodo article page. At the top, the Pomodo logo and 'Pomodoro Timer' are visible. The article title is 'The Ultimate Guide to JPEG Including JPEG Compression & Encoding' by Jonathan Griffin, dated Jan 04, 2023, with a 27-minute read time. A table of contents lists topics such as 'What is a JPEG?', 'JPEG is not a File Format', 'JPEG vs. JPG', 'How does JPEG Encoding Work?', and various encoding/decoding steps. A yellow callout box highlights the article as an 'Excellent overview of JPEG' with the URL <https://pomodo.io/tech-archive/jpeg-definitive-guide/>. The bottom of the page shows the start of the article text: 'JPEG is a standardized specification for lossy compression for digital images. The compression level can be adjusted, allowing for a trade-off between image quality and file size.'

Pomodo Blog Pomodoro Timer

Web Development

The Ultimate Guide to JPEG Including JPEG Compression & Encoding

Jonathan Griffin Jan 04, 2023 27 min read

TABLE OF CONTENTS

- What is a JPEG?
- JPEG is not a File Format
- JPEG vs. JPG
- How does JPEG Encoding Work?
- JPEG Encoding: Color Transformation
- JPEG Encoding: Chroma Subsampling
- JPEG Encoding: Block Splitting
- JPEG Encoding: Discrete Cosine Transform (DCT)
- JPEG Encoding: Quantization
- JPEG Encoding: Entropy Coding
- JPEG Decoding
- JPEG Browser Support

Excellent overview of JPEG:
<https://pomodo.io/tech-archive/jpeg-definitive-guide/>

JPEG is a standardized specification for lossy compression for digital images. The compression level can be adjusted, allowing for a trade-off between image quality and file size.

RAW vs JPEG: The Key Trade-off

RAW

There are dozens of RAW formats

✓ Advantages

- ✓ Maximum dynamic range & colour depth
- ✓ Full non-destructive editing latitude
- ✓ Recover blown highlights and shadow detail
- ✓ White balance adjustable after capture
- ✓ Noise reduction without baked-in artefacts

✗ Disadvantages

- ⚠ 10–30 MB per file (varies by sensor)
- ⚠ Requires dedicated software to open
- ⚠ Not directly shareable — must export
- ⚠ Slows burst shooting (buffer fill)
- ⚠ Proprietary formats risk obsolescence

JPEG

✓ Advantages

- ✓ Small files: 2–8 MB typical
- ✓ Opens in any software or device
- ✓ Ready to share immediately
- ✓ Fast continuous shooting
- ✓ Universal printing support

✗ Disadvantages

- ⚠ Lossy – quality degrades each save
- ⚠ Clipped highlights rarely recoverable
- ⚠ 8-bit limits fine tonal gradations
- ⚠ Camera applies irreversible processing
- ⚠ Less headroom in heavy editing

Storage Options

Every photographer needs a strategy — understand the landscape first



Cloud Storage

- › Access from any device
- › Automatic sync/backup
- › Monthly subscription cost
- › Dependent on internet
- › Privacy considerations



Local Drives

- › One-time cost
- › Fast access speeds
- › Full privacy control
- › Hardware failure risk
- › Physical vulnerability



Removable Media

- › Portable & affordable
- › No subscription
- › Easily lost or damaged
- › Limited longevity
- › USB sticks, SD cards, SSDs



Best practice: Use at least two independent storage locations (3-2-1 rule: 3 copies, 2 media types, 1 offsite)

Cloud Storage Services Compared

Service	Free Storage	Photo Quality	Best For	Platform
Google Photos	15 GB shared	Original or compressed	Android users, auto-org.	All platforms
iCloud Photos	5 GB free	Original quality	iPhone / Mac ecosystem	Apple-primary
Amazon Photos	Unlimited*	Original quality	Prime subscribers	All platforms
OneDrive	5 GB free	Original quality	Windows / Microsoft 365	All platforms
Dropbox	2 GB free	Original quality	Cross-platform sync	All platforms
Flickr	1000 photos	Original quality	Photography community	All platforms

** Amazon Photos offers unlimited photo storage (not video) for Prime members*

Section 3



Organisation Software

The right tool depends on your platform, workflow and how many photos you manage

Photo Organisation Software by Platform



Windows PC

Microsoft Photos: Built-in. Timeline view, basic albums, OneDrive sync. ★ Recommended for casual users.

DigiKam: Free & powerful. Facial recognition, geo-tagging, advanced search, plugin ecosystem.

Adobe Bridge: Metadata-heavy browser. Tight Photoshop/Lightroom integration.

Lightroom Classic: Industry standard. Non-destructive, catalogue-based, full DAM workflow.



Android

Google Photos: Pre-installed on most devices. AI search, auto-albums, cloud backup. ★ Most popular.

Simple Gallery: Lightweight, offline, privacy-first. No cloud dependency.

F-Stop Gallery: Folder-based, metadata editing, NAS support. ★ Recommended for power users.

Amazon Photos: Unlimited photo backup for Prime members. Good for backup strategy.



Apple Mac

Apple Photos: Built-in. iCloud sync, Memories, Smart Albums, face recognition. ★ Recommended first stop.

Lightroom Classic: Same power as Windows. Best for large RAW collections. *(Adobe)*

Capture One: Pro-grade. Excellent tethered shooting, superior colour engine.

DigiKam: Free, cross-platform alternative. Strong metadata & plugin support.



iPhone / iPad

Apple Photos: Tightly integrated. iCloud, Memories, shared albums, RAW support. ★ Default choice.

Google Photos: Cross-platform sync. Good if you also use Android or Windows.

Darkroom: Excellent local organiser with integrated editing. Premium features.

Mylio Photos: Sync across devices without cloud. Face recognition, geo map view.

Apple Photos Demonstration

- Organisation
 - All in one “Library” (Except we also have a “shared” Library)
 - Sorted by date of storage
 - Then collected and viewable in Albums
 - Manually added
 - By meta data
 - By content analysis (face recognition)
 - Shared Albums for friends.
- Editing: styles, adjust, crop, clean up

Section 4



Photo Editing Software

From quick mobile fixes to full professional retouching pipelines

Editing Software — Windows & Mac

Adobe Lightroom Classic

Professional

Cost: Subscription

Industry standard for photographers. Non-destructive RAW editing, powerful culling, batch processing, cloud sync. Best overall workflow.

Adobe Photoshop

Professional

Cost: Subscription

Pixel-level editing, compositing and retouching. Use alongside Lightroom. Essential for complex edits, product photography.

Capture One

Professional

Cost: Subscription/Perpetual

Preferred by studio and commercial photographers. Superior colour science, tethered shooting, style transfer. Steep learning curve.

DxO PhotoLab

Advanced

Cost: Perpetual

Excellent noise reduction and lens correction. DeepPRIME AI technology outstanding for high-ISO images. Good one-time cost value.

Affinity Photo Studio

Advanced & Free

Cost: NOW FREE!

Very impressive new release for Windows & Mac. RAW editing, retouching, HDR merge. No subscription. Excellent Photoshop alternative for occasional users.

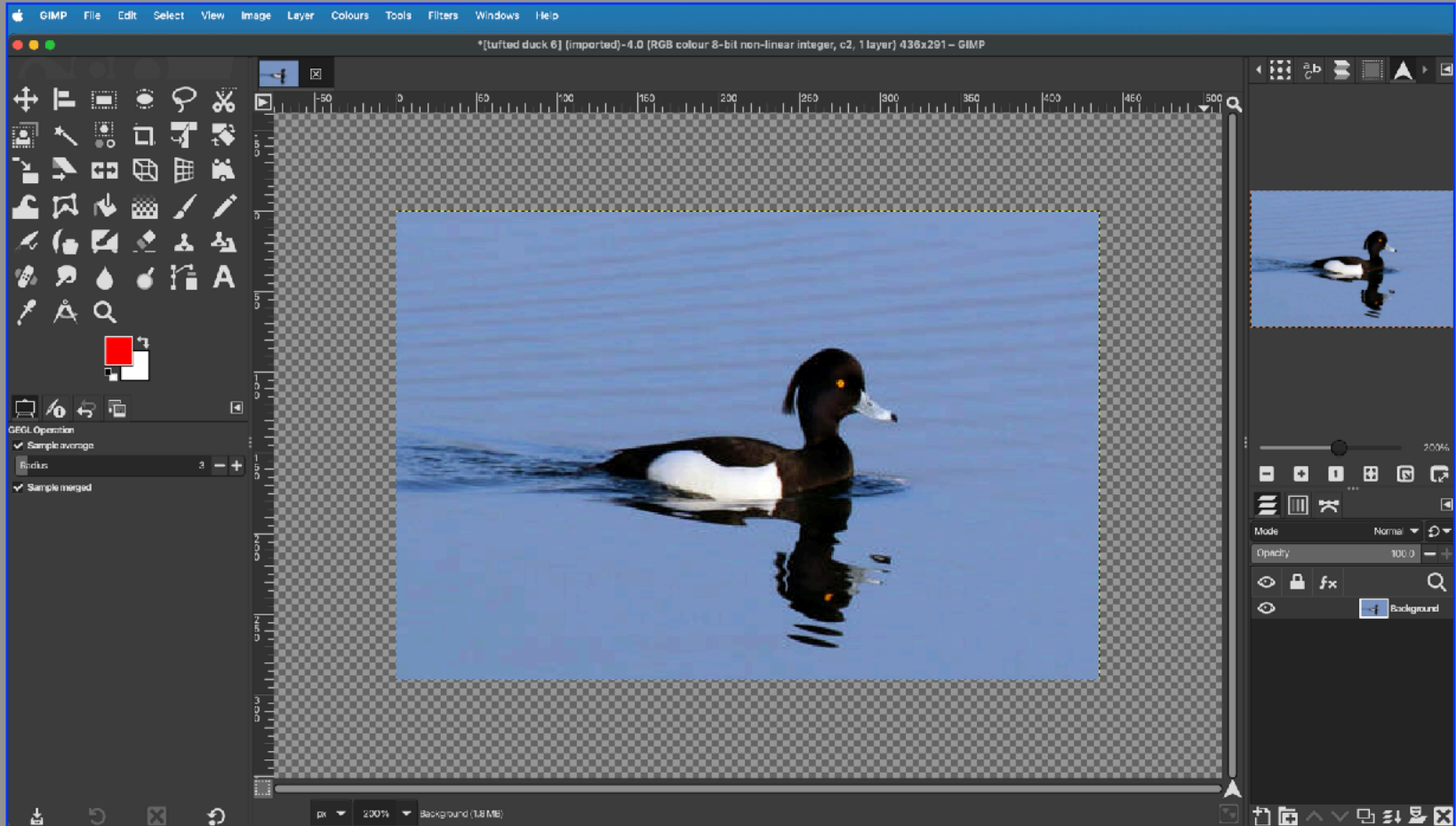
GIMP

Free

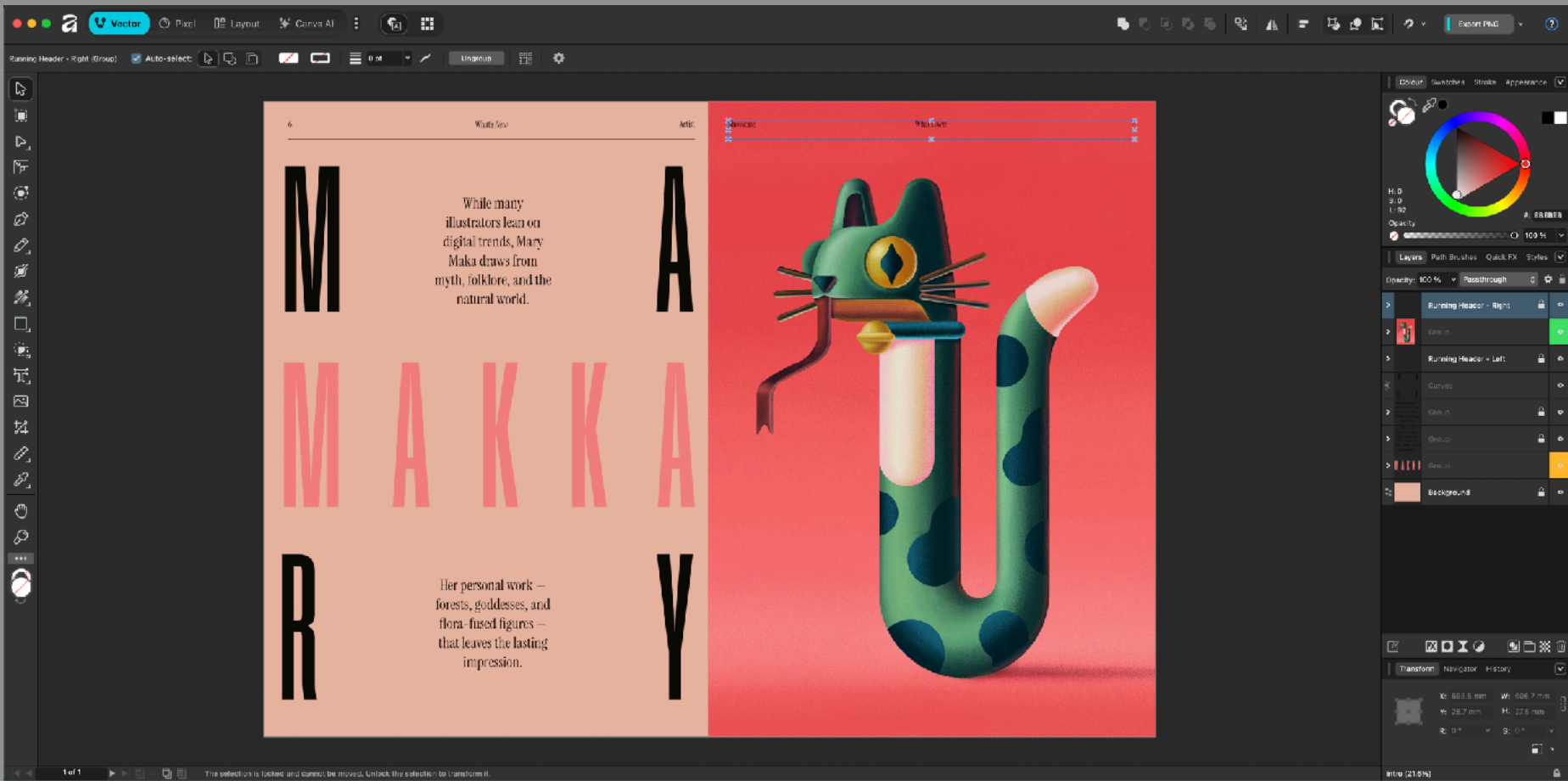
Cost: Free/Open Source

Free and powerful. Steep learning curve, no non-destructive workflow. Good for occasional complex edits without cost.

GIMP (on a Mac)



Affinity (on a Mac)



Editing Software — Android & iPhone

Lightroom Mobile

iOS & Android

Cost: Free / Subscription for advanced

Syncs with desktop Lightroom. Powerful RAW editing, presets, Healing Brush. Best cross-device workflow.

VSCO

iOS & Android

Cost: Free / Subscription

Film-look presets, strong community. Great for consistent style / branding. Less technical but high quality aesthetic results.

Halide Mark II

iOS only

Cost: Subscription

Primarily a camera app but excellent RAW capture and histogram review. Pairs well with Darkroom or Lightroom.

Snapseed

iOS & Android

Cost: Free (Google)

Comprehensive and free. Selective adjustments, healing, RAW support. Excellent for social media editing. No cloud dependency.

Darkroom

iOS only

Cost: Free / One-off IAP

Fast, intuitive RAW editor with excellent curve tool. Tight Apple Photos integration. Recommended for iPhone users.

Polarr

iOS & Android

Cost: Free / Subscription

AI-powered editing, face retouching, sky replacement. Good bridge between quick edits and deeper control.




Quick Reference: Recommended Tools by Platform

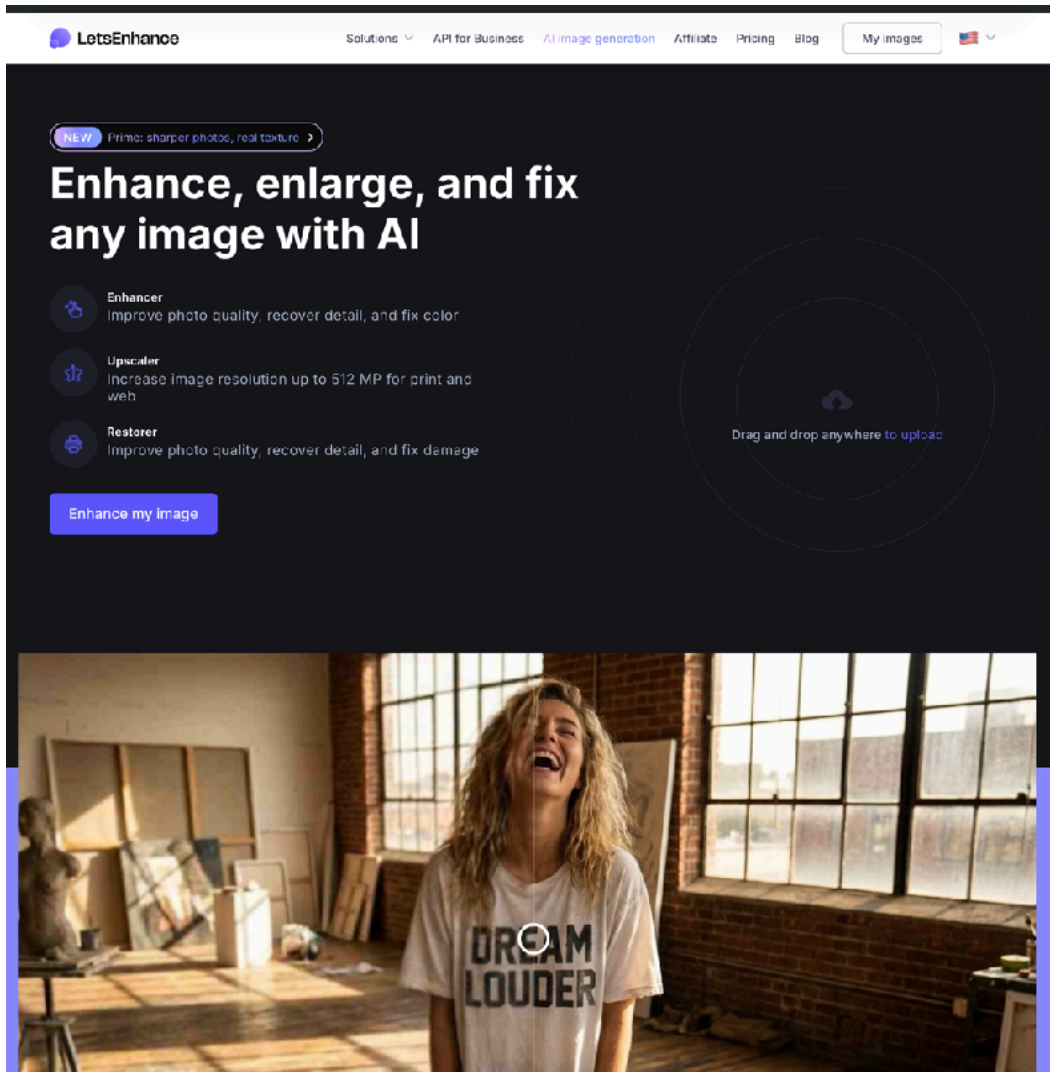
Platform	Organise	Edit (Basic)	Edit (Pro)	Cloud Backup
Windows	Microsoft Photos / DigiKam	Photos / Affinity	Lightroom / Capture One	OneDrive / Google Photos
macOS	Apple Photos	Apple Photos / Darkroom	Lightroom / Capture One	iCloud / Google Photos
Android	Google Photos / F-Stop	Snapseed / VSCO	Lightroom Mobile	Google Photos / Amazon
iPhone	Apple Photos / Mylio	Darkroom / Snapseed	Lightroom Mobile	iCloud / Google Photos

★ All platforms: [Lightroom \(desktop + mobile\)](#) gives the most seamless cross-platform RAW workflow

Demo of Photo enhancement

- There are quite a few
- Some can run locally on PC
- LetsEnhance is an Internet Service

20 Credits  valid for use at any moment	50 Credits  valid for use at any moment	120 Credits  valid for use at any moment
\$9 One-time payment	\$19 One-time payment	\$39 One-time payment
Buy bundle	Buy bundle	Buy bundle



LetsEnhance Solutions API for Business AI image generation Affiliates Pricing Blog My images


NEW Primo: sharper photos, real texture

Enhance, enlarge, and fix any image with AI

- Enhancer**
Improve photo quality, recover detail, and fix color
- Upscaler**
Increase image resolution up to 512 MP for print and web
- Restorer**
Improve photo quality, recover detail, and fix damage

Drag and drop anywhere to upload

[Enhance my image](#)



How Intended Use Shapes Your Choices

Social Media

Format: JPEG / HEIC

Storage: Cloud (Google/iCloud)

Tools: **Snapseed, VSCO, Lightroom Mobile**

Prioritise accessibility and speed. Compressed formats fine. Mobile workflow optimal.

Print & Exhibition

Format: RAW → TIFF

Storage: Local NAS + Cloud backup

Tools: **Lightroom + Photoshop**

Maximum quality essential. Colour-managed TIFF exports. Physical backups critical.

Family Archive

Format: JPEG / HEIC

Storage: Cloud + External drive

Tools: **Apple Photos, Google Photos**

Organisation and searchability over quality. Face recognition and albums key features.

Commercial / Stock

Format: RAW → JPEG/TIFF

Storage: RAID + Cloud

Tools: **Lightroom + Capture One**

Metadata keywording essential. Fast culling and batch export. Redundant backup mandatory.

Wildlife / Sports

Format: RAW (burst)

Storage: Fast local drives

Tools: **Lightroom Classic, Photo Mechanic**

Fast culling tools critical. Large storage volumes. Fast memory cards. Speed over convenience.

Casual / Personal

Format: JPEG / HEIC

Storage: Phone + Cloud sync

Tools: **Built-in app (Photos/Google)**

Simplest workflow. Default phone settings. Automatic cloud backup enough.

The 3-2-1 Backup Strategy



Copies

Keep three separate copies of every important photo. One working copy plus two backups is the minimum acceptable standard for valuable images.



Media Types

Store on at least two different media types — e.g., internal drive AND external HDD AND cloud. Diverse media reduces simultaneous failure risk.



Offsite Copy

Keep one copy offsite — physically separate from your primary location. Cloud storage counts. Protects against fire, flood and theft.

Metadata: The Hidden Value in Your Photos

What Metadata Contains

EXIF Data

Camera make/model, focal length, aperture, shutter, ISO, date/time, GPS location, flash used

IPTC Data

Title, caption, keywords, copyright, creator, usage rights — critical for professional work








XMP Data

Edit history, ratings, labels, collections, develop settings (non-destructive in sidecar files)

File Data

Filename, file size, creation and modification dates, colour profile embedded

Practical Tips

-  Enable GPS on your camera or phone for automatic location tagging
-  Ensure your camera clock is set correctly — wrong timestamps create chaos in sorted libraries
-  Add copyright information to your camera's custom settings so it embeds automatically
-  Use star ratings and colour labels during culling to speed up your selection workflow
-  Keywords entered in Lightroom/DigiKam are searchable years later — invest time upfront
-  Metadata survives format conversions if you use 'preserve metadata' export options
-  Consider Lightroom's face recognition feature for family archive searchability

Format Longevity & Long-Term Archiving

Archiving Recommendations

Prefer DNG:	Convert proprietary RAW to DNG for better long-term compatibility
TIFF for print masters:	Use TIFF for final high-res print or exhibition files
Avoid HEIC for archive:	Limited cross-platform support; convert to JPEG or DNG
Store originals:	Never delete originals. Edit non-destructively and export copies
Verify integrity:	Periodically check files with checksums to detect bit rot
Migrate formats:	Review your archive every 5 years and migrate obsolete formats

Storage Capacity Planning

Camera Type / Format	Typical File Size	Per 1,000 Photos	Per Year (5k shots)
Smartphone JPEG (12 MP)	3–5 MB	3–5 GB	15–25 GB
Smartphone HEIC (48 MP+)	5–8 MB	5–8 GB	25–40 GB
Mirrorless / DSLR JPEG	8–15 MB	8–15 GB	40–75 GB
Full-frame RAW (24–45 MP)	20–50 MB	20–50 GB	100–250 GB
Medium Format RAW (100 MP+)	80–150 MB	80–150 GB	400–750 GB
Video 4K (per minute)	400–800 MB	—	Variable

Planning Rule of Thumb

Budget for 3× your estimated annual storage need to allow for growth and duplicates from backups. A 4 TB external drive (~£80–£120) holds approximately 3–5 years of a typical enthusiast RAW workflow.

Privacy & Security Considerations



GPS Metadata Risks

Photos shared on social media with embedded GPS reveal home addresses and daily routines. Strip EXIF location data before sharing publicly. Most platforms strip automatically but not all.



Cloud Provider Privacy

Free cloud services may scan photos for AI training or advertising. Read terms carefully. Google Photos, iCloud and Amazon Photos have different data policies. Use end-to-end encrypted services for sensitive content.



Copyright Protection

Embed copyright metadata using IPTC fields in Lightroom or Bridge. Watermarking adds visible protection. Register important works with national copyright databases for legal enforceability.



Facial Recognition & AI

Apple Photos, Google Photos and Amazon Photos use on-device and cloud facial recognition. Consider privacy implications for subjects. Disable FR if shooting others without consent or in sensitive contexts.



Shared Album Caution

Shared albums on iCloud, Google Photos or Flickr can be forwarded. Set viewing vs. editing permissions explicitly. Shared links are often publicly accessible if the URL is discovered.



Data Portability

Maintain your own master library. Google Takeout and Apple Photos export prevent vendor lock-in. Catalogue software metadata is not always portable between applications — export to standard XMP.

Your Photography Workflow Checklist

CAPTURE

- ✓ Decide: RAW, JPEG or RAW+JPEG based on use case
- ✓ Ensure camera clock is correct and GPS enabled (phone)
- ✓ Use fast memory cards rated UHS-II for burst shooting

INGEST

- ✓ Import immediately after shoot — never rely on a single card
- ✓ Rename files to a consistent date-based scheme: YYYYMMDD_seq
- ✓ Create a folder hierarchy: Year > Month > Event

CULL

- ✓ Rate images in-application (1–5 stars or Reject/Pick)
- ✓ Delete clear failures; move picks to next stage
- ✓ Back up originals before editing begins

EDIT

- ✓ Edit non-destructively — never overwrite originals
- ✓ Export final versions as JPEG (web) or TIFF (print)
- ✓ Embed metadata and copyright before distribution

BACKUP

- ✓ Verify 3-2-1: local drive + external drive + cloud
- ✓ Test restores periodically — a backup you haven't tested is not a backup
- ✓ Check storage health annually; migrate aging drives proactively



Key Takeaways

Match format to purpose

Shoot RAW for creative and commercial work; JPEG/HEIC is fine for everyday life. TIFF for archival print masters.

Backup is non-negotiable

Implement 3-2-1 now. Hard drives and memory cards fail silently. A photo lost is a moment lost forever.

Use the right tool for your platform

Apple Photos, Google Photos, and Microsoft Photos are excellent free starting points. Upgrade to Lightroom when your collection grows or quality demands increase.

Start simple, scale up

Don't over-engineer your workflow. A consistent folder structure and one cloud backup beats an elaborate unreliable system.

Metadata pays dividends

Keywords and captions entered today make your archive searchable in ten years. Invest a little time upfront.

Privacy matters

Understand what cloud providers do with your data. Strip GPS before posting publicly. Embed copyright in originals.

Thank You

21/26 Slides Produced by Claude AI

Claude by Anthropic

The request to Claude was:

“Produce a presentation entitled “Managing and storing photographs” for a technical audience with no more than 20 slides that can be downloaded and opened in PowerPoint: The slides should cover the following but can be structured as required for a good presentation:

- The file formats used by used by cameras, including quality digital cameras and smart phones.*
- Options for storing digital photographs, including using cloud storage, device storage and memory sticks or other add on storage, and the pros and cons of different image file types.*
- Programs used for organising the storage giving recommendations for the cases where the person may wish to use a windows PC, an Apple Mac, an Android phone or an iPhone.*
- Programs, which can be the same as or different to those used to organise photographs, that are used for editing photographs. Again explain options for people wanting to do the editing on a windows PC, an Apple Mac, an Android phone or an iPhone.*
- Do the choices vary depending on the use to be made of the photographs.*
- Other points of interest to people deciding how to manage and store their photographs.”*

Apple Photos Demonstration

- Library:
 - All photos - initially sorted by date added - but date can be adjusted.
 - Can be shown by month and year
 - Can have a shared library with up to 6 people. view person, shared or both libraries
 - Collections
 - Memories: Apple Photos creates Memories by utilizing on-device machine learning and Apple Intelligence to analyze your photo library, identifying significant people, places, dates, and subjects to curate personalized video collections set to music.
 - Pinned: A set from the collections - Apple will suggest.
 - Albums: (Generally) as manually set up -
 - Shared Albums
 - People: face recognition
 - Featured Photos: a curated selection of images from your library, chosen by Apple's AI algorithm based on quality, people, and memories.
 - Trips
 - Media Types: collections of videos, selfies, etc.
 - Utilities (e.g.Imports, Duplicates, Receipts)
 - Editing: styles, adjust, crop, clean up
- Show
 - Library by date
 - Personal and shared Library
 - Albums & shared Albums
 - Collections
 - Trips
 - Maps
 - Memories?
 - Editing
 - Duplicate
 - Crop etc.