



Fieldra

Compared with ArcGIS Pro and QGIS

What the two big desktop GIS programs can do that Fieldra Desktop can't
yet,
and what to use in the meantime.

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ArcGIS Pro 3.x and QGIS 3.x as generally available; extensions and plugins are noted where needed.



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1. In short

Fieldra covers the survey job from start to finish: phones collect the data offline, it reaches the office computer over Wi-Fi, and Fieldra Desktop maps it, checks it, analyses it and prints it. ArcGIS Pro and QGIS are general-purpose GIS programs with decades of development: they go much further in online sharing, databases, heavy analysis, automation, cartography and very large data.

Area	Fieldra today	Gap
Field data collection and transfer	Built for it (phones, offline, Wi-Fi)	None — Fieldra's strength
Opening and exporting data	Most formats through GDAL (bundled, plus the computer's); .gdb and DXF read and write	Small — DWG after 2000, ECW/MrSID need extra software
Online services and sharing	WMS/WMTS in any system, XYZ, WFS, OGC API and ArcGIS REST layers with editing and sign-in	Medium — no publishing; no ArcGIS web maps
Databases and multi-user editing	PostGIS and SQL Server: live editing; with PostGIS also history from any program, review, restore to a time; optional team server for phones over the internet	Small — no Oracle; SQL Server without history or review
Coordinate systems	All EPSG systems, grid shifts, site grids, geoid heights; on phones too	Small — map always in Web Mercator
Editing	Draw, reshape, snap, trace, COGO, merge, split, offset, extend, trim, calculated fields, layer history; desktop layers edited on phones	Small — no Arcade constraint rules
Data quality	Field rules, subtypes, 12 topology rules (within and between layers) with fixes	Small — fewer rules
Vector analysis	About 55 everyday tools, sample design	Large — hundreds of tools there
Raster analysis	Terrain, focal, cost distance, suitability, hydrology...; the cell-by-cell tools on images of any size	Small — hydrology, cost distance and classification up to 8,192 cells a side
Spatial statistics	Ordinary, universal, empirical Bayesian and co-kriging, Gaussian simulation, hot spots, local Moran, OLS, GWR	Small
Networks and geocoding	Routes, service areas, closest facility, location-allocation, vehicle routing, turn rules, address search (OpenStreetMap)	Small — no live traffic (rush-hour speeds by time of day instead)
3D and point clouds	View, volumes, contours, profiles, TIN with breaklines, 3D buildings with roofs	Medium — no textured mesh editing
Imagery	Sentinel-2 and Landsat download with cloud masks and cloud-free composites, band combinations, pan-sharpening, classification, change	Medium — no deep learning

Area	Fieldra today	Gap
Map design and layouts	Rules, symbol levels, labels and annotation (curved along lines), series, layouts to A0, GeoPDF with a layer per map layer	Small — no blending or effects
Automation	History, batch, models; Python (built-in or the computer's) and JavaScript; plugins that add tools and commands	Small — few plugins exist yet
Size of data	Overlays and checks indexed (100,000 × 20,000 features in under a second); point clouds and rasters streamed	Small — drawing millions of features untested
Maturity and support	New; GIS tools not yet used on real jobs	Large — see chapter 12

Note: The most practical set-up: **Fieldra for survey projects**, plus **QGIS (free)** on the same computer for anything this document lists as missing. QGIS opens Fieldra's GeoPackage and file geodatabase exports directly.

How to read the tables

- **Yes** — included. **Extension** — ArcGIS Pro, at extra cost (e.g. Spatial Analyst, Network Analyst, 3D Analyst, Geostatistical Analyst, Image Analyst). Some ArcGIS tools also need the Standard or Advanced licence.
- **Plugin** — QGIS, a free add-on from the plugin manager, or its built-in GRASS, SAGA and GDAL toolboxes.
- **Partial** — some of it. **No** — not at all.
- Fieldra's column describes Fieldra Desktop, unless it says "phone".

2. Opening, saving and storing data

File formats

What	ArcGIS Pro	QGIS	Fieldra
Write file geodatabases (.gdb)	Yes	Yes (GDAL OpenFileGDB)	Yes — 2D feature classes and tables with domains, subtypes, relationship classes and a spatial index
Read .gdb curves, multipatch, annotation, rasters	Yes	Mostly	Curves (arcs, Bézier, elliptic) as smooth lines; others skipped
.gdb tables and relationship classes	Yes	Yes (GDAL)	Read (one-to-one, one-to-many, many-to-many through their table) and written (tables, one-to-many)
ArcGIS projects and styles (.aprx, .lyrx, .stylx)	Yes	Partial (SLYR plugin)	No
CAD drawings (DWG, DXF, DGN)	Yes	Yes (read; DXF write)	DXF read and write; DGN (v7) and DWG up to AutoCAD 2000 read
MapInfo, GML, OSM, S-57, Excel/ODS, FlatGeobuf	Yes	Yes	Yes (bundled GDAL)
Scientific grids (netCDF, HDF, GRIB)	Yes	Yes	GRIB bundled; netCDF and HDF with the computer's GDAL (comes with QGIS), choosing which variables to add
Many raster formats (JPEG 2000, ECW, MrSID, IMG...)	Yes	Yes	IMG, NITF, DTED, ENVI, SAGA, ASCII grids bundled; JPEG 2000, ECW, MrSID with the computer's GDAL
Excel, CSV, GeoPackage, Shapefile, GeoJSON, KML, GPX	Yes	Yes	Yes

Meanwhile: Fieldra ships GDAL (WebAssembly) and also uses a GDAL installed on the computer (QGIS, OSGeo4W, Homebrew) for what the bundled one lacks. DWG after 2000 still needs DXF or the free ODA File Converter; check the first .gdb files Fieldra writes open in ArcGIS Pro before sending them to a client.

Databases

Where large organisations keep shared GIS data.

What	ArcGIS Pro	QGIS	Fieldra
PostgreSQL/PostGIS, SQL Server, Oracle	Yes (enterprise geodatabase)	Yes	PostGIS and SQL Server (and Azure SQL): open tables (or the map view), edit live, save layers as tables; Oracle no

What	ArcGIS Pro	QGIS	Fieldra
Several people editing the same data at once	Yes (versioning, branch versions)	Yes (through the database)	Yes, through PostGIS: live tables (composite keys too, or only the map view), rows checked so no one's save is overwritten
Edit history and putting rows back	Yes (archiving, versions)	Partial (database audit, plugins)	Yes — kept from any program (trigger), restore a row, the table to a time, or undo a proposal; old history removed by age
Edits reviewed before they go live	Yes (branch versioning, reconcile and post)	Partial (plugins)	Yes — proposals previewed, approved or rejected by the table's reviewers; no branch merging
Replication and offline checkout	Yes	Partial (plugins, QField/Mergin)	Phone ↔ desktop over Wi-Fi, or through an optional team server you run
Related tables (one-to-many, e.g. a well and its visits)	Yes (relationship classes)	Yes (relations)	Yes — relationships by a key, related records in the details
Attachments on features	Yes	Partial	Yes — any file, kept in project packages

Meanwhile: Live tables need a primary key. History, proposals and reviewers are kept in tables Fieldra adds to the schema; switch on “keep changes made by any program” to record QGIS's and SQL edits too.

3. Online services and sharing

Fieldra was built to work without internet. It uses online maps only for the base map (street or satellite) and can save those for offline use.

Services

What	ArcGIS Pro	QGIS	Fieldra
Web map services (WMS, WMTS, XYZ tiles)	Yes	Yes	Yes — WMS in any system (warped to the map); tiles kept for offline
Web feature services (WFS, OGC API Features)	Yes	Yes	Yes — paged downloads that stay linked (Refresh), edits saved back (WFS-T, OGC API Part 4)
Services that need a sign-in	Yes	Yes	Yes — user and password, token or API key, per server
ArcGIS Online / Enterprise layers and web maps	Yes	Yes (ArcGIS REST, read)	Layers yes — FeatureServer features with edits saved back, MapServer and ImageServer images; web maps no
Publish maps and layers online	Yes	Partial (QGIS Server, QGIS Cloud)	No
Online field apps linked to the desktop	Field Maps, Survey123	QField, Mergin Maps	Fieldra phones, over local Wi-Fi or a team server; phones show web map layers and edit feature layers, saved back to the service
Team data through the cloud	Yes	Yes (QFieldCloud, Mergin)	Optional — the Fieldra team server (one small program on any computer or cloud machine); none needed otherwise
Address search (geocoding)	Yes (uses credits)	Plugin (e.g. Nominatim)	Yes — place search and table geocoding with OpenStreetMap (one address a second, up to 300 at a time)

Meanwhile: Web map and feature services open directly in Fieldra (Web layer). A layer from a feature service is a linked copy: Refresh brings the latest, Save sends your edits. Share results as PDFs, GeoPDFs or GeoPackages.

4. Coordinate systems

Systems and transformations

What	ArcGIS Pro	QGIS	Fieldra
All EPSG systems (national grids, other datums)	Yes	Yes	Yes (≈6,900)
Grid-based datum shifts (NTv2, e.g. OSTN15)	Yes	Yes (PROJ grids)	Yes — NTv2 or GeoTIFF grid per system (you add the file)
Choosing among several transformations	Yes	Yes	Partial — EPSG default, your own parameters, or a grid
Heights: geoids and vertical datums	Yes	Yes	Geoid heights (EGM96, EGM2008, national GeoTIFF) for points; no vertical datum catalogue
Custom and engineering (local) systems	Yes	Yes	Yes — proj4/WKT definitions, and site grids fitted to control points
Draw the map in a chosen projection	Yes	Yes	No — the map is always Web Mercator (the map engine's limit); exports and analysis use any system
Coordinates in national grids on the phone	Field Maps (projected)	QField	Yes — any EPSG system in the phone's converter; exact grid shifts with NTv2 files sent from the desktop

Meanwhile: Grid shifts and geoids are only as good as the files you add: check a known control point after setting one up. Geoid heights apply to point layers; convert elevation models in your GNSS or GIS software.

5. Editing and data quality

Editing

What	ArcGIS Pro	QGIS	Fieldra
Draw, reshape, split, delete	Yes	Yes	Yes — on phones too, for desktop layers
Snapping and tracing	Yes	Yes	Yes
COGO (bearings and distances)	Yes (plus parcel fabric)	Partial (plugins)	Yes (traverse with misclosure; compass-and-tape parcels from phones with Bowditch adjustment, area and survey report)
Advanced tools: merge, cut, extend/trim, offset, align, generalise, rotate/scale	Yes	Yes	Yes, except align
Feature templates and editing forms	Yes	Yes (drag-and-drop forms)	Partial — pick-lists, subtype defaults
Attribute rules (calculated values, constraints in Arcade)	Yes	Partial (default values, constraints)	Calculated fields (always or once when added); constraints as field rules and topology, not Arcade
Undo history	Yes	Yes	Yes — plus each layer's earlier versions kept between sessions, put back in one click
Editing desktop data on phones with sync back	Yes (Field Maps, through the cloud)	Yes (QField/Mergin, through the cloud)	Yes — over local Wi-Fi, merged feature by feature

Meanwhile: Make heavy edits (merging parcels, trimming roads) in QGIS, then bring the layer back as GeoPackage.

Data quality

What	ArcGIS Pro	QGIS	Fieldra
Domains, pick-lists, ranges, required fields	Yes	Yes	Yes
Subtypes	Yes	Partial (value maps, forms)	Yes
Topology rules	Yes (≈30 rules)	Plugin (Topology Checker) and geometry checker	Partial — 12 rules: overlaps, gaps, self-crossing, dangles, inside, duplicates, lines overlapping or crossing, points on lines, line ends on points, overlap with or points inside another layer
Fix topology errors from the error list	Yes	Yes (geometry checker)	Yes — overlaps, gaps, self-crossing areas, dangles, duplicates
Data reviewer / batch validation	Yes	Partial	Check data, one layer at a time

Meanwhile: Use Fieldra's checks to find problems; for many automatic fixes, use QGIS's geometry checker.

6. Analysis

Vector analysis

ArcGIS Pro has well over a thousand geoprocessing tools (with extensions); QGIS has several hundred, plus the GRASS and SAGA toolboxes. Fieldra has the everyday ones.

What	ArcGIS Pro	QGIS	Fieldra
Buffer, dissolve, convex hull, centroids	Yes	Yes	Yes
Clip, intersect, union, erase, spatial join, summarize within, near, merge	Yes	Yes	Yes
Select by attributes / location, filters, field calculator, joins	Yes	Yes	Yes
Identity, symmetrical difference, split, eliminate, append, dissolve by field	Yes	Yes	Yes
Thiessen (Voronoi) polygons	Yes	Yes	Yes
Delaunay triangles, minimum bounding shapes	Yes	Yes	Yes (hull, envelope, rectangle, circle)
Generate grids, hexagons, random or regular sample points	Yes	Yes	Yes (also random points in areas)

What	ArcGIS Pro	QGIS	Fieldra
Simplify, smooth, densify, points along lines, vertices to points, split at points, multipart to single, line ↔ area, line crossings, mean centre	Yes	Yes	Yes
Distance matrix, point distance	Yes	Yes	Yes (k nearest within a distance)
Linear referencing (routes, events)	Yes	Plugin	Yes — routes by id with length, field or post measures; point and line events with offsets; locate features; ticks (no route calibration editing or event overlay)
Batch runs and history of tools used	Yes	Yes	Yes (Toolbox)

Meanwhile: For tools not listed as Yes, run them in QGIS on a GeoPackage export and bring the result back.

Networks and routes

What	ArcGIS Pro	QGIS	Fieldra
Shortest route, service areas (e.g. 30 minutes to a clinic)	Extension (Network Analyst)	Yes (basic) / plugins	Yes — on a road layer, by distance or speed, one-way streets
Closest facility, OD cost matrix	Extension	Plugins	Yes
Location-allocation (p-median, coverage, fewest sites)	Extension	Plugins	Yes — over the road network or straight lines
Vehicle routing with capacities, service times and time windows	Extension	Plugins (e.g. ORS Tools, pgRouting)	Yes — several depots, shifts, breaks, several windows, skills, several trips, pick-up and delivery pairs
Turn restrictions, connectivity rules, levels (bridges)	Extension	Plugins (pgRouting)	Yes — forbidden turns drawn as lines, end-point connectivity, level fields
Live or historical traffic, time-of-day speeds	Extension (with data)	Plugins	Time-of-day speeds: periods with their own speed field or a share of the usual speed, for a departure time; no live traffic

Meanwhile: Networks are built from your own road layer: lines must share corners where they join (a tolerance joins near misses).

Raster analysis

What	ArcGIS Pro	QGIS	Fieldra
Slope, aspect, hillshade, calculator, reclassify, viewshed, NDVI	Yes (many tools need Spatial Analyst)	Yes	Yes
Zonal statistics	Yes	Yes	Yes
Cut and fill, volumes, contours, profiles	Yes	Yes	Yes
Hydrology: flow direction, accumulation, watersheds, stream networks	Extension	Yes (GRASS, SAGA, Whitebox)	Yes (D8, D-infinity and MFD, Strahler and Shreve order)
Advanced hydrology (D-infinity, flow length, basins, wetness index, depressions)	Extension	Yes	Yes — plus MFD (multiple flow direction), streams burnt in from a line layer, and the longest flow path and time of concentration per watershed
Cost distance, least-cost paths, suitability models	Extension	Yes	Yes (8 or 16 directions, weighted sum)
Focal / neighbourhood statistics, resample, mosaic, clip raster	Yes	Yes	Yes
Raster to polygons and polygons to raster	Yes	Yes	Yes
Size of rasters analysed	Very large (tiled)	Very large	Any size for slope, aspect, hillshade, focal statistics, reclassify, NDVI, the calculator on one image and zonal statistics (in bands of rows, written as tiled GeoTIFFs with overviews); volumes, sections and contours at full detail around the area measured; other tools up to 8,192 cells a side
Opening very large images without overviews	Yes (builds pyramids)	Yes (builds overviews)	Slow: 1–2 min for 1.5 GB; seconds with its .ovr or as a COG

Meanwhile: For very large models or multiple-flow-direction routing, run them in QGIS (free), then open the resulting GeoTIFFs in Fieldra for maps, contours and volumes.

Statistics

What	ArcGIS Pro	QGIS	Fieldra
Kriging and IDW	Extension (Spatial or Geostatistical Analyst)	Plugins / SAGA	Ordinary kriging and IDW; spherical, exponential, Gaussian, stable and K-Bessel semivariograms
Universal kriging (trends), anisotropy	Extension	Partial (SAGA, GRASS)	Yes — linear or quadratic trend; anisotropy set or found from the data
Empirical Bayesian kriging, co-kriging, simulation	Extension	Partial	EBK (local models from simulated semivariograms, optional log transform), ordinary co-kriging with one second variable, and sequential Gaussian simulation (mean, spread and probability maps, up to 500 × 500 cells and 500 realisations)
Hot spots (Getis-Ord Gi*) and global Moran's I	Yes	Plugin	Yes
Cluster and outlier (Local Moran's I), optimised hot spots, FDR correction	Yes	Plugin	Yes (permutation test; hexagon counts)
Regression: ordinary least squares	Yes	Partial	Yes (with residual map)
Geographically weighted regression, diagnostics (VIF, Koenker, Jarque-Bera)	Yes	Partial	Yes — GWR; VIF, Koenker, Jarque-Bera, robust errors, AICc, residual Moran's I
Charts in the analysis window	Yes	Plugin (DataPlotly)	Dashboard and layout charts only

Meanwhile: For regression diagnostics and other models, export a GeoPackage and use QGIS, R or Python.

7. 3D, point clouds and imagery

The October 2026 review improves recovery and large-data handling: photogrammetry retains original outputs, shows each import step and can retry failed additions; 3D-only deliverables and 3D Tiles payloads are preserved. Point-cloud tile selection uses a priority queue, raster contrast avoids a full-image working copy, and detailed zonal boundaries avoid the former argument-limit failure. These are specific improvements, not evidence of overall parity with ArcGIS Pro, Pix4D or QGIS.

3D and point clouds

What	ArcGIS Pro	QGIS	Fieldra
3D view with terrain, buildings, point clouds	Yes	Yes	Yes
Point cloud classification, filtering, editing classes	Yes	Partial (PDAL tools)	Ground (noise found first) and noise on every point of LAS or LAZ files of any size; buildings, vegetation and wires by shape, classes learned from your examples, building footprints
Make elevation models from point clouds	Yes	Yes (PDAL)	Yes — DTM and DSM, from LiDAR or photogrammetry clouds
TIN surfaces, breaklines	Extension	Partial	Yes — constrained TIN, contours, DEM, volumes; edit points, breaklines and holes, then rebuild
3D buildings (multipatch) and 3D editing	Yes	Partial	Partial — footprints as blocks with flat, gable, hip, pyramid or shed roofs, heights edited by selection, export as glTF; no multipatch or procedural rules
Photogrammetry from drone photos (orthomosaic, DSM, DTM, point cloud, 3D model)	Extension (Advanced / Drone2Map)	No (use OpenDroneMap)	Yes — OpenDroneMap engine, here or on a server
Ground control points marked in photos, quality report	Drone2Map	No	Yes - explicit CRS, unique point names, required elevations; originals retained until job removal
Textured 3D model on the map	Yes	Plugin	Yes (from Photogrammetry)
Quick 2D map right after landing	No	No	Yes (photos laid by GPS, not stitched)
Raw LiDAR processing (DJI L1/L2), live mapping while flying	No	No	No — DJI keeps these closed; DJI Terra only

Meanwhile: Photogrammetry runs on the OpenDroneMap engine, the same open engine WebODM uses. Compare its first projects side by side with DJI Terra or Pix4D before switching for client deliverables. Raw DJI LiDAR still needs DJI Terra.

Imagery

What	ArcGIS Pro	QGIS	Fieldra
Supervised / unsupervised land-cover classification	Extension	Plugin (Semi-Automatic Classification)	Yes (k-means; maximum likelihood or minimum distance)
Deep learning (detect trees, buildings, vehicles)	Extension	Plugins	No
Satellite image download and processing (Sentinel, Landsat)	Yes	Plugins	Sentinel-2 (10 m) and Landsat 4–9 (30 m, since 1982): true colour, bands or NDVI over the map view, clouds and shadows masked, cloud-free median composites
Change detection	Yes	Yes	Yes (difference and change classes between two dates)
Band combinations, pan-sharpening, stretches	Yes	Yes	Yes (Brovey and simple mean)

Meanwhile: Classes become areas with Raster to polygons; summarise them with zonal statistics.

8. Map design and layouts

Symbology and labels

What	ArcGIS Pro	QGIS	Fieldra
Single colour, categories, graduated colours and sizes	Yes	Yes	Yes
Rule-based symbols	Yes	Yes	Yes (expressions, first match)
Symbol levels (drawing order)	Yes	Yes	Yes — by a field or the category order
Blending modes and effects (shadows, glows)	Yes	Yes	No — the map engine has none
Custom point symbols (SVG, pictures), line patterns, hatching	Yes	Yes	Yes (shapes, pictures, dashes, hatching)
Label expressions, placement around points and along lines, priority	Yes	Yes	Yes
Label classes, stacking and abbreviation rules, annotation	Yes (Maplex)	Yes (PAL)	Label classes and annotation (moved and rotated at points, or curved along lines); no abbreviation rules
Transparency and scale ranges per layer	Yes	Yes	Yes

Meanwhile: For a map that must look exactly right, style it in QGIS; for field and progress maps, Fieldra's layouts are enough.

Layouts

What	ArcGIS Pro	QGIS	Fieldra
Current map and project-specific working designs	Yes	Yes	Yes: Use current map copies the view and visible layers; Refresh map previews redraws; each project keeps its own working design
Title, legend, north arrow, scale bar, grid, inset	Yes	Yes	Yes; Designer insets have independent view/scale and a linked extent outline in preview and PDF
Several map frames on one page, free placement of every element	Yes	Yes	Yes (Designer: eight resize handles, exact mm position/size, proportional resizing, zoom and scrolling)
Rulers, placement guides, grid and snapping	Yes	Yes	Yes (Designer: mm rulers, draggable saved guides, adjustable grid, page/element/guide snapping; editing aids are not printed)
Map series / atlas	Yes	Yes (atlas)	Yes (up to 60 pages)
Charts and tables on the page	Yes	Yes	Yes (Designer: charts and attribute tables on the page; Layout can add table pages)
Dynamic text, templates, multi-page reports	Yes	Yes	Partial — {date}/{scale} text, saved templates, form reports
GeoPDF with layers you can switch	Yes	Yes	Georeferenced, with the base map and each map layer as its own layer (up to 16)
Large paper sizes (A1, A0)	Yes	Yes	Yes (Designer: A0–A4, ANSI D, Tabloid)

Meanwhile: Very large frames are drawn at a lower resolution when the graphics card can't render them whole; the export says when. Designer exports one free-form page with independently rendered map frames; quick Layout supplies the map-series and switchable PDF-layer options.

Layout setup references: [ArcGIS Pro: Set up a layout](#); [QGIS: Overview of the Print Layout](#).

9. Automation and extending

Automation

What	ArcGIS Pro	QGIS	Fieldra
Scripting	Yes (ArcPy, Python)	Yes (PyQGIS, Python)	Python 3 (built in, offline, or the computer's own) and JavaScript, with layers and every toolbox tool
Python libraries (numpy, pandas, geopandas, rasterio...)	Yes	Yes	Yes — built-in Python has numpy, pandas, shapely, scipy (kept offline); the computer's Python has whatever is installed
Visual models (chain tools together)	Yes (ModelBuilder)	Yes (Graphical Modeler)	Yes — steps in a list (vector and raster tools), saved and run again
Expression language for fields and labels	Yes (Arcade)	Yes	Yes (Fieldra expressions)
Plugins / add-ins from others	Yes	Yes (1,000+ plugins)	Yes — JavaScript or Python plugins add toolbox tools (in models, batch runs and scripts) and ribbon commands; installed from a file, no online catalogue yet
Notebooks, scheduled tasks	Yes	Partial	No

Meanwhile: Repeat jobs with a saved model or a script, or share tools with other teams as a plugin. Scripts that need geopandas or rasterio run in the computer's Python (Run with › Python on this computer).

10. Size of data and performance

What	ArcGIS Pro	QGIS	Fieldra
Vector features per layer	Millions (with indexes)	Millions	Overlays, select by location and topology checks use a spatial index: a spatial join of 100,000 points with 20,000 areas takes under a second; drawing hundreds of thousands not tested
Rasters	Any size (pyramids, tiles)	Any size	Shown from a preview; the cell-by-cell and neighbourhood tools and zonal statistics on every cell of any size; hydrology, cost distance and classification up to 8,192 a side
Point clouds	Billions (LAS datasets)	Billions (indexed)	Any size, LAS or LAZ: tiled once (an octree), then drawn by view in full detail; noise, ground, classes set by hand, DTM and DSM on every point; shape and learned classes on an even sample of up to 6 million (3 million in light mode), carried to every point
Where work runs	Background processes	Background tasks	Raster tools, kriging, hydrology, vehicle routing and topology in a background worker, the heaviest calculations in compiled Rust (2–15 times faster than before); other tools in the window
Speed of the heavy tools	Native code, many cores	Native code (GDAL, GRASS, SAGA)	Compiled Rust (WebAssembly, with SIMD where the computer supports it, otherwise a plain build) on one core: e.g. hillshade of 1,000 × 1,000 cells in a few milliseconds, Gaussian simulation 8–10 times faster than before

Meanwhile: split very large layers by area, or filter them before analysis; clip rasters to the site in QGIS first.

11. Platform, cost and support

What	ArcGIS Pro	QGIS	Fieldra
Computers	Windows only	Windows, macOS, Linux	macOS and Windows
Phones	Field Maps, Survey123 (separate apps)	QField, Mergin Maps (separate)	Fieldra on iOS and Android, same system
Cost	Yearly subscription per user; extensions extra	Free, open source	Download from the app stores
Training, certification, client acceptance	Widely expected by clients	Widely used	New — clients may ask for ArcGIS files
Support	Esri support, large community	Large community, paid support firms	In-house

12. Limits of Fieldra itself

Beyond the comparison, some Fieldra features are new and have only been checked with test data:

- The GIS tools of the desktop (analysis, raster, hydrology, statistics, sample design, coordinates, layouts, topology, reading and writing file geodatabases) pass tests against known answers and against GDAL, but have not yet been used in the real app on real projects.
- The georeferenced PDF's structure is correct but has not been opened in ArcGIS, QGIS or Avenza yet; neither have written .gdb files been opened in ArcGIS Pro.
- The background worker has been tried in Chrome, not yet in the Mac app's webview (if it fails there, the tools still run, only without the background).
- Phone PDFs, office layers and their colours need a new build or an over-the-air update before they reach phones.
- The team sync server (sharing through the internet) is not built: devices share over local Wi-Fi only.
- Photogrammetry has been tested against a simulated processing server, not yet on a real flight end to end; the LiDAR tools on synthetic and small real-format files; the 3D model viewer not yet with a real model in the app. Raw DJI LiDAR, live mapping while flying, and editing the textured 3D mesh are not in Fieldra. Learned point classes have been tested on synthetic scenes: check them on a real site before relying on them.

Watch out: Before relying on Fieldra for a client deliverable, run one or two real projects in Fieldra and in your current tool side by side, and compare the results.

13. For balance: what Fieldra does that they don't

- **One system from phone to report.** Survey modules (water, roads, biodiversity, socio-economic forms, drone ground control) on the phone, and the same records on the desktop — no cloud account needed.
- **A real map in the field:** the phone map has the desktop's everyday tools — measure distance and area, buffers, colour by field, a time filter, bookmarks, terrain relief, contours and elevation profiles, and walking guidance to any point.
- **Survey calculators on the phone:** coordinates in degrees, DMS, UTM and MGRS; COGO (inverse, offset points, intersections by bearings or tapes); and sampling points laid in an area and found with Guide me.
- **Works with no internet at all:** phone-to-phone and phone-to-computer transfer over Wi-Fi or a phone hotspot.
- **Drone checks built in:** flight check before processing (overlap, GSD, RTK fix rate) and ASPRS 2023 accuracy reports from phone-surveyed checkpoints.
- **Simple to learn:** plain-language screens for field teams, not GIS specialists.
- **No licence fees,** and it runs on the Macs and Windows computers you already have (ArcGIS Pro is Windows only).

14. Known limits to resolve

Every limit known today, so each can be planned and fixed. “How to resolve” is the suggested fix; the workaround is what to do until then. Most of the earlier list is now done (feature services with editing and sign-in, any-system WMS, GDAL formats, history from any program, turn rules, routing breaks and trips, universal kriging, Sentinel-2, pan-sharpening, symbol levels, annotation, PDF layers, the computer's Python, the phone's national grids, resection and stratified sampling, point clouds of any size, ground classification that leaves noise out, and now reshaping on phones, web layers on phones, a team server, edit-conflict checks, keychain sign-ins, simulation, address search, curved annotation, per-layer PDF layers, netCDF variables, larger rasters and .gdb curves and relationship classes).

What can't be closed in Fieldra itself

- **Map projection:** the map engine (MapLibre) draws only Web Mercator (or a globe). Analysis, exports and coordinates use any system; only the on-screen map is Mercator.
- **DWG after AutoCAD 2000, ECW and MrSID:** closed formats whose readers are licensed (ODA, Hexagon, LizardTech). Fieldra reads them when the computer's GDAL has those drivers (QGIS installs often do for ECW).
- **Deep-learning detection** (trees, buildings): needs trained models and a GPU runtime; not bundled.
- **Publishing to ArcGIS Online / a portal, live traffic:** need a server or a paid service; Fieldra is built to work without one (it reads and edits ArcGIS layers, but does not publish). Address search uses the free OpenStreetMap service, so it needs internet and is slow for long lists.

- **Oracle, multipatch and mesh editing, blending effects:** need a database driver, 3D modelling or a map engine Fieldra does not have; use ArcGIS Pro or QGIS for those.

Desktop: data and services

Area	Limit	Workaround	How to resolve
Feature services	ArcGIS layers were checked against a stand-in service, not a live ArcGIS server (blocked here); GML simple features only (no curves or nested features); edits made by others since your download are found before saving (you choose to overwrite or keep theirs), but the server isn't locked while you edit; OGC API saves replace whole features.	Refresh before long edits.	WFS LockFeature where servers offer it; GML 3.2 curves.
Sign-ins	Passwords and tokens are kept in the macOS Keychain / Windows Credential Manager; where the system has none (some Linux setups) they stay in the app's settings.	Use service accounts with limited rights.	—
Warped WMS	Projected systems whose official axis order is north–east (some national grids) may come out swapped with WMS 1.3; 512-pixel requests per tile; no feature info on click.	Use WMS 1.1.1 or the service's WGS 84 layer.	Axis order from the EPSG dataset; GetFeatureInfo.
Formats	netCDF, HDF, JPEG 2000, ECW and MrSID need the computer's GDAL; the bundled GDAL needs files under 800 MB; written .gdb relationship classes are one-to-many (many-to-many come back as two); written subtypes need a whole-number subtype field; ArcGIS Pro projects (.aprx) are not read.	Install QGIS (it brings GDAL); split big files; export layers from ArcGIS Pro as GeoPackage.	Many-to-many classes in written .gdb; .aprx layer lists.
Databases	PostGIS and SQL Server (no Oracle, SAP HANA); SQL Server: SQL logins only (no Windows sign-in), a one-column key for live editing, no history or review, tested against a mocked server, not a real one; live tables read up to 500,000 rows; no branch versions merged from several proposals.	Use the map view for big tables; PostGIS for reviewed edits.	Windows and Entra ID sign-in; history for SQL Server; a run against a real SQL Server.
History	The trigger that records every program's edits needs rights to create functions and triggers; history grows until removed by age.	Ask the database owner to switch it on.	A database-side retention job.

Desktop: analysis

Area	Limit	Workaround	How to resolve
Data size	Overlays, select by location and topology checks are indexed (hundreds of thousands of features), but drawing that many on the map is untested. Cell-by-cell raster tools and zonal statistics work on any size; hydrology, cost distance, classification and viewshed up to 8,192 cells a side (about 320 MB per raster).	Filter or clip first; split by area.	Tiled hydrology and cost distance; vector tiles for display.
Vehicle routing	Ruin-and-recreate search for the time allowed (in Rust; routes about 15 % shorter than the earlier insertion-and-improvement search), but not proven best; up to 1,500 stops; pairs can't span a reload; travel times are those at the departure time given, not changing through the day.	Search longer (Search for); split big rounds by area or day.	Time-dependent matrices; a lower bound to show how far from the best a plan can be.
Networks	Turn restrictions are drawn as lines (not read from ArcGIS turn feature classes); rush-hour speeds are set by hand, not from traffic data; a road's cost is taken for when it is entered (a long road entered just before the rush is all at the free speed).	Draw the few turns that matter; split long roads.	Import turn tables; historical traffic profiles.
Statistics	Simulation is sequential Gaussian on up to 500 × 500 cells and 500 realisations (large runs take minutes); co-kriging takes one second variable, needs it measured with the first at 5 or more places and shares one semivariogram shape between them; EBK takes about a second per thousand points; K-Bessel smoothness is fitted from ½, 1½, 2½ and 3½ (not continuously) and there is no power model.	Use R or QGIS/SAGA for those.	Indicator simulation; EBK regression prediction; continuous K-Bessel shape.
Imagery	Open Sentinel-2 and Landsat only (no commercial imagery); clouds masked from each mission's own classes, which miss some thin haze; composites take the median, not the best-pixel; up to 2,048 pixels a side per read; no deep learning.	Zoom to the site; use more scenes in a composite.	Harmonised Landsat–Sentinel series; seasonal composites; time series charts.

Area	Limit	Workaround	How to resolve
Point clouds	Noise, ground, areas set by hand, DTM and DSM are worked out on every point of LAS or LAZ files of any size (streamed, LAZ stays LAZ); buildings, trees, wires and learned classes are found on an even sample of up to 6 million points (3 million in light mode) and reach the other points by the cube they fall in; clouds in degrees are saved from the loaded points; the tile set is built once per cloud and again on another computer.	Check the shape classes on a dense part of the site.	Shape classes on every point (neighbourhoods tile by tile).
3D	The textured 3D model can be viewed, not edited; 3D buildings are made from footprints and roof types, not multipatch or rule packages, and are drawn whole in one mesh (slow beyond some tens of thousands); learned point classes need examples on each site, and a forest is trained per cloud, not kept between projects.	Edit the mesh in the drone software.	Keep trained models between projects; mesh editing.
Cartography	No blending or effects; PDF layers are pictures (one per map layer, up to 16), not vector drawings; curved annotation follows the middle of the longest part of a line.	Finish showpiece maps in QGIS.	Vector PDF output.

Desktop: automation

Area	Limit	Workaround	How to resolve
Built-in Python	WebAssembly: slower than normal Python, about 2–4 GB of memory, no threads, packages built for it only.	Use the computer's Python for heavy work.	—
Computer's Python	Needs Python 3.8+ installed; each script starts a new Python (a second or two); libraries are whatever that Python has.	Install geopandas etc. with pip or conda.	Keep one Python running between scripts.
Scripts	Scripts stop when the Script window closes; no schedules.	Keep the window open; use saved models.	Background runs, scheduled tasks.
Plugins	Add toolbox tools and ribbon commands only (no new panels, map layers drawn their own way or map clicks); JavaScript runs in a worker with the same calls as scripts; Python tools run one at a time; no online catalogue or signing, so install only plugins you trust.	Share plugins as .zip files; keep heavy work in the computer's Python.	A plugin catalogue; panels and map tools for plugins.

Desktop: not yet proven

Area	Limit	Workaround	How to resolve
Newest features	Written .gdb domains, subtypes and spatial index were read back by GDAL 3.8 (which answers map-view queries through the index); ArcGIS layers against a stand-in service; co-kriging, 3D building volumes and routes against known answers; editing desktop layers on the phone by the app's checks and the desktop's merge tests, not yet on a phone in the field.	Try each on a copy of real data first.	Open the .gdb in ArcGIS Pro; one field day with phone edits.
Latest round	Team server pairing, pulls and photos were tested end to end on one computer; written .gdb tables and relationship classes, curves and netCDF variables read back by GDAL 3.8; simulation, address search (with a stand-in service; the real one is blocked here), PDF layers (read back by a PDF library) and phone reshaping by tests, not yet in the field.	Try each on a copy of real data first.	A week with a crew on the team server; open the .gdb in ArcGIS Pro.
This round	Feature service saving was checked against TinyOWS (WFS-T 1.1) and pygeoapi (OGC API); history triggers, reviewers, restore and composite keys against PostgreSQL 16 / PostGIS 3.4; GDAL formats with real MapInfo, DGN, GML, Excel, IMG, GRIB, netCDF and JPEG 2000 files; Sentinel-2 reading with a real scene; Python with a real Python 3. Not yet in the Mac and Windows apps on real projects.	Try each on a copy of real data first.	Run them on two or three real jobs; test in both apps.
Earlier features	Analysis, raster, hydrology, statistics, layouts, topology, .gdb writing and georeferenced PDF are checked against known answers and GDAL, not yet on real jobs or in ArcGIS/Avenza.	Compare with your current tool side by side.	Field trials and opening outputs in ArcGIS Pro and Avenza.
Platform	macOS and Windows only (no Linux build); Docker-based photogrammetry on Macs only.	Use a Mac or a processing server.	Linux build; Windows Docker support.

Phone

Area	Limit	Workaround	How to resolve
Coordinate converter	Systems with a grid datum shift are exact when the desktop has the NTv2 (.gsb) file (it goes to phones with the project); without it, or with a GeoTIFF grid, approximate (a few metres). MGRS not near the poles; a UTM entry with "S" after the zone is read as southern hemisphere.	Add the grid as NTv2 on the desktop, then send the project.	GeoTIFF grids to phones.
COGO calculator	Works on a flat plane around the points (fine to a few kilometres); the phone's declination needs location and a compass; resection from up to four points and intersection from up to three, bearings and taped or measured distances adjusted together by least squares, weighted by their accuracies, with a 95 % error ellipse and how far each measurement misses.	Keep sightings short; spread the known points around you.	More stations; whole traverse networks.
Sampling points	Up to 20,000 grid or 5,000 random points; stratified sharing by area or by area × spread (Neyman) from a number field of the desktop layer; the number of points for a target precision (simple or stratified, at 90, 95 or 99 %) is worked out from an expected spread.	Make optimised designs on the desktop and send them.	Sample size from pilot data on the phone.
Analysis on the phone	Measure, buffer, profiles, contours, survey calculators, time filters, and basic overlays (clip or erase a layer by areas, count points in areas with a field total); no statistics, routing or scripts. Desktop layers can be edited, lines and areas reshaped vertex by vertex (snapping to nearby corners and edges), lines split in two and areas split between two corners.	Do larger analysis on the desktop.	Union, dissolve and spatial joins on the phone; splitting areas along a drawn line.
Online data on the phone	Web map layers (XYZ, WMS, ArcGIS) are shown; feature layers downloaded (up to 20,000 features), edited, and saved back (ArcGIS, WFS-T, OGC API Part 4) with a check for features changed on the service since; files open as GeoJSON, KML/KMZ, GPX, CSV, zipped Shapefiles or GeoPackages; no PostGIS or SQL Server on the phone.	Save while online; on a conflict choose theirs or yours.	Services that need a sign-in.

Area	Limit	Workaround	How to resolve
Sync	Over the internet only through a team server you run (one program; the desktop pulls from it every few minutes); it needs a reachable address and, for HTTPS, a certificate.	Meet on the same Wi-Fi or a phone hotspot.	A hosted option for teams without a server.
Updates	New phone features reach phones only with a new build or an over-the-air update.	Install the latest build.	Publish an update after each release.

15. Suggested next steps for Fieldra

Done since the first version of this document: file geodatabases, sample design, hot spots and regression, hydrology (now with D-infinity, flow length, basins, wetness and depressions), empirical Bayesian kriging, symmetrical difference, update and tabulate intersection, cloud masks, cloud-free composites and Landsat, rush-hour speeds and U-turn rules, rule-based symbols, background processing, web map layers, DXF, grid shifts and geoids, TIN, free layouts, more overlay and raster tools, cost distance, local Moran, GWR, image classification, network analysis, related tables, topology fixes, PostGIS live editing, the toolbox and models, scripting, location-allocation, regression diagnostics, feature services with editing, vehicle routing, PostGIS history and review, offline Python, and now WMS in any system, GDAL formats, history from any program, turn rules, routing breaks and trips, universal kriging, Sentinel-2, pan-sharpening, symbol levels, annotation, PDF layers, the computer's Python, and national grids, resection and stratified sampling on phones, and now command search, background jobs you can stop, the sample project, result cards, autosave and layer history, calculated fields, twelve topology rules, routes and events, co-kriging, ArcGIS REST layers, .gdb domains, subtypes and spatial index, 3D buildings, editing desktop layers on phones, light mode for older computers, and now SQL Server, reshaping, web layers, data files, place search and track recording on phones, the team server, edit-conflict checks for feature services, keychain sign-ins, 13 more tools, Gaussian simulation, address search, curved annotation, a PDF layer per map layer, netCDF variables, rasters up to 8,192 cells, and .gdb curves, tables and relationship classes, and now the heavy calculations in compiled Rust, MFD flow and stream burning, 16-direction cost distance, stable and K-Bessel semivariograms, larger simulations, ruin-and-recreate vehicle routing, noise, ground and models on every point of LAS and LAZ clouds (LAZ written back), raster tools and zonal statistics on images of any size, full-detail volumes and sections, and a spatial index for overlays and checks, and now plugins (JavaScript or Python tools and commands), a faster (SIMD) Rust build for newer computers, and on phones: bearings and distances adjusted together, sample size for a target precision, edits saved back to feature services, grid files sent with the project, area splits and overlays. Ranked by how often survey teams would still need another program:

#	Add	Why
1	Test the new tools on real projects in the Mac and Windows apps	Confidence before client deliverables.
2	Open written .gdb files (domains, subtypes, spatial index) in ArcGIS Pro	Checked with GDAL, which uses the index; ArcGIS itself not yet.

#	Add	Why
3	Try ArcGIS layers, satellite masks, composites and Landsat on the live services	They were checked with stand-ins in the same formats only.
4	Use the team server with a real crew for a week	Checked end to end in tests, not yet over a mobile network.
5	Try SQL Server on a real server	Built and tested against a mocked server only.
6	Vector PDF output	Sharper print maps with selectable text.
7	Read ArcGIS Pro project layer lists (.aprx)	Quicker moves from ArcGIS Pro.