

Daniel Wulf – Work Sample

Two apps built independently. This document is not a feature list. It describes the technical decisions behind them and what each one cost.

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Nomad TravelGuide

Travel app with community features · Flutter, iOS and Android · live in both stores since July 2026 · version 1.1.0

Flutter client from one codebase, backend on Firebase with Firestore, Cloud Functions, authentication, storage and Cloud Messaging. Bilingual German and English. Built entirely on my own: architecture, backend, both store submissions, legal texts, support.

Decision 1: Move search to the server

User search originally ran as a prefix query against a lowercased name field. Anyone searching by a second name component found nothing.

Rebuilt around server-computed search tokens: a Cloud Function trigger on the user document generates the tokens on write, the query runs on array-contains with pagination, ranking and blocked accounts filtered out. The trigger has infinite-loop protection, and the migration ran as an admin callable in batches.

What surfaced during the rebuild: users who had never opened profile setup had no lowercased name field at all. They had been invisible in search since launch, and nobody had ever reported it. The backfill checked 21 accounts and updated 20.

The cost: an additional function, extra writes on every profile change, and a migration path that did not exist before.

Decision 2: One single path for media uploads

Uploads ran through several places with inconsistent behaviour. Two crop screens uploaded lossless PNG, and videos went out uncompressed.

Consolidated into a central upload service as the only route out: video compression, JPEG throughout, progress indicator with cancel, temp file cleanup. Resolution, bitrate and quality sit as named constants in one place.

I removed the first compression package again after integrating it: unmaintained for two years, no AGP 8 namespace, core library pulled from a third-party service, and bitrate only accepted in whole Mbit/s. Replaced it, and moved the review step in front of integration rather than after.

Decision 3: Privacy as architecture, not as text

I wrote the privacy policy, terms and moderation rules myself, then audited them against the code in three passes. Found and fixed:

- A connection between two users could be forged, and a forged connection granted access to the other person's location.
- A block could be circumvented by deleting the underlying document.
- Account deletion removed less than the policy promised.

Location and AI fields no longer sit in the publicly readable user document, and access is restricted server-side to confirmed connections. Unused permissions (microphone, speech recognition, Bluetooth) were removed. Retention for reports and moderation logs: twelve months after the case is closed.

The principle I took from it: enforce permissions server-side rather than hiding them in the UI. And exposing less is cheaper than guarding more.

Decision 4: Usage numbers without personal reference

Aggregated counters in monthly documents instead of per-user event logs. Events are batched locally and sent together – on backgrounding, after five minutes, or at forty events. The buffer survives an app kill and is bounded: 500 per key, 5000 total, maximum age fourteen days.

In the first version nine counters sat on the wrong screens and measured something other than intended. Corrected, and the analysis panel now separates counts by entry path so the number says what it claims to say.

Vumble

App for active mobility · Flutter, iOS and Android · close to release

Records distance travelled, detects the mode of transport automatically, and shows CO2 saved against driving plus calories burned. Runs entirely on device, with no internet permission. Technically the counterpart to Nomad: the difficulty sits in the device, not in the cloud.

Decision 1: A native location handler on iOS

The common standard package cannot switch location accuracy without stopping the location manager. For an app that measures in the background all day, that is the difference between usable data and gaps.

Instead, a custom CLLocationManager with Significant Location Change and an inverted power strategy: location is never switched off, only turned down. Privacy manifest added.

Field test result: battery consumption under one percent across 48 minutes of continuous tracking.

Decision 2: Two failures that produced no error

During field testing, tracking dropped out mid-journey. First cause: the power profile followed the raw motion activity reported by the system, and an unknown state counted as stationary. One false reading downgraded accuracy, and the system suspended the app. Fixed with a power policy that holds accuracy for a defined period, with an open tracking segment acting as a brake.

Second, deeper cause: the call that resumes tracking after a restart was attached to the home screen's initialisation. When the system woke the app through Significant Location Change with no screen, the Dart side never ran – native location updates arrived and nobody collected them. The call now sits in app initialisation.

Neither failure produced a message. They only surfaced because I compared measured distances against a reference app.

Decision 3: Two sources instead of one

After the field test series, walking distance on iOS comes from the step counter, with GPS used only as a comparison value. Cycling comes from GPS, with reconstruction from the system's motion history as a safety net. The effect of each path is distinguishable through separate diagnostic counters.

Build 41 measured against Strava: walking at 100 percent on every test day. Cycling 86 to 96 percent on country roads, 88 percent in city traffic with lights. The reconstruction no longer estimates stationary minutes – minutes with fixes but little yield count as a stop, minutes without fixes and a short chord count as standing still.

The rule for version 1.0: no feature gets cut for a faster release. Reliability of distance measurement comes first.

Further details

CO2 factors follow the official figures of the German Federal Environment Agency (car 164, bus 90, rail 44 grams per passenger kilometre). Test suite of 379 automated tests covering distance calculation, filter logic and mode detection. Notifications are entirely local with no server, and can be switched off in the profile. Bilingual from the start.

How I work

Both apps were built alone, including store submissions, GDPR implementation and user support. What I take from that: the bugs that survive longest are the ones that produce no error. A system that reports success and does nothing is more dangerous than one that crashes.

A detailed technical case study on Nomad is available at nomad-travelguide.de/case-study