Compass PRD (v4.1) — Solo-Ready, Comprehensive, Pragmatic

Document Type: Product Requirements Document (Solo-Adapted & Battle-Tested)

Version: 4.1

Date: November 04, 2025

Status: Ready for Solo Engineering Kickoff

Changelog (v4 → v4.1)

- Added de-dup/canonicalization, RRULE schedules, and ingestion hygiene
- Added one-tap constraint relaxers and report button
- Added neurodiversity-friendly attribute flags and car-light preference
- Added ICS import for existing family calendars (no OAuth)
- Tightened bandits: fallback switch, sparse-data guard, seeded priors
- Reduced weekly metrics to a 5-minute cockpit
- Strengthened legal/ops: DMARC/CAN-SPAM, robots/respect, safety takedown
- Added “Coverage Meter” UX and explicit source validation thresholds
- Included **Catalog Pipeline Sources** (Tier-1 structured sources + examples)
- Engineering checklists and order-of-operations updated

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0) One-Page Summary

Problem. Parents face overwhelming, high-stakes choices around enrichment with little trustworthy guidance; directories and groups don’t optimize for schedule, budget, or fit.

Solution. **Compass** is a hybrid AI advisor that collects concise family signals, uses a **structured recommender** + **constraint solver** to generate a small, actionable plan, then explains *why* via deterministic templates (LLM-optional for Q&A;). The moat is **automated, fresh local data**, deduped and normalized from structured public sources.

Age of AI. Optimization + explanation beats chat. Guardrailed LLM improves nuance without owning the decision boundary.

Solo Reality. Nights-and-weekends build, zero-touch ops. No manual catalog workflows. ≤ 5 hrs/week maintenance.

Impact. Faster, better-fit decisions; lower waste; equity via public programs/scholarships; calmer parents. Start with one metro and 4–5 reliable categories, then expand.

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1) Principles (unchanged + additions)

1) Explainability by design (templates; tradeoffs; confidence).

2) Optimization first, chat second (LLM is optional, sandboxed).

3) Automated catalog = moat (structured sources, zero-touch).

4) Lightweight feedback loops (Continue/Stop, thumbs, check-ins).

5) Privacy & safety (minimal data; consent; clinical boundary).

6) Equity aware (scholarship, commute, fairness metrics).

7) **Solo-sustainable** (features must cost <1 hr/week to maintain).

8) **Hygienic ingestion** (dedup, canonicalization, RRULE, validation, robots).

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2) Scope of MVP (6–8 Weeks, Solo Build)

In-scope: Mobile PWA; rapid intake; structured recommender; **Constraint Solver v1**; deterministic explanations; **LLM Q&A; (Beta, flagged)**; automated Tier-1 catalog; **partner sharing**; **weekly radar**; **calendar export + ICS import**; progress signals; **report button**; Trust Center; English-only; **coverage meter** per category.

Out-of-scope: Boutique studios; community; bilingual; provider portal; native apps; multi-city; real-time push; PDF parsing.

Deferred: Semi-auto weight tuning; ontology enrichment with HIL; bilingual; provider portal; multi-city.

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3) Catalog Pipeline Sources (Tier■1 Structured)

Strategy: Structured, public-good sources with predictable updates. Prefer ICS/iCal, RSS, or JSON feeds; fall back to well-formed HTML tables. No PDFs in MVP.

Core Source Types & Examples (build as pluggable scrapers)

- **City Recreation Departments**

- *Data:* seasons/leagues/classes; often ICS/CSV/JSON or HTML tables

- *Examples:* “City of Parks & Rec”, “Community Recreation Centers”

- **Public Library Systems**

- *Data:* youth events/classes; typically ICS/RSS feeds per branch or system

- *Examples:* “ Library Events Calendar”

- **YMCA Branches**

- *Data:* swim lessons, youth sports; sometimes JSON endpoints or structured HTML

- *Examples:* “YMCA of – Programs”

- **Youth Sports Orgs (National → Local Chapters)**

- *AYSO (soccer), Little League (baseball), USSSA/Babe Ruth (baseball), US Youth Soccer (clubs), USA Swimming local clubs, Scouts (BSA/Girl Scouts) service units*

- *Data:* registration windows, age bands, locations (chapter-level pages)

- **Community & Cultural Centers**

- *JCCs, Boys & Girls Clubs, Parks Conservancies, Nature Centers*

- *Data:* classes/events; ICS/RSS; sometimes JSON calendars

- **School District Extracurriculars (when structured)**

- *Data:* after-school programs, clubs, sports; seek ICS/CSV athletic calendars; avoid PDFs

- **Civic Event Hubs (when structured)**

- *Data:* citywide event APIs or open data portals with youth tags

- **Aquatics & Rec Facilities**

- *Data:* lessons, open swim blocks; often ICS/CSV

Access Modalities (priority order):

1) ICS/iCal (RRULE-ready)

2) RSS/Atom feeds

3) JSON/CSV APIs or downloads

4) HTML tables (consistent structure only)

Validation thresholds per source:

- Pass rate ≥ 85% (fields present, dates sane, links 200)

- Broken-link rate ≤ 5%

- If a source drops below thresholds for 2 consecutive runs → **auto-demote** (not “recommendable”) and alert.

Robots/compliance: Respect robots.txt, rate-limit; UA includes contact email; cease on request. Maintain allowlist YAML for base URLs; hard-exclude brittle JS apps or blocked paths.

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4) Ingestion & Normalization (v4.1)

- **De■dup & canonicalization:** `canon_hash = hash(normalize(name), start_date±3d, geohash6(venue), org_name)` with Levenshtein tie-break.

- **Schedules:** Store as **RRULE** (BYDAY/BYHOUR/BYMINUTE, DTSTART).

- **Money:** `{{amount, currency, period}}` (season/month/term). Delay normalization to $/mo until comparison time.

- **Venues:** Separate table with geohash + timezone.

- **Source fingerprint:** persist `source_item_id`, `source_url`, `scraper_id`.

- **Quality checks (auto-exclude if ≥2 fail):** HTTP 200, future date, price regex, geocode ok, sane ages, required fields present.

- **Change detection flags:** >50% field change, >30% price delta, new provider at known venue, deadline ≤7d. Weekly spot-check (≤1 hr).

- **Freshness SLAs:** 72h re-scrape; freshness ≥95%; deadline detection ≥90%; change→flag ≤72h.

Coverage Meter (user-facing): “We track **47 soccer** programs in your area • **updated every 72h**.”

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5) Recommendation & Solver

Scoring: weighted: Fit 50% (age/intensity/sensory/team/prereqs), Practical 30% (commute/schedule/price/scholarship), Goals 20% (ranked).

Outputs: For each child, **Primary / Budget■Saver / Stretch** with deterministic template:

- Why it fits (3–5 bullets)

- What would change this (budget, radius, intensity)

- Cost impact; travel time; schedule fit

- Confidence (0–1) label; Last verified timestamp

Constraint Solver v1: CP■SAT/backtracking; inputs: windows, radius, budget, per■child activity caps, fixed commitments.

Failure UX: Show *why infeasible* + **one■tap relaxers** (expand radius, raise budget, permit one extra time window).

Personalization:

- **Phase 1 (MVP):** Contextual bandits (Thompson) behind feature flag, ε start 0.1 → decay. Seed priors by category. **Sparse guard:** if <50 accepted events lifetime → disable updates. ENV fallback `BANDITS_ENABLED=false`.

- **Phase 2:** Semi■auto weight tuning from aggregate signals (monthly review).

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6) Explainability & LLM Q&A; (Beta)

Primary: deterministic templates (fast, free, grounded).

Secondary: **LLM Q&A;** modal, Beta-labeled; RAG over catalog + profile context; citations link back to listings.

Guardrails: no provider/date hallucinations; medical/clinical questions routed to resources; rate limits by plan; per■answer token cap; response helpfulness thumbs.

Cost control: cache common Qs; monitor spend; pause for Free tier if costs spike.

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7) UX Highlights

- Intake ≤90s; dyslexia■friendly font option; high■contrast mode.
- Rec cards with **Report** button (auto-hide for family; queues URL for weekly review).
- Partner share: read■only link with up/downvotes and notes; 30■day expiry.
- Radar: weekly digest; one■click check■in links (“Great / OK / Not great”).
- **ICS import**: block off existing commitments without OAuth.
- “Car■light” preference; neurodiversity flags (low sensory, small group, predictable routine).

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8) Safety, Privacy, Ops

- COPPA■style consent; minimal data; geomask home addresses.
- “Recommendations, not endorsements” disclaimer; link provider safety policies.
- **Fast takedown:** report → hide in 24h; review ≤48h.
- Email compliance: SPF/DKIM/DMARC; CAN■SPAM footer (address, unsubscribe).
- Robots.txt respected; polite crawling; cease-on-request registry.
- Legal: we may remove listings at our discretion for safety/accuracy.

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9) Metrics Cockpit (weekly, 5 minutes)

- **Catalog:** Coverage / Freshness / Broken■link%
- **Quality:** Acceptance% / Continue@30%
- **UX:** Decision latency p50
- **Learning:** Bandit exploration & reward delta (or flag off)
- **Costs:** LLM spend & Q&A; helpfulness%

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10) Engineering Order■of■Operations (Solo)

1) **Week 1–2:** Scraper framework (ICS/RSS/JSON → HTML); schema (venues, RRULE, money); dedup; validation; coverage meter.

2) **Week 3:** Scoring + Solver v1 + one■tap relaxers; deterministic templates.

3) **Week 4:** Partner share; radar digest; report button; ICS import.

4) **Week 5:** Bandits (behind flag); telemetry; ops dashboard.

5) **Week 6:** LLM Q&A; Beta; trust center; DMARC/SPF/DKIM; pilot.

Testing harness: 30 synthetic families × 4 categories nightly (ingest → solve → recs).

Time math: store UTC; convert to venue TZ in responses.

Distance: precompute simple drive time proxy nightly; avoid hot■path map APIs.

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11) Pricing & Gating (MVP posture)

- **Free:** Radar digest, 1 full rec/child/season, Solver Lite.

- **Essential ($9.99/mo | $79/yr):** Unlimited recs, full solver, partner share, calendar/ICS, progress tracking.

- **Premium ($19.99/mo | $149/yr):** + LLM Q&A; (unlimited), scholarship alerts, early features.

- Gate heavy features to protect costs; pilot free for first 100 families.

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12) Risks & Mitigations (delta highlights)

- **School district PDFs:** auto■demote if validation <70%; no PDF parsing in MVP.

- **Over■exploration:** start ε=0.1, decay; turn off via flag if noisy.

- **Ops overload:** any feature >1 hr/week maintenance → deprecate or automate.

- **Scrape blocks:** favor feeds/APIs; polite rates; hard■exclude brittle apps; cease-on-request.

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13) Pipeline Source Backlog (by integration effort)

- **Low effort (start here):** ICS/iCal library events; city rec ICS/CSV; YMCA JSON/HTML tables; AYSO region pages; Boys & Girls Clubs calendars.

- **Medium:** JCC calendars; nature centers (often ICS); aquatics facilities with CSV/HTML tables.

- **High (post■MVP):** School district extracurriculars if not structured; civic open data APIs needing mapping; scout councils with irregular pages.

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14) What We'll Change (Impact)

Parents decide faster with clarity; children land in better■fit activities; public programs get filled; equity improves through scholarships and local options; a solo builder sustains a useful service with <5 hrs/week.

Appendices

- **A. Data Model:** money objects, venues, RRULE schedules, source fingerprints.

- **B. API Sketches:** Profiles, Recommendations, Solve, Radar, Telemetry, Share.

- **C. Templates:** Rec card copy; Beta Q&A; prompt & guardrails.

- **D. Ops Checklists:** Monday/Wednesday/Friday/Sunday routines; incident flows.

Compass turns chaos into a transparent, optimized plan—fast, trustworthy, and feasible for one builder to maintain.