Handz V1 PRD Bundle — CH27: Notifications

Scope: reminders and prompts (maintenance, mastery, practice, inbox), user controls, scheduling rules, and safe rate limits. iOS-only V1; design tokens and components referenced from CH06.

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Owned Decisions	Notification categories, permission timing, preference model, scheduling rules, rate limits, deep-li
Open Questions / Placeholders	See §11 (Placeholder Registry)

1. Purpose and V1 principles

Goal: Notifications help users *return to Handz at the right time* to maintain mastery and execute practice plans, without becoming spammy or breaking trust.

- Notifications are **user-serving** first. No "marketing blast" notifications in V1; monetization prompts happen *in-app* (see CH25).

- Default posture is **quiet**. If a user denies notification permission, Handz still works fully; we rely on in-app badges and dashboards.

- All scheduling is in the user's **local time** and respects quiet hours, training time, and user-selected cadence.

- Notifications are **actionable**: tapping one deep-links to a specific screen and state (see §7).

- Notifications must be **rate-limited** and **content-safe** (no shaming, no medical claims; see CH30 for messaging standards).

Non-goals (V1):

- No community / gym broadcast messaging (planned later; out of scope for V1).

- No ML-based "best time to notify" optimization in V1 (can be added after baseline analytics in CH33).

- No push campaigns / promos. Trial/billing notifications are purely transactional and must be user-initiated/expected.

2. Definitions and notification primitives

This chapter uses these primitives. For overall glossary, see CH03.

- **Local notification**: Scheduled and delivered by the device (works offline). Used for reminders (maintenance due, planned practice, streak nudge).

- **Remote notification (push)**: Delivered via APNs (requires backend). Used only where device-scheduling is insufficient (e.g., "new inbox import received").

- **In-app notification**: An entry in an in-app feed/center (optional V1) or an inline banner/toast. Always available; can be paired with badge counts.

- **Badge**: iOS app icon badge count. In V1 it represents *actionable items* (e.g., unread inbox items, maintenance due today), not total history.

Notification "category" in this PRD means a user-visible toggle group (e.g., Maintenance Reminders). Under the hood, each category can have multiple triggers (e.g., "maintenance due today" vs "maintenance overdue").

3. Permission strategy and onboarding timing

Because there are no mainstream apps like Handz, we must **earn** notification permission by showing value first. Do not prompt on first launch.

3.1 When to request notification permission (V1)

- **First eligible moment**: after the user completes one "value loop," meaning they have either (a) saved their first flow (requires account) or (b) created their first Gameplan/Mastery target (CH23) or (c) completed their first Practice session (Pro/trial or credit).

- **Never** request permission while the user is in the middle of creating a flow (avoid interruption).

- **Guest users**: Do not prompt for notifications in Guest mode. Guest mode cannot save flows and should not create recurring reminders. Use in-app prompts to convert (see CH07/CH08).

- **Free users**: Prompt is allowed after they schedule maintenance or create a mastery plan; do not gate core navigation if they deny.

3.2 Pre-permission educational screen (soft prompt)

Before invoking the iOS system permission dialog, show a lightweight in-app explainer sheet:

Title: "Stay on track?"
Body: "Handz can remind you when it's time to maintain your gameplans and keep reactions sharp. You control timing and can turn this off anytime."
Buttons: [Enable Reminders] (primary) • [Not Now] (secondary)

Only if the user taps **Enable Reminders** do we trigger the system permission request.

3.3 If permission is denied

- Show a one-time confirmation banner: "No problem — you can still use Handz. You can enable reminders later in Settings."

- In Settings > Notifications, show a status line: "Notifications are off at the system level." Provide a button [Open iOS Settings] that deep-links to the app's iOS settings page.

- All reminder logic must degrade to **in-app indicators**: dashboard cards, badges, and a Maintenance page 'Due' list (CH24).

4. Notification catalog (authoritative for V1)

This section defines **every notification type** that exists in V1, including eligibility, triggers, copy, deep-link behavior, and frequency caps. Anything outside this list is out of scope.

4.1 Categories (user-facing toggles)

- **Maintenance Reminders** (CH24): reminders to maintain mastered paths/gameplans.

- **Practice Reminders** (CH20–CH22): reminders to run a planned practice session; credit/trial-related practice nudges.

- **Mastery Updates** (CH23): milestones and plan checkpoints; not 'performance judged,' only progress markers.

- **Inbox & Sharing** (CH17–CH19): new imports and link activity.

- **Account & Security** (CH07/CH34): email verification, password resets, account deletion confirmation.

- **Billing (Transactional)** (CH25): trial ending soon, payment failed, subscription renewed (StoreKit-driven where possible).

4.2 Notification type specifications (per Type ID)

Format: each Type ID below is a contract. If implemented, it must match these fields.

Type ID: N-MAINT-DUE-TODAY — Maintenance Reminders

Field	Value
Trigger	At the user's chosen daily reminder time **only if** at least one maintenance item is due today (CH24).
Delivery	Local notification
Eligibility	Account required; Free/Pro/Trial
Default	ON (recommended)
Frequency cap	1/day
Deep-link	handz://maintenance?filter=dueToday
Copy	"Maintenance due: {count} item(s). Keep your reactions sharp."
Suppression	Suppressed if category off / Pause all / system denied / no due items / quiet hours (defer).

Type ID: N-MAINT-OVERDUE — Maintenance Reminders

Field	Value
Trigger	At daily reminder time when at least one item is overdue AND user has not opened Maintenance in 48h.

Field	Value
Delivery	Local notification
Eligibility	Account required; Free/Pro/Trial
Default	OFF
Frequency cap	max 2/week
Deep-link	handz://maintenance?filter=overdue
Copy	"You've got {count} overdue item(s). Want to reschedule?"
Suppression	Same as above + suppressed if user opened Maintenance within last 48h.

Type ID: N-PRACTICE-SCHEDULED — Practice Reminders

Field	Value
Trigger	User explicitly schedules a practice session for time T (Practice Setup or Gameplan plan). Fire at T.
Delivery	Local notification
Eligibility	Pro/Trial; Free only when consuming a credit session (credits apply to saved flows only).
Default	ON if user scheduled
Frequency cap	1 per scheduled session
Deep-link	handz://practice/session?id={sessionId}
Copy	"Time to practice: {sessionName}."
Suppression	Suppressed if session deleted/cancelled.

Type ID: N-PRACTICE-STREAK-NUDGE — Practice Reminders

Field	Value
Trigger	At daily reminder time if user has an active streak at risk AND no practice logged today.
Delivery	Local notification
Eligibility	Pro/Trial; Free only if credits remaining
Default	OFF
Frequency cap	max 3/week
Deep-link	handz://practice
Copy	"Keep the streak alive? One quick set is enough."
Suppression	Suppressed if user completed any practice today.

Type ID: N-PRACTICE-CREDIT-EXPIRY — Practice Reminders

Field	Value
Trigger	48 hours before monthly credit refresh, only if user has unused credits.
Delivery	Local notification
Eligibility	Free (account required)

Field	Value
Default	ON
Frequency cap	1/month
Deep-link	handz://paywall?context=credits
Copy	"You have {creditsLeft} practice credit(s) left this month. Want to use one?"
Suppression	Suppressed if creditsLeft=0 at schedule time; reschedule if credits change.

Type ID: N-MASTERY-CHECKPOINT — Mastery Updates

Field	Value
Trigger	Mastery plan reaches a checkpoint date (e.g., week boundary) as defined in the plan.
Delivery	Local notification
Eligibility	Account required; Free/Pro/Trial
Default	ON
Frequency cap	max 2/week
Deep-link	handz://mastery/plan?id={planId}
Copy	"Checkpoint: {planName}. Review what to maintain next."
Suppression	Suppressed if plan paused/deleted.

Type ID: N-MASTERY-MAINT-OVERLOAD — Mastery Updates

Field	Value
Trigger	Maintenance queue exceeds user's preferred weekly capacity (CH24 overload prevention).
Delivery	Local notification
Eligibility	Account required; Free/Pro/Trial
Default	ON
Frequency cap	max 1/week
Deep-link	handz://maintenance?filter=overload
Copy	"Too much to maintain? Let's prioritize your top paths."
Suppression	Suppressed if overload already acknowledged in last 7 days.

Type ID: N-INBOX-NEW-IMPORT — Inbox & Sharing

Field	Value
Trigger	A new import arrives in Inbox (CH18).
Delivery	Push preferred; fallback in-app banner when app is open + badge update on open/resume.
Eligibility	Account required; Free/Pro/Trial (Free inbox cap = 10).
Default	ON

Field	Value
Frequency cap	hard cap 10/day + burst cap 1/min; if exceeded, deliver a daily summary instead.
Deep-link	handz://inbox?highlight={importId}
Copy	"New gameplan received." (lockscreen-safe) • Optional expanded: "{senderName} sent {flowName}."
Suppression	Suppressed if inbox category off / Pause all / user blocked sender / abuse filter (CH30).

Type ID: N-BILLING-TRIAL-END — Billing (Transactional)

Field	Value
Trigger	Trial ends in 48 hours. Schedule this at the moment trial starts based on StoreKit trial end date.
Delivery	Local (scheduled) and/or push
Eligibility	Trial users only
Default	ON
Frequency cap	1 per trial
Deep-link	handz://paywall?context=trialEnding
Copy	"Your trial ends soon. Keep practicing without interruptions."
Suppression	Suppressed if user already converted to Pro or cancelled trial before window.

Type ID: N-BILLING-PAYMENT-FAILED — Billing (Transactional)

Field	Value
Trigger	StoreKit reports billing issue / payment failed.
Delivery	Push if available; must also show in-app alert on next open.
Eligibility	Pro users
Default	ON
Frequency cap	1 per event
Deep-link	handz://paywall?context=paymentFailed
Copy	"Payment issue. Update your subscription to keep Pro features."
Suppression	Suppressed once user resolves billing.

4.3 General copy rules

- All templates must have **lock-screen safe** defaults (generic) if user has not enabled full preview in iOS settings.

- No claims like "guaranteed subconscious" in notifications. Keep promises modest and training-focused.

- Copy must be short (ideal < 90 characters) to avoid truncation.

5. Scheduling rules (time, cadence, and quiet hours)

These rules eliminate guesswork. Any scheduler implementation must satisfy the behaviors below.

5.1 User-configurable schedule inputs

- **Daily reminder time** (default: 7:00 PM local): used for Maintenance Due Today and optional Practice Streak Nudge.

- **Quiet hours** (default: 10:00 PM–7:00 AM): suppress delivery; defer to next allowed time window.

- **Training days** selector (default: none selected): optional; if set, Handz prefers to notify on training days for non-time-critical reminders.

- **Max notifications per day** (soft cap, default 2/day): used to batch Maintenance and Mastery into one summary when possible.

- **Snooze duration** (default options: 15m, 1h, tomorrow): used in applicable screens (Maintenance + Practice).

All schedule inputs are stored per-user in Notification Preferences (see §9).

5.2 General delivery window rules

- No notification is delivered during quiet hours. If a trigger fires in quiet hours, schedule it at the next quiet-hour end (e.g., 7:00 AM).

- If multiple notifications would fire within a 15-minute window, batch them into a **single** notification when possible (Maintenance + Mastery).

- If the user has set Training Days, and the trigger is not time-critical, prefer the next selected training day at reminder time.

- Respect iOS limits for pending local notifications. If the pending queue is at risk of exceeding system limits, schedule only the next 7 days and re-schedule on app open.

5.3 Time zone and DST handling

- All stored schedule preferences are in **local wall-clock time** (e.g., 7:00 PM) plus the device time zone identifier at the time of scheduling.

- On app open, compare stored time zone to current device time zone. If different, re-compute and re-schedule future notifications.

- DST transitions: if a scheduled time does not exist (spring forward), deliver at the next valid minute; if a time repeats (fall back), deliver only once.

5.4 Missed notifications

- If the device was off or notifications were disabled at fire time, Handz must show the same information as an in-app 'Due' card on next open.

- No 'catch-up spam': do not send a backlog of missed reminders. Show a single summary on next open if needed.

6. User controls and UI surfaces

V1 must provide clear, granular controls so users can stay in charge. Controls must be reachable from Settings and from contextual screens (Maintenance, Practice).

6.1 Settings > Notifications screen (required)

Location: Settings tab → Notifications.

- **System status row**: shows 'Enabled' or 'Off in iOS Settings'. If off, show [Open iOS Settings].
- **Master toggle**: 'Pause all notifications' (does not change system permission; simply suppresses all scheduling).
- **Category toggles**: Maintenance, Practice, Mastery, Inbox, Billing, Account/Security.
- **Schedule section**: Daily reminder time picker; Quiet hours start/end; Training days multi-select; Max per day (2/3/4) (soft cap).
- **Preview section**: shows example of what a 'Maintenance due' notification looks like using current settings.

Any change in Settings triggers immediate re-scheduling of future notifications (idempotent).

6.2 Contextual controls (required)

- **Maintenance page**: if user is overwhelmed, show a banner with [Snooze 1 day] [Edit priorities] [Change reminder time].
- **Practice setup**: when a user schedules a planned session, show a toggle 'Remind me' and allow choosing the time (default: now+1h or selected time).
- **Gameplan/Mastery plan setup**: show a toggle 'Maintenance reminders for this plan' plus an optional cadence (e.g., 2x/week).

6.3 Critical vs optional notifications

Some notifications are optional; others are critical to account/security or transactions. V1 policy:

- User can disable categories, but **transactional billing notices** and **security/account recovery** messages must still appear **in-app** (banner/alert) when relevant.
- If user disables Billing notifications, the app still shows in-app reminders when they open the app during trial end window or payment issue window.
- Email verification and password reset communications are primarily via email; push/local is optional and should not be relied upon.

6.4 Inbox notifications delivery strategy (push vs fallback)

Inbox items can arrive when the app is not open. The preferred V1 behavior is push notifications for N-INBOX-NEW-IMPORT. If push is not implemented in the first build, V1 must still feel usable.

- **Preferred**: Push notifications via APNs when a new inbox item is written to the backend for the recipient.

- **Fallback**: If push is not available, show an in-app banner and update badge count whenever the user opens the app or returns from background.
- In either case, the Inbox screen must clearly show unread/new items and the current inbox cap (free cap = 10).

7. Tap behavior and deep-link routing

Every notification must route to a deterministic screen and state. No 'dead ends'. If required data is missing, route to a safe fallback.

7.1 Routing rules (global)

- Tapping a notification always opens the app and routes using an internal deep-link URI (e.g., handz://maintenance?filter=dueToday).
- If the user is logged out, route to Login, then continue after login (post-auth redirect).
- If the user is in Guest mode, route to an 'Account required' interstitial explaining that saved items/reminders require an account.
- If the target object no longer exists (deleted flow/gameplan), route to the parent screen with a toast: "That item is no longer available."

7.2 Deep-link map (V1)

Deep-link	Destination
handz://maintenance?filter=dueToday	Maintenance tab, list filtered to Due Today.
handz://maintenance?filter=overdue	Maintenance tab, list filtered to Overdue.
handz://maintenance?filter=overload	Maintenance tab, Overload banner + priority picker.
handz://practice	Practice tab landing.
handz://practice/session?id={sessionId}	Practice Setup pre-filled with the saved session configuration.
handz://mastery/plan?id={planId}	Gameplan/Mastery detail screen for the plan.
handz://inbox?highlight={importId}	Inbox list with the specific import expanded/highlighted.
handz://paywall?context=trialEnding	Paywall screen (trial ending variant).
handz://paywall?context=paymentFailed	Paywall screen (payment issue variant).
handz://paywall?context=credits	Paywall/credits info sheet (free credits reminder).
handz://settings/notifications	Settings > Notifications.

8. Badge counts and in-app notification center

Badges must be meaningful. In V1, the badge is a count of **actionable items**, not a total of events.

8.1 Badge sources (V1)

- **Inbox**: number of unread inbox items (imports) not yet opened.

- **Maintenance**: 1 if there is at least one Due Today item and the user has not opened Maintenance today (binary, to avoid huge badges).

- **Billing**: 1 if there is an unresolved billing issue (payment failed) requiring action.

- **Security**: 1 if email not verified after X days (optional; can be in-app only).

Badge calculation rule: badge = unreadInboxCount + (maintenanceDueToday?1:0) + (billingIssue?1:0) + (securityFlag?1:0).

8.2 In-app notifications (minimum viable)

- At minimum, V1 supports lightweight **toasts/banners** for: new inbox import while app is open, payment issue detected, and 'notifications disabled' info banners.

- Optional enhancement (still V1-compatible): a simple in-app 'Updates' feed that lists recent notification events. If implemented, it must not be required for core flows.

9. Data model and persistence

This section defines the minimum data Handz must store to deliver notifications deterministically and to support debugging.

9.1 NotificationPreferences (per user)

```
{
userId: string,
systemPermission: "unknown" | "granted" | "denied", // cached; source of truth is
OS
pausedAll: boolean,
categoryEnabled: {
maintenance: boolean,
practice: boolean,
mastery: boolean,
inbox: boolean,
billing: boolean,
accountSecurity: boolean
},
schedule: {
dailyReminderTime: "19:00", // local wall-clock
quietHours: { start: "22:00", end: "07:00" },
trainingDays: [ "Mon", "Wed", "Fri" ], // optional; empty = none
maxNotifsPerDay: 2
},
lastPromptedAt: ISODateTime|null,
updatedAt: ISODateTime
}
```

9.2 NotificationEventLog (debug + analytics)

V1 stores a lightweight log of sent/delivered events. This is **not** a user-facing feature, but it supports support/debugging and future analytics.

```
{
id: string,
```

```
userId: string,
typeId: string,
channel: "local" | "push" | "in_app",
scheduledFor: ISODateTime|null,
sentAt: ISODateTime|null,
openedAt: ISODateTime|null,
suppressedReason: null | "category_off" | "paused_all" | "quiet_hours" |
"rate_limited" | "system_denied" | "missing_data",
context: { flowId?: string, planId?: string, importId?: string },
appVersion: string
}
```

9.3 Scheduling engine responsibilities

- Create/update/cancel local notification requests when preferences change or relevant underlying data changes (e.g., new maintenance items due).

- Ensure idempotency: re-running scheduling must not duplicate pending notifications.

- Apply rate limits and batching rules (see §10).

- Record suppressedReason when a notification would have fired but was suppressed (for debugging).

10. Safety, abuse prevention, and rate limits

Notifications are a trust surface. V1 must avoid creating spam, shame, or safety issues. This section is normative.

10.1 Content safety rules

- No shaming language ("lazy", "you failed", "you skipped"). Use neutral, supportive tone.

- No medical or injury claims. Avoid implying guaranteed subconscious conditioning; keep wording as "help you practice and remember."

- No aggressive upsell copy in notifications. Upsells happen in-app (CH25). Notifications can be transactional ("trial ends soon") or user-triggered reminders.

- No references to violence outside sport context; keep copy about training, practice, skill, planning.

10.2 Global rate limits (hard caps)

- **Hard cap**: 10 notifications/day total (all categories combined).

- **Burst cap**: max 1 notification per minute.

- **Inbox cap**: max 10 inbox push notifications/day; if exceeded, switch to a single daily summary ("You have new imports waiting").

- **Billing**: max 1 per event (trial ending, payment failed).

- **Maintenance**: max 1/day due-today; overdue max 2/week.

10.3 Soft caps (UX guardrails)

- Default maxNotifsPerDay = 2. If user tries to raise it, show a note: "More reminders can feel spammy. You can change this anytime."

- When multiple triggers fire, prefer a **single summary** notification with a compact message and route to a dashboard list.

- If user repeatedly dismisses a category (opens but takes no action) for 2 weeks, suggest turning it off (in-app suggestion, not a notification).

10.4 Abuse/security considerations

- Do not include sensitive data in push payloads. Use generic text on lock screen unless user enables previews in iOS settings.

- Validate all deep-link parameters server-side where applicable (e.g., inbox importId belongs to user).

- Protect against notification-triggered enumeration: import IDs must be opaque and unguessable.

- Follow CH30 warning ladder for any user-generated abuse signals; warnings should be in-app, not via push, except in extreme account security cases.

11. Placeholder registry (decisions that can change later)

These items are intentionally flexible. They must be represented as constants/config in code (not hard-coded into UI copy) so Handz can evolve without rewrites.

ID	Placeholder	Default (R1)	Notes
P-CH27-01	Default daily reminder time	7:00 PM local	Expose as config; allow future A/B tests.
P-CH27-02	Default quiet hours	10:00 PM–7:00 AM	Expose as config.
P-CH27-03	Inbox import expiry	Off (no expiry) unless explicitly added later	If added, update inbox UI and add expiring reminder.
P-CH27-04	In-app Updates feed	Optional	If shipped later, add nav entry and retention metrics.
P-CH27-05	Training-days defaults	None selected	If user indicates training schedule in onboarding, pre-fill.

12. Acceptance tests (QA-ready)

Each test is written as Given/When/Then. V1 is not shippable until all are passing.

- **AT-CH27-01 Permission timing**
  Given a new user launches Handz and has not saved a flow or created a mastery plan, When they navigate around, Then the iOS permission dialog is not shown.

- **AT-CH27-02 Soft prompt**
  Given a user completes their first saved flow, When they see the 'Stay on track?' sheet and tap Not Now, Then no system dialog appears and the user continues normally.

- **AT-CH27-03 Enable reminders**
  Given the soft prompt is shown, When the user taps Enable Reminders, Then the iOS permission dialog appears exactly once.

- **AT-CH27-04 Denied permission fallback**
  Given system permission is denied, When maintenance becomes due today, Then no local notification is delivered and the Maintenance tab shows a Due Today card on next open.

- **AT-CH27-05 Quiet hours defer**
  Given quiet hours are 10PM–7AM and a reminder is scheduled at 11PM, When the trigger fires, Then the notification is scheduled for 7AM instead.

- **AT-CH27-06 Batching**
  Given a user has both a mastery checkpoint and maintenance due within 10 minutes, When both triggers fire, Then the user receives only one combined notification.

- **AT-CH27-07 Category off**
  Given Maintenance Reminders are toggled off, When an item becomes due today, Then no Maintenance notifications are scheduled or delivered.

- **AT-CH27-08 Pause all**
  Given Pause all notifications is enabled, When any trigger fires, Then no local notifications are scheduled and event logs record suppressedReason=paused_all.

- **AT-CH27-09 Inbox push routes correctly**
  Given a new inbox import arrives and a push is delivered, When the user taps it, Then the app opens to Inbox and highlights the import.

- **AT-CH27-10 Badge computation**
  Given unreadInboxCount=3 and maintenanceDueToday=true and no billing issue, Then app icon badge shows 4.

- **AT-CH27-11 Time zone change**
  Given a user travels and device time zone changes, When the app opens, Then future reminders are re-scheduled for the same wall-clock time in the new zone.

13. Replit build prompt (copy/paste)

This prompt is designed to be pasted into a vibe-coding agent so it can implement CH27 without asking follow-up questions unless it detects missing dependencies.

```
You are building Handz (iOS-only V1). Implement CH27: Notifications exactly as
specified.

Deliverables:
1) Settings > Notifications screen with:
- system status row + deep-link to iOS Settings
- Pause all toggle
- category toggles (maintenance, practice, mastery, inbox, billing,
accountSecurity)
- schedule controls: dailyReminderTime, quietHours start/end, trainingDays,
maxNotifsPerDay
2) Local notifications scheduling engine that:
- schedules N-MAINT-DUE-TODAY, N-MAINT-OVERDUE, N-PRACTICE-SCHEDULED,
```

```
N-PRACTICE-STREAK-NUDGE, N-PRACTICE-CREDIT-EXPIRY, N-MASTERY-CHECKPOINT,
N-MASTERY-MAINT-OVERLOAD, N-BILLING-TRIAL-END
- enforces quiet hours, batching (15 min window), time zone change re-schedule, DST
rules
- enforces hard caps and burst caps; records suppressedReason in
NotificationEventLog
- is idempotent (no duplicates)
3) Inbox notifications:
- Preferred: push via APNs when new inbox item is created for recipient; payload
contains deep-link params
- Fallback: in-app banner + badge update on app open/resume
4) Deep-link router for all handz:// links defined in §7.
5) Badge computation per §8.

Constraints:
- Do NOT prompt for notification permission on first launch.
- Show a soft prompt ("Stay on track?") only after first value loop (first saved
flow OR first mastery plan OR first practice).
- If permission denied, rely on in-app cards and badges; do not spam prompts.
- No marketing/promo notifications in V1.
- Store preferences in NotificationPreferences schema (§9.1) and log events (§9.2).

Testing:
- Implement automated/unit tests where possible and manual QA checklist for
AT-CH27-01..11.

If you must pick libraries:
- For React Native: use expo-notifications for local notifications; for push use
APNs or a push provider; keep the code modular to swap providers later.
- For native iOS: use UNUserNotificationCenter.

Output:
- Provide a brief implementation plan, then implement incrementally: (a)
preferences storage, (b) settings UI, (c) scheduling engine, (d) deep-links, (e)
badges, (f) inbox push/fallback.
```

14. Troubleshooting playbook (developer + QA)

- **No notifications arrive**: check (1) system permission granted, (2) Pause all off, (3) category enabled, (4) device not in quiet hours, (5) scheduled notifications present in debug view.

- **Notifications arrive at wrong time**: verify time zone change logic ran on app open; verify quiet hours defer logic; verify DST edge handling.

- **Duplicate notifications**: verify scheduler is idempotent; ensure old pending requests are cancelled before re-scheduling; check unique identifiers per Type ID + context.

- **Push arrives but tap does nothing**: verify payload includes deep-link; verify router handles logged-out state and safe fallback.

- **Badge number feels wrong**: compare computed formula in §8.1; verify unread inbox count decrements on open; maintenance badge clears after user opens Maintenance tab that day.

- **User complains about spam**: inspect NotificationEventLog for rate-limit violations; confirm hard caps in §10.2 are enforced; consider increasing batching threshold.

- **App store review concerns**: confirm notifications are user-initiated reminders/transactional; confirm no deceptive or irrelevant messaging.