Functional Specification Document (FSD) — Project LENS (Texas V1)

Producto: AI Appraisal + On-site Verification + Certified Upgrade + Appraiser Network
Geo inicial: Texas
Pagador #1: Lender / Inversionista
Versión: FSD v1.0 (robusto, “build-ready”)

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0) Convenciones del documento

- **Must / Should / Could**: prioridad funcional.
- **Actor**: rol que ejecuta la acción.
- **Objeto**: entidad en sistema (Report, Job, Property, etc.).
- **Estados**: máquinas de estado explícitas para evitar ambigüedad.
- **SLA**: tiempos objetivo que deben ser medibles e instrumentados.

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1) Alcance y módulos del sistema

1.1 Módulos (Texas V1)

1. **Web App (Lender/Buyer)**: búsqueda, reportes, upgrades, tracking, pagos, export.
2. **Appraiser App/Portal (mobile-first)**: onboarding, jobs, captura de evidencia, notas, entrega, payouts.
3. **Admin Console**: gestión de jobs, tasadores, disputas, pricing, QA, analytics.
4. **Valuation & Report Engine**: ingestión data, comps, scoring, reporte HTML/PDF.
5. **Dispatch & Marketplace Engine**: matching, asignación, SLA, reintentos, geofencing.
6. **Payments & Billing**: cobros a clientes, payouts a tasadores, invoices, refunds.
7. **Audit, Security & Anti-fraud**: logs, evidencias, verificación EXIF, flags.
8. **Notification Service**: email/SMS/WhatsApp (según decisión), in-app.

1.2 Fuera de alcance (no Texas V1)

- US-wide day 1
- Marketplace DD abierto público (solo “placeholder” de arquitectura)
- Insight suite completa (solo “beta closed feature flag”)
- Integraciones bancarias profundas (LOS, appraisal management companies, etc.)

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2) Actores, permisos y RBAC

2.1 Roles

- **Client (Lender/Investor)**: paga, genera reportes, crea jobs, recibe entregables.
- **Client Team Member**: colabora, ve reportes según permisos.
- **Property Access Contact** (externo): coordina acceso (sin cuenta o con “magic link”).
- **Appraiser**: acepta jobs, inspecciona, sube evidencia, firma (si aplica).
- **Admin (Ops)**: monitorea SLA, reasigna, revisa, gestiona disputas.
- **Admin (Finance)**: payouts, refunds, reconciliación.
- **Admin (Super)**: pricing rules, feature flags, permisos.

2.2 Permisos (resumen)

- Client: CRUD sobre **Orders** y lectura sobre **Reports** propios; export.
- Appraiser: lectura/escritura solo en **Jobs asignados/aceptados**.
- Admin: lectura global; acciones por política.
- Property Contact: solo “confirmar cita / acceso / instrucciones” (limitado).

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3) Objetivos no funcionales y SLAs

3.1 SLAs target (Texas V1)

- **AI Report Generation**: P95 < 5 min (aspiracional P95 < 2 min)
- **On-site Dispatch**: asignación inicial < 10 min (condados piloto)
- **On-site Completion**: 48h objetivo (con ventanas programables)
- **Certified Upgrade**: 72h objetivo (según disponibilidad/condado)
- **Uptime**: 99.5% (V1)
- **Evidence Integrity**: 100% evidencias con timestamp + job_id + uploader_id; geotag “best effort”

3.2 Seguridad

- En tránsito: TLS
- En reposo: cifrado
- Logs: append-only
- Accesos: RBAC + expiración de sesiones + 2FA para Admin

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4) Entidades de datos (modelo lógico)

Campos mínimos; se pueden ampliar en implementación.

4.1 User

- id, role, name, email, phone
- org_id (para clientes)
- status (active/suspended)
- created_at, last_login

4.2 Organization (Client)

- id, name, billing_profile_id
- plan (payg/pro/enterprise)
- seats, permissions_template

4.3 Property

- id
- address_full, county, state, zip
- geo_lat, geo_lng
- property_type (SFR/Condo/Townhome/Commercial/Land)
- parcel_id (si aplica)
- created_by, created_at

4.4 AppraisalRequest (AI)

- id, org_id, property_id
- purpose (underwriting/loan/buy/sell/refi/other)
- requested_by
- status: `QUEUED | RUNNING | READY | FAILED | EXPIRED`
- report_id (si READY)
- inputs_snapshot (json)
- created_at, completed_at

4.5 Report

- id
- version (int)
- type: `AI_REPORT | AI_REPORT_WITH_ONSITE | CERTIFIED_APPRAISAL`
- value_estimate, value_range_min/max
- fast_sale_estimate (<=90d)
- confidence_score (0–100)
- comps (array)
- adjustments_summary
- risk_flags (array)
- sources (array)
- html_url, pdf_url
- generated_at
- locked (bool) (true para final certified)

4.6 Job (On-site / Certified)

- id
- job_type: `ONSITE_PHOTOS | CERTIFIED_APPRAISAL`
- property_id, org_id, request_id (optional), report_id (optional)
- scope (checklist + min_photos + areas)
- access_contact (name, phone, email)
- scheduling_window (start/end)
- address_instructions
- payout_amount, platform_fee
- status (ver sección 6)
- assigned_appraiser_id (nullable)
- sla_due_at
- created_at, updated_at

4.7 Evidence

- id, job_id
- media_type: `PHOTO | VIDEO | AUDIO | NOTE_TEXT`
- file_url
- exif_json (nullable)
- captured_at, uploaded_at
- geo_lat/lng (nullable)
- integrity_hash
- flags (array)

4.8 AppraiserProfile

- user_id
- license_type, license_state
- license_number, license_expiry
- verification_status: `PENDING | VERIFIED | REJECTED`
- coverage_radius_miles, home_base_lat/lng
- supported_job_types
- bank_panels (array, optional)
- rating, completed_jobs

4.9 Payment

- id
- org_id, user_id
- type: `CHARGE | REFUND | PAYOUT`
- provider_ref
- amount, currency
- status: `PENDING | SUCCEEDED | FAILED`
- created_at

4.10 Dispute / Ticket

- id, org_id
- related_job_id/report_id
- category, description
- status: `OPEN | IN_REVIEW | RESOLVED | REJECTED`
- resolution_notes

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5) Flujos funcionales (end-to-end)

5.1 Flujo A — AI Appraisal (core)

Actor: Client
Entrada: address/parcel + property type + purpose
Salida: Report (AI_REPORT) + PDF/Link

Steps

1. Client ingresa dirección (autocompletar) o parcel_id.
2. Sistema valida: Texas, condado soportado, tipo.
3. Se crea **AppraisalRequest** status QUEUED.
4. Engine ejecuta:
    - normaliza address
    - obtiene propiedad/parcel
    - obtiene comps + aplica scoring
    - calcula estimaciones + rangos
    - genera risk flags
    - arma reporte HTML + PDF
5. Request → READY y retorna Report.
6. Client:
    - visualiza reporte
    - exporta PDF
    - comparte link (con permisos)
    - solicita upgrades.

Reglas

- Must: mostrar **confidence score** + explicación mínima.
- Must: mostrar **fast-sale estimate (<=90 días)** como alternativa.
- Must: citar fuentes (a nivel “tipo de fuente”; no exponer keys internas).

Errores

- Address no encontrado → sugerir alternativas.
- Condado no soportado → “join waitlist” + capture email.

- Engine failure → retry automático + ticket admin si persiste.

5.2 Flujo B — Upgrade: On-site Photos + Notes

Actor: Client → Appraiser → Admin (si hay excepciones)
Salida: Report actualizado (AI_REPORT_WITH_ONSITE) + Evidence

Steps

1. Desde Report: “Order on-site verification”.
2. Client configura:
    - scope (interior/exterior)
    - **fotos mínimas por área**
    - notas requeridas (smell/mold/damage etc.)
    - contacto de acceso + ventana horaria
3. Sistema calcula precio (base + condado + urgencia).
4. Client paga.
5. Sistema crea **Job ONSITE_PHOTOS** status REQUESTED, SLA.
6. Dispatch:
    - elige pool de tasadores elegibles por radio + rating + disponibilidad
    - envía oferta (push/in-app)
7. Appraiser acepta → status ACCEPTED.
8. Appraiser programa llegada (ETA), contacta access_contact (opcional).
9. Appraiser realiza inspección:
    - captura fotos guiadas (checklist)
    - notas por voz/texto
    - submit
10. Sistema valida evidencia:

- EXIF si disponible
- timestamp
- duplicados
- geo “best effort”

11. Job → SUBMITTED → DELIVERED.
12. Engine genera “report addendum” y actualiza Report version+1.
13. Payout: se programa pago al tasador (post-QA si aplica).

Reglas

- Must: checklist mínimo por property type.
- Must: requerir confirmación de “acceso autorizado” (checkbox + nombre).
- Should: permitir rework si faltan fotos.

Casos especiales

- Nadie acepta en X minutos → boost payout o expandir radio.

- Access contact no responde → job ON_HOLD + notifica cliente.
- Evidencia sospechosa → flag + QA admin antes de payout.

5.3 Flujo C — Upgrade: Certified Appraisal (cuando aplique)

Actor: Client → Appraiser → Admin QA
Salida: Report final CERTIFIED_APPRAISAL (locked) + audit trail

Steps

1. Desde Report o desde cero: “Order certified appraisal”.
2. Client define:
    - banco/panel requerido (si aplica)
    - propósito (loan/refi)
    - fecha límite
    - contacto acceso
3. Sistema:
    - calcula precio + SLA
    - cobra
    - crea Job CERTIFIED_APPRAISAL
4. Dispatch matching:
    - must: appraisers VERIFIED
    - should: panel requerido (si se selecciona banco)
5. Appraiser:
    - inspección + fotos + notas
    - revisa draft pre-generado por AI
    - corrige/ajusta
    - firma/attest
6. Admin QA (must en piloto):
    - verifica checklist
    - valida integridad de evidencia
7. Report locked y entregado.

Reglas

- Must: separar “AI informational” vs “certified signed”.
- Must: versionado y bloqueo final.
- Must: auditar quién cambió qué (diff o logs de edits).

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6) Máquinas de estado

6.1 AppraisalRequest status

- QUEUED → RUNNING → READY
- RUNNING → FAILED (retryable)
- READY → EXPIRED (si link/artefacto vence)

Reglas

- Retry automático 2–3 veces en FAILED con backoff.
- Si FAILED persiste → ticket admin.

6.2 Job status (ONSITE / CERTIFIED)

`REQUESTED → OFFERED → ACCEPTED → SCHEDULED → IN_PROGRESS → SUBMITTED → (QA_REVIEW) → DELIVERED → CLOSED`

Estados alternos:

- `REQUESTED → CANCELLED` (antes de ACCEPTED)
- `ACCEPTED → NO_SHOW` (si no cumple)
- `IN_PROGRESS → ON_HOLD` (acceso bloqueado)
- `SUBMITTED → REWORK_REQUESTED` (faltantes)
- `ANY → DISPUTED`

SLA handling

- SLA timers por estado (ej. REQUESTED->ACCEPTED 30m; ACCEPTED->SUBMITTED 48h)
- Auto-escalate a Admin si se rompe SLA.

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7) Requerimientos funcionales por módulo

7.1 Web App (Client)

7.1.1 Autenticación

- Must: email + magic link / password (decisión de producto)
- Should: 2FA para roles sensibles (org admin)
- Must: invite team members con permisos.

7.1.2 Home / Dashboard

- Must:
  - “Run new appraisal”
  - lista de reportes recientes

    - jobs activos con estado/SLA
- Should:
    - filtros por condado, tipo, estado
    - favoritos

7.1.3 Run Appraisal

- Must:
    - address autocomplete
    - property type selector
    - purpose selector
    - confirmación de Texas/condado
- Should:
    - opción “I have parcel_id”
    - upload docs (fase)

7.1.4 Report Viewer

- Must:
    - Value estimate + range
    - Fast-sale estimate (90d)
    - Confidence + “why”
    - Comps table + mapa
    - Risk flags
    - Sources list
    - Download PDF
    - Share link (expirable)
    - CTA upgrades
- Should:
    - toggles: conservative/aggressive assumptions
    - “notes for underwriting” field

7.1.5 Upgrade Ordering (On-site / Certified)

- Must:
    - scope configurator
    - access contact + scheduling window
    - pricing breakdown
    - checkout
- Should:
    - urgency toggle (affects price + dispatch radius)

7.1.6 Job Tracking

- Must:
    - timeline + estado
    - SLA countdown
    - contact support

- Should:
    - chat with appraiser (proxy via platform)
    - reschedule request

7.1.7 Billing

- Must:
    - invoices/receipts
    - payment methods
- Should:
    - subscription management
    - packs de créditos

7.2 Appraiser App/Portal

7.2.1 Onboarding

- Must:
    - create account
    - upload license info
    - accept terms
    - set home base + radius
    - set availability
- Must: verification status gating (no jobs hasta VERIFIED)
- Should:
    - in-app checklist de documentos (W-9 etc.)

7.2.2 Job Feed

- Must:
    - lista de ofertas (con distancia, payout, SLA)
    - accept/decline
- Should:
    - auto-expire offers
    - “busy mode”

7.2.3 Job Detail

- Must:
    - address + map + directions
    - scope checklist (photos required)
    - access contact + call button
    - notes field
    - start job / end job

- Should:
    - schedule ETA + message template

7.2.4 Evidence Capture

- Must:
    - camera inside app
    - orden por checklist (Room/Area)
    - min photos enforcement
    - voice-to-text notes
    - submit package
- Should:
    - offline mode “store then upload”
    - duplicate detection warning

7.2.5 Certified Editing (si job_type CERTIFIED)

- Must:
    - ver draft del reporte
    - editar secciones permitidas
    - firmar/attest
- Should:
    - change log visible

7.2.6 Earnings / Payouts

- Must:
    - earnings ledger
    - payout schedule
    - tax forms placeholder
- Should:
    - instant payout (fase)

7.3 Admin Console

7.3.1 Ops Dashboard

- Must:
    - jobs por estado
    - SLA breaches
    - unassigned jobs
    - flags antifraude
- Must: reasignación manual

7.3.2 Appraiser Management

- Must:
  - verificar tasadores (approve/reject)
  - suspender/reactivar
  - ver historial + rating
- Should:
  - panel por banco/condado

7.3.3 Pricing Rules

- Must:
  - base price por job type
  - multiplicadores por condado/urgencia
  - payout splits
- Should:
  - surge pricing automático si baja acceptance rate

7.3.4 QA & Disputes

- Must:
  - revisar evidencias
  - solicitar rework
  - abrir/cerrar disputas
- Should:
  - plantillas de resolución

7.3.5 Report QA (piloto)

- Must:
  - ability to view AI report + evidence
  - flag inaccuracies
- Could:
  - “human review” add-on

7.4 Valuation & Report Engine

7.4.1 Data ingestion

- Must:
  - geocoding + normalización address
  - parcel & property facts (cuando existan)
  - comps retrieval
  - imagery retrieval (satélite/street si aplica)

- Should:
    - caching por address
    - incremental updates

7.4.2 Comps selection

- Must:
    - regla por proximidad y recencia
    - filtro por tipo
    - outlier handling
- Should:
    - similarity score explicable

7.4.3 Valuation output

- Must:
    - estimate + range
    - fast-sale estimate (liquidez)
    - confidence score
- Should:
    - scenario outputs (conservative/base)

7.4.4 Report builder

- Must:
    - HTML report (web)
    - PDF generation
    - appendix (sources, comps)
- Must:
    - versioning
    - immutable final certified report

7.5 Dispatch Engine

7.5.1 Matching rules

- Must:
    - within radius
    - verified appraisers only
    - exclude suspended
- Should:
    - prioritize highest ETA reliability
    - bank panel match (certified)
    - fairness rules

7.5.2 Offer lifecycle

- Must:
  - offer TTL (ej. 2 min)
  - cascade to next appraiser
- Should:
  - dynamic payout bump if no acceptance

7.6 Payments & Billing

7.6.1 Client charges

- Must:
  - checkout
  - payment method storage
  - invoice generation
- Must: refund workflow

7.6.2 Appraiser payouts

- Must:
  - hold period (piloto) hasta QA pass
  - payout status
- Should:
  - payout batching semanal

7.7 Notifications

- Must:
  - email/SMS al cliente en hitos: report ready, job accepted, delivered, SLA breached
  - push/app para tasador: offer, reminders
- Should:
  - templates configurables (Admin)

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8) UX Screens (lista completa de pantallas)

Client Web

1. Login
2. Dashboard
3. Run Appraisal (form)
4. Appraisal Processing (progress)
5. Report Viewer (web)
6. Share Link Modal
7. Order On-site (scope + schedule)
8. Order Certified (bank/panel)
9. Checkout
10. Job Tracking
11. Billing & Invoices
12. Team & Permissions
13. Support/Disputes

Appraiser

1. Signup / Login
2. Verification upload
3. Availability + radius
4. Job Feed
5. Job Detail
6. Evidence Capture (checklist)
7. Notes (voice/text)
8. Submit
9. Earnings
10. Profile/settings

Admin

1. Ops Dashboard
2. Job Detail + Reassign
3. Appraiser Verification queue
4. Pricing Rules
5. Disputes
6. Fraud Flags review
7. Reports review

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9) Reglas de negocio (Business rules)

9.1 Pricing

- Base price por job_type
- Multiplicadores:
    - county difficulty
    - urgency

    - property type complexity
- Split:
    - platform_fee + appraiser_payout
- Minimum payout garantizado para asegurar acceptance rate.

9.2 Cancelaciones

- Antes de ACCEPTED: refund full – processing fee (configurable)
- Después de ACCEPTED: parcial según “time spent”
- No-show por access_contact: fee configurable

9.3 Rework

- 1 rework incluido si faltan fotos requeridas
- rework adicional: fee o impacto rating tasador (según causa)

9.4 Rating tasador

- Score por:
    - SLA compliance
    - completeness
    - dispute rate
    - client feedback

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10) Instrumentación y analítica (eventos)

Eventos mínimos

- appraisal_requested
- appraisal_ready
- report_viewed
- upgrade_clicked
- job_created
- job_offered
- job_accepted
- job_scheduled
- evidence_uploaded
- job_submitted
- job_delivered
- dispute_opened
- payout_initiated

Dashboards

- Supply health (acceptance rate, coverage)

- SLA compliance por condado
- Revenue by module
- Conversion AI → on-site → certified

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11) Casos borde (Edge cases)

1. Dirección ambigua → confirmación en mapa.
2. Condado no soportado → waitlist.
3. Usuario no-owner pide inspección → requiere access_contact y “authorization attestation”.
4. Appraiser sin señal → offline capture.
5. Fotos sin EXIF → permitir pero flag.
6. Evidence duplicada → warning + flag.
7. Múltiples requests mismo address → cache + version.
8. Disputa por “valor incorrecto” → policy: AI informational (no garantía), certified con proceso formal.

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12) Feature Flags (para manejar scope)

- `INSIGHTS_BETA`
- `DD_MARKETPLACE_BETA`
- `CERTIFIED_ENABLED_BY_COUNTY`
- `SURGE_PRICING_ENABLED`
- `OFFLINE_CAPTURE_ENABLED`

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13) Criterios de aceptación (Definition of Done)

Para Texas V1

- AI report end-to-end funcionando con PDF y share.
- On-site job end-to-end con dispatch, evidencia y addendum.
- Certified job end-to-end con verificación tasador, firma y reporte locked.
- Admin puede operar SLA y reasignación.
- Payments + payouts en producción (piloto controlado).
- Logs + antifraude mínimo implementado.

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14) Backlog de V2 (para no perderlo)

- US expansion (multi-state compliance)
- Insights subscription full
- DD Marketplace abierto
- Integraciones con LOS/underwriting tools
- Automated bank panel mapping
- “Fast sale” model calibrado por micro-mercado

Si quieres, el siguiente paso natural (sin que me tengas que repetir nada) es que te entregue el **UX/UI Specification Document** con:

- user journeys,
- pantallas por estado,
- componentes UI,
- copy base,
- y reglas de validación por campo (address, schedule, checklist, etc.).