QuantumSpectra — Platform domain report

Hyperspectral imaging × quantum-enhanced AI × satellite feeds × structural simulation × custodial blockchain finance — one platform for sustainable agriculture and earthquake-safe urban development.

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Domains

#	Domain	Tagline
1	Identity, Wallet & Ledger backbone	Every domain plugs into the same account, custodial wallet, hash-anchor ledger and role model.
2	Hyperspectral scans, certificates & Safety Registry	Upload a cube or scene → indices, pesticide/MRL fingerprint, carbon credit or TBDY 2018 risk → certificate → public registry.
3	İmece Commons — farm-to-fork market	Coops list provenance-backed lots inside fair price bands; orders, levies, inspections and anomalies are anchored and audited.
4	Collective Farming Pilot · CSA · budget tracker	One parameterised model drives 19 programme documents, the CSA, pickups, reminders and the budget-vs-actuals tracker.
5	3-stage Quality QR passport & stall scanner	Soil → raw produce → processed product: three graded scans, safety blockers, one QR; shoppers verify, rate and rank hubs.
6	God's Eye — Justice Index	Evidence from every domain is scored into four fairness pillars per city; citizens attest or dispute; Claude explains.
7	Renewal Finance — earthquake-safe rebuild bonds	Case → appraisal → ML risk → underwriting → tradable renewal bond → staged draws → monthly coupons → retrofit schemes.
8	Social Housing & Sustainable Donations	Municipal sites funded by wallet donations and pledges, allocated by a transparent need score, leased with anchored rent.
9	9D BIM Tender Feasibility	Parse the IFC, score nine BIM dimensions, publish an auditable, anchored feasibility PDF.
10	Rural Health research screening	Hyperspectral screening → triage → referral → outcome; verification loop, cohort model, follow-ups and equity alerts.
11	Sustainable Mining & Kastamonu province	Satellite + hyperspectral surveys, tailings/AMD alerts, critical-raw-material engineering, drill plans and a province report.
12	Micronutrients, seed registry & value chains	Seed lots to TTSM criteria, MAP quality, hemp & saffron value-chain planning, buyer bids and live prices.
13	AI assistants, quantum & external integrations	Claude Sonnet 5.5 / Opus 5.5 via the Emergent Universal Key for streaming assistants, explainers and translations; keyless public data; optional IBM Quantum.
14	Disaster Governance — extreme scenarios on updatable 3D terrain	Wildfire, flood and landslide scenarios on a live-fetched, municipality-patchable DEM; district risk tables, pond siting, comparative mitigation analysis, anchored decisions.

Node legend

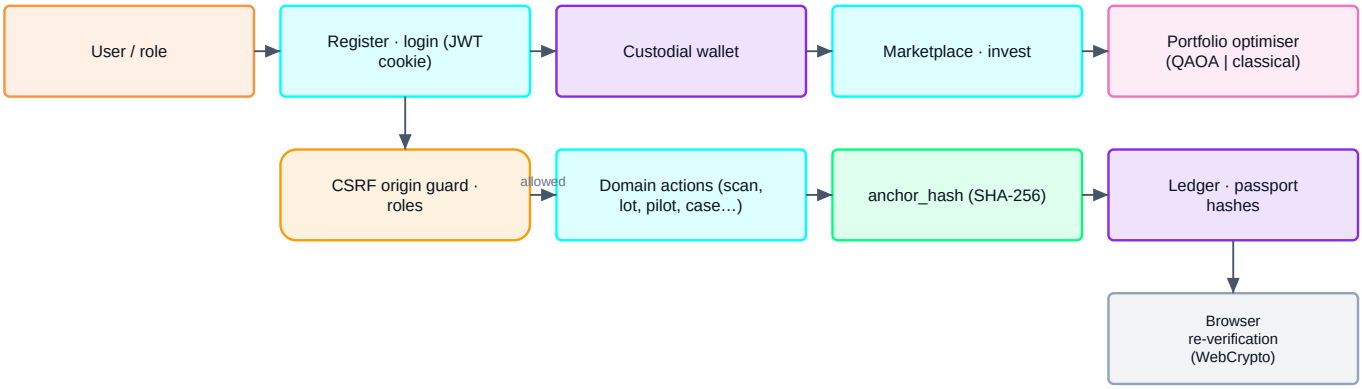
actor	actor / role
process	process
data	data / collection
decision	decision
anchor	anchored record
external	external service / cron
output	output (PDF, e-mail, page)

Identity, Wallet & Ledger backbone

Every domain plugs into the same account, custodial wallet, hash-anchor ledger and role model.

Users register with a role (farmer, cooperative, public authority, inspector, health worker, collective executive, admin, public viewer…). A custodial wallet (TRY balance, carbon credits, certificates) is created at sign-up; JWT sessions ride an httpOnly cookie with a CSRF origin guard. Every consequential record — scans, lots, trades, inspections, pilot inputs, pickups, closes — is SHA-256 anchored and the ordered anchors form passport hashes anyone can recompute in the browser. The ledger, marketplace listings and portfolio optimiser (classical or IBM Quantum QAOA when a token is present) sit on top.

Flowchart



Actors	All roles · Admin (seeded)
Pages	/login · /register · /wallet · /ledger · /marketplace · /dashboard
Collections	users (wallet.try_balance, carbon_credits), login_attempts, certificates, carbon_records, marketplace, investments, ledger, quantum_jobs
Integrations	JWT + bcrypt (auth) · Fernet-encrypted custodial keys · IBM Quantum Runtime REST (optional token; simulator fallback) · Resend e-mail
Anchored	wallet creation · every mint (certificate / carbon credit) → tx hash · ledger entries · all domain records via anchor_hash()
Live counts	accounts: 46 · ledger entries: 5 · certificates: 56 · listings: 3

Key endpoints

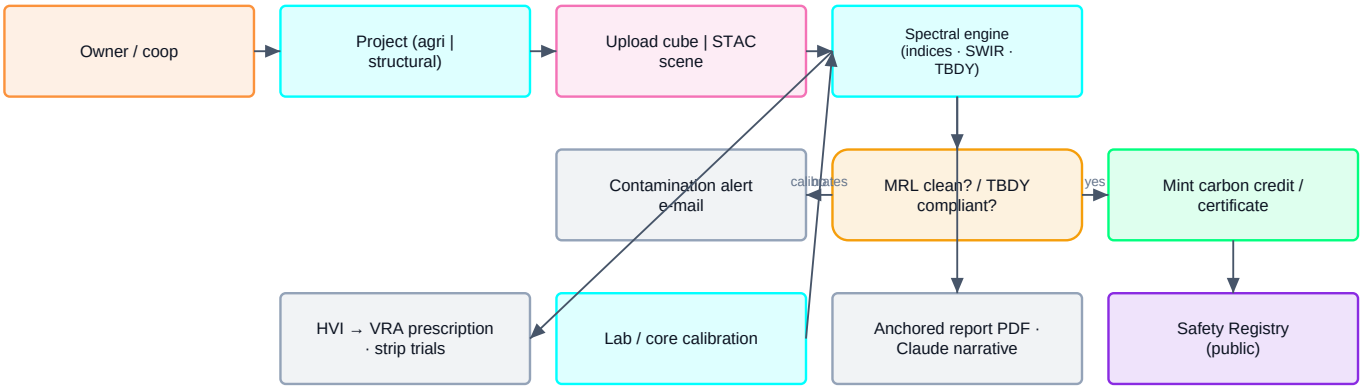
```
POST /api/auth/register · login · logout
GET /api/auth/me
GET /api/wallet
GET /api/ledger
GET/POST /api/marketplace
POST /api/marketplace/{id}/invest
POST /api/marketplace/optimize
GET /api/quantum/status · /jobs
GET /api/stats/public
```

Hyperspectral scans, certificates & Safety Registry

Upload a cube or scene → indices, pesticide/MRL fingerprint, carbon credit or TBDY 2018 risk → certificate → public registry.

A project (agriculture or structural) receives an uploaded hyperspectral file or a live Sentinel-2 scene found through the Element84 STAC API. The spectral engine computes vegetation indices, crop health, SWIR residue fingerprints vs MRLs, nutrient passports (N·P·K via HVIs → variable-rate prescription), or — for buildings — material/soil/structural indicators scored against TBDY 2018. Clean farms mint zero-carbon credits; compliant buildings mint safety certificates; both land in the owner's wallet, the public Safety Registry and an anchored PDF. Lab assays and core tests calibrate the models. Spectral results are SIMULATED research-grade values until live sensors stream.

Flowchart



Actors	Farmer / building owner · Cooperative · Inspector · Analyst · Public (registry)
Pages	/dashboard · /projects/:id · /registry · /field
Collections	projects, scans, files (object storage), certificates, carbon_records, registry, strip_trials, calibrations, field_captures
Integrations	Element84 Earth Search STAC (Sentinel-2, no key) · Emergent object storage · Claude Sonnet 5.5 report narrative · Resend certificate / contamination alerts · IBM Quantum (optional)
Anchored	scan hash → scan_anchor · certificate tx hash · carbon credit tx hash · calibration records · registry entries
Live counts	projects: 41 · scans: 53 · registry entries: 22 · field captures: 6

Key endpoints

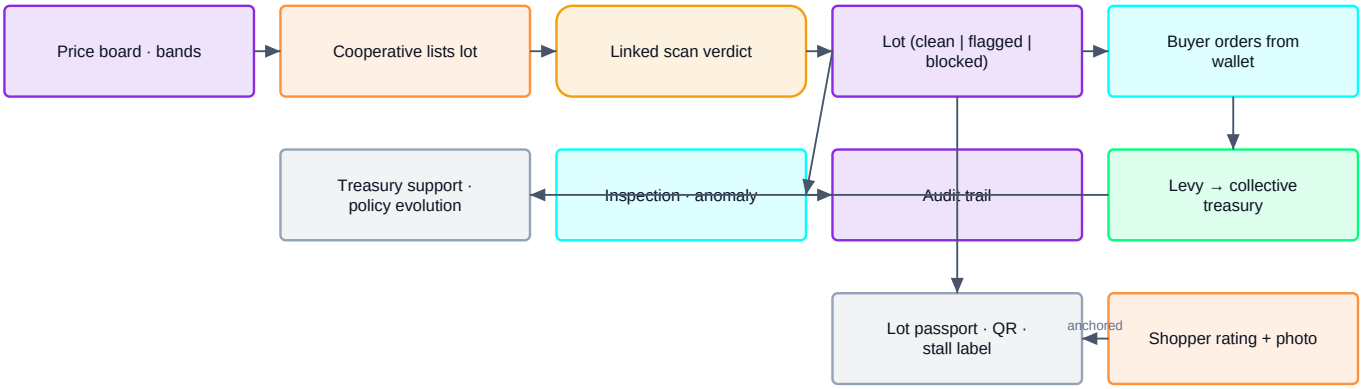
```
POST /api/projects · /upload · /projects/{id}/run
GET /api/scans/{id}/pdf
GET /api/satellite/search
GET /api/scans/{id}/hvi · prescription.geojson · taskdata.zip
POST/GET /api/scans/{id}/trials
POST /api/scans/{id}/nutrients/calibration · materials/calibration
GET /api/registry
POST/GET /api/field/captures
```

İmece Commons — farm-to-fork market

Coops list provenance-backed lots inside fair price bands; orders, levies, inspections and anomalies are anchored and audited.

Per city, a price board sets farmer-floor and consumer-ceiling bands from live reference prices. Cooperatives list lots (optionally linked to a hyperspectral scan → verdict verified clean / flagged / blocked), buyers order from their wallet, and a small levy feeds the collective treasury that auto-supports coops, forecasts and disburses by proposal. Inspectors file inspections; anomaly detection flags out-of-band prices and recalls; everything appears in the audit trail and the public lot passport (QR, stall label PDF, shopper ratings with photos). Farmer-linkage levers and the policy-evolution panel close the loop with municipalities.

Flowchart



Actors	Cooperative · Buyer (any user) · Inspector · Collective executive · Public shopper
Pages	/commons (tabs: prices, lots, coops, schedules, audit, treasury, linkage, policy) · /passport/:lotId
Collections	coops, lots, orders, price_changes, inspections, anomalies, treasury, treasury_proposals, lot_feedback, linkage_requests
Integrations	Live FX / reference prices (Frankfurter, no key) · Emergent object storage (feedback photos) · Claude Sonnet 5.5 explainers
Anchored	lot creation · price change · order (tx + levy) · inspection · anomaly · feedback (rating + photo SHA-256) · → passport hash
Live counts	lots: 23 · orders: 10 · inspections: 6 · cooperatives: 6

Key endpoints

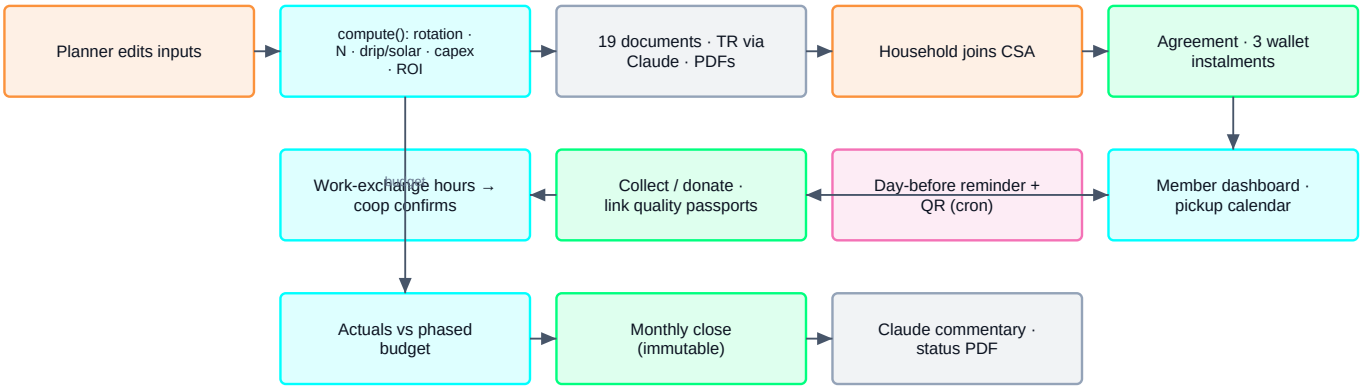
```
GET /api/commons/prices · /policy
GET/POST /api/commons/coops · /lots · PATCH /lots/{id}/price
POST /api/commons/orders
GET/POST /api/commons/inspections · GET /anomalies · /audit
GET /api/commons/treasury · /forecast · /avoided-costs · POST /treasury/disburse
GET /api/commons/passport/{lot} · qr.png · label.pdf · POST feedback
GET/POST /api/commons/linkage/requests
```

Collective Farming Pilot · CSA · budget tracker

One parameterised model drives 19 programme documents, the CSA, pickups, reminders and the budget-vs-actuals tracker.

Planners edit pilot inputs (Kastamonu — Taşköprü: 120 ha from 45 plots, Siyez / onion / salep split, members, solar kWp…). compute() derives rotation, nitrogen balance, drip/solar sizing, capex, ROI/NPV and the CSA box economics, so all 19 documents (legal, agronomy, infrastructure, economics, implementation, community, governance) always agree; Claude tailors narratives and translates to Turkish (cached, anchored). Households join the CSA from the handbook: anchored agreement, three wallet instalments relative to the join date, welcome e-mail. The member dashboard shows the pickup calendar; day-before reminders carry a signed QR that confirms collection in one tap and links the box to its quality passports; work-exchange hours are logged and coop-confirmed. Planners and coops log actuals against the phased budget, close months (immutable, anchored), request Claude variance commentary and export the status-report PDF.

Flowchart



Actors	Public authority / collective executive (planner) · Cooperative · CSA member household · Public (docs)
Pages	/commons → Pilot programme · /commons/member · /pickup/:token
Collections	pilot_programme, pilot_versions, pilot_tailored, pilot_translations, pilot_members, pilot_csa_ledger, pilot_pickups, pilot_pickup_reminders, pilot_hours, pilot_member_briefs, pilot_actuals, pilot_actuals_closes, pilot_actuals_commentary
Integrations	Claude Sonnet 5.5 (tailor, brief, commentary, doc Q&A) · Opus 5.5 (long docs, translation) · Resend (welcome, pickup reminders) · ECB FX (EUR capex) · Platform cron pickup-reminders (daily)
Anchored	inputs version · document anchor · translation · CSA agreement + instalment tx · pickup (collect/skip/qr) · hours + confirmation · reminder dispatch · actuals entry · monthly close · commentary
Live counts	CSA members: 0 · pickups recorded: 0 · TR translations: 0 · actual entries: 60

Key endpoints

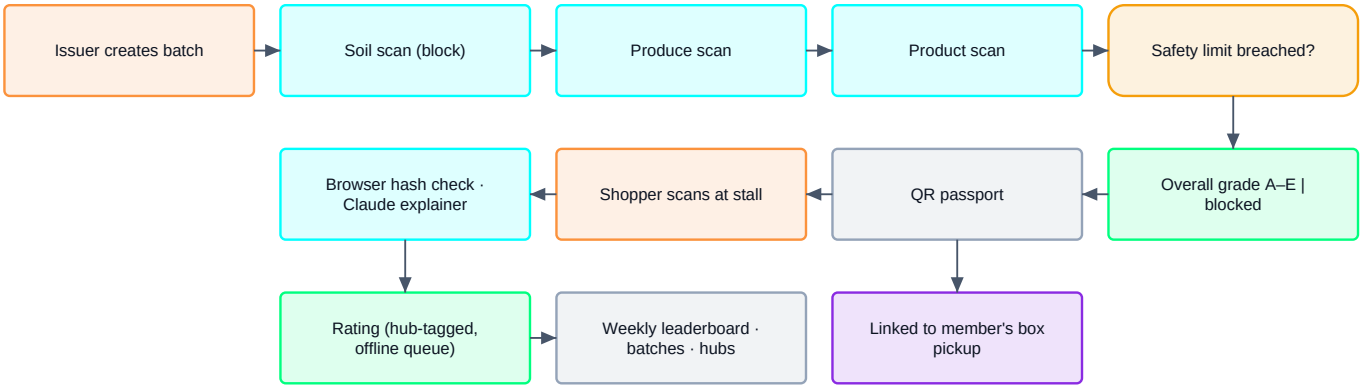
```
GET /api/pilot · PUT /inputs
GET /api/pilot/docs/{id}?lang= · /pdf · /pack.pdf · POST /tailor · /ask (SSE)
GET /api/pilot/projection · POST /narrative
POST /api/pilot/members/join · GET /me · POST /me/pay/{n}
GET /api/pilot/members/me/dashboard · POST /me/pickups/{week} · /me/hours · /me/brief
GET/POST /api/pilot/members/pickups/confirm/{token} · reminders/run
GET /api/pilot/actuals · POST /entries · /close/{month} · /commentary · GET /report.pdf
```

3-stage Quality QR passport & stall scanner

Soil → raw produce → processed product: three graded scans, safety blockers, one QR; shoppers verify, rate and rank hubs.

Issuers (coop, inspector, farmer, executive) create a batch for Siyez, onion or salep from a pilot block. The spectral engine grades the block soil (SOC, pH, N/P/K, salinity, heavy metals), the raw produce (MRL, defects, maturity) and the processed product (moisture, purity/adulteration, mycotoxin proxy) A–E; any safety-limit breach blocks the batch regardless of score. Each stage and the batch are anchored into a passport hash. A shopper scans the QR at the stall (camera, manual code or photo), re-computes the hash in the browser, reads the Claude explainer, rates the batch (hub-tagged, offline-queued) — ratings join the chain and feed the weekly Bayesian leaderboard of batches, hubs and products. Scans are SIMULATED until sensor feeds exist.

Flowchart



Actors	Issuer (coop / inspector / farmer / executive) · Shopper (anonymous) · CSA member
Pages	/commons → Quality QR · /quality/:batchId · /quality/scan · /quality/leaderboard
Collections	quality_batches, quality_explanations, quality_feedback, quality_scans
Integrations	Claude Sonnet 5.5 explainer · jsQR camera decoding (browser) · WebCrypto SHA-256 (browser)
Anchored	batch creation · each stage scan hash · re-scan events · feedback events · → passport hash
Live counts	batches: 0 · shopper ratings: 0 · scan events: 0

Key endpoints

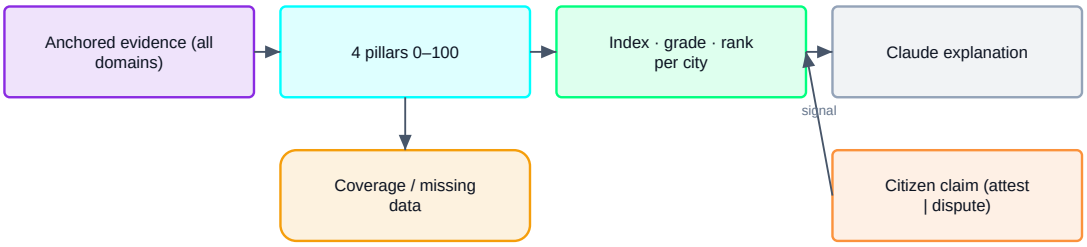
```
GET /api/quality/meta
POST /api/quality/batches · /batches/{id}/scan/{stage}
GET /api/quality/batches · /batches/{id} · qr.png
POST /api/quality/batches/{id}/explain · /feedback · /scan
GET /api/quality/leaderboard?window=
GET /api/quality/hubs · /hubs/{hub}/poster.pdf · POST /hubs/poster-pack/run · GET /hubs/poster-packs
```

God's Eye — Justice Index

Evidence from every domain is scored into four fairness pillars per city; citizens attest or dispute; Claude explains.

The Utopian-Revolutionary Justice Framework aggregates anchored evidence — clean food share, price-band compliance, building safety, housing allocation fairness, mining adoption attestations — into pillar scores (0–100), an index, a grade and a rank per city, with coverage flags for missing data. Anyone can file a claim (attest / dispute / allocation / mining) that becomes a legitimate signal; Claude Sonnet 5.5 renders a plain-language explanation of each verdict without authority voice.

Flowchart



Actors	Any citizen · Municipality · Planners
Pages	/justice
Collections	justice_claims, (reads: lots, orders, inspections, registry, social_housing, mining_sites …)
Integrations	Claude Sonnet 5.5 explainer
Anchored	claims (attest / dispute) · verdict hash
Live counts	claims: 41

Key endpoints

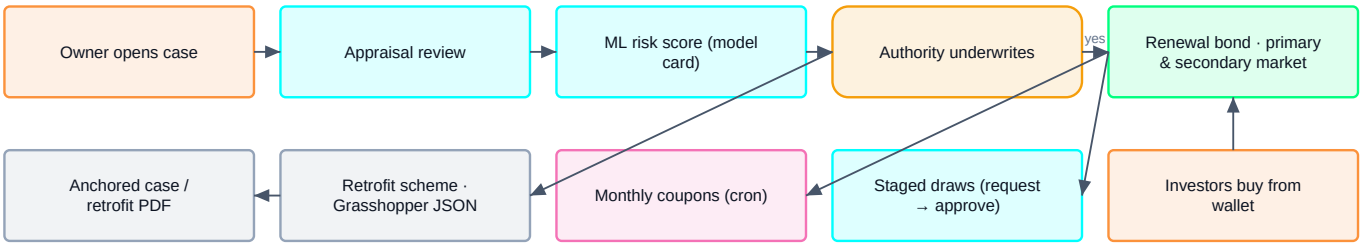
```
GET /api/justice/index
GET/POST /api/justice/claims
POST /api/justice/explain
```

Renewal Finance — earthquake-safe rebuild bonds

Case → appraisal → ML risk → underwriting → tradable renewal bond → staged draws → monthly coupons → retrofit schemes.

A building owner opens a renewal case; appraisers review, a transparent ML model scores risk (model card published), and the public authority underwrites. Investors buy bond units from their wallet on the primary and secondary market (orders book); contractors request staged draws that planners approve; a platform cron pays coupons monthly. Retrofit schemes (with Grasshopper JSON export) and anchored case/retrofit PDFs document each step; the pipeline map shows cases by city.

Flowchart



Actors	Building owner · Appraiser / inspector · Public authority (underwriter) · Investor · Contractor
Pages	/renewal
Collections	renewal_cases, bond_orders, bond_holdings, coupon_runs, retrofit_schemes, cron_runs
Integrations	Platform cron monthly-coupon-run (1st, 06:00 UTC) · numpy logistic model
Anchored	case · appraisal · underwriting · bond purchase / order fill · draw approval · coupon run
Live counts	cases: 19 · bond orders: 7 · cron runs: 2510

Key endpoints

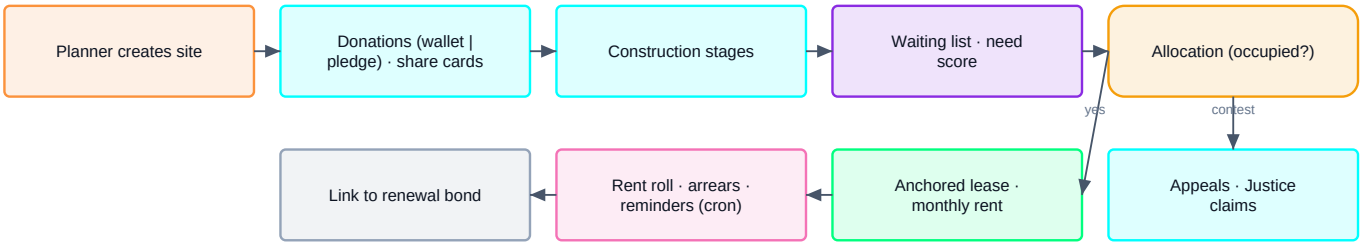
```
GET /api/renewal/pipeline · /cases · /map · /schemes
POST /api/renewal/cases · /appraisal/review · /underwrite
POST /api/renewal/cases/{id}/bond/invest · /bond/orders · /bond/orders/{id}/buy · GET /bond/market · /holdings
POST /draws/{stage}/request · /approve
GET /api/renewal/ml/model-card · POST /ml/refresh
GET /cases/{id}/report.pdf · /retrofit · /retrofit/report.pdf
POST /api/cron/coupon-run
```

Social Housing & Sustainable Donations

Municipal sites funded by wallet donations and pledges, allocated by a transparent need score, leased with anchored rent.

Planners create sites (TBDY 2018 standards, funding stack) and advance construction stages. Anyone donates from wallet or pledges (shareable QR cards and pages drive campaigns). Households apply to the waiting list with a need-based priority score (income, children, earthquake victim, disability…); allocation happens when a site is occupied, with appeals that planners resolve and Justice claims can contest. Tenants sign anchored leases, pay monthly rent from wallet; the rent roll tracks arrears, a cron sends reminders, and a site's rent can be linked to a renewal bond.

Flowchart



Actors	Public authority / executive (planner) · Donor (any user) · Household applicant / tenant · Public
Pages	/social-housing · /campaign/:siteId
Collections	social_sites, donations, waitlist, allocations, appeals, leases, rent_payments, rent_reminders
Integrations	Platform cron rent-reminders (5th, 06:30 UTC) · Resend
Anchored	site · donation · stage · waitlist application · allocation · appeal · lease · rent payment · reminder
Live counts	sites: 0 · donations: 0 · applications: 5 · leases: 0

Key endpoints

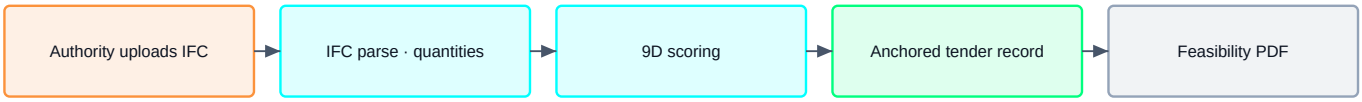
```
GET/POST /api/social-housing/sites · POST /sites/{id}/stage · /donate
GET /sites/{id}/share · qr.png · card.png
POST/GET /sites/{id}/waitlist · /allocate · /appeal · /resolve
POST /sites/{id}/lease/sign · /lease/pay · GET /rent-roll · POST /link-bond
POST /api/cron/rent-reminders
```

9D BIM Tender Feasibility

Parse the IFC, score nine BIM dimensions, publish an auditable, anchored feasibility PDF.

Public authorities upload an IFC model; the parser extracts quantities and systems, and the 9D engine scores geometry, time, cost, sustainability, facility management, safety, acoustics, lean/logistics and circularity. The tender record and its PDF are anchored so bidders and auditors see the same assessment.

Flowchart



Actors	Public authority · Bidders / public
Pages	/tenders
Collections	bim_tenders
Integrations	IFC parsing (ifcopenshell-style text parse)
Anchored	tender · PDF hash
Live counts	tenders: 0

Key endpoints

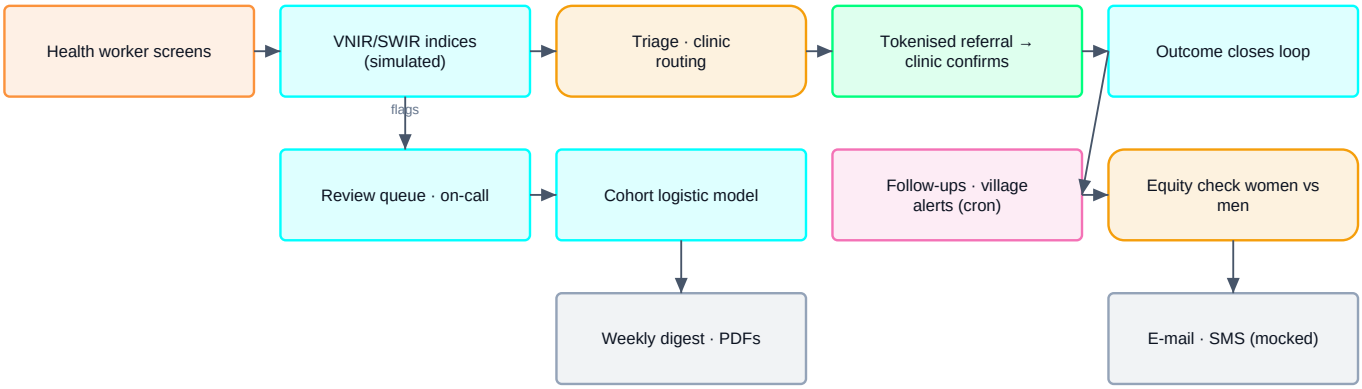
```
GET/POST /api/bim/tenders
POST /api/bim/ifc/parse
GET /api/bim/tenders/{id}/pdf
```

Rural Health research screening

Hyperspectral screening → triage → referral → outcome; verification loop, cohort model, follow-ups and equity alerts.

Health workers screen patients with VNIR/SWIR indices (SIMULATED research model, not a medical device), get a triage level and clinic routing, and send a tokenised referral the clinic confirms; outcomes close the loop. Flags (cross-track leakage, outliers, SWIR without cube) enter a review queue for the on-call clinician; a transparent logistic cohort model is trained per oncology track. Women's-health follow-ups and village trend alerts run on crons with e-mail (SMS is MOCKED until Twilio keys exist); equity checks compare women's vs men's loop closure. Field visits, referral PDFs and the weekly digest complete the workflow.

Flowchart



Actors	Health worker · Clinic (referral token) · On-call clinician · Admin
Pages	/health · /health/visits/:id · /referral/:caseId/:token
Collections	health_cases, health_referrals, review_queue, oncology_models, followups, equity_alerts, village_alerts, visits, sms_log (mocked)
Integrations	Claude Sonnet 5.5 case explainer · Resend · Twilio SMS (MOCKED — keys pending) · Platform crons daily-ops · weekly-ops · Emergent object storage (case photos, cubes)
Anchored	screening · referral token · outcome · review decision · model training · follow-up / visit
Live counts	cases: 19 · review items: 0 · field visits: 0

Key endpoints

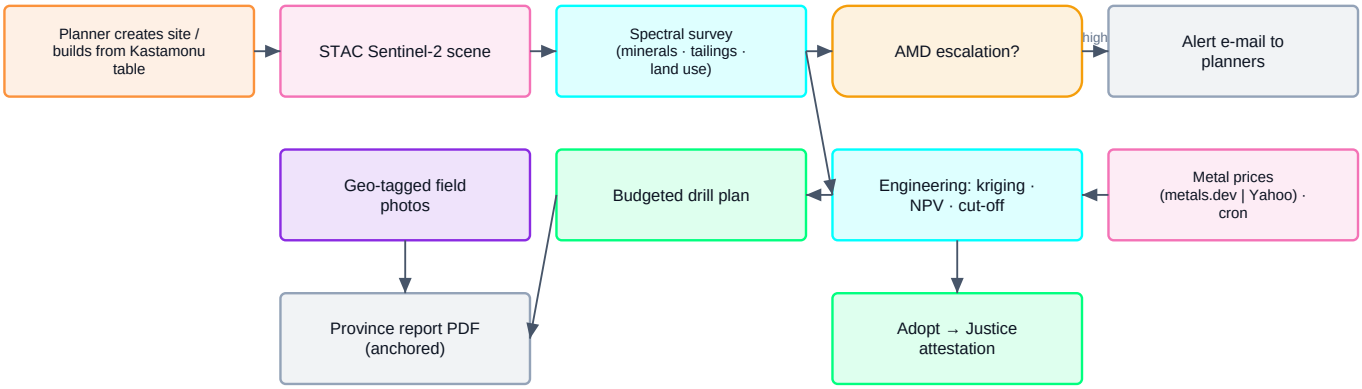
```
POST /api/health/screen · GET /cases · /cases/{id}/timeline · POST /outcome
GET/POST /api/health/referral/{case}/{token}(/confirm) · GET referral.pdf
POST /cases/{id}/cube · GET cube/verify · /sensors · /devices
GET/POST /api/health/oncology/queue · /oncall · /digest/send
POST /api/health/oncology/model/train · /cases/{id}/risk
GET /api/health/followups · /equity · /villages/trends · POST /visits
POST /api/cron/daily-ops · /weekly-ops (manual: /maternity-followups · /equity-check · /oncology-digest)
```

Sustainable Mining & Kastamonu province

Satellite + hyperspectral surveys, tailings/AMD alerts, critical-raw-material engineering, drill plans and a province report.

Sites are surveyed with Sentinel-2 scenes (STAC) plus a SIMULATED spectral model for minerals, tailings and land use; AMD escalation e-mails planners. The CRM inventory (Cu, Co, Au, Mn, Fe, Cr, magnesite…) feeds deterministic engineering — kriged resource classes, NPV at live metal prices (metals.dev if keyed, else keyless Yahoo + reference), cut-off and a budgeted next-N drill plan. The Kastamonu table and map layer let planners build sites from occurrences, sweep surveys, attach geo-tagged field photos (object storage) and publish the anchored province report PDF; adopting a site files a Justice attestation.

Flowchart



Actors	Planner (authority / executive) · Any user (survey, photos) · Public
Pages	/mining
Collections	mining_sites, mining_surveys, mining_engineering, mining_prices, mining_price_alerts, mining_sweeps, mining_photos, mining_province_reports
Integrations	Element84 STAC (Sentinel-2) · metals.dev (key pending) · Yahoo Finance fallback · Frankfurter FX · Emergent object storage (photos) · Claude Sonnet 5.5 site explainer (SSE) · Resend tailings / price alerts · Platform cron daily-ops (metals refresh)
Anchored	site · survey · engineering version · drill plan · sweep · photo (SHA-256) · province report (content hash)
Live counts	sites: 16 · surveys: 0 · field photos: 0

Key endpoints

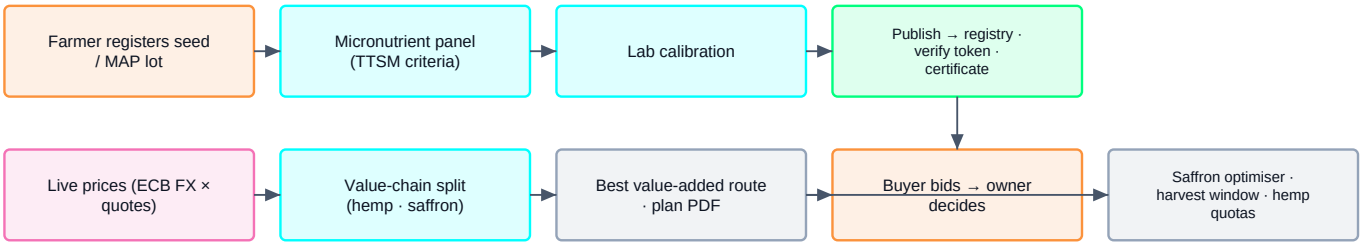
```
GET /api/mining/meta · /sites · /stats · POST /sites · /sites/{id}/survey · /adopt · PATCH /alerts
GET /api/mining/crm · /inventory · /prices · POST /prices/refresh
POST /sites/{id}/engineering · GET /drill-plan?budget_musd=
GET /api/mining/kastamonu-minerals · POST /{row}/site · /kastamonu/survey-sweep
GET/POST /kastamonu-minerals/{row}/photos
GET /api/mining/kastamonu/report.pdf · /sites/{id}/report.pdf
POST /api/cron/daily-ops (manual: /metals-refresh)
```

Micronutrients, seed registry & value chains

Seed lots to TTSM criteria, MAP quality, hemp & saffron value-chain planning, buyer bids and live prices.

Hybrid seed lots are registered against TTSM criteria with hyperspectral micronutrient panels, calibrated by lab assays, published to a public registry with a tokenised verification link and an anchored certificate PDF. For Kastamonu hemp and Safranbolu saffron the value-chain engine splits each lot into products, prices them from the live feed (ECB FX × reference quotes, overridable by community quotes) and recommends the highest value-added route; the saffron optimiser and Open-Meteo harvest window plan the season, district hemp quotas are tracked. Buyers post bids on registry lots and product splits; owners accept or decline.

Flowchart



Actors	Farmer / cooperative · Lab · Buyer (public bids) · Executive
Pages	/micronutrients · /seed/:lotId/:token · /offers
Collections	micro_lots, micro_calibrations, micro_registry, price_quotes, bids, hemp_quotas
Integrations	Frankfurter ECB FX (no key) · Open-Meteo weather (no key) · Resend bid notifications
Anchored	lot · calibration · publish · certificate · bid decision
Live counts	lots: 0 · bids: 0 · community quotes: 0

Key endpoints

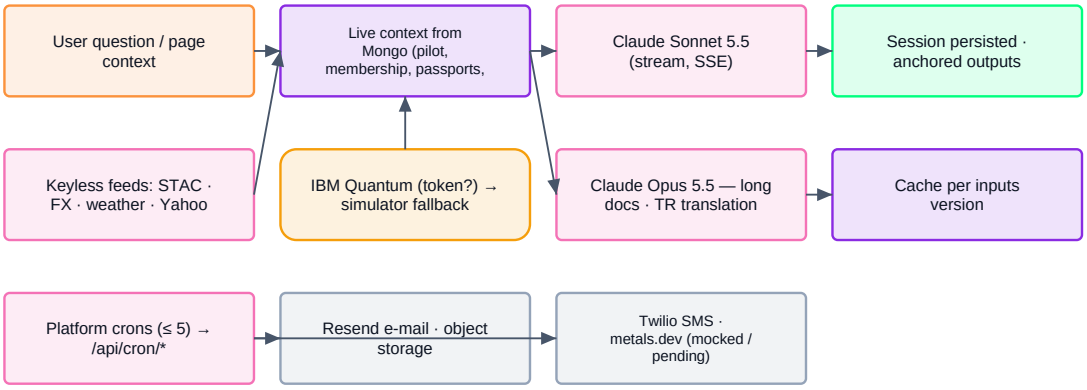
```
GET /api/micro/catalog · POST /lots · /lots/{id}/calibration · /publish · GET /registry ·
/verify/{lot}/{token} · certificate.pdf
GET /api/micro/lots/{id}/value-chain · /plan · /plan.pdf
GET /api/micro/prices · POST /quotes
GET /api/micro/offers · POST /bids · /bids/{id}/{decision}
GET /api/micro/saffron/optimize · /harvest-window · /hemp/quotas · /hemp/flow
```

AI assistants, quantum & external integrations

Claude Sonnet 5.5 / Opus 5.5 via the Emergent Universal Key for streaming assistants, explainers and translations; keyless public data; optional IBM Quantum.

All narrative AI runs through emergentintegrations with the Universal Key: Sonnet 5.5 for quick grounded narratives (İmece assistant with live context and persisted sessions, Ask-the-Analyst, document Q&A, quality explainer, member brief, variance commentary, projection narrative) and Opus 5.5 for long documents and Turkish translations (cached per inputs version, anchored). Keyless public feeds supply satellite scenes (STAC), FX (Frankfurter), weather (Open-Meteo) and metal prices (Yahoo fallback). Resend delivers all e-mail; Emergent object storage holds photos, cubes and files. IBM Quantum runs via the Qiskit Runtime REST API only when a valid token is configured (simulator fallback otherwise); Twilio SMS and metals.dev stay mocked / fallback until keys arrive. Five platform crons (max) drive the work: pickup reminders (daily), a daily ops bundle (women's-health follow-ups · metals refresh · seasonal trial reminders), a Monday ops bundle (equity + village checks · oncology digest · stall poster pack), monthly coupons and rent reminders.

Flowchart



Actors	Every user (assistant) · Planners (narratives) · Platform (crons)
Pages	Floating İmece assistant on Commons / Quality / Member pages · /dashboard Ask the Analyst
Collections	assistant_sessions, chat_history, pilot_translations, pilot_tailored, quality_explanations, cron_runs
Integrations	Claude Sonnet 5.5 & Opus 5.5 (Emergent Universal Key) · Resend e-mail · Emergent object storage · Element84 STAC · Frankfurter ECB FX · Open-Meteo · Yahoo Finance (fallback) · IBM Quantum Runtime REST (optional) · Twilio SMS (MOCKED) · metals.dev (pending key)
Anchored	translations · tailored narratives · explanations · commentary · cron run records
Live counts	assistant sessions: 0 · cached translations: 0 · cron runs: 2510

Key endpoints

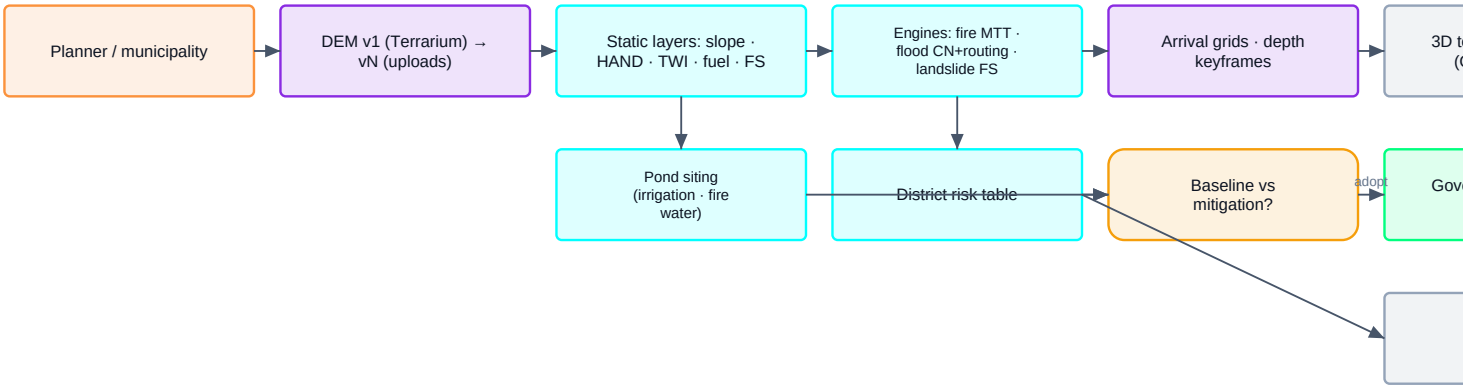
```
POST /api/assistant/chat (SSE) · GET/DELETE /sessions/{id}
POST /api/chat/stream · GET /history
POST /api/pilot/docs/{id}/ask (SSE) · /tailor · /translations/warm
POST /api/quality/batches/{id}/explain
POST /api/mining/sites/{id}/explain (SSE)
POST /api/cron/* (Bearer WEBHOOK_CRON_SECRET)
```

Disaster Governance — extreme scenarios on updatable 3D terrain

Wildfire, flood and landslide scenarios on a live-fetched, municipality-patchable DEM; district risk tables, pond siting, comparative mitigation analysis, anchored decisions.

Planners pick a preset (Kastamonu province ≈ 1 km cells, Kastamonu city basin ≈ 115 m) or any Türkiye bounding box; elevation is fetched from free AWS Terrarium tiles (Copernicus GLO-30 derived), cached and stored as a versioned DEM that can be patched with an uploaded XYZ / ASCII-grid / GeoTIFF after earthworks. Deterministic engines run in the backend: wildfire minimum-travel-time spread with Rothermel-style wind/slope factors over a proxy fuel map; SCS curve-number runoff routed by a 2-D storage-cell scheme (e.g. 200 kg/m² over the whole province → flood risk by district); infinite-slope landslide factor of safety with D8 debris runout. Results are arrival-time grids and quantised depth keyframes, replayed on the 3D terrain with a scrubber — simulation decoupled from rendering. Firebreaks and artificial ponds are compared against a baseline; a pond-siting report ranks sites near agriculture for low-cost irrigation and firefighting water; every scenario, terrain version and governance decision is hash-anchored and exported as a council-ready PDF.

Flowchart



Actors	Public authority / municipality · Inspector · Collective executive · Admin · Public (viewer)
Pages	/disaster
Collections	disaster_terrains (versioned DEM), disaster_scenarios (frames, districts, summary), disaster_decisions
Integrations	AWS Terrarium elevation tiles (no key) · Emergent object storage (optional DEM archive)
Anchored	terrain version · scenario run · pond siting · governance decision
Live counts	terrains: 2 · scenario runs: 0 · decisions: 0

Key endpoints

```
GET /api/disaster/presets · terrain · terrain/{id}
POST /api/disaster/terrain · /terrain/{id}/upload
POST /api/disaster/scenarios · GET /scenarios · /scenarios/{id} · /report.pdf
GET /api/disaster/terrain/{id}/ponds · ponds.pdf
POST/GET /api/disaster/decisions
```

Provenance

content hash 14d0f0ab5979384a6ebe2d33212fb37976a42c2dc5e81196a372a501a8c26979
anchor 0x1834bb447ff5fdafe9130ee7c1f4ab37b88135be501c862de6e0560fc8634e9d
source backend/architecture.py · Mermaid text, this PDF and docs/DOMAIN_REPORT.md derive from the same DOMAINS structure

Spectral / health / mining scans are SIMULATED research-grade values until live sensors stream; blockchain anchors are SHA-256 hashes stored in MongoDB; Twilio SMS and metals.dev run mocked / fallback until valid keys are provided.