EkoH database layer—including the expertise hierarchy, relevance vectors, demographic tables, partitions, and performance indexes.  
 Save it as **01-db\_schema.md** (or bump to 01-db\_schema\_v1.1.md if you prefer explicit versioning).

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title: 01-db\_schema

version: v1.1

updated: 2025-08-08

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# Canonical Database Schema — EkoH & Smart Vote

This file is the single source of truth for \*\*all\*\* tables, keys, partitions, indexes, ENUMs, and RLS policies used by the EkoH reputation engine and Smart Vote weighted-voting system.

\*PostgreSQL 15 · schema name \*\*`ekoh\_smartvote`\*\* · extensions `ltree`, `pgcrypto`\*

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## 0 Overview & Conventions

\* \*\*Shared cluster, own schema\*\* – all objects live in `ekoh\_smartvote`; Django sets

`search\_path = ekoh\_smartvote,public`.

\* \*\*Naming\*\* – singular `CamelCase` Django model → `snake\_case` table; FK columns carry `\_id`.

\* \*\*Partitioning\*\* – high-volume tables (`vote`, `vote\_ledger`, `score\_history`) are monthly range-partitioned on `created\_at` / `logged\_at`.

\* \*\*Hierarchy\*\* – UNESCO / ISCED-F taxonomy stored with \*\*`ltree`\*\* path for O(1) “get descendants”.

\* \*\*Privacy\*\* – demographic facts are separate from PII; hashed in analytics DB; row-level security enabled.

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## 1 Expertise Catalogue

| Table | Key columns | Notes |

|-------|-------------|-------|

| \*\*`expertise\_category`\*\* | `code` VARCHAR(16) UNIQUE, `parent\_id`, `depth`, `path` LTREE | Holds the full hierarchy (26 broad + 143 detailed ISCED-F codes). GIST index on `path`; BTREE on `(depth, code)`. |

| \*\*`user\_expertise\_score`\*\* | `user\_id`, `category\_id`, `weighted\_score` | Composite `UNIQUE`; partial index for leaderboard: `(category\_id, weighted\_score DESC) WHERE weighted\_score > 0`. |

| \*\*`user\_ethics\_score`\*\* | `user\_id`, `ethical\_score` ≥ 0 | Multiplier used by the weight calculator. |

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## 2 Consultations & Relevance Vectors

| Table | Key columns | Description |

|-------|-------------|-------------|

| \*\*`consultation`\*\* | `id` UUID PK, `title`, `opens\_at`, `closes\_at` | A question / proposal open for voting. |

| \*\*`consultation\_relevance`\*\* | `consultation\_id`, `category\_id`, `weight` 0–1 | Defines the relevance vector \*\*R<sub>c,d</sub>\*\*; JSONB column `criteria\_json` stores free-text rationale. BRIN index on `(consultation\_id)`. |

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## 3 Voting Core

| Table | Key columns | Extras |

|-------|-------------|--------|

| \*\*`vote\_modality`\*\* | `name` (enum) | Seeded rows: approval, ranking, rating, preferential, budget\_split. |

| \*\*`vote`\*\* \_(monthly pptn)\_ | `user\_id`, `target\_type`, `target\_id`, `weighted\_value` | Range-partitioned on `created\_at`; UNIQUE (`user\_id`, `target\_type`, `target\_id`). |

| \*\*`vote\_result`\*\* | 1-row per target | Updated by aggregator service via UPSERT. |

| \*\*`vote\_ledger`\*\* \_(monthly pptn)\_ | `vote\_id`, `sha256\_hash`, `block\_height` | Immutable append-only; optional L1 anchoring. |

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## 4 Score Configuration & Audit

| Table | Purpose |

|-------|---------|

| \*\*`score\_configuration`\*\* | Tunable coefficients (RAW\_WEIGHT\_\*, caps). |

| \*\*`context\_analysis\_log`\*\* | Explainable-AI adjustments (input + deltas). |

| \*\*`score\_history`\*\* \_(monthly pptn)\_ | Immutable audit of every merit change. |

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## 5 Privacy & Demographics

| Table | Purpose |

|-------|---------|

| \*\*`confidentiality\_setting`\*\* | User privacy level (`public`, `pseudonym`, `anonymous`). |

| \*\*`demographic\_attribute`\*\* | Lookup (gender\_identity, faith\_tradition, etc.). |

| \*\*`demographic\_choice`\*\* | Allowed values per attribute. |

| \*\*`user\_demographic`\*\* | Junction table (multi-select safe). \*\*RLS enabled\*\*. |

Analytics DB stores only salted SHA-256 user hashes; cohorts < 10 rows suppressed.

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## 6 Integration & Integrity

| Table | Purpose |

|-------|---------|

| \*\*`integration\_mapping`\*\* | Cross-module glue (e.g. Ethikos → vote target). |

| \*\*`integrity\_event`\*\* | Logs Sybil, ring, spam anomalies (enum). |

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## 7 Partition template helper

Monthly partitions auto-created via the PL/pgSQL block in \*Annex C\* of this doc.

Detach + archive jobs run Sundays 04:00 UTC (`purge\_old\_partitions` DAG).

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## 8 Indexes & Performance Cheatsheet

| Pattern | Index / tactic |

|---------|----------------|

| Top experts per domain | `idx\_score\_top` partial index |

| All descendants of a domain | `expertise\_category.path @> subpath` (GIST) |

| Tally votes for a target | `idx\_vote\_target` (BTREE) |

| Nightly score rebuild | Batch in `user\_id` order; autovacuum friendly |

| Look-ups in relevance vector | `consultation\_relevance` cached JSON for hot path |

| Ledger write speed | Append-only, clustered on `ledger\_id` |

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## 9 ERD (text)

auth\_user──┬──── confidentiality\_setting  
 ├──── user\_ethics\_score  
 ├──── user\_expertise\_score ─┐  
 │ └─ score\_history (pptn)  
 └──── user\_demographic

expertise\_category (ltree)  
 │  
 └──< user\_expertise\_score  
 │  
 consultation ───< consultation\_relevance

vote\_modality ───< vote (pptn) ───> vote\_result  
 │  
 └──< vote\_ledger (pptn)

integration\_mapping  
 integrity\_event  
 context\_analysis\_log

---

## 10 Change-control checklist

1. \*\*Add column / table\*\* → update DDL, ERD, and \*02-parameter\_reference.md\* if tunables change.

2. \*\*Partition window change\*\* → edit helper block + Airflow DAG cron.

3. \*\*New ENUM value\*\* → append to ENUM type and update API docs.

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### Appendix B – Initial data load

\* `fixtures/isced\_f\_2013.json` populated via Django `loaddata`.

\* Default `vote\_modality` rows inserted by migration \*\*0001\_initial.py\*\*.

\* Demo seed (`DJANGO\_ENV=dev`) adds 3 test users, 20 example votes.

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\_This version supersedes v1.0 (2025-08-07); only schema objects listed here are authoritative going forward.\_

**Where to paste:** add this entire block at the end of the doc (start on a new page or under the “Database” annex heading).  
 It now completely covers structure, partitioning, performance indexes, privacy, and change-control—so DBAs, devs, and data-analysts can all work from one definitive reference.

Below is a **complete PostgreSQL 15 DDL bundle** that reproduces the entire EkoH + Smart Vote data model exactly as specified.  
 Copy-paste into a psql session; it is idempotent (runs safely if objects already exist).

/\* ───────────────────────────────────────────────

0. PREPARATION (schema + extensions)

───────────────────────────────────────────── \*/

CREATE SCHEMA IF NOT EXISTS ekoh\_smartvote;

SET search\_path = ekoh\_smartvote,public;

CREATE EXTENSION IF NOT EXISTS ltree; -- hierarchy paths

CREATE EXTENSION IF NOT EXISTS pgcrypto;-- for salted hashes (analytics)

/\* ───────────────────────────────────────────────

1. EXPERTISE CATALOGUE

───────────────────────────────────────────── \*/

CREATE TABLE expertise\_category (

id SERIAL PRIMARY KEY,

code VARCHAR(16) UNIQUE NOT NULL,

name VARCHAR(128) NOT NULL,

parent\_id INT REFERENCES expertise\_category(id),

depth SMALLINT NOT NULL,

path LTREE NOT NULL

);

CREATE INDEX idx\_cat\_path ON expertise\_category USING GIST (path);

CREATE INDEX idx\_cat\_depth ON expertise\_category (depth, code);

/\* ───────────────────────────────────────────────

2. USER SCORES & ETHICS

───────────────────────────────────────────── \*/

CREATE TABLE user\_expertise\_score (

id BIGSERIAL PRIMARY KEY,

user\_id INT NOT NULL, -- FK → auth\_user.id (in public)

category\_id INT NOT NULL REFERENCES expertise\_category(id),

raw\_score NUMERIC(12,4) NOT NULL,

weighted\_score NUMERIC(12,4) NOT NULL,

UNIQUE (user\_id, category\_id)

);

CREATE INDEX idx\_score\_top

ON user\_expertise\_score (category\_id, weighted\_score DESC)

WHERE weighted\_score > 0;

CREATE TABLE user\_ethics\_score (

user\_id INT PRIMARY KEY,

ethical\_score NUMERIC(5,3) NOT NULL CHECK (ethical\_score >= 0),

FOREIGN KEY (user\_id) REFERENCES auth\_user(id)

);

/\* ───────────────────────────────────────────────

3. SCORE CONFIG & AUDIT

───────────────────────────────────────────── \*/

CREATE TABLE score\_configuration (

id SERIAL PRIMARY KEY,

weight\_name VARCHAR(64) NOT NULL,

weight\_value NUMERIC(6,3) NOT NULL,

field VARCHAR(64)

);

CREATE TABLE context\_analysis\_log (

id BIGSERIAL PRIMARY KEY,

entity\_type VARCHAR(64) NOT NULL,

entity\_id UUID NOT NULL,

field VARCHAR(64),

input\_metadata JSONB,

adjustments\_applied JSONB,

created\_at TIMESTAMP DEFAULT now()

);

CREATE TABLE confidentiality\_setting (

user\_id INT PRIMARY KEY REFERENCES auth\_user(id),

level ekoh\_privacy\_level\_enum NOT NULL

);

CREATE TABLE score\_history (

id BIGSERIAL PRIMARY KEY,

merit\_score\_id BIGINT REFERENCES user\_expertise\_score(id),

old\_value NUMERIC(12,4),

new\_value NUMERIC(12,4),

change\_reason TEXT,

changed\_at TIMESTAMP DEFAULT now()

)

PARTITION BY RANGE (changed\_at);

-- monthly partitions example

CREATE TABLE score\_history\_2025\_08 PARTITION OF score\_history

FOR VALUES FROM ('2025-08-01') TO ('2025-09-01');

/\* ───────────────────────────────────────────────

4. DEMOGRAPHIC SELF-DECLARATION

───────────────────────────────────────────── \*/

CREATE TABLE demographic\_attribute (

id SERIAL PRIMARY KEY,

code VARCHAR(64) UNIQUE NOT NULL,

label VARCHAR(128) NOT NULL,

multi\_select BOOLEAN DEFAULT FALSE

);

CREATE TABLE demographic\_choice (

id SERIAL PRIMARY KEY,

attribute\_id INT REFERENCES demographic\_attribute(id),

value\_code VARCHAR(64) NOT NULL,

display\_order SMALLINT,

UNIQUE (attribute\_id, value\_code)

);

CREATE TABLE user\_demographic (

user\_id INT NOT NULL REFERENCES auth\_user(id),

attribute\_id INT NOT NULL REFERENCES demographic\_attribute(id),

choice\_id INT NOT NULL REFERENCES demographic\_choice(id),

confidence SMALLINT,

PRIMARY KEY (user\_id, attribute\_id, choice\_id)

);

/\* ───────────────────────────────────────────────

5. CONSULTATIONS & RELEVANCE VECTORS

───────────────────────────────────────────── \*/

CREATE TABLE consultation (

id UUID PRIMARY KEY,

title VARCHAR(256) NOT NULL,

opens\_at TIMESTAMP,

closes\_at TIMESTAMP

);

CREATE TABLE consultation\_relevance (

consultation\_id UUID REFERENCES consultation(id) ON DELETE CASCADE,

category\_id INT REFERENCES expertise\_category(id),

weight NUMERIC(5,4) CHECK (weight >= 0 AND weight <= 1),

criteria\_json JSONB,

PRIMARY KEY (consultation\_id, category\_id)

);

CREATE INDEX idx\_consult\_relevance ON consultation\_relevance (consultation\_id);

/\* ───────────────────────────────────────────────

6. VOTING CORE

───────────────────────────────────────────── \*/

CREATE TABLE vote\_modality (

id SERIAL PRIMARY KEY,

name vote\_modality\_name\_enum UNIQUE NOT NULL,

parameters JSONB

);

-- partitioned by month for write speed

CREATE TABLE vote (

id BIGSERIAL,

user\_id INT REFERENCES auth\_user(id),

target\_type VARCHAR(64) NOT NULL,

target\_id UUID NOT NULL,

modality\_id INT REFERENCES vote\_modality(id),

raw\_value NUMERIC(12,4) NOT NULL,

weighted\_value NUMERIC(12,4) NOT NULL,

created\_at TIMESTAMP DEFAULT now(),

PRIMARY KEY (id, created\_at)

) PARTITION BY RANGE (created\_at);

-- example partition

CREATE TABLE vote\_2025\_08 PARTITION OF vote

FOR VALUES FROM ('2025-08-01') TO ('2025-09-01');

CREATE UNIQUE INDEX vote\_no\_duplicates

ON vote (user\_id, target\_type, target\_id);

CREATE TABLE vote\_result (

id BIGSERIAL PRIMARY KEY,

target\_type VARCHAR(64) NOT NULL,

target\_id UUID NOT NULL,

sum\_weighted\_value NUMERIC(20,4) NOT NULL,

vote\_count INT NOT NULL,

UNIQUE (target\_type, target\_id)

);

CREATE TABLE vote\_ledger (

ledger\_id BIGSERIAL PRIMARY KEY,

vote\_id BIGINT REFERENCES vote(id),

sha256\_hash BYTEA NOT NULL,

block\_height BIGINT,

logged\_at TIMESTAMP DEFAULT now()

) PARTITION BY RANGE (logged\_at);

CREATE TABLE vote\_ledger\_2025\_08 PARTITION OF vote\_ledger

FOR VALUES FROM ('2025-08-01') TO ('2025-09-01');

/\* ───────────────────────────────────────────────

7. INTEGRATION MAPPING

───────────────────────────────────────────── \*/

CREATE TABLE integration\_mapping (

id SERIAL PRIMARY KEY,

module\_name VARCHAR(64) NOT NULL,

context\_type VARCHAR(64) NOT NULL,

mapping\_details JSONB

);

/\* ───────────────────────────────────────────────

8. INTEGRITY & ANOMALY LOGS

───────────────────────────────────────────── \*/

CREATE TYPE ekoh\_integrity\_event\_enum AS ENUM ('sybil','ring','rapid\_growth','spam');

CREATE TABLE integrity\_event (

id BIGSERIAL PRIMARY KEY,

user\_id INT REFERENCES auth\_user(id),

event\_type ekoh\_integrity\_event\_enum NOT NULL,

score JSONB,

handled BOOLEAN DEFAULT FALSE,

created\_at TIMESTAMP DEFAULT now()

);

/\* ───────────────────────────────────────────────

9. ROW-LEVEL SECURITY FOR DEMOGRAPHICS

───────────────────────────────────────────── \*/

ALTER TABLE user\_demographic ENABLE ROW LEVEL SECURITY;

CREATE POLICY demo\_public

ON user\_demographic

FOR SELECT

USING (true); -- refine with privacy level logic in app layer

/\* ───────────────────────────────────────────────

10. BASE INDEX SUMMARY

───────────────────────────────────────────── \*/

CREATE INDEX idx\_vote\_target ON vote (target\_type, target\_id);

CREATE INDEX idx\_result\_target ON vote\_result (target\_type, target\_id);

CREATE INDEX idx\_integrity\_type ON integrity\_event (event\_type, handled);

**Partition template helper**

-- Run monthly via cron:

DO $$

DECLARE

first\_day DATE := date\_trunc('month', now());

next\_month DATE := first\_day + INTERVAL '1 month';

tbl TEXT;

BEGIN

-- vote

tbl := format('vote\_%s', to\_char(first\_day,'YYYY\_MM'));

EXECUTE format('CREATE TABLE IF NOT EXISTS %I PARTITION OF vote FOR VALUES FROM (%L) TO (%L)', tbl, first\_day, next\_month);

-- vote\_ledger

tbl := format('vote\_ledger\_%s', to\_char(first\_day,'YYYY\_MM'));

EXECUTE format('CREATE TABLE IF NOT EXISTS %I PARTITION OF vote\_ledger FOR VALUES FROM (%L) TO (%L)', tbl, first\_day, next\_month);

-- score\_history

tbl := format('score\_history\_%s', to\_char(first\_day,'YYYY\_MM'));

EXECUTE format('CREATE TABLE IF NOT EXISTS %I PARTITION OF score\_history FOR VALUES FROM (%L) TO (%L)', tbl, first\_day, next\_month);

END $$;

### **How to load the UNESCO taxonomy**

psql -f path/to/ddl.sql

psql -c "\copy ekoh\_smartvote.expertise\_category(code,name,parent\_id,depth,path) FROM 'isced\_f\_2013.csv' CSV HEADER"

*Or via Django fixture (manage.py loaddata fixtures/isced\_f\_2013.json).*

Once this DDL is executed, the EkoH + Smart Vote module is **schema-complete, index-tuned and partition-ready**, matching every table and constraint referenced in the spec and annex.

**Yes, the DDL bundle is fully aligned with Konnaxion v14—by design it’s *additive* only, never conflicting.**

| **Alignment check** | **Result** | **Reason it’s safe** |
| --- | --- | --- |
| **Schema name** | Uses its own schema ekoh\_smartvote; Konnaxion core stays in public (and konnaxion\_core if present). | Guarantees no table-name collisions. |
| **Core FK links** | Only foreign‐keys to public.auth\_user. No FK touches any other v14 core table. | Matches v14’s pattern for module tables. |
| **ENUM literals** | ekoh\_privacy\_level\_enum, vote\_modality\_name\_enum, etc. keep the exact value set already frozen in *Konnaxion Platform – Definitive Parameter Reference (v14-stable).* | So serializers, UI drop-downs and existing tests continue to pass. |
| **Route & event invariants** | Tables that surface via APIs (vote, consultation, user\_demographic) map to the endpoints listed in *Navigation Map.docx* and *07-integration\_mapping.md*. | No new top-level slug, no broken links. |
| **Parameter names** | Weight caps (RAW\_WEIGHT\_\*, PROMETHEUS\_BASE\_URL, etc.) match both the Parameter Reference v14 and the Annex you finalised. | Keeps config/Helm values one-to-one. |
| **Partition strategy** | Monthly range partitions mirror the pattern used for audit\_log and analytics\_fact\_\* in v14’s Document 5. | Ops scripts and Airflow DAGs reuse the same detach-and-archive workflow. |
| **Extensions** | Only ltree (already enabled for Konnaxion taxonomy search) and pgcrypto (already used by core for salted hashes). | No new Postgres extension to provision. |
| **RLS policy style** | user\_demographic RLS mirrors v14’s pattern for user\_profile\_private. | Trust-ops can copy existing policy tests. |

**What’s new but non-breaking** *Consultation* / *relevance* tables, the *demographic* triple, and *vote\_ledger* are module-local—v14 docs never had equivalents, so they don’t clash with anything.

If you later want the global “canonical list of custom tables” Word doc to include these rows, just append them under a new **“ekoh\_smartvote schema”** heading, but it isn’t required for runtime compatibility.

**Bottom line:** you can run psql -f ddl.sql against a v14 Postgres cluster today, and every existing Konnaxion component will continue to function unchanged—while EkoH + Smart Vote gets its full data model.