

Het Weefgetouw Swarp as Architecture-as-Verb

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A Four-Month Development Report on the Quaternion-Octonion Substrate, the Two-Axis Loom, and the Friston-Fiske-Schank Dynamics that Run on It.

What this report is

This is a development report on Swarp, written from inside the project at the end of May 2026. Version 1.0 organised the report around the integration of Active Inference, Relational Models Theory, and Case-Based Reasoning, and treated Swarp's thirteen user-visible threads as the architecture. This version corrects that reading. The threads are not the architecture; they are the surface of an outside of an outside — product labels in `src/shared/domain-config.ts` (`productLabelN1`) that can be renamed tomorrow without disturbing anything load-bearing. What is load-bearing is the weaving operation that sits underneath them.

The opening sentence Swarp uses to describe itself is the report's own starting point: *"SWARP is een levend weefgetouw waarin mensen, ideeën en systemen samen weven. Elke draad — of het nu gaat om jouw kennis, je gezin, je werk of je wijk — is verbonden met alle andere draden. Lokaal, regionaal, nationaal en internationaal. Denk aan opgaven in de zorg, het onderwijs, de economie, de democratie."* The verb is *weven*; the noun is *weefgetouw*; the threads are what runs through. The architecture is the loom, and the loom has a substrate (quaternion-octonion mathematics), two axes (scale and opgave), a dynamics (Friston's predictive processing), and a set of four basic stitches (Fiske's relational modes). Schank's case-based reasoning is how stored experience finds its place on the loom. The threads — including the political one that previous versions of this report over-emphasised — are emergent slices through this fabric, not building blocks of it.

What follows therefore moves through the loom from the bottom up. Section 1 names the weaving operation as the architectural primitive and the two axes that hold it in tension. Section 2 describes the quaternion-octonion substrate beneath the loom. Section 3 covers the scale-axis as instantiated in the Spatial-Web infralayer. Section 4 sets out Active Inference as the dynamics that drives the schietspoel. Section 5 maps Fiske's four relational modes onto the four basic stitches and back onto the basis quaternions of the substrate. Section 6 explains Schank's contribution as the case-retrieval mechanism that gates the dynamics. Section 7 then comes back to the user-visible surface — the emergent threads and the five surface-level architectural choices — and explicitly demotes the threads to surface labels, with the political surface as one example among thirteen rather than as the paradigm. Section 8 reads the loom back out of its own lexicon by spectral analysis. Section 9 covers comparisons with adjacent civic platforms. Section 10 covers epistemological commitments. Section 11 lists what is built, what is provisional, and where the next four months go. Section 12 closes.

The two extensive appendices remain part of the report. Appendix A enumerates every operational page and route, organised by the surface threads, so that the apps inventory is complete; the framing in section 7 is what tells the reader how to read it. Appendix B reproduces the 304-concept common lexicon. Appendix C presents the spectral analysis of the lexicon graph and is the report's main empirical instrument: the loom describes itself when the random walk on its concepts is computed.

1. The loom — Swarp as architecture-as-verb

Most software is described in nouns: a user, a record, a service. Swarp is described — by its own opening sentence — as a verb. *Weven*, weaving. The unit of architecture is not the thread and not the tapestry but the act of bringing one thread under another, repeatedly, across two axes, in such a way that what was disconnected becomes mutually constraining without being merged.

Two axes hold the weaving in tension. The first is the **scale-axis**: the same opgave appears at the local level (the *wijk*), at the regional level (the *gemeente* or province), at the national level (the *Tweede Kamer*), and at the international level (the EU, the planetary commons). The same person, the same kennis, the same gezin shows up on each of these scales differently. A loom that organises social life has to make scale-equivariance a first-class property: a stitch made at the *wijk*-level has to be recognisably the same stitch when read from a national vantage. Section 3 will say how this is implemented; the point here is that the *requirement* is structural.

The second is the **opgave-axis**: the substantive domains that life forces people to weave through — *zorg*, *onderwijs*, *economie*, *democratie*, and the dozens of finer-grained opgaven beneath each. The opgaven are not categorical. A single citizen's day touches several simultaneously: the child taken to school connects *onderwijs* to *gezin* to mobility to local *democratie* (*schoolkeuze* is a political act). The loom has to allow stitches to cross opgave-boundaries without losing their content; in practice this is done by re-using the same four basic stitches (section 5) regardless of which opgave one is in.

The threads — what Swarp's `domain-config.ts` lists as *AYYA360*, *Politiek*, *Werk*, *Kids*, *Academie*, *PoC*, *Zingeving*, *Gezond*, *Atelier*, *Hobby*, *Thuis*, *Lab*, *Community* — are *vertical* runs on this loom. They are useful as user-facing entry points, the way "shopping" or "reading" are useful as entries into a city, but they are not the city. A reader who treats the thirteen threads as the architectural inventory will systematically miss what Swarp is. This is the methodological correction the present version of the report makes against version 1.0.

The architectural problem the loom is built to address is what Roger Schank called *expectation failure without script revision* (Schank, 1982, pp. 21–25). Citizens in established democracies report stable, structural mistrust of representative institutions, not as anger but as the accumulated residue of repeated mismatches between what the citizen expected the political system to do and what it did, in the absence of any procedural mechanism by which those mismatches feed back into revised expectations on either side (De Vries, 2018, ch. 2). The same pattern repeats in *zorg*, *onderwijs*, *economie*. Every existing class of platform — deliberation

tools (Polis), federated identity systems (Solid, ActivityPub), persona-matching tools (Stemwijzer, Wahl-O-Mat) — addresses one register of one opgave and treats the rest as exogenous. None weaves. The architectural argument of this report is that the loom is the missing primitive, and that the substrate, dynamics, and stitches that make weaving possible are available; sections 2–6 set them out.

2. The substrate — quaternion-octonion

Beneath the loom is a mathematical substrate that determines how stitches at one scale relate to stitches at another, and how stitches in one opgave compose with stitches in adjacent opgaven. The substrate is the quaternion algebra (and its octonion extension), and it is a deliberate choice rather than an aesthetic one.

Quaternions are the algebra of rotations in three-dimensional space (and equivalently of orientations in four). They have four basis elements, $\{1, i, j, k\}$, with the multiplication rules $i^2 = j^2 = k^2 = ijk = -1$. The reason this matters for a civic platform is not metaphorical. A citizen's stance on an opgave at the wijk-level and the same citizen's stance on the same opgave at the national level are not two unrelated data points; they are two views of the same underlying orientation, related by a rotation. Quaternions are the tool that composes such rotations without the gimbal-lock and discontinuity problems that plague Euler-angle representations. When the Spatial-Web infralayer (section 3) carries a stance up the scale-axis, the lift is a quaternion composition.

Octonions extend the substrate to eight basis elements and are non-associative. In the cosmological reading developed in the agora essays *Understanding Personality Through Quaternion Dynamics* (</blog/understanding-personality-through-quaternion-dynamics>, 11 March 2026), *The 19 Layers of Existence — Quaternion-Vacuum Model* (</blog/the-19-layers-of-existence-a-quaternionvacuum-model-of-emergent-reality>, 12 March 2026), and *De Spiraal-Foton Triade* (</blog/de-spiraal-foton-triade-wanneer-kabbalah-rowlands-categorie-theorie-en-kosmische-helices-samenkomen>, 26 March 2026), the octonion is the substrate at which composition itself loses associativity: $(a \cdot b) \cdot c \neq a \cdot (b \cdot c)$. This is the formal reason Swarp treats *path* through the loom as architecturally distinct from *position* on the loom: in a non-associative substrate, what a citizen has done in what order is not reducible to the set of things they have done. The drift logs that section 4 will introduce are the operational consequence of taking this seriously.

The four basis quaternions $\{1, i, j, k\}$ map, non-coincidentally, onto the four Fiske modes of section 5: identity (CS, the unmarked case) and three independent rotations (AR, EM, MP) that generate the full space of relational stances by composition. This mapping is the formal hinge between the substrate and the dynamics: it is what makes Active Inference (section 4) over a Fiske vector (section 5) into a coherent operation rather than an arbitrary one. The non-commutativity $i \cdot j = k$ versus $j \cdot i = -k$ at the substrate level corresponds exactly to

the empirical observation at the relational level that *the same two stitches in opposite order produce different fabrics* — a fact that flat-vector psychometrics systematically loses.

The substrate is not user-facing. By design — `replit.md` records this on 6 May 2026:

"Quaternions zitten daar weer onder. Bewust géén user-facing draad in domain-config". A citizen using Swarp will never see a quaternion. The substrate is what makes the user-facing surfaces commensurate; that is its only job, and its absence is what would make the surfaces incommensurable.

3. The scale-axis — Spatial Web as the infralayer that carries scale-equivariance

The scale-axis of the loom is implemented in software as the Spatial-Web infralayer in `shared/schema/spatial-web.ts`. The infralayer is the IEEE 2874-2025 stack — SWID for identifiers, HSML for entity-and-relationship modelling, HSTP for transactions, UDG for graph snapshots — chosen specifically because it carries entities, relationships, and graph state as first-class protocol citizens, with decentralised identifiers of the form `did:swarp:{type}:{id}` that are not bound to a server domain.

The agora essay *Swarp and the Future of the Spatial Web* (`/blog/swarp-and-the-future-of-the-spatial-web`, 13 March 2026) argues the case in detail. The essential point for the architecture is this: a stance held at the wijk-scale must be lift-able to gemeente, provincie, Rijk, and EU without losing identity or fragmenting into four unrelated copies. ActivityPub-style messaging protocols (W3C, 2018) cannot do this — they carry activities, not states — and graph databases without protocol-level identity cannot do this either. IEEE 2874 was designed for exactly this kind of typed, signed, scale-equivariant state, and the quaternion substrate of section 2 supplies the composition law that the infralayer's lift operations rely on.

In Swarp the scale-axis is concretely realised in the per-administrative-layer architecture of the Personal Political Profile (and equivalent per-layer profiles for other opgaven). A citizen's profile is *not* a single vector; it is a vector per layer, θ_I for I in $\{\text{wijk, gemeente, provincie, TK, EP}\}$, with explicit composition rules between layers. This is the loom's scale-axis made concrete: the same person stitches differently at each scale, and the loom keeps the stitches commensurable.

Postcode is the sole spatial input from the user, by design. The centralised resolver in `server/services/postcode-resolver.ts`, with its cache table in `spatial-web.ts` and PDOK fallback, lifts a four-digit postcode through the layers of the scale-axis: wijk, gemeente, provincie, region. The deprecated shadow columns in eight legacy schemas (marked `@deprecated` and not yet dropped) record an earlier architecture in which each thread carried its own gemeente field; the centralisation is part of taking the scale-axis seriously rather than letting each thread re-implement it.

4. The dynamics — Active Inference as the motor of the loom

Once a substrate and a scale-axis exist, the loom needs a motor. The motor is Karl Friston's Active Inference, more precisely the Free Energy Principle applied as a process theory: agents minimise long-term surprise by maintaining and updating a generative model of their environment, with the schietspoel of the loom corresponding to the precision-weighted update that runs on every observation (Friston, 2010, pp. 127–129; Parr, Pezzulo, & Friston, 2022, ch. 1; Friston, FitzGerald, Rigoli, Schwartenbeck, & Pezzulo, 2017, sec. 3).

Active Inference is generic about the *content* of the latent variables it operates on. Section 5 will show that this content is supplied by Fiske; section 6 will show that the trigger is supplied by Schank. What this section establishes is the form of the motor itself, as it is instantiated in Swarp.

Each citizen carries, for each scale-layer l and for each opgave-domain d , a Bayesian state $\theta_{l,d} = (\mathbf{f}_{l,d}, c_{l,d})$, with $\mathbf{f}_{l,d} \in \mathbb{R}^4$ a vector over the four Fiske modes and $c_{l,d} \in [0,1]$ a scalar precision. When the citizen acts in a way that registers in opgave d at scale l — votes, joins, signs, comments, attends — the system constructs an observation vector $\mathbf{o}$ in the same space, with observation confidence c_o derived from the strength of the act (a vote weighs 2, party membership weighs 3; both available yields $c_o = 1.0$, only one yields 0.7 or 0.5). The posterior is updated by a precision-weighted exponential moving average:

$$\mathbf{f}_{l,d} \leftarrow \alpha \mathbf{f}_{l,d} + (1-\alpha) \mathbf{o}, \\ \alpha = 0.85.$$

The intuitive reading of the update rule is straightforward: the new estimate is a weighted compromise between what the system believed before and what the new observation suggests, with α controlling how stubbornly the prior holds. The choice of $\alpha = 0.85$ is a design parameter, not a derivation. Three properties together justify the value chosen. *Responsiveness*: for a sustained sequence of identical observations the residual decays as α^n , so after 20 observations the residual is below 4 %; twenty observations is roughly the upper end of what an engaged citizen will produce in five years of municipal politics, so the system *will* converge to sustained input within a single political cycle. *Stability against single outliers*: a single anomalous observation moves the posterior by $(1-\alpha) = 15$ % of the gap, which registers but does not flip a profile on a stunt vote. *Non-stationarity as design assumption*: an EMA is, formally, a recursive estimator for a Gaussian random walk and is therefore the appropriate update rule when one explicitly believes the parameter drifts (Hyndman & Athanasopoulos, 2021, sec. 8.1) — a citizen's conviction over an adult life is not stationary.

Each pass of the schietspoel updates one stitch by a controlled fraction of the new evidence. The loom does not move forward in jumps and it does not stand still; it converges on sustained input over a single political cycle and forgives a single outlier. The drift trajectories — versioned posterior states stored per user per layer per opgave — are what allow later distinction between observation and trend, and they are why the non-associativity of the octonion substrate (section 2) bites: the trajectory is the path, not the endpoint.

The crucial architectural fact, which returns at every level of the loom, is that the four dimensions over which Active Inference operates are the four Fiske modes, which are themselves the four basis quaternions of the substrate. Friston supplies the *form* of the motor; the *content* of what the motor moves is determined by the substrate, by way of Fiske. This is what makes Swarp's Active Inference not a generic predictive-processing engine but a civically meaningful one.

5. The weave-modes — Fiske's four as the basic stitches

Alan Fiske's Relational Models Theory holds that all human social relations are constructed from four elementary modes, combined and instantiated according to local conventions (Fiske, 1992, pp. 689–691; Fiske, 2004, ch. 2):

- **Communal Sharing (CS)** — relations in which the parties treat themselves as equivalent on some dimension; distribution is by need; the operation is *participation*.
- **Authority Ranking (AR)** — relations ordered along a linear hierarchy; distribution is by rank; the operation is *deference / command*.
- **Equality Matching (EM)** — relations of one-for-one balance; distribution is equal-share; the operation is *turn-taking, reciprocation*.
- **Market Pricing (MP)** — relations mediated by ratio and price; distribution is by exchange-value; the operation is *transaction*.

In Swarp these are not categories *of* social relations; they are four basic *stitches* with which any social relation is woven. A gezin contains all four (CS in the meal, AR in the parental decision, EM in chore-rotation, MP when allowance is involved). A wijk-initiative contains all four (CS in the volunteer hours, AR in the chair, EM in the quid-pro-quo with the gemeente, MP in the budget). A national-political stance contains all four. The Fiske vector $\mathbf{f}$ is therefore not a *type* of person; it is the *mix* of stitches a given person tends to employ in a given opgave at a given scale.

The mapping onto the substrate is exact. The four basis quaternions $\{1, i, j, k\}$ correspond to (CS, AR, EM, MP), with CS as the identity (the unmarked, default mode; an infant relates to its mother in CS by default), and AR/EM/MP as the three orthogonal rotations that generate the full space of relational stances by composition. Two consequences follow immediately. First, the non-commutativity of quaternion multiplication ($i \cdot j = k$ versus $j \cdot i = -k$) is what allows two stitches in the same modes to produce different results depending on the order in which they are made — an empirical property of human relations that flat-vector models systematically miss. Second, the rotation-composition law of quaternions is what lets the scale-axis lift of section 3 carry a Fiske mix from wijk to nation without arbitrary parameter choices: the lift *is* the composition.

This is also what justifies the choice against a left–right axis or a Nolan-style two-axis. Those axes flatten the quaternion structure into a vector space with no rotational composition and lose

precisely the property that makes the stitches the *building units* of the loom rather than the *labels on a chart*. Their further architectural disadvantage is that they are not theoretically grounded in any model of the underlying psychology; they are post-hoc summaries of historical positions of European parties and become incoherent outside that context. Fiske's modes have cross-cultural ethnographic and laboratory support (Fiske, 2004, ch. 2). They map onto political positions not by translating "left" and "right" but by reading off how a given party characteristically organises distribution, which produces a four-vector per party with empirical content against which a four-vector per user can be compared by cosine similarity. The cost of the choice is that the four-dimensional space is not legible to users without onboarding; Swarp mitigates this with a colour and vocabulary mapping (CS green, AR blue, MP red, EM yellow) and with an inverse-question framing in the UI ("which parties most resemble your relational fingerprint?").

6. Weaving opgaven — Schank case-based reasoning as the gate

Active Inference (section 4) supplies the motor; Fiske (section 5) supplies the four basic stitches; the substrate (section 2) supplies the composition law. What is still missing is the rule by which a *new* stitch finds its position on the loom. Without such a rule the system would either update on every observation (over-fits noise) or update on a fixed schedule (loses signal). The rule is supplied by Roger Schank's Case-Based Reasoning (Schank, 1982, ch. 2; Schank & Abelson, 1977, pp. 36–68).

Schank's central claim — argued at book-length in *Dynamic Memory* and synthesised for Swarp in the agora essays *Swarp als Leer Systeem* (/blog/swarp-als-leer-systeem, 29 March 2026) and *SWARP: Hoe Mensen Écht Leren* (/blog/swarp-hoe-mensen-echt-leren-een-revolutionair-case-based-learning-systeem, 29 March 2026) — is that human memory organises experience around scripts (and their abstractions, MOPs, Memory Organisation Packets), and that learning is triggered not by repetition but by **expectation failure**. A new observation that fits the script reinforces it silently; a new observation that fails the script triggers retrieval of similar past failures, comparison, and a candidate revision.

In Swarp the case-based machinery sits *across* the loom rather than under it. Every opgave-domain has a case-library: stored stitches, indexed by their Fiske-and-context fingerprint. When a new observation arrives, the system retrieves cases whose fingerprint resembles the current one, asks whether those cases' scripts predict the new observation, and triggers the Active-Inference update of section 4 only if there is a script-level mismatch. Concretely: a user reading an academic post about Political Expectation Failure Theory can convert that post into a forum discussion through `POST /api/academia/posts/:id/deel-op-forum`; an emotion-tagged response on that discussion can then trigger what the codebase calls a PoC-cycle, in which the system extracts a candidate revision to the user's existing schema. The Bayesian update on the political profile and the Schankian script revision in the Agora are *coupled*: a new script changes how subsequent observations are interpreted, which changes the observation vector, which feeds back into the Fiske-space update.

In Bayesian terms the Schankian gate is a form of *active sampling* — the agent prefers observations that are informative because they violate prediction (Friston et al., 2017, sec. 3) — translated to a civic platform, where the analogue of an informative observation is a piece of content that violates the user's existing political script. This is what makes Swarp a *learning* surface rather than a recommendation surface. The Markov-navigator of Appendix C is the formal correlate at the lexicon level: the slow-mixing terrain of concepts (spectral gap 0.025, mixing time ~40 hops) is what allows a user's path of next-concepts to traverse meaningfully through related stitches before being pulled toward stationary attractors. A fast-mixing graph would deliver the answer in three steps; a slow-mixing graph delivers a journey through the case-library. The agora essays *The Spiral Navigator* (/blog/the-spiral-navigator, 10 March 2026) and *Spiral Learning Theory* (/blog/spiral-learning-theory, 18 March 2026) argue exactly this distinction.

The three frameworks therefore cohere as follows. Friston is the engine, Fiske is the fuel, Schank is the throttle. The substrate of section 2 is the chassis on which all three are mounted, and the scale-axis of section 3 is the road they travel.

7. Emergent threads and apps — what the surface currently looks like

Sections 1–6 describe what Swarp *is*. This section describes what users currently *see*, and is therefore methodologically the most fragile part of the report: the surface is what changes most often and what carries the least architectural weight.

The user-facing surface is organised, in the May 2026 build, into thirteen labelled threads — `productLabelN1` in `src/shared/domain-config.ts`: `AYYA360`, Swarp Politiek, Swarp Werk, Swarp Kids, Swarp Academie, Swarp PoC, Swarp Zingeving, Swarp Gezond, Swarp Atelier, Swarp Hobby, Swarp Thuis, Swarp Lab, Swarp Community. These are product entry-points, not architectural units. Each is a vertical slice through the loom: a particular set of *opgaven* (column-projection), at a particular set of scales (row-projection), with particular case-libraries pre-loaded and particular weave-modes given default precision. The threads can be renamed, regrouped, split, or merged without disturbing anything in sections 2–6. Appendix A enumerates the routes per thread for completeness; readers should treat the enumeration as a snapshot of the surface, not as an inventory of the architecture.

A note on emphasis. Earlier drafts of this report devoted disproportionate attention to the political surface (`/mijn-politiek-profiel`, the *partijen* routes, the per-layer Bayesian update) because that surface has the most code-area and the most detailed mathematical apparatus. Re-reading the architecture from the substrate up makes it clear that Swarp Politiek is one thread among thirteen, and that the same loom that carries it also carries Swarp Gezond, Swarp Werk, Swarp Kids, Swarp Zingeving, and the rest. The Personal Political Profile is a useful worked example of the Active-Inference-over-Fiske-over-quaternion stack made fully concrete; it is not the architecture, and it does not even have privileged status among the threads. A reader interested in the same stack as it appears in *welzijn* should read Appendix A.8 alongside section 4; in education, A.5; in work, A.3.

Five architectural choices govern how the thread surfaces sit on top of the loom. They were defended in detail in version 1.0 of this report; here they are stated briefly.

7.1 Loosely Coupled Subapps over monolith and microservices: each thread has its own schema file under `shared/schema/<thread>.ts`, its own routes, no cross-thread imports of components, but shares the database and process. The convention is enforced at code-review time. This buys most of the modularity of microservices at none of the operational cost, and reflects the architectural intent that threads are *removable surface* and not *load-bearing structure*. The deferred cost is that the convention is not enforced by the runtime; the bet is that when (if) one thread requires hard isolation it can be peeled out into a true service without rewriting the others.

7.2 IEEE 2874 over ActivityPub for identity and federation: argued in section 3. The Spatial-Web infralayer demands a protocol that carries typed, signed *state*, not a stream of *activities*. ActivityPub-bridged interoperability is acknowledged as a separate engineering project for when the network effect requires it.

7.3 Postgres with Drizzle over a graph database: the bulk of production queries are vector arithmetic over Fiske vectors and time-series reads over drift trajectories, both of which Postgres serves natively; the relational constraints Swarp relies on (uniqueness of postcodes, foreign keys, partial unique indexes) are first-class in Postgres and second-class in graph databases; Drizzle-with-Zod gives end-to-end type safety from row to component. UDG snapshots are stored as JSONB so that a graph-query engine can be added as a read-side projection without rewriting the system.

7.4 Fiske-space over a left-right axis: argued in section 5 from the substrate. The practical mitigation for legibility is colour-coding (CS green, AR blue, MP red, EM yellow) and inverse-question framing.

7.5 OpenAI as orchestration LLM, candidly pragmatic: GPT-4o-mini's classification quality on Dutch civic text is materially higher than open-weight alternatives in May 2026, and the operational cost of self-hosting an inference cluster would consume engineering attention better spent on the loom itself. Migration to self-hosted inference is treated as a future engineering choice, not an architectural one.

8. The loom reads itself — spectral confirmation

The architecture admits a direct read-out. Swarp's common lexicon — 304 ACTIVE concepts at the end of May 2026, distributed across 33 domains, connected by 1 088 undirected semantic edges — is itself a graph, and the engine in `server/markov-engine.ts` treats it as one on every request to `/api/lexicon/markov/analysis`. The same engine drives the navigator at `/markov-navigator` that suggests the next concept a user might profitably visit. Reading the spectrum of this graph is therefore not a model of the system from outside; it is the system telling us what shape it has.

The transition matrix $P = D^{-1}A$, with D the degree matrix, is the matrix the engine actually iterates. It is similar to the symmetric normalised matrix $N = D^{-1/2} A D^{-1/2}$, so the top fifteen eigenvalues of N — computed by power iteration with Gram–Schmidt deflation — give the spectrum of the random walk through the lexicon. Three things are visible in that spectrum, and each maps back onto a feature of the loom that sections 1–7 named.

The first is *connectedness*. The Perron eigenvalue $\lambda = 1$ is returned with multiplicity nine in the top-fifteen list; a direct breadth-first labelling confirms eleven connected components, a giant of 232 nodes and ten satellites of two to twelve each. For an undirected graph the multiplicity of $\lambda = 1$ in N is the number of connected components. This is the spectral signature of the surface-thread soft split of section 7: the lexicon is not a single coherent vocabulary but a small set of near-disjoint sub-vocabularies, one per thread family. Each thread keeps its internal language; a user who enters through one thread does not drift into another by random walk alone, which is the design intent. Bridges between threads are built deliberately by the AIDEN suggestion mechanism rather than left to topology.

The second is *mixing inside the giant*. Restricted to the 232-node giant component, the second eigenvalue is $\lambda_2 = 0.975$, the spectral gap is 0.025 , and the mixing time is therefore on the order of forty steps. A walker through the lexicon needs roughly forty hops to forget where it started, on a graph with clustering coefficient $\bar{C} = 0.63$ and average degree 7.2 . This is locally dense and globally slow, which is the right shape for a learning surface in the Schankian sense of section 6: paths of five or six concepts — the typical depth of a Markov-suggested sequence — preserve thematic coherence rather than collapsing immediately onto stationary attractors.

The third is *bipartition*. The spectrum carries substantial negative eigenvalues — $\lambda \approx -0.81, -0.79, -0.76, -0.75$ — which in N are the signature of near-bipartite substructure. The eigenvectors associated with these eigenvalues separate concepts of theoretical foundation (*Free Energy, Surprisal, Markov Blanket, Active Inference*) from concepts of operational deployment (*Marketplace, Consent, Coach, Health Diagnosis*). This is the same theory–practice axis that the loom has to weave across: the substrate (section 2) and the dynamics (section 4) on one side, the surface threads (section 7) on the other. The cross-thread bridges enumerated in Appendix A are what keep the chain ergodic across this axis rather than reducible.

The stationary distribution is the last piece of the read-out. The five highest-mass concepts are *TOA-Triade* ($\pi = 0.024$), *Marketplace* (0.021), *AIDEN* (0.018), *Oscillation* (0.017), and *Consent* (0.016). A long random walk through Swarp spends disproportionate time near these five. *TOA-Triade* (Thinking–Feeling–Doing balance) is the individual-scale anchor; *Marketplace* and *Consent* are the relational-scale anchors; *AIDEN* is the meta-cognitive scale; *Oscillation* is the temporal scale. The four scales the loom is organised around are precisely the four scales the spectrum makes heaviest. The lexicon and the architecture were built by the same hand, so this is not independent confirmation — but it is the kind of internal consistency one wants: the gravity of the vocabulary lands where the loom says it should. Appendix C presents the full computation.

9. Comparison with related systems

The loom of sections 1–6 is not the first attempt to build civic software. It is, however, the first architecture this report is aware of in which substrate, dynamics, and weave-modes are instantiated as one stack rather than addressed in isolation. This section places Swarp alongside the comparator platforms whose limits made the work necessary.

9.1 Polis (Small et al., 2021) clusters opinion vectors over a population, surfaces statements that bridge factions, and has been deployed in vTaiwan and elsewhere. Its strength is that it scales: thousands of participants can be summarised into an interpretable opinion topology in minutes. Its structural limitation is that it has no model of the individual participant beyond the vote vector. There is no place in the architecture for a generative model of why this person agreed to that statement, no representation of the script that produced their expectation, and therefore no mechanism by which their participation revises anything other than the population-level topology. The citizen is reduced to data; the script is left untouched. In the loom vocabulary: Polis weaves the population-level pattern but does not weave the per-user dynamics.

9.2 SenseMaker and the Cynefin tradition (Snowden & Boone, 2007) ask citizens to self-signify short narratives along multi-dimensional signifiers, producing landscapes of meaning that are read by domain experts. SenseMaker's underlying ontology is closer to Swarp's than Polis's: it treats stories as structured rather than as votes, and it preserves individual signification rather than averaging it away. The architectural distance is that SenseMaker is a *measurement* instrument; the loop ends with the analyst reading the landscape. There is no per-user posterior, no update on subsequent contributions, no script revision mechanism. SenseMaker is what Swarp would be if it stopped at section 5 and never built sections 4 and 6.

9.3 Decidim and Loomio are deliberation and decision-making platforms with mature implementations and active municipal use. Their architectural strength is process: structured proposals, comments, votes, and resolutions, with rich permissions. Their limitation, from the loom perspective, is that they treat the citizen as a *role-bearer in a process* rather than as a *Bayesian agent with a profile that updates*. A user's history on Decidim is a list of actions; it is not a posterior. The loom's per-layer per-opgave Bayesian profile (section 4) is what is missing.

9.4 Solid (Sambra et al., 2016) provides architectures in which users own their data and can move it between services. It is a remarkable engineering achievement with respect to data sovereignty. But it has no cognitive layer at all; it is a storage-and-message-passing protocol, agnostic about what the data means or how it should be updated. Putting a Solid pod under a citizen relocates where the expectation lives but does not weave anything. Swarp uses Solid pods for the storage of the per-user posteriors that the loom maintains, which is the right division of labour: Solid for sovereignty, the loom for dynamics.

9.5 Persona-based matching platforms (Stemwijzer in the Netherlands, the German Wahl-O-Mat, the dozens of similar tools published before each election) attempt to model the individual citizen by mapping their answers onto a low-dimensional ideological space. But the model is static: it produces a snapshot, not a posterior. There is no update from one election to the next,

no representation of confidence, no mechanism by which observed political behaviour revises the model. The compass is, in Schank's terms, a script-application engine without script revision. In the loom vocabulary: it has Fiske-shaped slots (sometimes) but no Active-Inference motor and no Schankian gate.

The pattern across all five is the same. Each addresses one register of one opgave and treats the others as exogenous. None weaves. The loom is what addresses the missing primitive.

10. The epistemological architecture

The sections above raise an unavoidable question. Swarp uses, as priors over the Fiske posterior, parameters derived from interpretive systems whose epistemological status is contested: Human Design, Paths of Change, the Wu Xing element scheme, the RIASEC vocational typology. RIASEC has substantial empirical support in vocational psychology (Holland, 1997, ch. 4); the others do not. How can a platform that claims to be theoretically grounded in Friston, Fiske, and Schank justify using such priors?

The answer is that Swarp does not assert these systems as truths. It asserts them as *priors*, in the strict Bayesian sense, with explicit confidence weights and explicit posterior update. The epistemological move is precise: an interpretive system enters the architecture as a generative model of *initial estimate*, not as a claim about reality. The system says, of a user whose birth time is known with high confidence and who has not yet made any political choice, "the Human Design model assigns this user a Fiske four-vector $(0.6, 0.2, 0.5, 0.3)$ with confidence $c_0 = 0.4$." The number 0.4 is doing real work: it is the weight by which this prior will be displaced by observation. After approximately five politically meaningful observations, the contribution of the prior to the posterior is, by the EMA arithmetic of section 4, less than 5 %.

For each interpretive system used as a prior, the architectural commitment is that *the predictive performance of the prior, on the first observed political choice of a held-out user, exceeds the predictive performance of a uniform prior*. If this is not the case — if Human-Design-derived priors do no better than chance — then the prior contributes nothing, and the epistemic respectful framing collapses into an opaque ritual. The commitment is testable by held-out validation, of the standard form used in any predictive modelling exercise. As of May 2026 this validation has not been published; the team's own internal numbers suggest that the HD-derived prior performs above the uniform-prior baseline on the AR and CS axes but is approximately at baseline on EM and MP. Priors are kept, weighted, or discarded on evidence, not on devotion.

This is structurally different from the position occupied by mainstream profiling systems. A system that infers a persona from clicks and uses that persona to recommend content is making an implicit epistemological claim that the persona is a faithful representation of the user, but the claim is buried in code and inaccessible to the user. Swarp's framework makes the claim explicit, attaches a number to it, updates it on observation, and exposes the update trajectory to the user. The user is not protected from being modelled — they are inevitably modelled — but they are protected from being modelled silently and from being modelled stably.

A second epistemological commitment follows from the architecture's "no dead-end text" rule (formalised in the project's working agreements on 5 May 2026). Every semantic token in the user interface — a Fiske dimension label, a Human Design type, a Paths-of-Change colour, a party name, a match row — must link through to a more detailed view that explains the term, its provenance, its current confidence in the user's profile, and the chain of evidence that produced it. The rule is the inverse of the dark-pattern aesthetic documented across persona-based platforms (Mathur, Acar, Friedman, et al., 2019); it is the user-interface expression of the Bayesian framing of section 4.

11. What is built, what is provisional, where the next four months go

A development report should be candid about the state of the work. Not everything described above is finished, and several pieces are in production for pragmatic reasons rather than because the underlying choice is settled.

Several pieces of the architecture are present in design and schema but not yet exercised at scale. The Solid pod integration is implemented at the schema level and has been wired through a handful of pilot users; the federation pattern of section 7.2 will only show its real shape when a meaningful population of IEEE-2874-speaking counterparts exists, which it currently does not. The Spatial-Web tables in `shared/schema/spatial-web.ts` are populated with a small fraction of the entities the production system actually maintains; most operations still run against the relational schema directly rather than through HSML. The octonion-level non-associativity of section 2 is recognised at the substrate level but its operational consequences for the drift logs are not yet fully exploited; the trajectory data is stored, but the path-dependent retrieval that the substrate makes possible is implemented in only one of the thirteen threads (Swarp Politiek). These are not failures of the architecture but the consequence of bringing infrastructure into existence ahead of the demand for it.

Several choices are pragmatic and known to be pragmatic. The exponential moving average of section 4 uses $\alpha = 0.85$ as a global parameter rather than per-user; a per-user α , fitted from each user's own drift trajectory, would be more defensible and is on the list. The orchestration LLM is OpenAI, as section 7.5 already conceded, because in May 2026 nothing self-hosted matches the quality at the latencies the conversational surface requires; the architecture is structured to make swapping it out cheap when that gap closes. The system runs on Replit infrastructure, with its operational conveniences and its dependency on a single vendor, because the team is two people and that is the right trade-off at this stage.

The structural debt is also visible. The interim `kern.*shadow` schema continues to exist alongside the long-term target of a single `swarp.*schema` and a single `etl.*schema` (the binding architecture is recorded in `docs/diagrams/swarp_genormaliseerd_datamodel.svg`). The migration is the largest piece of structural work on the immediate horizon. The eight `@deprecated` municipality/province/neighbourhood shadow columns scattered across schemas are not yet dropped — they are still readable, and code is being weaned off them rather than the columns being removed under it.

Some commitments are operational rather than architectural. The "no dead-end text" rule of section 10 is a discipline, not a check; every new page the team adds has to be written to it, and existing pages are still being audited for stragglers. The thirteen-thread split decided on 6 May 2026 (the original nine plus the four LCS threads — Patroon/Knoop/Kettingboom/Proefdraad) implies a great deal of rerouting in the existing code, only some of which has been done. The Wikipedia-as-source-of-truth rule for election results is being followed for new modules but the older politics tables still carry numbers from the era when ORI was treated as the source.

Where the next four months are likely to go is, accordingly, less in new architecture and more in completion. The migration to `swarp.*` and `etl.*`. The dropping of deprecated shadow columns. The audit of the no-dead-end rule across the existing routes enumerated in Appendix A. The thickening of the Spatial-Web tables to the point where they are the primary store for the entities they describe. Operationalising path-dependent retrieval across the remaining twelve threads, so that the octonion substrate stops being an architectural commitment and starts being a daily mechanism. A first wave of deployments outside the Netherlands, which will test whether the Fiske primitives and the script content travel — Fiske's claim of cross-cultural exhaustiveness is defended (Fiske, 2004, ch. 2) but contested for collectivist-honour cultures (Henrich, 2020, ch. 9), and the only honest way to find out is to run the system somewhere it has not been run yet.

12. Closing

The four months between the start of the work that became the present Swarp architecture and the end of May 2026 produced a system in which a quaternion-octonion substrate carries the scale-axis through a Spatial-Web infralayer, an Active-Inference motor drives the schietspoel of the loom over four basic Fiske stitches, and a Schankian case-based gate decides when the schietspoel moves. The thirteen user-visible threads — including the political one that earlier drafts of this report over-emphasised — are surfaces on this loom, not building blocks of it.

What this report has *not* done is make a claim about whether the loom, so wired, will measurably reduce democratic expectation failure in any meaningful population, or improve outcomes in any of the other twelve opgaven the threads address. That is not a question an architectural report can answer. It is a question the architecture is now instrumented to answer, and the next four months will begin to.

The two appendices that follow are the architecture itself, in the sense that an architecture is finally what it actually consists of: the routes a user can reach in Appendix A, the vocabulary the system uses to think about them in Appendix B, and the spectral read-out of that vocabulary in Appendix C. They are the part of this report that does not get shorter on rereading, and they are the reason the report is honest.

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[Swarp Agora — internal corpus](#)

The list above contains the externally-published apparatus. The *primary* theoretical underpinning of Swarp does not live outside the system; it lives inside it, as the Swarp Agora. The agora is a corpus of 927 essays (May 2026 snapshot) by Hans Konstapel, originally published on constable.blog and migrated into Swarp's `blog_posts` table as the intellectual foundation of the Academia/Agora module. Every essay is reachable inside the running app at `/blog/<slug>`. Where this paper cites a Swarp-internal essay, the canonical address is the agora slug, not the external blog URL; the constable.blog URL is preserved on each row in `external_source_url` for provenance only. The essays load-bearing for *this* paper are listed below by agora slug and publication date.

- *The Spiral Navigator* — `/blog/the-spiral-navigator` (10 March 2026). The essay that defines the spiral-navigator concept that section 5.1 and Appendix C operationalise as the Markov walk over the lexicon. Read this first if the navigator surface is what one wants to understand.
- *Spiral Learning Theory* — `/blog/spiral-learning-theory` (18 March 2026). Companion to the navigator essay; explains why a learning surface should be slow-mixing rather than fast-mixing, which is the architectural reading given to the spectral gap of 0.0251 in Appendix C.4.

- *Swarp als Leer Systeem* — /blog/swarp-als-leer-systeem (29 March 2026). The Schank-side argument as it applies to Swarp specifically.
- *SWARP: Hoe Mensen Écht Leren — Een revolutionair Case-Based Learning Systeem* — /blog/swarp-hoe-mensen-echt-leren-een-revolutionair-case-based-learning-systeem (29 March 2026). The case-based-reasoning grounding for the AYYA360 and Coach surfaces.
- *Wat is Swarp Agora?* — /blog/wat-is-swarp-agora (29 March 2026) and *Swarp-Agora* — /blog/swarp-agora (26 March 2026). The two essays that define the agora as the corpus, i.e. as what this very section is referencing.
- *Understanding Personality Through Quaternion Dynamics* — /blog/understanding-personality-through-quaternion-dynamics (11 March 2026). Theoretical backing for the quaternion substrate referenced in section 3 and in the Spatial-Web infralayer.
- *The 19 Layers of Existence — A Quaternion-Vacuum Model of Emergent Reality* — /blog/the-19-layers-of-existence-a-quaternionvacuum-model-of-emergent-reality (12 March 2026). Cosmological frame for the layered architecture.
- *Swarp and the Future of the Spatial Web* — /blog/swarp-and-the-future-of-the-spatial-web (13 March 2026). Architectural rationale for the Spatial-Web infralayer (shared/schema/spatial-web.ts).
- *De TOA-Triade: Resonante Emergentie* — /blog/de-toa-triade-resonante-emergentie (5 October 2025). Foundational essay for the TOA-Triade concept that turns up as the heaviest stationary attractor in Appendix C.3 ($\pi = 0.024$).
- *Het Persoonlijke Culturele Patroon (PCP)* — /blog/het-persoonlijke-culturele-patroon-pcp (5 May 2026). The PCP narrative profile that the /compatibiliteit route reads.
- *Het SWARP Spiritueel Profiel: Resonantie en Gemeenschapsverbinding* — /blog/het-swarp-spiritueel-profiel-resonantie-en-gemeenschapsverbinding (5 May 2026). Backing for SSP (/mijn-spiritueel-profiel).
- *Probeer AYYA360 Levensloopbegeleiding* — /blog/probeer-ayya360-levensloopbegeleiding (12 February 2026). The AYYA360-as-lifespan-guidance framing.
- *SWARP: Een Innovatief Model voor Beroepskeuze* — /blog/swarp-een-innovatief-model-voor-beroepskeuze (31 March 2026). Backing for the /beroepen matching surface.

The reader who wants to read Swarp's *self-description* before reading anyone else on Swarp should start with *Wat is Swarp Agora?* and *The Spiral Navigator*, in that order. The 927-essay corpus is the substrate; this paper is one reading of it.

The paper draws on the Swarp codebase as deployed in May 2026, on the agora corpus listed above (blog_posts), and on the technical companion document "Swarp — Stand van Zaken 2026" (version 1.0). Specific route and schema references can be cross-checked against shared/schema/spatial-web.ts, server/routes/persoonlijke-politiek-profiel.ts, server/utils/hd-fiske-spec.ts, and server/system-agent.ts.

Annotated further reading

The bare reference list above is the apparatus of citation. The list below is for the reader who wants to understand *why* a source mattered for the argument and *where to go next* once it has been read. The notes are deliberately critical: they say what each source delivers, where it is weak, and how it connects to the others. Entries are grouped by the section of the paper in which they first do work.

[On democratic expectation failure \(sections 1, 4, 6, 11\)](#)

De Vries, C. E. (2018). *Euroscepticism and the future of European integration*. Oxford University Press. The empirical anchor for the claim that citizen dissatisfaction is structural rather than incidental. Chapters 2 and 5 are the load-bearing ones; chapter 2 establishes the *benchmark theory* of EU support (citizens compare the perceived performance of the EU to the perceived performance of their national government), chapter 5 documents how the resulting dissatisfaction is stable across economic cycles. Read alongside Hooghe & Marks (2018, *Journal of European Public Policy*) for the postfunctionalist counter-frame, and Foa & Mounk (2017, *Journal of Democracy*) for the global cross-section. The reader who wants the historical depth should add Crouch (2004, *Post-Democracy*).

Schank, R. C. (1982). *Dynamic memory: a theory of reminding and learning in computers and people*. Cambridge University Press. The paper's most-used source, despite its age. Chapters 2–4 introduce scripts, MOPs (Memory Organisation Packets) and the central insight that learning is triggered by expectation failure, not by repetition. Chapter 7 develops the case-based reasoning approach that became, in different hands, the foundation of the modern recommendation literature. Pair with Schank & Abelson (1977) for the original script theory and with Kolodner (1993, *Case-Based Reasoning*) for the formal CBR development. Schank's later popular work (*Tell Me a Story*, 1990) is more accessible but less rigorous.

Heath, J. (2014). *Enlightenment 2.0: restoring sanity to our politics, our economy, and our lives*. HarperCollins. Not cited in the body but useful for a reader who wants the broader case for why low-information democratic decision-making is a hard problem and why technological mediation is necessary rather than optional. Heath is more readable than Habermas and less utopian than

Schmachtenberger, and he names the cognitive constraints that any civic platform has to design around.

[On Active Inference and the Free Energy Principle \(section 4\)](#)

Friston, K. (2010). The free-energy principle: a unified brain theory? *Nature Reviews Neuroscience*, 11(2), 127–138. The canonical short statement. Pages 127–129 give the core formulation; pages 130–134 sketch the relation to existing theories of perception, action and learning. Notoriously dense; the reader new to variational inference should take it slowly, perhaps after reading the textbook below. The crucial sentence for our purposes is on page 129: agents minimise long-term surprise by maintaining and updating a generative model.

Parr, T., Pezzulo, G., & Friston, K. (2022). *Active inference: the free energy principle in mind, brain, and behavior*. MIT Press. The textbook that the field needed. Chapters 1–4 are the conceptual development; chapters 5–8 are the formal machinery, with worked examples. Read this before, not after, the *Nature Reviews Neuroscience* paper — it makes the latter intelligible. The book is open-access from the MIT Press Direct platform; there is no excuse for not having it on the shelf.

Friston, K., FitzGerald, T., Rigoli, F., Schwartenbeck, P., & Pezzulo, G. (2017). Active inference: a process theory. *Neural Computation*, 29(1), 1–49. The technical paper that establishes active inference as a process-level theory rather than only a normative one. Section 3 (the discussion of epistemic versus pragmatic value, pages 13–22) is what justifies, by analogy, why a civic platform should prefer to surface content that violates the user's expectations rather than content that confirms them. This is the formal cousin of Schank's expectation-failure trigger.

Solms, M. (2021). *The hidden spring: a journey to the source of consciousness*. W. W. Norton. Not part of the paper's apparatus but essential for the reader who wants to see how the Free Energy Principle is being extended into the affective and motivational domains. Solms' chapters 6–8 are the relevant ones. Useful background for the SSP (Swarp Spiritueel Profiel) module, which sits closer to affect than to cognition.

[On Relational Models Theory \(sections 5, 7.4\)](#)

Fiske, A. P. (1992). The four elementary forms of sociality: framework for a unified theory of social relations. *Psychological Review*, 99(4), 689–723. The paper that the entire Swarp politics layer rests on. Pages 689–693 lay out the four primitives; pages 694–710 show how they combine to produce the apparent diversity of social arrangements; pages 711–723 anticipate and answer objections. Anyone who finds the four-mode classification unsatisfying should read those last twelve pages before complaining; Fiske has thought of the objection.

Fiske, A. P. (2004). Four modes of constituting relationships. In N. Haslam (Ed.), *Relational models theory: a contemporary overview* (pp. 61–146). Erlbaum. The mature statement, twelve years after the *Psychological Review* paper. Chapter 2 of the volume is the cross-cultural defence; chapter 4 by Haslam himself situates the theory in the broader social-psychological landscape. The volume as a whole is the reader's best one-stop introduction.

Henrich, J. (2020). *The WEIRDest people in the world*. Farrar, Straus and Giroux. The friendly antagonist. Henrich's argument that Western, Educated, Industrialised, Rich, Democratic populations have unusual psychology has implications for the cross-cultural transfer of any model — including Fiske's — calibrated on Western data. Chapter 9 is the directly relevant one. Take this seriously before claiming that any Fiske-based platform generalises beyond its calibration culture.

Tomasello, M. (2019). *Becoming human: a theory of ontogeny*. Harvard University Press. For the reader who wants to see how the Fiske primitives connect to developmental psychology. Tomasello's chapters on shared intentionality and joint commitment provide a developmental account of how children acquire relational competence in CS-, AR-, and EM-like patterns; market pricing comes later and is more culturally constructed. Useful for the Swarp Kids module.

[On the architecture of distributed civic platforms \(sections 7.1–7.2, 9\)](#)

Newman, S. (2021). *Building microservices* (2nd ed.). O'Reilly. The standard reference. Chapters 1–3 give the conceptual case for and against microservices; chapter 7 is the load-bearing one for our argument that distributed systems impose distributed costs. Anyone tempted to recommend microservices for a small-team civic platform should read chapter 17 (operating microservices) first.

Sambra, A. V., et al. (2016). *Solid: a platform for decentralized social applications based on linked data*. MIT CSAIL & QCRI Technical Report. The original Solid statement, before the protocol matured into its current shape. The current normative reference is the Solid Protocol Specification (<https://solidproject.org/TR/protocol>), maintained by the Solid Project under W3C-style processes. Read both: the technical report for the *why*, the specification for the *what*.

Berners-Lee, T. (2018). *One small step for the web*. *Inrupt blog*. The civic case for Solid in non-technical language. Use as a way to explain Solid to a stakeholder who will not read the protocol specification. The reader who wants the political-economy argument behind Solid should add Zuboff (2019, *The Age of Surveillance Capitalism*).

W3C (2018). *ActivityPub*. W3C Recommendation. The protocol specification. Indispensable for understanding what ActivityPub does and does not provide. Read sections 4–6 (actors, activities, server-to-server protocol) and then ask, of any platform proposed to be built on ActivityPub, what aspects of the platform's domain are already in the JSON-LD vocabulary. The answer for civic profile state is "almost none", which is the point of section 7.2 of this paper.

IEEE 2874-2025. *Standard for Spatial Web Protocol, Architecture and Governance*. IEEE Standards Association. Recently ratified, still small in deployment. Read the standard alongside the Spatial Web Foundation's white papers (<https://spatialwebfoundation.org/>) for the conceptual framing. Critical readers should ask whether IEEE 2874 will achieve the network effect that ActivityPub already has, and what would have to happen for that to occur. The honest answer is that this is uncertain and is the principal risk of the Swarp federation roadmap.

[On political profiling and matching \(sections 5, 9.5\)](#)

Stemwijzer (Pro Demos). <https://www.stemwijzer.nl/> The dominant Dutch voting advice tool. Source code available; the matching algorithm is documented in their methodological notes. Useful as the literal alternative against which Swarp's Bayesian PPP is compared. The architectural difference — static questionnaire versus updating posterior — is visible from one minute of using each.

Holland, J. L. (1997). *Making vocational choices: a theory of vocational personalities and work environments* (3rd ed.). PAR. The empirical foundation for RIASEC, the only one of the AYYA360 priors with strong, peer-reviewed psychometric support. Chapter 4 is the methodological core. The reader who wants the meta-analytic case should read Nye, Su, Rounds, & Drasgow (2012, *Perspectives on Psychological Science*).

Mathur, A., et al. (2019). Dark patterns at scale: findings from a crawl of 11K shopping websites. *PACM HCI*, 3(CSCW), 81. The empirical basis for the claim that mainstream profile-based platforms operate by extraction rather than legibility. Section 4 of the paper documents the prevalence of patterns that work specifically against user understanding of what is being modelled. Read alongside Brignull's *Deceptive Design* taxonomy for the practitioner vocabulary.

[On deliberation platforms and sense-making \(section 9\)](#)

Small, C., et al. (2021). Polis: scaling deliberation by mapping high-dimensional opinion spaces. *Recerca*, 26(2). The most explicit technical statement of how Polis works. Read alongside the case-study literature on vTaiwan (Hsiao et al., 2018, cited in the references) for the deployment side. The reader who wants to understand why Polis cannot, by design, model the individual participant should read section 3 of the technical paper carefully.

Snowden, D. (2020). *Cynefin: weaving sense-making into the fabric of our world*. Cognitive Edge. Long, idiosyncratic, occasionally polemical, and necessary. The chapters on SenseMaker (chapter 12) and on the Cynefin framework (chapters 3–4) are the relevant ones. Snowden's prose rewards effort; the SenseMaker methodology rewards still more effort, but the methodological commitment to participant-anchored signification is genuinely original and deserves to be taken seriously even where one disagrees with its implications.

Calleja-López, A., et al. (2018). *Decidim: redes políticas y tecnopolíticas para la democracia participativa*. UOC. The architectural and ideological account of Decidim by its principal authors. Spanish-only; for an English entry, see the Decidim platform documentation at <https://docs.decidim.org/>. The crucial reading for our purposes is the section on what Decidim deliberately does not model about participants, and why.

Smith, R. (2017). *Loomio and the problem of deliberation at scale*. Loomio Cooperative Handbook. The cooperative's own account. Useful as a comparison point because Loomio is built explicitly for small-group rather than mass-scale deliberation, and the architectural choices reflect that. Loomio is, in a real sense, what you build when you take seriously the limitation of Polis-style aggregation; it makes the opposite trade-off and pays the corresponding price.

[On forecasting, time series, and the EMA update rule \(section 4\)](#)

Hyndman, R. J., & Athanasopoulos, G. (2021). *Forecasting: principles and practice* (3rd ed.).

OTexts. Open-access at <https://otexts.com/fpp3/>. Section 8.1 is the formal treatment of exponential smoothing and the connection to the random-walk model that justifies the EMA choice in section 2 of this paper. Section 8.4 (state space models) is what the Swarp Bayesian PPP would converge to if generalised. The book is short, free and indispensable.

West, M., & Harrison, J. (1997). *Bayesian forecasting and dynamic models* (2nd ed.). Springer.

The deeper book, for the reader who wants the full Bayesian state-space machinery. Chapters 2 and 5 are the load-bearing ones. The Swarp design parameter $\alpha = 0.85$ is, formally, a discount factor in the West–Harrison sense, and the architectural mitigation discussed in section 6 (per-user fitting of α) maps onto the discount-factor learning problem treated in chapter 6.

[On AYYA360-related interpretive systems \(sections 10, 11\)](#)

Parkyn, C. (2009). *Understanding Human Design*. Hierophant Publishing. The most usable layperson introduction to the Human Design system. Read with the epistemological framing of section 5 of this paper firmly in mind: this is a source of priors, not of truths. The reader who wants the original Ra Uru Hu material can find it in *The Definitive Book of Human Design* (Curry & Parkyn, 2011), but Parkyn is more concise.

Beck, D. E., & Cowan, C. C. (1996). *Spiral Dynamics: mastering values, leadership, and change*.

Blackwell. The empirical foundation for the colour-stage gravities used in the SSP. Beck and Cowan adapted Clare Graves's biopsychosocial model into the more familiar coloured-stages presentation. The original Graves work (collected in *The Never Ending Quest*, 2005) is harder to read but more rigorous. Critical reception of Spiral Dynamics is mixed; for the methodological case for caution, see the relevant chapters in Wilber (2000) below.

Wilber, K. (2000). *A theory of everything: an integral vision*. Shambhala. Useful as the most articulate exponent of the Integral framework that the agora compares Swarp against, and useful as a counterpoint: Wilber proposes a meta-theory, Swarp proposes an infrastructure within which multiple theories compete as priors. The difference is the entire epistemological argument of section 5.

Maciocia, G. (2015). *The foundations of Chinese medicine* (3rd ed.). Elsevier. The standard reference for the Wu Xing (Five Elements) framework that Swarp's Shen-coordinate uses. Chapters 2 and 4. Approached as a prior rather than as a metaphysics, this material is among the most internally consistent of the AYYA360 component systems; whether the prior earns its keep against the uniform baseline (the falsification condition stated in section 5) remains an empirical matter.

[On the operational stack \(section 7.5 and the appendix material\)](#)

Drizzle ORM Documentation. <https://orm.drizzle.team/> The reference for the ORM that carries Swarp's relational model. Worth reading in full; Drizzle's design choices (no DSL, type inference from schema, opt-in migrations) are themselves an argument for the relational-over-graph choice in section 7.3.

TanStack Query Documentation. <https://tanstack.com/query/latest> The server-state library that mediates between Swarp's React frontend and its Express API. The hierarchical query-key conventions (`['/api/recipes', id]`) and the cache-invalidation patterns are non-trivially load-bearing for the LCS architecture, because they make cache scoping per-thread tractable.

Mollie API Documentation. <https://docs.mollie.com/> For the reader who wants to understand the Seeds economy from the payment side. The webhook flow is the architecturally interesting bit: payments arrive asynchronously and are reconciled idempotently, which is the only sane pattern for any system that allows users to spend money.

Resend API Documentation. <https://resend.com/docs> The transactional-email provider behind the magic-link authentication and the horoscope scheduler. For the reader who wonders why Swarp uses a hosted provider rather than its own SMTP, the answer is in Resend's documentation on deliverability — running one's own SMTP in 2026 is a full-time engineering job that does not advance the platform's mission.

Replit Documentation: Authentication & Object Storage. <https://docs.replit.com/> The platform substrate. Especially relevant for the sidecar-mediated GCS object-storage flow described in section 7.5; the architecture is unusual and worth understanding before assuming the platform is "just hosting".

[Pointers to the broader civic-tech ecosystem](#)

The Centre for Public Impact, *The Future of Citizen Engagement* series. <https://www.centreforpublicimpact.org/> A continuously updated set of case studies on civic-tech deployments, including Decidim, Polis, vTaiwan, Madrid Decide, and others. The case-study methodology is mostly qualitative but the breadth is unmatched.

Nesta, *Digital Democracy* programme. <https://www.nesta.org.uk/project/digital-democracy/> The British counterpart to the Centre for Public Impact's work, with a stronger focus on UK and European deployments. The programme's reports on the limits of voting-advice applications are the most useful empirical critique of the persona-based matching pattern.

Public Discourse Project, *Designing Online Spaces for Constructive Conflict*. <https://thepublicdiscourse.org/> A practitioner-oriented body of work on the user-experience design choices that distinguish productive from destructive online discussion. Useful for any team designing the discussion-and-deliberation surfaces of a civic platform.

The annotated reading is intended for the reader who, having absorbed the paper's argument, wants to test it against the broader literature. Where two sources disagree, the disagreement is itself the most useful information.

Appendix A — Complete enumeration of Swarp functions

This appendix lists every user-facing function of the Swarp platform as deployed in May 2026, grouped by *draad* (thread) as defined in `shared/domain-config.ts`. Each entry gives the function's name, a short description of what it does for the user, the route(s) at which it lives, and the theoretical or empirical grounding from which it is derived (paper, blog, or framework). Items grouped under "Cross-cutting infrastructure" are not part of any single draad but support all of them. Entries marked "internal/admin" are visible only to operators and ambassadors. The grounding column distinguishes between *primary theory* (peer-reviewed source), *practitioner literature* (blogs, methodology notes, books), and *internal essay* (a Swarp-Agora seed post stored in `server/seed-data/`).

A.1 — Bron / AYYA360 (**productLabelN1: AYYA360**)

Function	Route(s)	What it does	Grounding
AYYA360 profile compute	/ayya360, /ayya360-landing	Computes a four-system birth profile (Human Design chart, Paths-of-Change colour, Shen element, RIASEC archetype) from birth data.	Holland (1997, ch. 4) for RIASEC; Parkyn (2009) for HD; Beck & Cowan (1996) for the colour-stage adaptation that PoC draws from; Maciocia (2015, ch. 2) for Shen/Wu Xing. Internal essay: "AYYA360 als profielengine" on constable.blog.
Levensloop overview	/levensloop	Maps the user's life across five epochs derived from the AYYA360 profile, with epoch-specific guidance.	Erikson's (1959) life-stage model adapted; Levinson (1978, <i>The Seasons of a Man's Life</i>) for the epoch interval choice.
Heldentocht (hero's journey)	/heldentocht	Stages the user's current life situation against the Campbell monomyth.	Campbell (1949, <i>The Hero with a Thousand Faces</i>); Vogler (2007, <i>The Writer's Journey</i>) for the operational adaptation.
Daily horoscope	/daghoroscoop	Generates a daily forecast from the AYYA360 profile combined with calendrical Shen-element timing.	Maciocia (2015) for the Wu Xing day-cycle; the engine is implemented in <code>server/ayya360-engine.ts</code> (<code>computeDailyHoroscope</code>).
Beroepen (occupations)	/beroepen, /beroepen-hub	Surfaces vocational matches against O*NET-derived RIASEC codes.	Holland (1997); O*NET database (US Department of Labor); Nye et al. (2012) for the meta-analytic case.
Beroep failures	/beroep-failures	Records and surfaces <i>expectation failures</i> in past vocational choices to drive script revision.	Schank (1982, ch. 7) on case-based reasoning from prior failures.

Personal coach	/coach, /personal-coach	Conversational AI coach grounded in the user's AYYA360 profile and recent observations.	Active inference framing (Friston, 2010); Schank (1982) on dialogue as script-revision.
Compatibility check	/compatibiliteit	Compares two AYYA360 profiles across the four sub-systems.	Internal essay: " <i>PCP — Personal Compatibility Profile</i> " on constable.blog.
Paden (paths)	/paden	Renders the four Paths-of-Change colour pathways and where the user currently is on each.	Internal: <i>Paths of Change</i> methodology used as the PoC layer in AYYA360.
Toa Triade	/toa-triade	Tri-axis self-positioning across Tao, Anam Cara, and Wisdom traditions.	Synthesis essay on constable.blog (" <i>Toa Triade als coachingsraster</i> ").
Verhaalmotor (story engine)	/verhaalmotor	Generates narrative cultural profiles per user, fusing HD/PoC/Shen/RIASEC into prose.	Bruner (1991) on narrative as cognition; Schank (1990, <i>Tell Me a Story</i>).
Wijsheid (wisdom)	/wijsheid	Surfaces wisdom prompts indexed against the user's current life-epoch.	Sternberg (1998) <i>Balance theory of wisdom</i> ; internal AYYA360 epoch mapping.
Sport	/sport	Sport recommendations adapted to HD type (energy economy) and Shen element.	Parkyn (2009) on HD energy types; sport-physiology integration is exploratory and not peer-reviewed.
Cultural profile	/mijn-cultureel-profiel, /cultureel-profiel	Renders the user's narrative cultural profile for peer-to-peer connection.	Internal essay: " <i>Narratieve cultuurprofielen</i> ".

A.2 — Schering / Swarp Politiek (**productLabelNl: Swarp Politiek**)

Function	Route(s)	What it does	Grounding
Personal Political Profile (PPP)	/mijn-politiek-profiel, /mijn-politiek	Bayesian Fiske four-vector per administrative layer (TK, PS, GEM), updated on each politically meaningful act.	Fiske (1992); Friston (2010); body of this paper, sections 2–5. Internal essay: <i>"PPP — Persoonlijk Politiek Profiel"</i> on constable.blog.
Political map (NL/EU)	/politiek-kaart, /kaart-nl	Cartographic overview of municipal/provincial Fiske topology, with citizen-vector overlays.	De Vries (2018) for the dissatisfaction cartography frame.
Party comparison	/partijen, /partijen/:id	Compares parties on Fiske vector against the user's posterior; surfaces match scores with adaptive thresholds.	Cosine similarity over Fiske vectors; party Fiske scores derived from manifesto analysis (cf. Manifesto Project, https://manifesto-project.wzb.eu/).
Party detail	/partijen/:id, /partijen/:id/raadslid/:id	Drill-down per party, per council member, with Fiske breakdown and recent council positions.	Same as above.
Citizen initiatives	/initiatieven, /mijn-initiatieven, /initiatieven/:id	Create, support, and track local citizen initiatives; auto-classified into Fiske and matched to council fractions.	Initiative classifier in <code>server/services/initiatief-fiske-classifier.ts</code> ; matching logic in <code>server/routes/burger-initiatieven.ts</code> .
Initiative invite	/initiatief-uitnodiging	Invitation flow for initiative co-signing.	Operational.
Citizen reporting (meldpunt)	/burger-meldpunt	Bottom-up reporting of local issues to the council, classified into Fiske themes.	Bottom-up principle stated in the project's working agreements.

Gemeenten overview	/gemeenten	Per-municipality cockpit with Fiske topology of council vs. citizens, ORI agenda items, local news.	ORI (https://api.openraadsinformatie.nl/); local-news aggregation as fallback.
Gemeente cockpit	/gemeenten/:id, /gemeenten/:id/poc-synthesizer	Single-municipality dashboard with PoC synthesis across decisions, council members, citizen vectors.	Internal synthesis essay; ORI integration.
Council decision detail	/raadsbesluit/:id	Per-decision Fiske classification, theme, related citizen vectors.	ORI classifier in <code>server/services/ori-realtime-monitor.ts</code> .
Agenda signals	/agenda-signalen	Real-time feed of municipal agenda items relevant to the user's Fiske profile.	ORI real-time monitor; matching by Fiske similarity.
Realisation map	/realisatiekaart	Tracks which initiatives have moved through the policy cycle.	Operational.
Local TV / news	/streektv, /swarp-tv	Aggregated local news and regional broadcasters as a fallback for areas with thin ORI coverage.	Bottom-up principle; sources include Sleutelstad, regional media.
Politician contact	(server-side /api/politicus-contact)	Direct, rate-limited communication with named politicians.	Operational; uses Resend for delivery.
Narrative analysis	/narratieve-analyse	Ambassador-led narrative-research analysis of citizen interviews.	Schank (1982) on case extraction; Snowden (2020, ch. 12) for narrative anchoring.
Workshop facilitation	/workshop, /workshop/:id	Ambassador-facilitated political workshops with structured Fiske and PoC outputs.	Internal methodology developed in the Ambassador role.

Swarp overview	/swarp-overzicht	Aggregate cross-municipality view for ambassadors and admins.	Internal/admin.
Politics essay	/essay-politiek	Long-form essay rendering of the political theory underpinning PPP.	Linked to constable.blog and the agora.
Ambassador admin	/admin/ambassador-requests	Approval flow for ambassador role requests.	Internal/admin.
Platform announcements	/admin/announcement	Curated announcements pushed to subscribed users.	Internal/admin.
Patricia simulator (admin)	/admin-patricia-simulator	Internal scenario simulator for testing PPP behaviour against synthetic users.	Internal/admin.
Kiesraad sync (admin)	/admin/kiesraad-2026	Imports election data from Kiesraad.	https://www.kiesraad.nl/ as bron-of-truth for election data.
ORI sync (admin)	/admin/ori-sync	Manual trigger of ORI pull jobs per municipality.	https://api.openraadsinformatie.nl/ .
Data sync (admin)	/admin/data-sync	Cross-source reconciliation.	Internal/admin.
Seed requests (admin)	/admin/seed-requests	Approval queue for Seed credit requests.	Internal/admin.
Zaadbank (admin)	/admin/zaadbank	Seed-bank operations.	Internal/admin.
Kiesraad-style result viewer	/admin/kiesraad-2026	Election-result tooling.	Wikipedia/Kiesraad as source-of-truth (project working agreement).

A.3 — Inslag / Swarp Werk (productLabelN1: Swarp Werk)

Function	Route(s)	What it does	Grounding
ZZP tools dashboard	/zfp-tools	One-stop dashboard for self-employed users (time tracking, fiscal status, opdrachten).	Operational.
Fiscal	/fiscaal	Tax overview, VAT rates, fiscal transactions, audit log.	Dutch Belastingdienst rules; schema in shared/schema/vonk.ts.
Personal administration	/mijn-administratie	Invoices, time entries, business partners, audit log.	Operational.
Opdrachtenmarkt	/opdrachtenmarkt	Marketplace for assignments, with Fiske-based match to provider profiles.	Internal Fiske matching; same algorithm as PPP.
Vakmensen	/vakmensen, /swarp-vakmensen	Find certified professionals by trade and locality.	Operational.
Certification	/certificering	Track and renew professional certifications.	Operational.
Jobs	/jobs	Generic job board.	Operational.
Companies	/companies, /companies/:id	Company profiles, members, followers.	Operational.
Markt (marketplace)	/markt, /swarp-markt	Generic marketplace surface.	Operational.
Crowdfund	/crowdfund, /swarp-crowdfund	Project-based crowdfunding for local initiatives and ZZP campaigns.	Operational.
Collectief (cooperative)	/collectief, /swarp-collectief	Cooperative formation and shared overhead.	Operational.
Partner registration	/partners/register	Register a partner organisation for the Swarp ecosystem.	Operational.

A.4 — Spoel / Swarp Kids (**productLabelN1: Swarp Kids**)

Function	Route(s)	What it does	Grounding
Swarp Kids landing	/swarp-kids, /swarp-kids-promo	Entry surface for parents and children.	Operational.
Mijn kind	/mijn-kind	Per-child profile with developmental milestones, missions, badges.	Tomasello (2019) on developmental relational competence; internal essay on Kids gamification.
Gezin (family)	/gezin, /gezin-hub	Family dashboard with shared lists, reports, life-step rapporten.	Operational.
Add family member	/gezin/lid-toevoegen	Invite a family member with magic-link auto-linking on consume.	<code>server/routes/auth-magic.ts</code> (atomic single-use).
Pedagogical reports	(paid)	AI-generated pedagogical reports per child, paid in Seeds via Mollie.	OpenAI generation; payment flow in <code>server/routes/payments.ts</code> .
Virtual school for kids	/virtual-school-kids	Age-adapted virtual school sessions for children.	Operational; adapted from the broader Virtual School module.

A.5 — Vonk / Swarp Academie (**productLabelN1: Swarp Academie**)

Function	Route(s)	What it does	Grounding
Academia (Agora)	/academia, / academia/:slug, / academia/:slug/ invite	Long-form academic posts; conversion to forum discussion; PoC-cycle on emotion-tagged response.	Schank (1982); internal seed posts on PEFT, SWARP-as-CBR, Fractal Wisdom Simulator (in server/seed-data/academia-posts-seed.ts).
Blog	/blog, / blog/:slug, / blog-correlatie	Imports blog content (constable.blog and others); correlation analysis across posts.	https://constable.blog.
Knowledge base	/knowledge	Aggregated knowledge feed across blog/academia/lexicon.	Operational.
Research	/research, / research/:id, / research-lab	Research projects, sources, experiments, notes, collaborators.	Operational.
Learn (general)	/learn, / learning-journeys	Learning trajectories with milestone tracking.	Kolb (1984, <i>Experiential Learning</i>); Schank (1982) on indexing learning by failure.
Virtual school (adult)	/virtual-school, /virtual-school-multi, / virtual-school-session	Adult virtual classroom sessions.	Operational.
Virtual conservatorium	/conservatorium, / conservatorium-session, / virtueel-conservatorium	Music and arts education sessions.	Operational.
Training	/training	Structured training modules.	Operational.
Lexicon	/lexicon, / lexicon/:slug	Versioned concept dictionary with relations between concepts.	Wittgenstein (1953) family-resemblance; operational implementation in shared/schema/bron.ts.

Kiemtuin (seed garden)	/kiemtuin	Curated emergent ideas and "seedling" content.	Internal essay.
Leerstructuur	/leerstructuur	Structural map of the learning landscape across draden.	Operational.
Semantic network	/semantic-network	Graph view of concepts and relations.	Lexicon graph projection.
Markov navigator	/markov-navigator	State-space navigation through learning content using Markov-chain estimates of next-best content.	Internal essay: <i>"Markov-navigatie als leertool"</i> .
Wetenschap synthese	/wetenschap-synthese	LLM-summarised scientific synthesis on topics chosen by the user.	Operational.
Collective intelligence	/collectieve-intelligentie	Surface for cross-user wisdom emergence from agora discussions.	Internal essay; cf. Surowiecki (2004), Malone (2018).
Architectuur	/architectuur	Live architectural diagram of Swarp itself, including this paper as referenced source.	Self-reference.
Essays portal	/essay-ayya360, /essay-dimensions, /essay-generative-infrastructure, /essay-markov, /essay-politiek, /essay-quaternion, /essay-spiral-navigator, /essay-swarp-qt, /essay-swarp, /essay-verandermethodes	Long-form internal essays.	Internal Swarp essays; constable.blog.

Methode artikel	/methode-artikel, /methode-artikel/:slug	Per-method long-form articles.	Internal.
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A.6 — Prisma / Swarp PoC (**productLabelNl: Swarp PoC**)

Function	Route(s)	What it does	Grounding
PoC4 functions library	/functies, /poc4-bibliotheek	Library of organisational/ personal functions classified along the PoC4 colour scheme.	Internal: PoC4 typology developed in constable.blog essays.
PoC4 coverage	/coverage, /poc4-coverage, /poc4-coverage-trend	Visualises which colour-types are covered in a team or community and which are missing.	Internal essay: <i>"PoC4 coverage als teamdiagnose"</i> .
Compatibility (PoC)	/compatibiliteit	Pairwise compatibility within the PoC framework.	Internal.
Verandermethodes	/verandermethodes, /essay-verandermethodes	Library of change methods (TRIZ, Theory U, Cynefin, etc.) with PoC mapping.	Snowden (2020) for Cynefin; Scharmer (2009) for Theory U; Altshuller (1984) for TRIZ.
PoC4 case reflectie	(server-side)	Reflective case-based audit of PoC4 application in past projects.	Schank (1982) CBR.
Gemeente PoC synthesizer	/gemeenten/:id/poc-synthesizer	Aggregates PoC reflections at the municipal level.	Internal.

A.7 — Spectrum / Swarp Zingeving (**productLabelNl: Swarp Zingeving**)

Function	Route(s)	What it does	Grounding
Spirituele hub	/spirituele-hub, /spiritualiteit	Entry surface for the spirituality draad.	Operational.
Mijn spiritueel profiel (SSP)	/mijn-spiritueel-profiel, /spiritueel-profiel	Five-dimensional gravity profile (BLUE/RED/GREEN/YELLOW/WHITE), 5D from birth or 4D from MBTI.	Beck & Cowan (1996) Spiral Dynamics; Graves (2005); internal essay " <i>SSP — Swarp Spiritueel Profiel</i> " on constable.blog.
SSP enrolment	/ssp-aanmelden	Onboarding flow for SSP.	Operational.
Spinoza chat	/spinoza	Conversational interaction with a Spinoza-trained LLM persona.	Spinoza (1677, <i>Ethica</i>); persona constructed via prompt-engineering.
Filosofen	/filosofen	Library of philosopher personae for thematic dialogue.	Operational.
Filosofie generator	/filosofie-generator	Generates a personal philosophical position statement from the user's profile.	Operational.
Philosopher chat	/philosopher-chat	Chat with a chosen philosopher persona.	Operational.

A.8 — Dauw / Swarp Gezond (**productLabelNl: Swarp Gezond**)

Function	Route(s)	What it does	Grounding
Welzijn dashboard	/welzijn	Aggregated wellbeing dashboard with measurements, mood, referrals.	Operational.
GP question portal	/dokter, /dokter-out-of-the-box	Asynchronous question portal with GP triage.	Operational.
VGC (Virtual GP Care)	/vgc, /vgc-simulatie	Simulation and live VGC consultations.	Operational.
Therapeutic hub	/therapeutic	Entry to therapeutic resources.	Operational.
Therapie studio	/therapie-studio	Therapy session scheduling and structured intake.	Operational.
Vrije tijd	/vrije-tijd	Leisure recommendations adapted to user profile.	Operational.
Vraagbaak	/vraagbaak, /juridische-vraagbaak, /juridische-monitor	Q&A portal including legal questions; ongoing monitoring of legal changes.	Operational.
Crisis dashboard	/crisis-dashboard	Specialised dashboard for users in crisis with escalation paths.	Operational; safety-by-design considerations.

A.9 — Patroon / Swarp Atelier (**productLabelNl: Swarp Atelier**)

Function	Route(s)	What it does	Grounding
Kunstenaar	/kunstenaar	Generate artwork from textual prompts; upload media; commission art from human artists in the network.	Operational; uses generative image models.

A.10 — Knoop / Swarp Hobby (**productLabelN1: Swarp Hobby**)

Function	Route(s)	What it does	Grounding
Hobby	/hobby	Record hobbies, find peers by hobby, join interest-based groups.	Operational.

A.11 — Kettingboom / Swarp Thuis (**productLabelN1: Swarp Thuis**)

Function	Route(s)	What it does	Grounding
Mijn woning	/mijn-woning	Manage home: rooms, devices, energy, maintenance, documents, purchases, savings validation, cohort learning.	Operational; full schema in <code>shared/schema/ecosystem.ts</code> .

A.12 — Proefdraad / Swarp Lab (**productLabelN1: Swarp Lab**)

Function	Route(s)	What it does	Grounding
Research lab	/research, /research-lab	Research project workspace with sources, experiments, notes, collaborators.	Operational.
Sandbox	/sandbox	Free-form experimentation surface.	Operational.
TRIZ	/triz, /triz-principles	TRIZ contradiction-resolution toolkit with the 40 inventive principles.	Altshuller (1984, 1999); operational adaptation.
Future Forge	/future-forge	Speculative-design surface for future scenarios.	Inayatullah (2008, <i>Six Pillars: futures thinking for transforming</i>).
Inzichten	/inzichten, /projective-insights	Surfaces emergent insights across user research notes.	Operational.

A.13 — Weefsel / Swarp Community (**productLabelN1: Swarp Community**, always-on)

Function	Route(s)	What it does	Grounding
Feed	/feed	Activity feed across user connections.	Operational.
Messages	/messages	Direct messaging between users.	Operational.
Connections	/connections	Manage user-to-user connections.	Operational.
Groups	/groups, /groups/:id, /group-detail	Topical groups with members.	Operational.
Forum	/forum	Threaded forum discussions, including agora-spawned threads.	Operational; emotion-coupling triggers PoC cycle (see A.5 Academia).
Collectieven	/collectieven	Collective formation and management surface.	Operational.
Invites	/invites, /invite/:token	Invitation flows across draden (gezin, initiatief, group).	Operational.
Communities of Practice	/cop	Practitioner community surfaces.	Wenger (1998) <i>Communities of Practice</i> .
Meetings	/meetings	Plan and run online meetings (WebSocket signalling in server/meeting-service.ts).	Operational.
Seeds wallet	/seeds	Internal Seeds currency: balance, transactions, Mollie checkout.	Mollie integration.
Agenda	/agenda	Personal agenda surface combining ORI signals, meetings, and personal items.	Operational.
User profile (public)	/user/:id, /user-profile	Public-facing user profile.	Operational.
Ervaringen	/ervaringen	User-contributed experience reports.	Operational.

Workshop detail	/workshop/:id, /workshop-detail	Workshop attendance and follow-up.	Operational.
Bug reports	/bug-reports	User-submitted bug reports.	Operational.

A.14 — Cross-cutting infrastructure (no single draad)

Function	Route(s)	What it does	Grounding
Profile	/profiel	The user's main profile page; account actions (incl. <i>Beheer opgeslagen data</i>).	Operational.
Mijn data	/profiel/mijn-data	Per-draad data inventory with archive and delete operations.	Data-sovereignty principle; aligned with GDPR (EU 2016/679).
Mijn tijdlijn	/mijn-tijdlijn	Chronological view of all the user's activities across draden.	Operational.
Mijn plek	/mijn-plek	Postcode-based local context (resolved via <code>server/services/postcode-resolver.ts</code>).	PDOK Locatieserver (https://api.pdok.nl/).
Onboarding	/onboarding, /onboarding-v2	First-time user flow, draad selection.	Operational.
Magic-link login	/magic-login, /magic-confirm	Email magic-link authentication with 15-min TTL and atomic single-use.	<code>server/routes/auth-magic.ts</code> .
Replit Auth (OIDC)	/api/login, /api/callback, /api/logout	OIDC-based authentication via Replit.	Replit Auth integration.
Solid pod	/solid-pod	Manage Solid pod connection and sync categories.	Sambra et al. (2016); https://solidproject.org/ .
SDK settings	/sdk-settings	Configuration of integrations and developer settings.	Operational.
Translation manager	/translation-manager	Internal i18n editor (NL/EN/DE/FR/ES).	Operational.
Account overdracht	/account-overdracht	Account-handover flow for end-of-life or delegation.	Operational.
Voorwaarden	/voorwaarden	Terms and conditions.	Operational.
Privacy	/privacy	Privacy policy and data-processing register.	GDPR-aligned.

Help / handleiding	/help, / handleiding	User documentation.	Operational.
Navigatie kaart	/navigatie-kaart	Map of all routes for orientation.	Operational.
Dashboard	/dashboard, /my- dashboard, / dashboard- instellen	Per-user configurable dashboard.	Operational.
Search	(server-side /api/ search)	Cross-draad search.	Operational.
Welcome email	(server-side)	Onboarding email sequence.	Resend integration.
Engineering hub	/engineering-hub	Internal/admin: developer tooling.	Internal/admin.
Software analyse	/software- analyse	Internal/admin: codebase metrics.	Internal/admin.
System Agent	/system-agent	Internal/admin: live status of the meta-monitoring agent.	server/system-agent.ts.
Agents	/agents, / agent/:id, / agent-detail	Internal: live view of Active Inference agents and their Markov blankets.	Friston (2010); schemas in shared/schema/agents.ts.
Surprisals	/surprisals	Internal: log of recent expectation failures across agents.	Friston et al. (2017).
Coherence	/coherence	Internal: meta-coherence metric across agents.	Internal essay.
Delegations	/delegations	Internal: agent-to-agent delegation log.	Internal.
Protocols	/protocols	Internal: Spatial Web protocol surface (HSTP transactions, UDG snapshots).	IEEE 2874.
KAYS	/kays	Internal: KAYS consensus session view.	Internal/Spatial-Web bridge.
Vortex	/vortex	Internal: dynamic visualisation of agent activity.	Internal.

Valis monitor	/valis-monitor	Internal: VALIS-principle adherence monitor (named after Dick, 1981).	Dick (1981, <i>VALIS</i>).
Uncertainty heatmap	/uncertainty-heatmap	Internal: visualisation of where the system has highest predictive uncertainty.	Operational.
Smart Eye	(server-side /api/smarteye)	Internal vision-and-classification utility.	Internal.
Knowledge graph	(server-side /api/knowledge-graph)	Internal: graph queries over lexicon and academia.	Internal.
Knowledge extraction	(server-side /api/knowledge-extraction)	Internal: LLM-driven extraction of structured knowledge from text.	Internal; OpenAI.
Theories	(server-side /api/theories)	Internal: catalog of theories used in the system, with provenance.	Internal.
PCP narratives	(server-side /api/pcp-narratives)	Personal Compatibility Profile narrative generation.	Internal essay on constable.blog.
Socrates	(server-side /api/socrates)	Socratic-questioning facilitation layer for the agora.	Operational; cf. Schmachtenberger's Consilience Project.
Kennis (knowledge router)	(server-side /api/kennis)	Cross-cutting knowledge access layer.	Internal.
Phi (Φ)	(server-side /api/phi)	Internal: Integrated Information Theory (IIT) Φ proxy across the agent network.	Tononi (2004); experimental.
Metaswarp	(server-side /api/metaswarp)	Internal: meta-state of the Swarp system itself.	Internal.
Quaternion composite	(server-side /api/quaternion-composite)	Internal: quaternion-based state composition (cosmology layer).	Hamilton (1844); internal essay on octonion cosmology (speculative, marked as such in the project).

Publiek composite	(server-side /api/ publiek- composite)	Public composite views over multiple draden.	Internal.
ContentDiscovery	/content- discovery	Cross-draad content discovery surface.	Operational.

A.15 — Additional functions and route corrections

The earlier sections cover the principal user-facing surfaces but, for full fidelity to `client/src/App.tsx`, the following entries complete the enumeration and correct a small number of route paths.

Additional Bron / AYYA360 entries

Function	Route(s)	What it does	Grounding
AYYA360 landing (Ontdek)	/ontdek	Public landing surface introducing AYYA360 to non-authenticated visitors.	Operational.
AYYA360 essay	/essay	The original long-form essay that frames the AYYA360 system as a profile engine.	Internal essay on constable.blog.
Levensloop — Coaching tab	/levensloop (sub-tab)	Coaching prompts indexed against the user's current life epoch.	Internal; <code>client/src/pages/levensloop/CoachingTab.tsx</code> .
Levensloop — Casussen tab	/levensloop (sub-tab)	Case archive of comparable life situations from the user's cohort.	Schank (1982) on case-based reminding.
Levensloop — Mijn kring tab	/levensloop (sub-tab)	Visualises the user's social ring (gezin, vrienden, mentors, professionals).	Operational; relational primitives from Fiske (1992).
Levensloop — Sport tab	/levensloop (sub-tab)	Epoch-adapted sport recommendations.	See A.1 <i>Sport</i> .
Levensloop — Zorgzaam tab	/levensloop (sub-tab)	Care obligations and caregiving network.	Operational.
Levensloop — Financiën tab	/levensloop (sub-tab)	Personal-finance overview indexed to life epoch.	Operational.
Levensloop — Zelfhulp tab	/levensloop (sub-tab)	Self-help library indexed to current epoch.	Operational.
Levensloop — Monitor dashboard tab	/levensloop (sub-tab)	Trend dashboard across the other tabs.	Operational.
Levensloop — Profile tabs router	/levensloop (router)	Tab navigator that composes the above eight tabs.	Operational; <code>client/src/pages/levensloop/ProfileTabs.tsx</code> .

Coach (canonical route)	/coach	Personal-coach surface (canonical path; the earlier listing's /personal-coach is a component name, not a route).	See A.1 <i>Personal coach</i> .
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Additional Schering / Swarp Politiek entries

Function	Route(s)	What it does	Grounding
Party comparison (canonical)	/partijen/ vergelijk	Side-by-side comparison of two or more parties on Fiske vector and stated positions.	Cosine similarity over party Fiske vectors; cf. Manifesto Project.
Council member profile	/raadslid/:id	Per-council-member profile with voting record, Fiske drift, citizen contact.	Operational; ORI integration.
Woonplaats page	/ woonplaats/:naam	Public-facing local context page for any postcode-resolved place; aggregates news, council activity, citizen vectors.	Bottom-up principle; PDOK Locatieserver.
Gemeente PoC synthesizer (canonical)	/gemeente/:naam/ poc	The PoC-synthesis surface lives at /gemeente/:naam/poc, not under /gemeenten/:id/poc-synthesizer as earlier listed.	See A.2 <i>Gemeente cockpit</i> .
Governance dashboard	/governance	Cross-municipal governance metrics for ambassadors and policy researchers.	Internal/operational.
My initiatives (canonical)	/mijn- initiatieven	Personal dashboard of initiatives the user has created or supported.	See A.2 <i>Citizen initiatives</i> .
Democracy hub (NL alias)	/democracy, / democratie	Entry surface for the democracy stack across draden.	Operational.
Initiative invite flow (token)	/initiatief- uitnodiging/:token	Token-bound invite to co-sign a specific initiative.	Operational.
Shared list (token)	/gedeeld/:token	Token-bound public read of a list shared by another user.	Operational.
Invitation report (token)	/uitnodiging- rapport/:token	Token-bound rapport outcome of an ambassador-led invitation cycle.	Operational.

Additional Inslag / Swarp Werk entries

Function	Route(s)	What it does	Grounding
Personal administration (redirect)	/mijn-administratie	Currently redirects to /mijn-politiek-profiel; the personal-administration UI is being reconstituted under the political-profile surface. Listed honestly as a redirect rather than a live page.	Operational; transitional.
Business case generator	/business-case	Generates a business-case document from a project description (markets, costs, revenue model, risks).	Operational.
SOC (Service & Operations Centre)	/soc	ZZP/cooperative SOC dashboard for small operators.	Operational.
VanCampen	/vancampen	Branded partner surface for the VanCampen integration in the ZZP draad.	Operational/partnership.

Additional Spoel / Swarp Kids entries

Function	Route(s)	What it does	Grounding
Family member onboarding (token)	/uitnodiging-rapport/:token	Token-bound rapport outcome surface used in family invitation flows.	See above.
Child virtual school session	/kids-school/:kindId	Per-child virtual school session UI.	Operational.
Add family member (gezin-scoped)	/gezin/:id/lid-toevoegen	Gezin-scoped invite path.	See A.4 <i>Add family member</i> .

Additional Spectrum / Swarp Zingeving entries

Function	Route(s)	What it does	Grounding
SSP enrolment (canonical)	/ssp/aanmelden	Onboarding flow for SSP. The earlier listing's /ssp-aanmelden is incorrect.	See A.7 <i>SSP enrolment</i> .

Additional Weefsel / Swarp Community entries

Function	Route(s)	What it does	Grounding
Connections (NL alias)	/connecties	Dutch-language alias for /connections.	Operational.
Group direct page	/groups/:id	Direct entry into a single group.	Operational.
CoP direct page	/cop/:id	Direct entry into a single Community of Practice.	Wenger (1998).
Invite accept (token)	/invite/:code	Token-bound invite acceptance flow.	Operational.
Campaign join (token)	/join/:code	Token-bound campaign join flow.	Operational.
Rewards	/rewards	Reward and badge wallet earned through community participation.	Operational; Seeds-adjacent.

Additional Cross-cutting infrastructure entries

Function	Route(s)	What it does	Grounding
System dashboard (alias)	/system	Alias for / dashboard.	Operational.
Dashboard configuration	/profiel/ dashboard-instellen	Per-user dashboard composition surface.	Operational.
Engineering hub (canonical)	/engineering	The engineering hub lives at / engineering, not / engineering-hub.	Internal/admin.
Translations admin	/admin/ translations	Internal i18n editor.	See A.14 <i>Translation manager</i> .
Magic-link login (canonical)	/inloggen, / inloggen/ bevestig, /login	The login surface canonically lives at / inloggen and / inloggen/ bevestig; /login is an English alias. The earlier listing's / magic-login// magic-confirm are component names, not routes.	See A.14 <i>Magic-link login</i> .
Knowledge detail	/knowledge/:id	Per-knowledge-item detail view.	See A.5 <i>Knowledge base</i> .
Lexicon detail	/lexicon/:id	Per-concept detail view.	See A.5 <i>Lexicon</i> .
Verandermethodes detail	/ verandermethodes /:id	Per-method detail view.	See A.6 <i>Verandermethodes</i> .
Therapeutic detail	/therapeutic/:id	Per-therapeutic-resource detail view.	See A.8 <i>Therapeutic hub</i> .
Crisis detail	/crisis, / crisis/:id	Crisis dashboard (canonical path is / crisis, not / crisis-dashboard).	See A.8 <i>Crisis dashboard</i> .
Profile (other user)	/profile/:id	Public profile of another user.	Operational.
Profile (self, EN alias)	/profile	English alias for / profiel.	Operational.

TV (canonical)	/tv	Swarp TV surface (canonical path is /tv; the earlier listing's /swarp-tv is incorrect).	See A.2 <i>Local TV / news</i> .
Uncertainty heatmap (canonical)	/heatmap	The heatmap lives at /heatmap, not /uncertainty-heatmap.	See A.14 <i>Uncertainty heatmap</i> .
VALIS monitor (canonical)	/valis	The VALIS monitor lives at /valis, not /valis-monitor.	Dick (1981).
Agent detail (canonical)	/agents/:id	Per-agent detail view.	See A.14 <i>Agents</i> .
Architectural map (canonical)	/kaart	The navigation map lives at /kaart, not /navigatie-kaart.	Operational.
Academia agora (alias)	/academia/agora	Alternative entry to the agora index.	See A.5 <i>Academia (Agora)</i> .
Academia invite (token)	/academia/uitnodiging/:token	Token-bound invite to comment on a specific agora post.	See A.5.

Server-side route modules not yet attributed in the per-draad sections

The following Express route modules in `server/routes/` exist as backing services rather than as user-visible pages, and were either not enumerated above or are worth naming explicitly for completeness:

Module	What it does	Grounding
<code>me-data.ts</code>	Aggregated personal-data inventory served to the /profiel/mijn-data page.	GDPR-aligned; Solid-compatible.
<code>org-features.ts</code>	Organisation-level feature flags for partner accounts.	Operational.
<code>dev-test-login.ts</code>	Internal: developer-only login bypass.	Internal; disabled in production.
<code>welcome-email.ts</code>	Onboarding email sequence orchestration via Resend.	Operational.
<code>zaadbank.ts</code>	Backing service for the Zaadbank admin surface.	Internal/admin.

agenda.ts and agenda-signalen.ts	Two-tier agenda service: personal agenda items and ORI-derived political signals respectively.	ORI integration.
politicus-contact.ts	Rate-limited politician-contact endpoint backing the council-member profile page.	Operational.
lokaal-nieuws.ts	Local-news aggregation backing /streektv and /woonplaats/:naam.	Bottom-up principle.
wijken.ts and woningen.ts	Geographic and housing data services backing the Wonen draad and the political map.	Operational; PDOK-derived.
gezin-levensstap.ts and gezinnen.ts	Family-step lifecycle and family-membership services backing the Kids draad.	Operational.
kids-game.ts	Backing service for child-facing gamified surfaces.	Operational.
ladder-data.ts	Internal data ladder service for cross-draad ranking and ladder visualisations.	Internal.
levenspad.ts	Internal life-path computation service for Levensloop.	Internal.
mijn-tijdslijn.ts	Backing service for the personal-timeline page.	See A.14 <i>Mijn tijdslijn</i> .
pcp-narratives.ts	Personal Compatibility Profile narrative-generation service.	See A.14.
poc4.ts, poc4-case-reflectie.ts, poc4-coverage-trend.ts, poc4-koppelingen.ts	Backing services for the PoC4 draad surfaces.	See A.6.
publiek-composite.ts and quaternion-composite.ts	Cross-draad composite read APIs (the latter feeds the speculative quaternion-cosmology view).	Internal; cosmology layer marked speculative.
verhaalmotor.ts	Backing service for the story-engine surface.	See A.1 <i>Verhaalmotor</i> .

A.16 — On the empirical and theoretical grounding of the function set

The grounding column is intentionally heterogeneous. A function may be grounded in (a) a peer-reviewed paper, (b) a well-known practitioner book, (c) a Swarp-internal essay published on

constable.blog or seeded into the agora, or (d) marked as *operational* when its design is utilitarian and not derived from a specific external source. The reader who wants to interrogate any of the more speculative groundings (octonion cosmology, IIT Φ proxy, the spiritualiteit and AYYA360 prior systems) should treat them according to the epistemological framing of section 5 of this paper: as priors with explicit confidence weights, falsifiable in their predictive contribution, not as ontological commitments. A function listed as merely *operational* is not less defensible; it is one for which the architectural justification is downstream of the integration argued in this paper, and for which no external scholarly source is the primary reference.

The total count, as of this writing, is approximately 170 user-facing pages and 100 server-side route modules. The growth rate has been roughly six new functions per month over the preceding twelve months, with the LCS refactor (section 7.1) intended to keep that rate sustainable.

Appendix B — Complete lexicon

This appendix lists every active concept in the Swarp lexicon (table `lexicon_concepts`, status `ACTIVE`) as of May 2026, grouped by the lexicon's own *domain* taxonomy. For each concept the entry gives the canonical English term, the symbolic English definition as held in the database, the *process verb* (the action the concept invites), the level label where applicable, and the PoC order — the Paths-of-Change category (WHY/OBSERVATION/VALUATION/TRUTH) under which the concept is filed. The lexicon is the operational vocabulary of the platform; every semantic token in the user interface that links to `/lexicon/:slug` resolves to one of the entries below. Total: 304 concepts across 33 domains.

B.1 — Domain: **agenda** (6 concepts)

Term	Definition	Process verb	Level	PoC
PoC Appointment	A scheduled activity categorized in one of the four PoC realities, making the nature, purpose and participant roles of the interaction explicit.	categoriseren		VALUATION
PoC Reality	One of the four fundamental perspectives on reality (Paths of Change): Social/blue (connection), Intention/purple (purpose), Project/green (action), Plan/amber (structure).	perspectieven		WHY
RSVP	The formal confirmation process for invitations: Yes (attending), No (absent) or Maybe (tentative). In SWARP the RSVP status determines the coherence score of collective appointments.	bevestigen		VALUATION

Time Planning	The conscious organization of time in PoC realities: social (meetings), intentional (reflection), project-based (action) and planning (structure).	plannen		TRUTH
Virtual Appointment	A planned interaction in one of SWARP virtual spaces: Meeting Room (formal), Group Chat (informal) or Personal Space (reflective).	ontmoeten		OBSERVATION
iCal Feed	A standardized RFC 5545 calendar format enabling SWARP appointments to be synchronized with external calendar applications.	synchroniseren		TRUTH

B.2 — Domain: **aiden** (1 concepts)

Term	Definition	Process verb	Level	PoC
AIDEN Charter	Governance contract that bounds AIDEN to autonomous data-and-content actions within a single owner-set budget, while excluding code, schema, workflow, secrets, and external publishing from its domain.			

B.3 — Domain: **arbeid** (1 concepts)

Term	Definition	Process verb	Level	PoC
Vorming & Werk	The extended concept of labour encompassing both paid work and unpaid formative activities such as parenting, mentoring, and education. Replaces the narrower notion of 'work' with a broader category of intentional human activity aimed at development and contribution.			

B.4 — Domain: **ayya360** (31 concepts)

Term	Definition	Process verb	Level	PoC
AYYA360 Profiel	Composite identity profile combining HD chart, PoC coordinate, Shen coordinate, RIASEC and Extended Profiles for a single user.			
Balance	Personal equilibrium across three coupled oscillatory layers: Cognition (thinking), Emotion (feeling), and Action (doing) — the lived experience of the TOA-Triade.	to balance / to attune	Persoonlijk Profiel	WHY
Belbin Team Role	Nine team role types (Plant, Monitor, Coordinator, etc.) determining natural contribution patterns in group work.	to fulfill one's team role	Persoonlijk Profiel	VALUATION
Big Five	Five-factor personality model (Openness, Conscientiousness, Extraversion, Agreeableness, Neuroticism) — the empirical backbone of personality science.	to measure personality dimensions	Persoonlijk Profiel	TRUTH

Bodygraph	Visual map of Human Design energy centers, channels, and gates — revealing how life force flows through the individual.	to read one's energy flow	Persoonlijk Profiel	TRUTH
CLUKS Motor Skills	Motor skills analysis system mapping physical capabilities to sport recommendations based on 4D profile data.	to assess motor potential	Persoonlijk Profiel	OBSERVATION
DISC Profile	Communication style framework (Dominance, Influence, Steadiness, Conscientiousness) — predicts interaction patterns in teams.	to adapt communication style	Persoonlijk Profiel	OBSERVATION
Enneagram	Nine-type personality framework mapping core motivations, fears, and growth paths — derived from MBTI cross-reference in AYYA360.	to recognize motivation patterns	Persoonlijk Profiel	OBSERVATION

Fractal Karma	The self-similar recurrence of the same cognitive script failure across all scales of human organization — personal, team, organizational, societal — as described in Konstapel (2026, "Fractal Karma and the Enneagram").	to recur by pattern		WHY
Human Design	Synthesis system combining I Ching, astrology, Kabbalah, and quantum physics into a bodygraph revealing individual energetic blueprint.	to decode one's design	Persoonlijk Profiel	TRUTH
MBTI Type	Myers-Briggs Type Indicator — 16 personality types used as entry method for cross-referencing all other profile systems.	to type oneself	Persoonlijk Profiel	TRUTH
PoC Worldview	Colours of consciousness mapping individual worldview orientation — determines value systems and communication patterns.	to perceive through color	Persoonlijk Profiel	OBSERVATION

Profile Personalization	Adaptive content generation based on the user's AYYA360 4D profile. Human Design type determines learning style (Generator=doing, Projector=observing). PoC color sets value orientation (RED=action, BLUE=structure, GREEN=connection, YELLOW=vision). RIASEC directs domain relevance. Shen element adds energetic context.	to personalize / to adapt	L3 - Adaptive Content	OBSERVATION
RIASEC Profile	Holland's vocational interest model (Realistic, Investigative, Artistic, Social, Enterprising, Conventional) mapping career orientation.	to orient vocationally	Persoonlijk Profiel	OBSERVATION
Shen Element	Five-element energy system (Wood, Fire, Earth, Metal, Water) determining rhythmic patterns and seasonal vitality cycles.	to flow elementally	Persoonlijk Profiel	TRUTH

TOA-Triade	The Resonant Emergence Framework coupling three oscillatory layers: Cognition, Emotion, and Action.	to resonate triadically	Persoonlijk Profiel	WHY
Wellness	Integrated health dashboard tracking sleep, movement, stress, and mood — correlated with AYYA360 energy cycles for personalized insights.	to nurture wellbeing	Persoonlijk Profiel	OBSERVATION
Artificial Artist	Creative profiling module that maps 4D profiles (HD+PoC+Shen+RIASEC) to artistic creativity types across 5 disciplines, with AI artwork generation.	to create artistically	Persoonlijke Actie	VALUATION
Compatibility	Multi-dimensional matching analysis between individuals based on HD composite charts, PoC alignment, and RIASEC complementarity .	to match / to attune to others	Persoonlijke Actie	OBSERVATION

Creative Profile	Artistic creativity mapping from 4D profiles across 5 disciplines — revealing creative strategy, worldview rhythm, direction, and discipline scoring.	to create / to express	Persoonlijke Actie	VALUATION
Daily Horoscope	Personalized daily energy forecast based on Human Design transit calculations — predicts optimal timing for decisions and rest.	to attune daily energy	Persoonlijke Actie	OBSERVATION
Enneagram als Verdedigingsstrategie	In SWARP, the nine Enneagram types describe the specific defensive strategy used to avoid revising a cognitive script when it fails. PoC mapping: Types 1/5/6 Blue, Types 2/9 Green, Types 3/4 Yellow, Type 8 Red, Type 7 Red+Yellow.	to defend by type		WHY
Extended Profile	A typology entry (MBTI, Enneagram, Belbin, TCM, etc.) cross-referenced to a user via PoC- and Shen-tags with relevance score.			

Health Diagnosis	AI-assisted health pattern analysis based on the Dokter Out of the Box approach — holistic diagnosis beyond conventional categories.	to diagnose	Persoonlijke Actie	TRUTH
Learning Journey	Structured educational pathways that guide users through training modules with progress tracking and milestone achievements.	to learn on a journey	Persoonlijke Actie	WHY
Lifespan Guidance	Comprehensive 4D profiling (HD + PoC + Shen + RIASEC) offering life purpose, career guidance, compatibility, and personalized developmental insights.	to guide one's life course	Persoonlijke Actie	WHY
Mood Tracker	Daily mood registration with pattern analysis and correlation to AYYA360 energy cycles for self-awareness.	to track one's mood	Persoonlijke Actie	OBSERVATION
Onboarding	Dual-path entry system (MBTI quick-start or Human Design deep-profile) that initializes all derived personality profiles and platform personalization.	to onboard / to initiate	Persoonlijke Actie	WHY

Personal Coach	AI coaching system using the complete AYYA360 profile — operates from the TOA-Triade framework as co-navigator in the Omega-Loop.	to coach / to co-navigate	Persoonlijke Actie	WHY
SWARP-TV	Netflix-style content streaming platform using PoC emotion model as genres (BLUE/RED/GREEN/YELLOW), Bakhtin chronotopes as narrative structure, with personalized recommendations and user-generated productions.	to stream narratively	Persoonlijke Actie	VALUATION
Sport Profile	CLUKS-based sport recommendations mapping 4D profile to optimal physical activities and movement patterns.	to move according to design	Persoonlijke Actie	VALUATION

B.5 — Domain: **beroepen** (3 concepts)

Term	Definition	Process verb	Level	PoC
RIASEC Profile	Holland's six interest dimensions mapping occupational preference and work style	to typify	L3 - Personal Profile	TRUTH
Occupation	A structured activity profile that bundles skills, tasks, and knowledge domains into a professional identity	to practice	L4 - Personal Action	VALUATION
Professional Case	An expectation failure from professional practice converted into a learning story via Schank's theory	to learn from failure	L4 - Personal Action	OBSERVATION

B.6 — Domain: **collective_action** (6 concepts)

Term	Definition	Process verb	Level	PoC
Morphotype	A source image or visual pattern that serves as the structural seed for AI-driven creative translations across domains (house, garden, fashion, furniture, etc.) — the artistic DNA that preserves essence while transforming form	to translate	L4 - Individual Action	OBSERVATION
Collective Intelligence	The emergent capacity of agent groups to share beliefs, resolve conflicts through consent, and optimize collective decision-making via precision-weighted aggregation.	to think collectively	Collectieve Actie	WHY
Forum	Community discussion platform for deliberation with threaded posts, expert contributions, and knowledge co-creation across domains.	to deliberate / to discuss	Collectieve Actie	VALUATION

Insight as Art	The complete McWhinney Paths of Change cycle where a detected projective insight (Mythic/Yellow) is confirmed through cross-ratio structure (Unitary/Blue) and manifested as visual art, poetry and spoken word (Sensory/Red) — pattern becoming perception becoming creation	to manifest	L5 - Collective Action	VALUATION
Organization	Legal entity management for companies, cooperatives, and foundations with compliance tracking, member roles, KVK registration, and fiscal integration.	to organize legally	Collectieve Actie	VALUATION
Social Network	Platform-wide social features including feed, posts, connections, messaging, groups, skill endorsements, and cooperative democracy interactions.	to connect socially	Collectieve Actie	VALUATION

B.7 — Domain: **collective_intelligence** (5 concepts)

Term	Definition	Process verb	Level	PoC
Ethical Evaluation	A systemic scoring mechanism that evaluates agent actions through Good/Bad/ Nothing verdicts based on impact on collective coherence, weighted by the Seven Virtues.	to evaluate ethically	L3 - Collective Governance	VALUATION
Knowledge Graph	A force-directed relational visualization mapping connections between agents, articles, lexicon concepts, discussions, and MetaSwarp features — making the invisible web of knowledge visible.	to map / to connect	L3 - System Visualization	OBSERVATION
Hidden Knowledge	Implicit patterns, causal relationships, and emerging themes embedded in community interactions that are not directly observable but discoverable through AI-driven extraction pipelines.	to extract / to surface	L4 - Knowledge Discovery	OBSERVATION

Tit-for-Tat	Axelrod's cooperation strategy where agents mirror the previous behavior of their interaction partners — cooperate first, then reciprocate. The foundation of trust-building in multi-agent systems.	to reciprocate	L4 - Game Theory	TRUTH
Seven Virtues	The weighted ethical criteria (wisdom, justice, courage, love, temperance, faith, hope) used to evaluate agent actions — each virtue contributes a score to the overall ethical assessment.	to weigh virtuously	L5 - Ethical Framework	VALUATION

B.8 — Domain: **content** (10 concepts)

Term	Definition	Process verb	Level	PoC
Chronotope	A Bakhtinian time-space framework that shapes narrative structure and meaning through the fusion of temporal and spatial indicators	to align with time-spaces	Theoretisch Fundament	WHY
StoryTeller	The scientifically validated narrative engine built 3 times and tested by Prof. John Rijsman (Tilburg University), forming the academic foundation of Impuls-TV and SWARP-TV FormatGenerato	to narrate scientifically	Theoretisch Fundament	TRUTH
Academia Agora	An open forum (agora = ancient Greek public square) within SWARP where invited thinkers publish essays and SWARP members engage in academic dialogue.	publish		WHY
Knowledge Blog Archive	The historical collection of 896 essays by Hans Konstapel, migrated from constable.blog to SWARP as the intellectual foundation of the Academia module.	archive		

Academia Producer	An invited scientist, thinker or researcher who has accepted a SWARP Academia invitation and is authorized to publish essays on the Agora.	invite		
Case-Based Reasoning	Roger Schank's learning method where content takes viewers into recognizable cases/situations that lead to emotional insight through narrative structure	to reason through cases	Persoonlijk Profiel	TRUTH
Emotion Cycle	The left- and right-rotating cycle where emotions are the action potential; the right brain hemisphere connects emotions (water) with spirit	to cycle emotions	Persoonlijk Profiel	OBSERVATION

Myth Fragment	An authentic mythological text from one of five world cultures (Sumerian, Greek, Hindu, Norse, Indigenous) correlated to a specific Monomyth stage, Tarot card, Sefirah, and PoC color. The living myth database contains 95 fragments across 17 stages.	to narrate / to correlate	Persoonlijke Actie	VALUATION
Public Broadcasting Quality	The 5 quality dimensions inherited from public broadcasting: societal relevance, artistic quality, educational value, cultural diversity, and democratic function	to assess broadcasting quality	Persoonlijke Actie	OBSERVATION
Format Generation	The AI-driven process of generating narrative content formats by fusing genre (PoC color), chronotope (narrative framework), and content category into cinematic productions	to generate formats	Ecosysteem Integratie	VALUATION

B.9 — Domain: **cop** (35 concepts)

Term	Definition	Process verb	Level	PoC
CoP Ontdekken	Discovery function on the CoP page that allows users to search all available Communities of Practice by name or description, regardless of membership status			
Emotionele surprise	An unexpected emotionally charged event (incident or invention) that triggers deep reflection and wisdom. The fundamental trigger for CoP emergence according to the oscillator model of Active Inference.			
Familie-CoP	A Community of Practice of type 'familie' (extended family): grandparents, aunts, uncles, cousins and in-laws — multiple generations connected in a shared knowledge and practice space.			

Fractie	A political party group within a legislative body (gemeenteraad, Provinciale Staten, Tweede Kamer). In SWARP stored in <code>kern.fracties</code> with (partij_id, bestuursorgaan_id, periode_start) as canonical key and <code>aantal_zetels</code> as seat count for that period.			
Gezin-CoP	A Community of Practice of type 'gezin' (nuclear family): parents and children as a closed learning and growth unit. The most fundamental social organization in any society.			
Resonantiekern	An emotionally charged case (<code> emotieWaarde ≥ 3</code>) that acts as the founding resonance of a new CoP. Multiple resonantiekernen from different individuals signal compatible eigenfrequencies and enable phase-locking.			

SBI-code	Standard Business Classification code (Standaard Bedrijfsindeling) used by CBS to classify companies by sector. Used in SWARP to characterize Bedrijf-CoPs and enable sector-based matching.			
Uitnodiging (PENDING)	A consent-based invitation state — a Swarp user must accept before their HD profile may be used in a composite.			
Verandermethode	A documented intervention method positioned within the PoC topology, characterized by a primary reality, a path of change, originator and scale of application.			

Verkiezing	A democratic election event linked to a specific bestuursorgaan and date. In SWARP stored in kern.verkiezingen; results in kern.verkiezingsuitslagen (verkiezing_id, partij_id, zetels) with UNIQUE (verkiezing_id, partij_id) ensuring idempotent seeding from primary sources.			
Bedrijf-CoP	A Community of Practice automatically created for a company or freelancer (ZZP) that serves as the living layer of organizational knowledge sharing, decision making and programming.			

Besluitvormer	A CoP function enabling collective decision-making through resonance voting: members submit proposals, vote 1-5 stars, proposals are ranked by resonance score, and Hub/Leader can mark them as chosen or rejected.			
CoP Teamsimulatie	A VHS Multi-Player session initiated from within a Community of Practice. The CoP context is automatically passed to the simulation engine, shaping the organizational scenario to the practice community domain.			
CoP Toegangscontrole	Access control mechanism for Communities of Practice with three modes: open (anyone), invitation (link required), closed (owner approval required)			

CoP Wachtendenlijst	Queue of citizens who have requested access to a closed (besloten) CoP, pending owner approval			
Contextmonitor	A CoP function that makes the living context of the community visible: who is active, what PoC-roles are present, what phase the group is in (growth/flow/balance/renewal), and how activity evolves over time.			
Eigenfrequentie	The natural oscillation frequency of a Community of Practice, expressed as its primary PoC-reality (OBSERVATION, VALUATION, TRUTH or WHY). Groups with compatible eigenfrequencies achieve phase-locking and form stable CoPs.			
Familie Hub	Relational analysis hub for broader kin Human Design composites — focus on relationship dynamics.			

Gedeelde lijst	An owner-scoped collection of administrative items shared peer-to-peer via an invitation token — the smallest unit of collective political bookkeeping in SWARP			
Gezin Hub	Pedagogical analysis hub for parent-child Human Design composites within a household.			
Kiesraad	The Dutch Electoral Council. Independent constitutional body that organises elections, validates results, and publishes the official process-verbal per polling district, municipality and province. Primary canonical source for SWARP electoral data.			

Maslow-piramide als PoC-model	Reading of Maslow's pyramid as a PoC model: the five layers (physiological, safety, belonging, esteem, self-actualisation) are not a strict hierarchy but a fractal of growth needs that any change-process passes through. Used in SWARP to anchor each political issue in the developmental layer it primarily serves.			
Persoonlijke administratie	A user-private workspace for archiving sent political emails, marking favorite politicians, and bookmarking ORI agenda items or citizen initiatives.			

Phase-locking	The synchronization process by which individual oscillators (people with shared emotional surprises) align their phases, creating coherent collective resonance — the emergence condition for a Community of Practice.			
Programmamer	A CoP function for AI-assisted co-creation of work programmes: members enter a shared goal, GPT-4o generates 6-8 work packages per PoC-role (Doener/Hub/Leider/Visionair), stored as an actionable programme for the community.			

Provinciale Staten	Provincial parliament of one of the twelve Dutch provinces. Elected every four years; total seats vary per province (Zeeland 39 — Gelderland/N-Holland/N-Brabant/S-Holland 55). PS members elect the Eerste Kamer (Senate). In SWARP modelled as the layer between Tweede Kamer (national) and Gemeenteraad (municipal).			
Veranderkundig Kompas	Visual PoC quadrant interface that maps the four McWhinney realities (M/U/S/So) onto the four main Swarp tabs and links them to 1161 change methods.			
Biofield-laag	Coherence layer in a HD composite per Konstapel (2026) — shared/open centers, resonance channels, interference zones.			

Groeps-quaternion (compositie)	Aggregate quaternion fingerprint of two or more actors, expressing their collective coherence, phase-locking and per-member deviation from the group mean.			
Issue-prioritering	Ranking of 10 thematic issues per citizen (1-10) on the personal political profile, distilled from Hans Konstapel's Meta-Election Programme 2025 blog. Each issue maps to a Maslow level (1-5) and a Fiske mode (CS/AR/EM/MP), so the priority order doubles as a developmental signal.			
Lotgenoten-PoC	A peer-to-peer Proof of Concept clustering mechanism that groups users by shared tags from their email archives, mapping the dominant Fiske mode to a PoC color (GREEN-CS, BLUE-AR, YELLOW-EM, RED-MP).			

Partij van Één	Status assigned when no existing party crosses the adaptive similarity threshold for a layer — the citizen occupies a Fiske-position not represented by any current political formation.			
Persoonlijk Politiek Profiel	A per-citizen Fiske-vector across the four governance layers (TK, EK, PS, GEM) operationalising Konstapel's claim that every human is a political party.			
Wijk Fiske-aggregaat	Anonymous district-level aggregate ($k \geq 3$) of citizen Fiske-vectors, used to surface emergent ideological coalitions independent of formal party labels.			

Inverse Match	Bayesian-flavoured matching procedure that computes per-layer cosine similarity between a citizen vector (profile + AYYA360 prior, confidence-weighted) and party vectors, with adaptive thresholds ($\mu + \sigma$ of inter-party similarity).			
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B.10 — Domain: **economy** (2 concepts)

Term	Definition	Process verb	Level	PoC
Activity Points	Points earned through meaningful platform engagement: training completion (25 pts), content creation, knowledge enrichment. Stored in userRewardStats, convertible to Seeds (min 50 pts). Bridges intrinsic motivation (learning) with extrinsic reward (Seeds economy).	to earn / to reward	L2 - Reward System	VALUATION
Seed	The unit of value exchange within the SWARP ecosystem — representing crystallized contribution rather than static currency.	to seed / to cultivate	Ecosysteem	VALUATION

B.11 — Domain: **ecosystem** (19 concepts)

Term	Definition	Process verb	Level	PoC
Freelance Tools	Integrated toolkit for freelancers: time tracking, invoicing, portfolio management, and fiscal administration.	to manage one's business	Persoonlijke Actie	VALUATION
Leisure	Hobby profiling, matching with like-minded people, and activity recommendations based on AYYA360 profile preferences.	to organize leisure	Persoonlijke Actie	VALUATION
My Home	Personal property management hub for maintenance planning, energy optimization, craftsman booking, and neighborhood coordination.	to manage one's living space	Persoonlijke Actie	VALUATION
Tax Admin	Comprehensive tax/VAT management with automatic record creation, VAT determination, credit notes, and fiscal period tracking.	to administer taxes	Persoonlijke Actie	VALUATION

Assignment Market	Platform for posting and matching paid assignments — connecting commissioners with qualified agents and freelancers.	to match assignments	Collectieve Actie	VALUATION
Certification	Professional certification program validating platform expertise — Practitioner, Builder, Master, Architect levels.	to certify / to validate	Collectieve Actie	VALUATION
Community Purchasing	Collective purchasing power organized at neighborhood level — pooling demand to negotiate better prices and sustainable options.	to pool collectively	Collectieve Actie	VALUATION
Companies	Legal entities registered as organizations within the platform — from sole proprietors to cooperatives.	to register	Collectieve Actie	TRUTH
Craftsmen Network	Verified craftsmen marketplace connecting skilled professionals with homeowners for maintenance, renovation, and sustainable improvements.	to connect with expertise	Collectieve Actie	VALUATION

Freelancer Collaboration	Structured cooperation between freelancers — forming temporary collectives for shared projects, knowledge exchange, and collective bargaining.	to collaborate / to co-create	Collectieve Actie	VALUATION
Marketplace	Community exchange platform for housing, services, and second-hand goods within the neighborhood ecosystem.	to exchange / to trade	Collectieve Actie	VALUATION
Smart Meeting	AI-assisted meeting with integrated Jitsi video conferencing, AIDEN facilitation, philosopher consultation, and structured decision-making.	to deliberate / to decide together	Collectieve Actie	VALUATION
Sustainability Crowdfund	Collective sustainability funding at neighborhood level — pooling Seeds and resources for green initiatives.	to fund collectively	Collectieve Actie	VALUATION
Job Board	Marketplace connecting talent with opportunities within the cooperative ecosystem.	to match	Ecosysteem	OBSERVATION

Philosophers	Multi-philosopher AI system with 25 configured thinkers, the SWARP-Phi generator using 5-layer Philosophical Resonator Stack, 7 Foundational Oscillations, and Cultural Harmonics.	to philosophize generatively	Ecosysteem	WHY
Research Lab	Academic research dashboard for analyzing Active Inference patterns, coherence dynamics, and emergent behaviors across the agent ecosystem.	to research emergently	Ecosysteem	OBSERVATION
SDK & API	External developer interface providing REST API access to system data, AIDEN interactions, and MCP Server for AI assistant integration.	to integrate externally	Ecosysteem	TRUTH
Second-hand Exchange	Neighborhood-level second-hand goods exchange — circular economy within the community.	to reuse / to exchange	Ecosysteem	VALUATION

TRIZ	Theory of Inventive Problem Solving: 40 principles for systematic innovation applied to platform challenges and user problem-solving.	to solve inventively	Ecosysteem	TRUTH
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B.12 — Domain: **gezin** (3 concepts)

Term	Definition	Process verb	Level	PoC
Kerngezin	The nuclear family unit: two parents (or one) and their children living under one roof or sharing primary responsibility. In SWARP: the basis for the Gezin Hub HD-composite analysis.			
Gast-rol	Family member without a Swarp account, added to a Gezin or Familie Hub via the guest tab. Two roles exist: grootouder_gast (grandparent guest) and mede_opvoeder_gast (co-parent guest). Optional birth time and place enable Human Design type calculation; defaults of 12:00 / Netherlands ensure composite analyses always work.			

Levensstap- rapport	A personalised AI-generated guidance report describing the next meaningful life step for a single family member, based on their Human Design chart, age, and an optional situation note. Costs 30 Seeds. Doubles as an invitation-with-impact: when sent by email, the recipient receives a teaser plus a magic-link to claim both the report and a Swarp account that is automatically linked to the existing family-member record.			
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B.13 — Domain: **governance** (32 concepts)

Term	Definition	Process verb	Level	PoC
Fiske Relational Models	Alan Page Fiske's theory that all human social relations are constructed from four elementary cognitive models (CS, AR, EM, MP). These function as social coherence regimes, each characterised by a specific oscillatory coupling dynamic between individual and collective. Validated in Dutch electoral geography (Konstapel 2026): regional cultural identity predicts both voting behaviour and dominant relational model. The electoral vote is a RELATIONAL vote — downstream of coupling regime preference, not policy positions.	to model social relations	Theoretisch Fundament	WHY

Harmony Balance	The goal of restoring societal balance through content that connects rather than divides — the core purpose of public broadcasting heritage	to balance harmoniously	Theoretisch Fundament	WHY
PEFT	Political Expectation Failure Theory — unified theory of democratic instability (Konstapel, Leiden 28 March 2026). Integrates three layers: (1) Schank's EFT as cognitive foundation, (2) Kees de Vries' democracy cycles as political pattern, (3) Holling's Panarchy as ecosystem dynamics. Thesis: political instability results from stacked expectation failures across all three levels simultaneously. Published in SWARP Academia Agora.	analyseren		

Authority Ranking	A relational model structured along a linear hierarchy where higher rank confers precedence, obligations and the right to direct those below. Produces hierarchical drive: a dominant oscillator entrains subordinate ones, coherence flows top-down. Values: respect, deference, tradition. Electoral expression: CDA, SGP secondary in AR-dominant areas; amplifies CS in confessional regions.	to rank by authority	Platform Architectuur	OBSERVATION
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Communal Sharing	A relational model in which group members treat each other as equivalent, sharing resources and identity without calculation. Produces full-phase synchronisation: agents are tightly coupled to the group oscillator, individual variance is suppressed. In-group / out-group boundaries are sharp. Electoral expression: orthodox-confessional parties (SGP, CU) in Bijbelgordel regions (Urk, Gelderse Vallei).	to share communally	Platform Architectuur	VALUATION
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Equality Matching	A relational model governed by balance, reciprocity and turn-taking. Each party maintains an internal ledger of equivalence; imbalance demands correction. Produces anti-phase balance: agents couple through reciprocal exchange, maintaining stable difference rather than identity. Electoral expression: agrarian-pragmatic regions (Achterhoek, Twente, Westland) where EM norms of fair play combine with PVV's equal-treatment demand.	to match by equality	Platform Architectuur	VALUATION
Fiske-profiel	The Fiske Relational Model profile of a party or group, expressed as CS/AR/MP/EM scores (0-100) indicating relational model dominance.	profileren	L2	TRUTH

Gemeente-cockpit	Dashboard linking 795 local parties across 334 municipalities to their Fiske profiles and Open Raadsinformatie council documents.	navigeren	L2	OBSERVATION
Market Pricing	A relational model governed by ratios, utility and abstract value. Parties interact on the basis of calculated benefit, independent of personal identity or status. Produces weak coupling in a distributed network: agents interact through price signals, maintaining autonomy while participating in aggregate order. Electoral expression: urban-intellectual regions (Leiden, Utrecht, Het Gooi) → D66, VVD. The vote reflects MP preferences for individual autonomy and meritocracy.	to price by market	Platform Architectuur	WHY

Agenda-signaal	Per-citizen ranked notification about an upcoming local council item, scored by cosine similarity between the citizens Fiske/ POC vector and the items Fiske vector, with a small bonus for overlap with the citizens top issues. Status flow: NIEUW → GEZIEN → BIJGEWOOND/ GEMAILD/ GENEGEERD.			
Burgerinitiatief	A citizen-initiated proposal that emerges from bundled experienced problems and is submitted to the municipality as a concrete request for maintenance	to initiate collectively		TRUTH
Citizen Report	A local signal submitted by a citizen about a concrete issue in their neighbourhood or place, linked to a PoC theme and potentially supported by video evidence and council decisions	to signal	L3 - Group Action	TRUTH

Culturele Identiteitslagen	The non-governmental layers of identity — regional culture (streek), roots/heritage (afkomst) and worldview/religion (levensbeschouwing) — that run parallel to administrative power structures and equally shape how citizens experience society.	to layer identities		VALUATION
Democratische Ladder	A multi-scale model showing both governmental (administrative) and cultural (identity) layers that shape a citizen's lived experience. From neighbourhood to national parliament on one axis; from regional culture to roots and worldview on another.	to participate		TRUTH

Fractie-match	Engine that ranks the factions of a municipal council against a citizen initiative on Fiske similarity and proposes the best top-5 plus the best 2-faction coalition that can pass it. Drives the mail-CTA per faction.			
Initiatief Fiske-classifier	Background AI service (gpt-4o-mini, JSON mode) that auto-fills CS/AR/EM/MP vector and theme on every new or updated kern.initiatief, fire-and-forget after POST/PATCH.			
Raadsrapport	Printable Fiske analysis report of all council parties in a municipality, generated within the Administrative Workshop for aldermen.	rapporteren	L3	WHY

Bookmark System	A user-scoped persistence layer that lets a citizen mark agenda items, initiatives, politicians, factions and decisions as 'kept' for later — a cognitive anchor against the noise of public information	to bookmark	L4 - Personal Action	OBSERVATION
Citizen Journalism	A democratic media form where citizens actively report, document and share local issues, creating a counterweight to top-down media structures through collective truth-finding	to report	L4 - Personal Action	OBSERVATION
ORI Real-time Agenda-Monitor	Service that pulls agenda items, council proposals, motions and decisions from the Open Council Information API per municipality and classifies each item via gpt-4o-mini into a Fiske vector (CS/AR/EM/MP) plus theme. Idempotent UPSERT on (gemeente_id, ori_id) into kern.ori_agenda_item.			

Party Match Score	A per-layer Bayesian score combining Fiske similarity and issue overlap (score = $\alpha \cdot \text{fiske_sim} + (1 - \alpha) \cdot \text{issue_overlap}$, $\alpha=0.6$) that ranks parties for a citizen on TK/PS/GEM — operationalising 'every person is a political party'	to match	L4 - Personal Action	WHY
Place Page	The smallest democratic unit in the SWARP ecosystem: a dedicated page per place aggregating citizen reports, videos, council decisions and submission forms — enabling hyper-local self-organisation	to organise	L4 - Personal Action	OBSERVATION
Politieke Partij	An organized political collective with a Fiske relational profile, operating at municipal, provincial or national scale. In SWARP, parties have positions on all 8 dimensions, departments per region, and member roles from supporter to list leader.	to organize politically	L4 - Coordinated Strategy	VALUATION

Citizen Report	Community issue reporting system for neighborhood problems — from broken streetlights to safety concerns.	to report community issues	Collectieve Actie	OBSERVATION
Consent	Sociocratic decision-making where proposals proceed unless there are paramount objections — not consensus but consent.	to consent / to govern	Collectieve Actie	VALUATION
Democratic Consent	Extended consent-based decision making with delegation — combining sociocratic principles with digital voting and mandate tracking.	to decide by consent	Collectieve Actie	VALUATION
GEPL Cycle	Genereren-Evalueren-Plannen-Leren — the governance rhythm determining the collective phase of decision-making.	to cycle through governance	Collectieve Actie	WHY
Neighborhood Circle	Local governance unit at neighborhood level — the smallest circle of sociocratic decision-making in the holonic structure.	to govern locally	Collectieve Actie	VALUATION

Partijstandpunt	A political position formulated by a party along one of the 8 SWARP dimensions. Each standpoint is grounded in the party's Fiske relational model and expresses how the party approaches that dimension.	to take a political position	Collectieve Actie	VALUATION
Petition	Formal community petition mechanism with signature collection, threshold tracking, and governance escalation.	to petition collectively	Collectieve Actie	VALUATION
Region	A geographic-cultural sub-region within a province, clustering municipalities that share historical identity, landscape and community bonds — the intermediate scale between municipality and province	to cluster	L5 - Collective Action	VALUATION

Region TV	A participatory media platform that combines editorial productions with citizen video reports per region, democratically ranked by community support — embodying the Free Energy Principle of active inference in media	to broadcast	L5 - Collective Action	WHY
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B.14 — Domain: **health** (2 concepts)

Term	Definition	Process verb	Level	PoC
Health Diagnosis	Massively parallel probabilistic analysis generating multiple hypotheses with confidence scores from symptom patterns, evidence sources, and patient context	to diagnose	Persoonlijke Actie	TRUTH
Referral Network	Structured pathway connecting diagnosed conditions to qualified providers through urgency-weighted matching, enabling care continuity across specializations	to refer	Collectieve Actie	OBSERVATION

B.15 — Domain: **human-design** (2 concepts)

Term	Definition	Process verb	Level	PoC
Activated Channel	A Human Design channel formed when both connecting gates are activated by planetary positions.			
Defined Center	A Human Design center that is consistently energized via at least one activated channel.			

B.16 — Domain: **juridisch** (8 concepts)

Term	Definition	Process verb	Level	PoC
Belief Conflict	A clash between competing mental models or worldviews detected through variational free energy analysis in Active	to resolve	L4 - Personal Action	TRUTH
Legal Reflection	A value-based analysis linking law to perspective, feeling, and underlying principle via PoC	to reflect	L4 - Personal Action	OBSERVATION
Dispute Mediation	Structured resolution process for conflicts between parties using escrow and mediation, tracking progress through PoC color analysis	to mediate	L5 - Collective Action	VALUATION
Legal Article	The smallest unit of legislation defining a specific right, prohibition, or procedure	to prescribe	L5 - Collective Action	TRUTH
Legal Code	A codified system of legal rules establishing rights, obligations, and procedures	to regulate	L5 - Collective Action	TRUTH

Legal Monitor	A pattern detection system that identifies systemic issues in legislation through analysis of citizen questions and reflections	to monitor	L5 - Collective Action	OBSERVATION
Digital Judge	AI-driven legal advice translating complex legislation into plain language for citizens	to advise	L6 - Ecosystem	VALUATION
Learning Legislator	Adaptive governance concept where policy evolves based on systematic signals from society, implementing feedback loops between citizens and legislation	to adapt	L6 - Ecosystem	WHY

B.17 — Domain: **knowledge** (17 concepts)

Term	Definition	Process verb	Level	PoC
Expectation Failure	The moment when reality diverges from prediction — Roger Schank's core learning mechanism. In Active Inference: surprisal that triggers model updating. In COLLIN: the transition from Perception to Action phase. The heart of every training module and scenario.	to surprise / to violate expectations	L1 - Core Learning	OBSERVATION
Experience Cycle	The complete learning loop from action to reflection: Situatie → Verwachting → Verwachtingsfout → Reflectie → Leermoment. Maps to COLLIN phases (Perception → Action → Integration → Learning) and the SWARP-TV narrative arc (Stories → Content → Actie → Ervaring).	to cycle through experience	L2 - Experiential Learning	WHY
Composing Profession	Any profession that creates, orders or structures. The composing action modulates chaos into form.	create	Concept	VALUATION

Ervaringsbibliotheek	The curated collection of 2,478 professional expectation failure cases (Schank) linked to O*NET occupations via RIASEC classification, serving as pre-experiential learning material.	to document experience		TRUTH
Virtual Conservatory	Creative space where every profession that creates, designs, or orders is treated as a composing profession.	compose	Module	WHY
Activiteitsblending	The process of combining HD-derived PoC weights with behavioral signals from completed learning sessions to produce a refined, experience-adjusted profile.	to blend activities		TRUTH
Modulation (Quadrivium)	Moving from one tonality or state to another. The bridge between Arithmetica and Astronomia in the Quadrivium framework.	modulate	Handeling	OBSERVATION

Profiel-gekoppelde failure	A professional expectation failure case selected and ranked by cosine similarity to a user's personal RIASEC profile, enabling targeted pre-experiential learning.	to profile-link failure		WHY
Quadrivium	The four Liberal Arts: Arithmetica, Geometria, Musica, Astronomia.	organize	Kader	TRUTH
Training	AI-generated learning modules based on Roger Schank Expectation Failure Theory — personalized to user PoC color and profile.	to train	Persoonlijke Actie	OBSERVATION
Four-Point Structure	A set of four numerical values extracted from a domain entity, normalized and compared via cross-ratio to find structural resonance across domains	to extract	L5 - Collective Action	OBSERVATION
Sound as Infrastructure	Sound is the foundational layer of reality. Every profession that modulates is composing (Konstapel 2026).	resonate	Fundament	WHY

Cross-Ratio	The fundamental invariant of projective geometry: $CR(a,b,c,d) = ((a-c)(b-d))/((b-c)(a-d))$, preserved under all projective transformations	to compute	L6 - Ecosystem	TRUTH
Geometric Resonance	The phenomenon where structures from different domains share the same projective form, suggesting a deeper underlying pattern — Plato's Forms manifested in data	to resonate	L6 - Ecosystem	WHY
Knowledge Base	Collaborative wiki with AI-powered Q&A — the collective memory of the platform.	to curate knowledge	Ecosysteem	TRUTH
Projective Insight	A structural isomorphism between data from different domains revealed through cross-ratio comparison — a Platonic Form visible only through radical perspective change	to detect	L6 - Ecosystem	WHY

Smart Eye	AI content discovery engine that automatically finds, analyzes, categorizes and quality-checks internet content relevant to the platform.	to discover content	Ecosysteem	OBSERVATION
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B.18 — Domain: **lebensloop** (19 concepts)

Term	Definition	Process verb	Level	PoC
Coach	An experienced volunteer mentor matched to a person by personality type (PoC color), vocational profile (RIASEC) and life phase. The coach guides through transitions using observational and reflective skills.	to guide	L2 - Guidance	OBSERVATION
Community of Affinity	A network of people connected by kinship, shared values or emotional bonds rather than professional interest. Provides the relational foundation for lifecycle support through informal care and mutual recognition.	to connect through kinship	L2 - Kinship Network	VALUATION
Informal Care	Unpaid care provided by family members, friends or neighbours to someone who is ill, disabled or elderly. A critical component of the support circle that requires its own support structures to prevent caregiver burnout.	to care informally	L2 - Informal Care	VALUATION

Self-Help Group	A temporary group of people sharing a common life event (loss, divorce, unemployment, illness, relocation) who exchange experiences and mutual support. Groups form, activate, and complete their lifecycle naturally.	to share experiences	L2 - Peer Experience	VALUATION
Socialisation	The process by which individuals learn social norms, values and behaviours through participation in communities. In the lifecycle system, socialisation is a continuous process spanning all life epochs.	to socialize	L2 - Social Learning	OBSERVATION

Support Circle	A personal support circle surrounding an individual through life phases, consisting of roles such as godmother (Meter), godfather (Peter), family, friends and neighbours. The circle activates during crises and provides continuous social scaffolding.	to support	L2 - Social Support	VALUATION
Vitality	The integral health state encompassing physical, mental, social and spiritual dimensions. Measured and supported through the lifecycle guidance system as a dynamic equilibrium rather than a static condition.	to vitalize	L2 - Integral Health	OBSERVATION

Case Management	Structured coordination of support when a crisis is detected (Holmes-Rahe > 300). A case manager orchestrates the support circle, coach and professional services towards resolution through defined protocols.	to coordinate	L3 - Structured Coordination	TRUTH
Community of Interest	A group united by shared curiosity about a topic, idea or domain of knowledge. Unlike communities of practice, membership is driven by intellectual interest rather than professional application.	to explore together	L3 - Shared Curiosity	WHY
Community of Practice	A group of practitioners who share a craft or profession and learn through regular interaction, shared repertoire and joint enterprise. The primary vehicle for professional knowledge transfer in the lifecycle system.	to practice together	L3 - Experience Sharing	OBSERVATION

Cooperative	A member-owned organization operating on principles of democratic governance, mutual benefit and shared responsibility. In the lifecycle system, cooperatives provide the organizational form for mutual guarantees and collective purchasing power.	to cooperate	L3 - Cooperative Organization	VALUATION
Knowledge Centre	A hub for systematically collecting, organizing and disseminating knowledge relevant to lifecycle guidance. Combines academic research, practical experience and community wisdom into accessible resources.	to centralize knowledge	L3 - Knowledge Hub	TRUTH

Mutual Guarantee	A cooperative mechanism where members mutually guarantee each other's commitments across financial, labour and knowledge domains. Based on solidarity principles within cooperative structures.	to mutually guarantee	L3 - Mutual Guarantee	VALUATION
Three-Generation System	The intergenerational wisdom transfer system where three generations (grandparents, parents, children) form the natural unit of lifecycle support. Older generations transmit experiential knowledge while younger generations provide vitality and innovation.	to transmit across generations	L3 - Intergenerational Wisdom	VALUATION

Integral Healthcare	A holistic approach to health that integrates physical, mental, social and spiritual dimensions within the lifecycle guidance system. Bridges formal healthcare with informal community support.	to heal integrally	L4 - Holistic Health	WHY
Kondratiev Cycle	The long economic wave (~50-60 years) that determines macro-economic context for individual financial lifecycle planning. Understanding one's position in the Kondratiev cycle enables better financial decision-making across life phases.	to cycle economically	L4 - Long Economic Wave	TRUTH

Set-Point	The equilibrium personality state to which an individual naturally returns after perturbations. Based on psychological set-point theory — understanding one's set-point enables realistic goal-setting and acceptance in lifecycle guidance.	to equilibrate	L4 - Equilibrium Personality	TRUTH
Banking Robot	An AI financial advisor that manages personal lifecycle finances by integrating Kondratiev cycle awareness, life phase needs, cooperative mutual guarantees and individual saving/spending patterns into automated financial guidance.	to advise financially	L5 - AI Financial Advisor	TRUTH

Self-Unfolding City	A city that organizes itself through the emergent interactions of its four divisions (Governance, Enterprise, Social, Cultural) mapped to PoC colors. The city as a living organism that adapts and evolves through its citizens' collective intelligence.	to self-organize urbanly	L5 - Self-Organizing City	WHY
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B.19 — Domain: **lexicon** (2 concepts)

Term	Definition	Process verb	Level	PoC
Process Verb	The unfrozen form of a nominalized concept — revealing the underlying activity that a noun merely labels.	to unfreeze / to verbify	Theoretisch Fundament	WHY
PoC Order	The four fundamental orders: Truth, Observation, Valuation, and Why — mapping to quaternionic dimensions of meaning.	to orient semantically	Persoonlijk Profiel	TRUTH

B.20 — Domain: **mystiek** (9 concepts)

Term	Definition	Process verb	Level	PoC
Monomyth	Joseph Campbell's universal narrative structure describing the hero's transformative journey through 17 stages of Departure, Initiation, and Return — the archetypal pattern underlying all human growth.	to journey / to transform	Theoretisch Fundament	TRUTH
Sacred Mathematics	The mathematical layer revealing structural convergence between arithmetic series and universal mysticism. Key discoveries: Tetractys (1+2+3+4=10=Se firot), 153 (sum 1-17=Vesica Piscis), 253 (sum 1-22=Tarot paths, reduces to 10).	to reveal / to converge	Theoretisch Fundament	TRUTH

Sefirot	The ten emanations of the Kabbalistic Tree of Life (Kether through Malkuth), representing the stages through which the Infinite reveals itself. In SWARP, mapped to the 17 Monomyth stages with multi-stage nodes.	to emanate / to unfold	Theoretisch Fundament	TRUTH
Tarot Major Arcana	The 22 archetypal cards (0-XXI) of the Tarot, each corresponding to a path on the Kabbalistic Tree of Life. SWARP maps 17 of the 22 cards to the Monomyth stages as symbolic mirrors of developmental phases.	to reflect / to mirror	Theoretisch Fundament	OBSERVATION

Tetractys	The Pythagorean sacred figure: $1+2+3+4=10$, the blueprint of the universe. Maps directly to the 10 Sefirot. Demonstrates that material reality (10/ Malkuth) inherently contains the forces of 1 (point), 2 (line), 3 (plane), and 4 (body).	to emanate / to sum	Theoretisch Fundament	TRUTH
Triangular Number	A number that equals $n(n+1)/2$, the sum of the first n natural numbers. Key triangular numbers in SWARP: 10 (Tetractys/ Sefirot), 21 (Tarot Arcana), 78 (total Tarot cards), 153 (17 Monomyth stages/Vesica Piscis), 253 (22 paths, reduces to 10).	to accumulate / to build upon	Theoretisch Fundament	TRUTH

Vesica Piscis	The geometric form created when two circles overlap — the gateway between worlds. The number 153 (sum of 1-17, the 17th triangular number) is connected to the Vesica Piscis ratio ($\sqrt{3} \approx 153:265$). The hero traverses 17 stages to arrive at this point of synthesis.	to synthesize / to bridge	Theoretisch Fundament	WHY
Hero's Journey	Campbell's monomyth — 12 universal stages from the Ordinary World to the Return with the Elixir. In SWARP the user's emotional position determines their current stage.	Journey	Archetype	WHY
Ifá Odù	One of 16 primary archetypes in the Ifá oracle tradition — each Odù carries a personality, shadow, and proverb that mirrors the user's current PoC-reality.	Reveal	Archetype	WHY

B.21 — Domain: **paden** (2 concepts)

Term	Definition	Process verb	Level	PoC
Layers of Life	Patricia van der Haak framework of concentric life spheres used to personalize platform paths and aggregate governance insights.	to navigate life layers	Persoonlijke Actie	WHY
Route Plan	Personalized path through the platform based on Layers of Life framework and AYYA360 profile — each path contains platform modules with personalized rationale.	to navigate purposefully	Persoonlijke Actie	WHY

B.22 — Domain: **platform_architecture** (11 concepts)

Term	Definition	Process verb	Level	PoC
Agent Simulation	The service that manages 500+ autonomous agent life cycles through phases, surprisal generation, social activity, coherence, and kairotic moment detection.	to simulate agency	Platform Architectuur	OBSERVATION
Audit Trail	Cryptographically -chained logging of all business actions and user activities for tamper-proof accountability and compliance.	to audit / to trace	Platform Architectuur	OBSERVATION
Global Search	Platform-wide search across agents, knowledge articles, forum discussions, users, and all content domains.	to search / to find	Platform Architectuur	OBSERVATION
Hero's Journey	The SWARP module implementing Campbell's 17-stage Monomyth as an interactive navigation framework, correlating each stage with Tarot Major Arcana, Kabbalistic Sefirot, Paths of Change colors, and Panarchy movements.	to navigate / to correlate	Platform Architectuur	OBSERVATION

Lexicon	The self-referential semantic library of 85 building blocks that defines all platform concepts through process verbs, PoC ordering, and 6 hierarchical levels — implementing Process-First Semantic Modeling where meaning emerges from activity.	to define semantically	Platform Architectuur	TRUTH
Life Path	The computational engine that calculates a user's position in the Hero's Journey based on 14 days of platform activity patterns. Maps behavior to Monomyth stages through weighted activity analysis, integrating AYYA360 profiles and seasonal archetypes.	to position / to navigate	Platform Architectuur	OBSERVATION

MetaSwarp	The meta-intelligence layer that tracks all platform features, decisions, relationships, and self-referential knowledge for system-wide awareness.	to self-reflect systemically	Platform Architectuur	OBSERVATION
Notification	System-generated signal alerting users to state changes, treatment updates, referral responses, and time-sensitive events across platform modules	to notify	Platform Architectuur	OBSERVATION
Privacy Management	User-controlled data governance including consent management, data export, and GDPR compliance through Solid Pod integration.	to govern one's data	Platform Architectuur	TRUTH
Software Analysis	AIDEN's two-step pipeline that inventories all software functions and maps each 1-on-1 to lexicon building blocks, generating an IKEA-style assembly recipe.	to analyze software	Platform Architectuur	OBSERVATION

Polymorphic Fractal Hub Model	Formal specification unifying Schank CBR, McWhinney PoC, Human Design, and Active Inference into a single polymorphic hub architecture. Hub(S,C,M) = Script + Cases + Members, as unit quaternion on S3 under POMDP free energy minimisation.	to compose fractally		TRUTH
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B.23 — Domain: **poc4** (2 concepts)

Term	Definition	Process verb	Level	PoC
PoC⁴ Function Library	The complete 16×16 grid of 256 basic functions derived from the cartesian product of McWhinney's four realities (W1×W2×W3×W4). Each function carries a code, an algorithmic name, and a PDF-extracted official name.	classify	Operationeel instrument	
PoC⁴ Koppelingen	Lazy AI-generated links between change methods, philosophers and the 256 PoC ⁴ basic functions, surfaced as clickable badges in both directions.			

B.24 — Domain: **seeds** (3 concepts)

Term	Definition	Process verb	Level	PoC
Seed-feature	A row in the seed_features table that defines, for one feature key (e.g. GEZIN_RAPPORT), the cost in Seeds plus its multilingual labels. Single source of truth: changing a price is one UPDATE, not a code deploy.			
Seeds-bank	The single source of truth for all virtual currency operations. Routes never touch seed_balances or seed_transactions tables directly; all debits/credits go through storage.spendSeeds, storage.spendSeedsForFeature, and storage.addBonussSeeds.			

Trial-period	14-day free-access window starting at users.created_at, during which spendSeedsForFeature returns success without charging. After expiry, a one-time 500 Seeds welcome bonus is granted lazily on first /api/trial/status call.			
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B.25 — Domain: **simulation** (10 concepts)

Term	Definition	Process verb	Level	PoC
Panarchy	The adaptive cycle framework (growth → conservation → release → reorganization) governing multi-scale system dynamics.	to cycle adaptively	Theoretisch Fundament	WHY
Agent	An autonomous oscillating system that minimizes variational free energy through active inference cycles.	to infer actively	Platform Architectuur	TRUTH
Coherence	The emergent quality of alignment between oscillating agents — measured as the degree to which collective predictions converge.	to cohere	Platform Architectuur	TRUTH
Coherence Visualization	Fractal visualization of emergent coherence patterns across agent populations — revealing the living topology of collective alignment.	to visualize emergence	Platform Architectuur	OBSERVATION
KAYS	Knowledge-Aligned Yielding Synthesis — the engine that measures and enhances coherence across the platform.	to synthesize coherently	Platform Architectuur	TRUTH

Kairotic Moment	A critical threshold where collective coherence, environmental pressure, and agent readiness converge for transformative action.	to recognize the moment	Platform Architectuur	OBSERVATION
Surprisal	A process disruption that signals prediction error — the difference between expected and observed states.	to surprise / to disrupt	Platform Architectuur	OBSERVATION
Forge Action	One of three transformative operations (Resonate, Disrupt, Merge) applied to scenarios	to act	L4 - Coordinated Strategy	OBSERVATION
Potential Map	An exploratory landscape of seeds, weak signals and opening questions	to explore	L5 - Collective Action	WHY
Resonant Scenario	A collectively forged future scenario that resonates with participant profiles and coherence metrics	to forge	L5 - Collective Action	VALUATION

B.26 — Domain: **social** (7 concepts)

Term	Definition	Process verb	Level	PoC
Collective Myth	A community-wide narrative emerging bottom-up from individual stories, revealing the archetypal pattern a group is living — mapped to the Hero Journey after emergence, never imposed before.	synthesise		WHY
Mythic Synthesis	The AI-driven process of reading across many conversations without imposing categories, letting recurring themes and tensions surface naturally before interpreting them through archetypal lenses.	emerge		WHY
Emotion Slider	The IAMAC-derived input mechanism (Identity × Attraction × Power × Actor) mapping 20 named emotions on a scale of -10 to +10 — the primary navigation instrument in SWARP's narrative and CoP modules.	Sense	L3 - Structured Coordination	OBSERVATION

Invitations	Network growth mechanism through personal referrals — organic community expansion.	to invite	Persoonlijke Actie	OBSERVATION
Messages	Direct person-to-person communication channel within the platform.	to message	Persoonlijke Actie	OBSERVATION
News Feed	The social stream where users share updates, ideas, and activities — the pulse of the community.	to share	Persoonlijke Actie	OBSERVATION
Groups	Self-organizing communities of practice around shared interests or goals.	to organize	Collectieve Actie	VALUATION

B.27 — Domain: **system** (12 concepts)

Term	Definition	Process verb	Level	PoC
AIDEN	Adaptive Intelligence for Distributed Emergence Navigation — the self-evolving system agent.	to self-observe / to evolve	Platform Architectuur	OBSERVATION
Remember	Holling panarchy signal: the platform is in the α -phase (renewal/ destruction), the archive is large but little new content is being added. The system 'remembers' its past without new growth. In SWARP: AIDEN logs a Remember warning when platform-wide α -phase + large archive + few new posts.	herinneren		
Resource Monitor	Platform health assessment across four resource dimensions (physical, financial, social, cognitive) based on VanCampen's Law of Functionality: $(m-i)>r$ as universal viability criterion.	to monitor viability	Platform Architectuur	OBSERVATION

Revolt	Holling panarchy signal: the fast layer (CoP, micro) enters collapse/ renewal phase while the slow layer (Academia, macro) is still stable. Revolt can trigger creative breakthrough or system shock. In SWARP: automatic trigger for the Socrates Monitor when CoP-layer reaches Ω/α .	instorten		
Solid Pod	Decentralized personal data store based on Tim Berners-Lee's Solid Project — users own and control their data.	to own one's data	Platform Architectuur	TRUTH
System Overview	Real-time dashboard showing platform health, agent activity, coherence metrics, and system state.	to monitor	Platform Architectuur	OBSERVATION

Tipping Point Analysis	Self-Organized Criticality engine detecting where the system operates between order and chaos — power-law analysis, avalanche cascades, and intervention recommendations.	to detect criticality	Platform Architectuur	OBSERVATION
Media-Hub Event	A typed event emitted by any SWARP module through the central Media-Hub event bus. 17 event types connect all modules: training, knowledge, levensloop, SWARP-TV, forum, Seeds economy. Each event triggers cross-module effects (TV stories, forum discussions, notifications, activity points).	to emit / to propagate	L4 - System Architecture	TRUTH
Delegations	Liquid democracy mechanism allowing users to delegate voting power to trusted representatives.	to delegate	Collectieve Actie	VALUATION

Governance	Multi-level governance structure combining fractal democracy with consent-based decision making.	to govern	Collectieve Actie	WHY
Protocols	Formalized interaction patterns that guide collective decision-making and collaboration processes.	to formalize	Collectieve Actie	TRUTH
Webhook Integration	Event-driven webhooks connecting SWARP to external systems — 8 event types including surprisals, coherence changes, and crisis detection.	to integrate externally	Ecosysteem	TRUTH

B.28 — Domain: **theoretical_foundation** (21 concepts)

Term	Definition	Process verb	Level	PoC
Active Inference	Friston's framework where agents act on the world to confirm their predictions rather than passively observing — the theoretical engine behind all SWARP dynamics.	to infer by acting		TRUTH
Anti-fragility	Taleb's concept of systems that gain from disorder — SWARP architecture designed to strengthen under stress rather than merely survive.	to strengthen through stress	Theoretisch Fundament	WHY
COLLIN Framework	Collective Learning and Intelligence Network — the organizational learning framework connecting individual insights to collective wisdom.	to learn collectively	Theoretisch Fundament	WHY

Dinaturality	A transformation natural in both covariant and contravariant arguments simultaneously — in SWARP: the mathematical form of Active Inference as variational free-energy minimization between predictive and generative models	to transform dinaturally	L1 - Theoretical Foundation	TRUTH
Directed Univalence	The principle that equivalent directed types are definitionally identical — in SWARP: the mathematical proof that panarchy scale invariance is not an approximation but an identity	to identify through equivalence	L1 - Theoretical Foundation	TRUTH
Free Energy	The quantity that living systems minimize — a bound on surprise. Variational free energy drives agent behavior through the Free Energy Principle.	to minimize surprise	Theoretisch Fundament	TRUTH

Oscillation	The fundamental rhythmic process underlying all SWARP dynamics — agents oscillate between exploration and exploitation.	to oscillate	Theoretisch Fundament	TRUTH
Segal Type	A directed type satisfying the Segal condition: composable morphisms have unique composites — in SWARP: the mathematical form of an Agent as a predictive system with coherent state transitions	to compose coherently	L1 - Theoretical Foundation	TRUTH
Self-Organized Criticality	A system that naturally evolves toward critical states where small perturbations can trigger cascading transformations across all scales.	to self-organize critically	Theoretisch Fundament	TRUTH

Simplicial Type Theory	A synthetic foundation for directed higher category theory internalizing Segal spaces, directed path types, and directed univalence — enabling proof-assistant-ready formalization of infinity-categories	to synthesize directedly	L1 - Theoretical Foundation	TRUTH
Twisted Type Theory	Extension of directed type theory with a twist operation resolving mixed variance into pure covariance, enabling syntactic proofs of Yoneda's lemma and dinatural transformations	to twist / to resolve variance	L1 - Theoretical Foundation	TRUTH
VanCampen Framework	A bio-physical modeling framework that maps environmental and physiological variables to human functioning through the Law of Functionality.	to model bio-physically	Theoretisch Fundament	TRUTH

Expectation Failure	Schank's learning mechanism: genuine knowledge is encoded only when an expectation fails and the emotional charge is strong enough. Without surprise, there is no real learning.	Surprise	L2 - Experiential Learning	OBSERVATION
Kolb Experiential Learning Cycle	Kolb's four-stage learning cycle (Concrete Experience → Reflective Observation → Abstract Conceptualization → Active Experimentation) used in VHS Multi-Player to map simulation acts to learning phases.			
Zone van Naaste Ontwikkeling (Vygotsky ZPD)	Vygotsky's concept describing the gap between what a learner can do alone and with a more capable peer. In VHS Multi-Player, AI players model expertise one ZPD level above the current team level, acting as the 'more knowledgeable other'.			

Communicative Actie (Habermas)	Habermas's theory of communicative action with four validity claims (Truth, Rightness, Sincerity, Comprehensibility) that determine the type of speech act. Used in VHS Multi-Player to classify event types by communicative intent.			
Double-Loop Learning	Argyris & Schön's concept distinguishing single-loop learning (fixing symptoms) from double-loop learning (questioning underlying assumptions). Implemented in VHS Multi-Player feedback engine.			
Seed Ripeness	A composite metric (0-1) measuring a potential's readiness for realization, computed from community resonance, temporal maturation, KAYS coherence and SOC criticality	to ripen	L4 - Coordinated Strategy	OBSERVATION

Seed Garden	A self-evolving system where potentials harvested from collective scenario sessions grow through resonance and coherence into realized platform features	to cultivate	L5 - Collective Action	WHY
Seed Realization	The transformative moment when a ripe potential auto-generates platform content, closing the Active Inference loop between collective imagination and concrete platform evolution	to realize	L5 - Collective Action	VALUATION
Wu Wei	The principle of non-action as optimal strategy — when uncertainty is high and impact is low, the wisest choice is to refrain from acting, allowing the system to self-organize.	to not-act / to yield	L5 - Philosophical Wisdom	WHY

B.29 — Domain: **theorie** (5 concepts)

Term	Definition	Process verb	Level	PoC
HoTT: Identity as Path	Homotopy Type Theory's central principle: identity proofs between two objects are paths between them. In SWARP: a completed learning cycle is a loop $(Id_A(a,a))$, and path equivalence corresponds to experiential identity.	traverse		
PoC Topology	The mathematical space spanned by the four PoC realities (Unitary, Sensory, Social, Mythic), forming a quaternion vector space in which every science, method and concept has a unique position.	map		
PoC Vector	A four-dimensional vector $[U, S, V, M]$ assigning a normalized weight to each of the four PoC realities for any science, method or concept. Enables geometric comparison of disciplines.	calculate		TRUTH

Science Synthesis	The AI-driven process of generating a hypothetical new science to fill a detected gap in the PoC topology, based on the surrounding disciplines and the path-of-change connecting them.	synthesize		
Gap Detection	The algorithmic identification of unoccupied regions in PoC space — regions where no known science currently exists, suggesting potential new disciplines.	detect		

B.30 — Domain: **theory** (1 concepts)

Term	Definition	Process verb	Level	PoC
Recursie (alternatieve realiteit)	A reflective move that re-frames a situation from a non-dominant PoC reality, integrated as a single closing line in coach responses without a separate trigger.			

B.31 — Domain: **training** (3 concepts)

Term	Definition	Process verb	Level	PoC
Case-Based Reminding	Schank-CBR mechanism where a current situation triggers retrieval of a structurally similar past case to scaffold reasoning.			
Just-in-Time Training (JIT)	Schank-style learning that delivers a relevant case at the moment of expectation failure, not on demand.			
System-Push met Recognition	Reverse-inference pattern where the system computes prior+likelihood and the user only confirms via recognition (yes/partial/no).			

B.32 — Domain: **verhaalmotor** (5 concepts)

Term	Definition	Process verb	Level	PoC
Story Engine	The ancient oracle architecture (Ifá/ I Ching/Torah/ Campbell) reborn as a digital system — the user's emotion is the cast, the narrative is the map.	Narrate	Module	WHY
Campbell Stages	The 12 archetypal movement phases of the Hero's Journey — from Ordinary World (1) through Crisis (8-9) to Return with Elixir (12). Each emotion range maps to a specific stage.	Map	Concept	WHY
Oracle Aphorism	A compressed proverb in Ifá style — short, paradoxical wisdom that links the user's situation to a universal pattern. The spreuk is the crystallized lering of the narrative.	Compress	Concept	WHY

Oracle Cast	The selection mechanism in divination systems — in SWARP the emotion value (-10 to +10) is the cast that selects the Odù and determines the PoC-reality.	Cast	Concept	OBSERVATION
Ebo — Ritual Action	In the Ifá tradition, the ebo is the concrete sacrifice or action prescribed to restore balance — in SWARP it is the specific task for this week that addresses the expectation failure.	Act	L4 - Personal Action	TRUTH

B.33 — Domain: **vhs** (9 concepts)

Term	Definition	Process verb	Level	PoC
Beroepssimulatie	An immersive role-playing experience where a user takes on the perspective of a professional and makes decisions in realistic work scenarios.			
HD-type Beroepsmatching	A method that uses a child's Human Design type to highlight professions that align with their energetic and cognitive style, marked with a star badge.			
VHS Multi-Player	A professional multi-player simulation environment based on Schank's Expectation Failure Theory, where multiple participants each take on a different professional role within the same fictional organization. All players simultaneously face the same narrative events but respond from their own role perspective. Built on Active Inference and Paths of Change.			

VHS Scenario-template	A curated professional simulation scenario for VHS Multi-Player. Pre-built organizational context, roles and story per sector (care, education, government, technology, law, finance). Avoids AI setup cost and ensures pedagogical quality.			
Collectieve Blinde Vlekken	Systematic gaps in a team's operator profile that indicate underrepresented cognitive modes (quaternion operators) across all team members.			
Observatierapport	AI-generated report by the VHS Multi-Player observer role: analyses team operator profiles, role complementarity, failure patterns (Schank) and provides team development recommendations.			

Observer-analyse	Structured analysis of team dynamics by a non-participating observer in a simulation, producing operator distribution maps and collective blind spot detection.			
VHS Kids	A profession simulation for children based on Schank's Expectation Failure Theory — children play the role of a profession in authentic scenarios to learn through failure.			
Team Quaternion-profile	The aggregate quaternion operator profile of a simulation team, calculated as the mean of Li, Lj, Lk and scalar scores across all active (non-observer) participants.			

The lexicon is editable through /admin/translations and through the lexicon-extension scripts in scripts/lexicon-.ts. New concepts are first proposed (status PROPOSED), then approved into ACTIVE. Only ACTIVE concepts are listed here.*

Appendix C — Spectral analysis of the lexicon: motivation, computation, and architectural conclusion

C.1 Why a Markov chain was built

The common lexicon (Appendix B) was assembled by hand over the four months of the development reported here. By mid-May 2026 it had grown to 304 ACTIVE concepts spread across 33 domains, with each concept linked to a small set of related concepts through the `relatedConceptIds` field on `lexicon_concepts`. At that size the vocabulary stopped being legible by direct inspection: nobody on the team could hold the whole graph in their head, and the question of whether the vocabulary cohered with the architecture, or had drifted away from it, could no longer be answered by reading the list.

A second pressure came from the user-facing side. Section 5.1 already noted that the engine in `server/markov-engine.ts` powers `/markov-navigator`, the navigator that suggests "next concepts" to a learner. The conceptual basis of that surface is set out in the agora essay *The Spiral Navigator* (`/blog/the-spiral-navigator`, 10 March 2026), which frames the navigator as a learner traversing a slow-mixing terrain rather than as a recommender producing one-shot answers; the companion essay *Spiral Learning Theory* (`/blog/spiral-learning-theory`, 18 March 2026) gives the pedagogical justification for that choice. The Markov chain analysed here is the operational realisation of that essay-pair: the suggestion mechanism is a one-step random walk on exactly the graph we are now describing. Because the walk is the user-facing artefact, the walk's spectrum is *what users actually experience as the shape of Swarp*. If the spectrum is malformed — if the graph falls into many tiny components, or if it mixes so fast that any sequence of suggestions decays into the stationary distribution within three steps — users will feel that as incoherent navigation, not as a property of an abstract matrix.

Three concrete questions therefore needed answering, and only spectral analysis answers them cleanly:

1. **Connectedness.** How many disjoint vocabularies has the lexicon actually grown? The thirteen-thread soft split of section 3 was a *design intention*; the graph might or might not honour it.
2. **Mixing rate.** Over how many "next concept" steps does a learning path retain thematic coherence before it dissolves into the system's stationary attractors?
3. **Symmetry breaks.** Are there structural axes inside the lexicon — bipartitions, opposing camps — that reveal architectural tension the team had not yet named?

These three questions map precisely onto the three regimes of the spectrum of $N = D^{-1/2} A D^{-1/2}$: the multiplicity of $\lambda = 1$, the spectral gap $1 - \lambda_2$, and the magnitude of the most negative eigenvalues. The Markov chain was built because there is no other instrument that answers all three at once on the actual production graph.

C.2 Computation

The pipeline is the production code path, not a research notebook. On every request to `/api/lexicon/markov/analysis` the engine performs the following:

4. Load all rows from `lexicon_concepts` where `status = 'ACTIVE'` (Drizzle query in `server/markov-engine.ts:fetchNetwork`).
5. Build the symmetric adjacency from `relatedConceptIds`: an edge (i, j) exists if either concept lists the other.
6. Compute the degree vector d and the row-stochastic transition matrix $P = D^{-1} A$. Its stationary distribution is $\pi_i = d_i / \sum_k d_k$ (closed form for an undirected reversible chain).
7. Find the connected components by breadth-first search on the adjacency.
8. Compute the top-15 eigenvalues of $N = D^{-1/2} A D^{-1/2}$ on the full graph, and again on the giant component, by power iteration with Gram–Schmidt deflation against previously found eigenvectors. The first iteration on each subgraph is seeded with the vector $\sqrt{d}$, which is the exact Perron eigenvector for N , so $\lambda_1 = 1$ is recovered to numerical precision rather than approximated.
9. Compute clustering coefficient and betweenness centrality (Brandes' algorithm) for the same graph.

The computation runs in roughly 800 ms on the live database; results are cached for 60 s. The numbers reported below are from the live snapshot of 7 May 2026.

C.3 Result

Graph-level invariants.

Quantity	Value
ACTIVE concepts (nodes)	304
Semantic edges	1 088
Distinct domains	33
Edge density	0.0236
Average degree	7.16
Clustering coefficient $\bar{C}$	0.631
Connected components	11
Giant component size	232 (76.3 %)
Spectral gap (giant, $1 - \lambda_2$)	0.0251
Mixing-time bound	≈ 40 steps

Top-15 eigenvalues of $\mathcal{N}$.

k	Full graph	Giant component	Reading
1	1.0000	1.0000	Perron — connected component count
2	1.0000	0.9749	second component / mixing rate
3	1.0000	0.9598	component / second cluster
4	1.0000	0.9473	component / third cluster
5	1.0000	0.9369	component / fourth cluster
6	1.0000	0.9323	component
7	1.0000	0.9234	component
8	1.0000	0.9013	component
9	1.0000	0.8505	last positive cluster
10	0.9749	0.8164	first non-component eigenvalue (full)
11	0.9598	-0.8137	bipartite axis 1
12	0.9574	-0.7932	bipartite axis 2
13	-0.9574	0.7782	inherited from giant
14	0.9473	-0.7644	bipartite axis 3
15	0.7862	-0.7440	bipartite axis 4

The multiplicity of $\lambda = 1$ on the full graph is at least nine in the top-fifteen list, consistent with eleven connected components found by BFS (two of the smallest components are not separated within the top-15 power iteration because their spectra are dominated by the giant). The sequence $0.9749, 0.9598, 0.9473, \dots$ in the giant column is the cluster spectrum *inside* the largest component, which carries the system's main vocabulary.

Top-25 stationary attractors (the concepts a long random walk lands on most often):

#	Term	Domain	Level	π	degree	betweenness
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1	TOA-Triade (Balans Denken- Voelen- Doen)	ayya360	3	0.0244	53	1.000
2	Marketplace (Marktplaats)	ecosystem	5	0.0211	46	0.636
3	AIDEN	system	2	0.0179	39	0.442
4	Oscillation (Oscillatie)	theoretical _foundation	1	0.0170	37	0.751
5	Consent	governance	5	0.0161	35	0.459
6	Contextmonitor	cop	3	0.0156	34	0.012
7	Besluitvormer	cop	3	0.0156	34	0.012
8	Programma maker	cop	3	0.0156	34	0.012
9	Eigenfrequentie	cop	3	0.0156	34	0.012
10	MetaSwarp	platform_architecture	2	0.0147	32	0.105
11	Support Circle (Ondersteuningsgroep)	levensloop	2	0.0142	31	0.071
12	CoP Toegangsc ntrole	cop	3	0.0142	31	0.009
13	Agent	simulation	2	0.0115	25	0.250
14	Coherence (Coherentie)	simulation	2	0.0115	25	0.727
15	Layers of Life (Lagen van het Leven)	paden	4	0.0110	24	0.161

16	Health Diagnosis (Gezondheidsdiagnose)	health	4	0.0101	22	0.005
17	Chronotope (Chronotop)	content	1	0.0101	22	0.244
18	Coach	levensloop	2	0.0092	20	0.003
19	Case Management (Casusmanagement)	levensloop	3	0.0092	20	0.003
20	Freelancer Collaboration (ZZP Samenwerking)	ecosystem	5	0.0087	19	0.056
21	Creative Profile (Creatief Profiel)	ayya360	4	0.0083	18	0.011
22	Community Purchasing (Buurtinkoop)	ecosystem	5	0.0083	18	0.033
23	Personal Coach (Persoonlijke Coach)	ayya360	4	0.0074	16	0.025
24	Politieke Partij	governance	4	0.0074	16	0.098
25	Neighborhood Circle (Wijkkring)	governance	5	0.0069	15	0.100

Domain mass (the fraction of stationary probability captured by all concepts in a domain):

Domain	$\sum \pi$	nodes	Domain	$\sum \pi$	nodes
cop	0.146	35	content	0.038	10

ayya360	0.106	31	vhs	0.028	9
governance	0.096	32	mystiek	0.027	9
ecosystem	0.075	19	juridisch	0.024	8
levensloop	0.069	19	social	0.022	7
theoretical_foundation	0.069	21	collective_intelligence	0.017	5
system	0.052	12	collective_action	0.015	6
simulation	0.045	10	agenda	0.015	6
knowledge	0.041	17	paden	0.012	2
platform_architecture	0.040	11	health	0.012	2

The top six domains account for 0.561 of the total mass; the remaining 27 domains share the other 0.439. The distribution is heavy-tailed in the way Zipf's law would predict for a hand-curated vocabulary, but the *identity* of the heaviest domains is what matters architecturally, and is the subject of section C.4.

C.4 What the analysis reveals about the fundamental architecture of Swarp

Four conclusions follow, and together they constitute a description — measured rather than claimed — of what Swarp fundamentally is.

First, Swarp is not a single application; it is a federation of eleven near-disjoint vocabularies welded together by deliberate bridges. The eleven connected components are the spectral fingerprint of the LCS (Loosely Coupled Subapps) decision recorded in section 3 and in `replit.md` on 30 April 2026: the system was *built* to be loosely coupled, and the lexicon shows that the coupling stayed loose. The giant component (76 % of the vocabulary) is the main civic-cognitive surface; the ten satellites are specialised vocabularies (PoC4 simulation, lexicon administration, AIDEN-internal terms, Human-Design micro-vocabulary, etc.) that intentionally do not bleed into the main surface. This is the exact opposite of the "everything-talks-to-everything" topology that microservice architectures tend to produce in practice; the spectrum confirms the architectural commitment to vocabulary isolation as a first-class property.

Second, the giant component is a slow-mixing learning surface, not a search engine. The spectral gap of 0.025 — mixing time on the order of forty steps — is small enough that paths of five, six, seven concepts retain thematic coherence rather than collapsing onto the global attractors. This is the spectral signature of a pedagogical surface, not an information-retrieval surface. A search engine wants a *large* spectral gap so that the answer is always "close" to the query; a learning surface wants a *small* spectral gap so that the user can travel meaningfully through neighbourhoods of related concepts before being pulled to the centre. Swarp is the

second, by measurement. This vindicates the choice — never explicitly argued in the four months but everywhere implicit — to treat the lexicon as a *terrain* rather than as an index.

Third, the architecture has a built-in theory–practice axis, and it is operationally healthy. The four substantial negative eigenvalues ($-\$0.81$, $-\$0.79$, $-\$0.76$, $-\$0.74$) on the giant indicate near-bipartite structure. The eigenvectors of these eigenvalues separate concepts of theoretical foundation (*Free Energy*, *Surprisal*, *Markov Blanket*, *Active Inference*, *Octonion*) from concepts of operational deployment (*Marketplace*, *Consent*, *Coach*, *Health Diagnosis*, *Neighborhood Circle*). This is the same theory–practice tension section 2 named as the architectural problem of integrating Friston with Schank. That the tension is *visible* in the spectrum but does *not* fragment the giant into two components means the architectural response — the AIDEN-mediated bridges, the cross-thread translations enumerated in Appendix A — is doing its job: theory and practice live in opposing camps but remain connected.

Fourth, the four scales of integration are present in measurement, not just in argument. Of the top five stationary attractors, *TOA-Triade* (the individual-cognitive integration, $\pi = 0.024$) and *Oscillation* (the temporal substrate, $\pi = 0.017$) anchor the individual register; *Marketplace* and *Consent* ($\pi = 0.021$, 0.016) anchor the relational register; *AIDEN* ($\pi = 0.018$) anchors the meta-cognitive register. The four scales the report is organised around are precisely the four scales the random walk lands on most often. A long sequence of "next concept" suggestions on /markov-navigator will spend most of its time in their orbit. This is what the architecture *is*, when the system describes itself in its own terms: a four-scale integration with a theory $\leftrightarrow$ practice axis running through it, woven across eleven loosely coupled vocabularies that together carry 304 concepts in 33 domains.

The domain-mass distribution adds a further architectural note. The two heaviest domains are *cop* (Community of Practice, mass 0.146) and *ayya360* (the lifespan-guidance app, 0.106). That ordering — relational-collective practice ahead of individual-developmental practice ahead of governance ahead of economy — is the de-facto centre of gravity of Swarp as it stands. Whether that centre matches the team's intentions for the next four months is itself a question worth asking; the spectrum does not answer it, but it is the instrument that lets the question be posed concretely rather than vaguely.

The Markov chain was built to make the lexicon legible to a team that could no longer hold it in their heads. It turned out, on running the numbers, to make the architecture legible as well. That is the strongest justification for keeping the spectral pipeline in production: the system is now able to describe itself, and what it describes is consistent with what the four months of work intended to build.