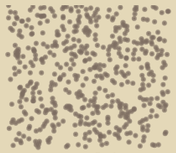
THE WORLD OF

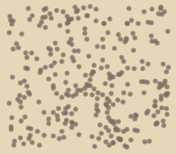
Telling the Bees

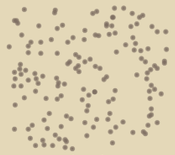
a world-canon reveal

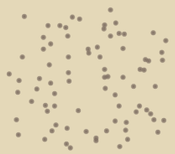
Kaosi Unini

Groundhog Day · IndieCade Climate Jam 2026


world


sand


shade


yard


porch


bee

§01 FRAME

A hundred years ago, a fifteen-year-old girl planted a seed.

She traded her clan's glass for an outsider's metal ~ a harmonica ~ and did something audacious, never done before. What she started was small: one drip of nectar, one revived flower, one bee remembering an ancient pattern. What it grew into was a guild, a city-sized igloo made of polymerized wax, a founder's mastery drive that ran a hundred years, and a slow decline that has arrived at Nao.

This is the story of that world. Nine sections. Read what you want, come back later. Late-game reveals included; nothing is spoiler-guarded.

The play verb is *tend*. Not save, not rescue, not defeat, not escape.

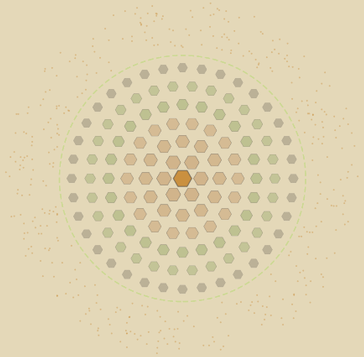


fig. 1 · overhead

§02 THE CONDITION

The heat won a long time ago.

Not all at once. In corridors, first. In sand valleys that used to shuttle trade, then nothing, then shimmery heat, nebulous and visible. In wildflowers, which appeared in one field and not the next, and then none. In wax, a subtle give. A little. Enough to notice, but worsening fast.

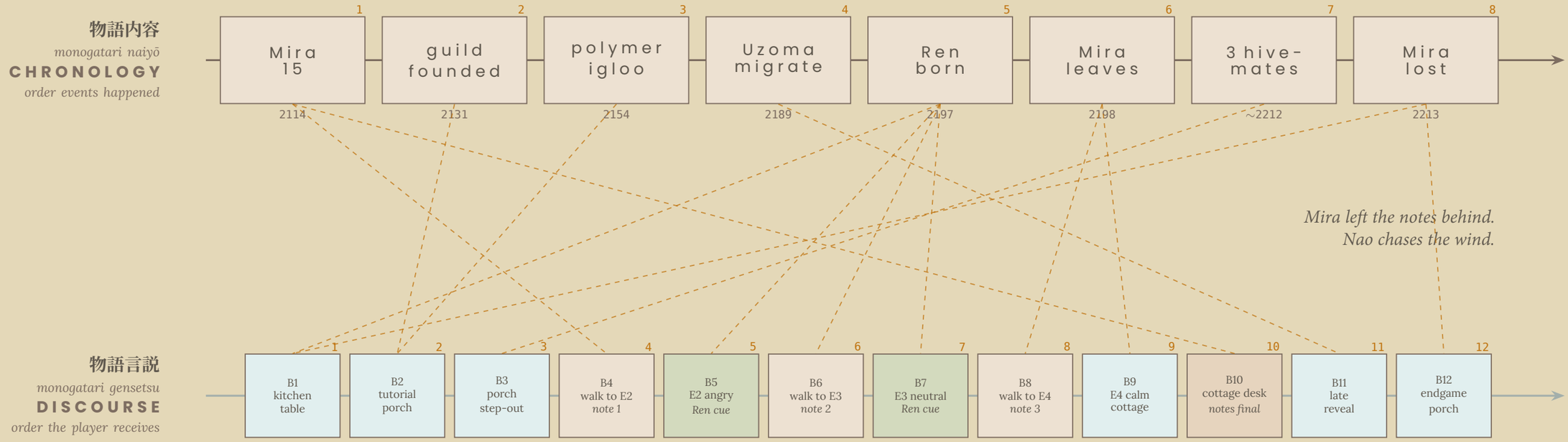
The Kessu igloo casts a shade circle at its base. Inside that circle, the forest still stands. A ring of green, a mile or so wide. The forest is not lush. It is not dying either.

The wild bees are still out there, in the middle distance, angrier every year. They sting more than they used to.

The guild bees are inside the shade. Their rhythm has slowed. Nobody in the guild cares to know why. Every keeper has noticed.

§03 TWO TIMES

Fig. 3 · When story-world chronology and player-discourse do not align. Top axis: order of world events. Bottom axis: order the player receives them. Dashed lines map each event to the beat in which the player learns of it. Kessu-tan beats carry Mira's research notes; veilblue beats carry environment; foliage beats carry Ren's dialogue cues.

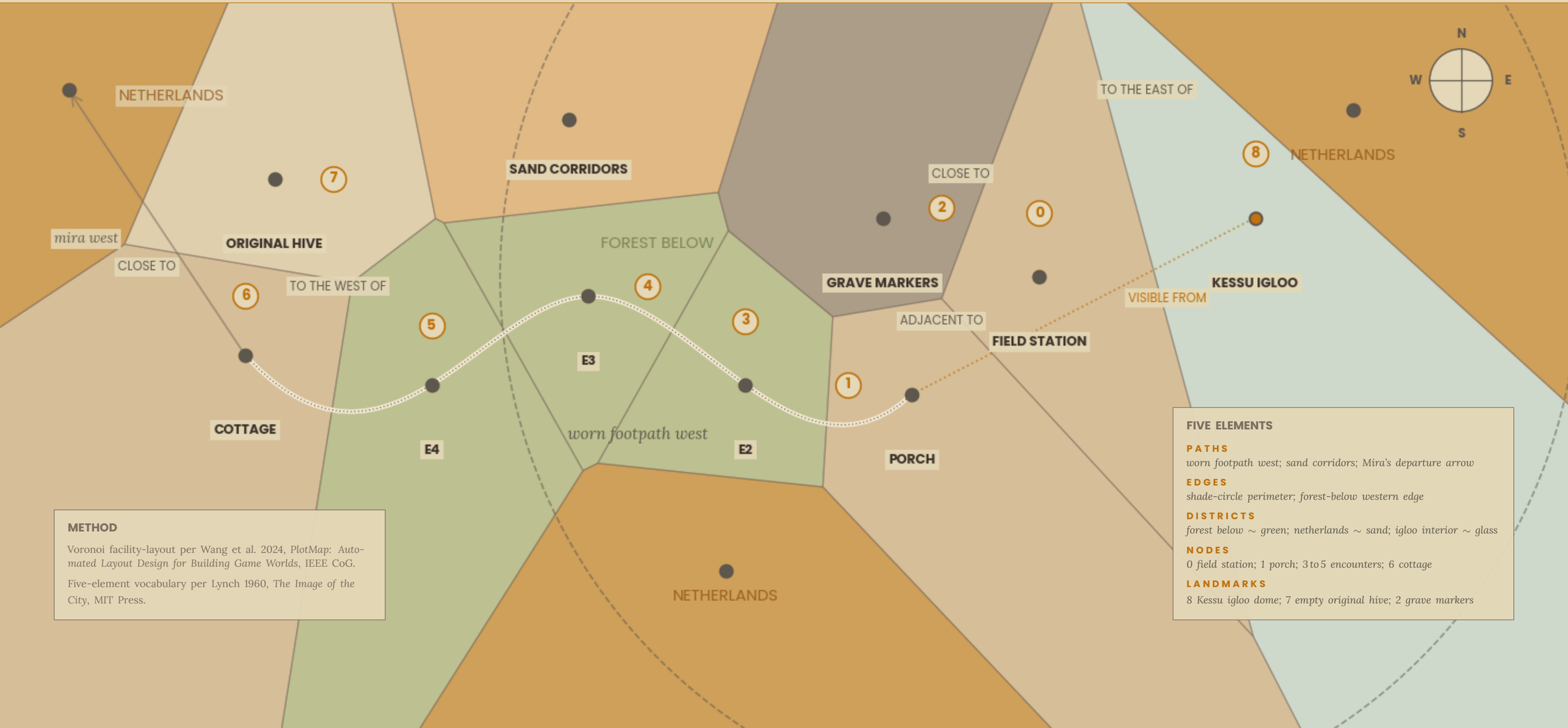


Every world-event above happened before the player arrives. The game's job is to schedule when Nao ~ and the player through her ~ becomes able to see each one. Beat 1: Ren (no. 5) at the table, and Mira lost (no. 8) as the pre-game state. Beat 2 tutorial porch: the guild's founding (no. 2) and the polymerised igloo (no. 3) looming east; Beat 3 porch step-out surfaces the guild bee's three lost hive-mates (no. 7). Mira's notes trace the middle across the walk: the harmonica trade (no. 1) at note 1 and again at notes final; Ren's lost clans (no. 5) at note 2; Mira leaves the guild (no. 6) at note 3, and again as the cottage settles at Beat 9. The Ren-cue beats (5, 7) re-surface Ren's dialogue as memory. Beat 11 late-reveal offers the Uzoma migration (no. 4); Beat 12 endgame porch closes on Mira lost (no. 8).

method: dual-timeline visualisation per Miyagawa et al. 2025, *Visualizing Variation of Relationships Among Characters Accompanying with Story Unfoldment*, Kansai University.

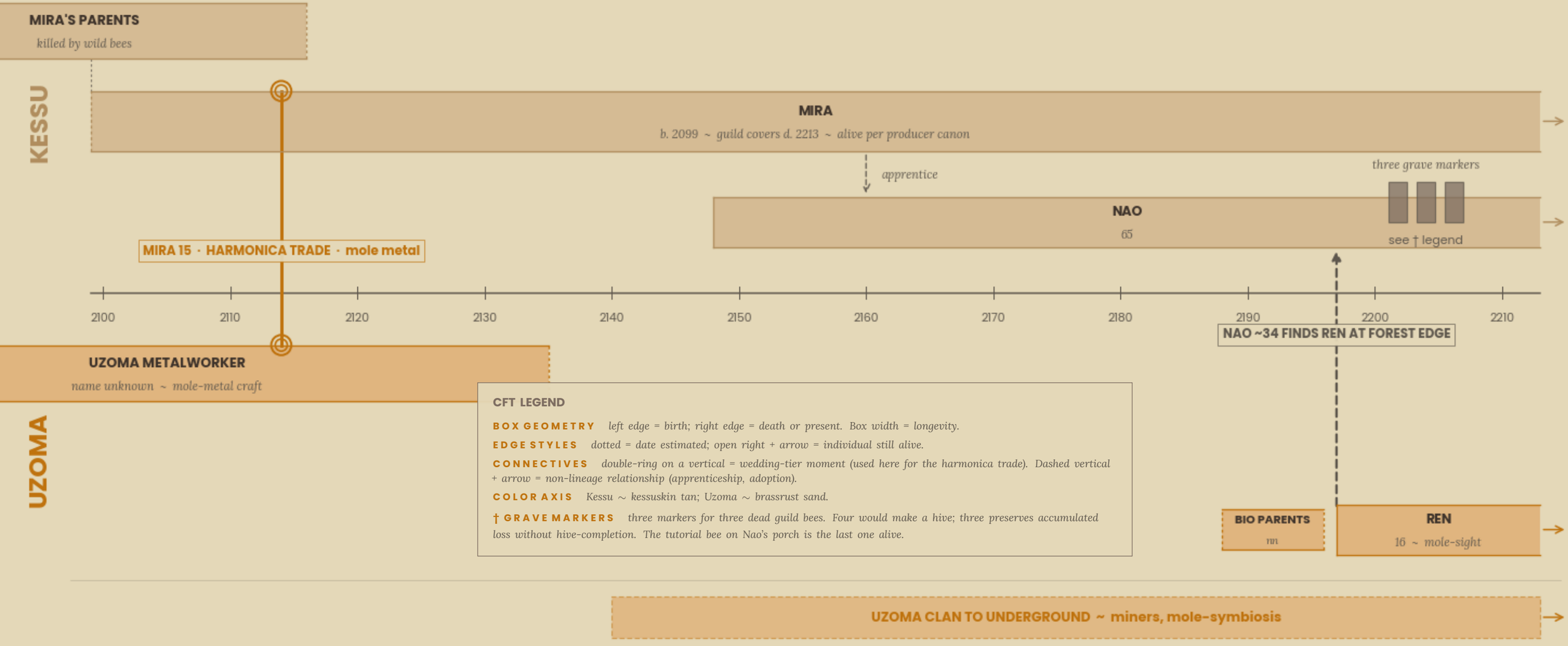
§04 WORLD MAP

Fig. 4 · What the world is. Colored regions are Voronoi cells around canonical facilities. The white curvy line traces Nao's westward walk; constraint labels use the vocabulary of Wang's facility-layout formalism.



§05 CONTEXTUAL CLAN TREE

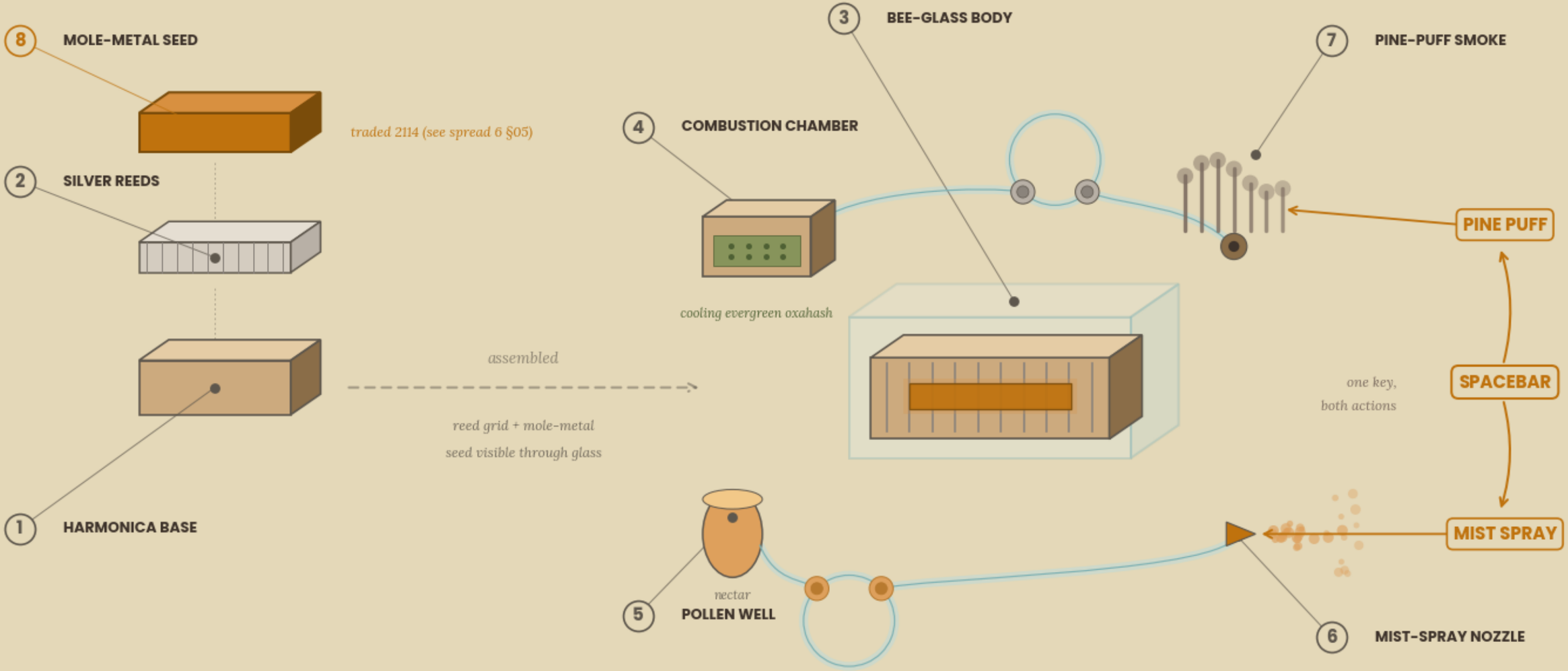
Fig. 5 · Two clans, one crossing. Kessu lineage runs across the top; Uzoma across the bottom. Time flows right (2099 ~ 2213, anchored to Mira 114 = 2213). Boxes render each individual as a longevity bar with dotted edges for estimated dates and open right edges for the living. Two vertical connectives mark the moments the two clans touch: the mole-metal harmonica trade at Mira 15 in 2114 and Nao finding Ren at the forest edge in 2197.



method: contextual family-tree layout per Borges 2019, A contextual family tree visualization design, Information Visualization 18(4).

§06 THE NECTARONICA

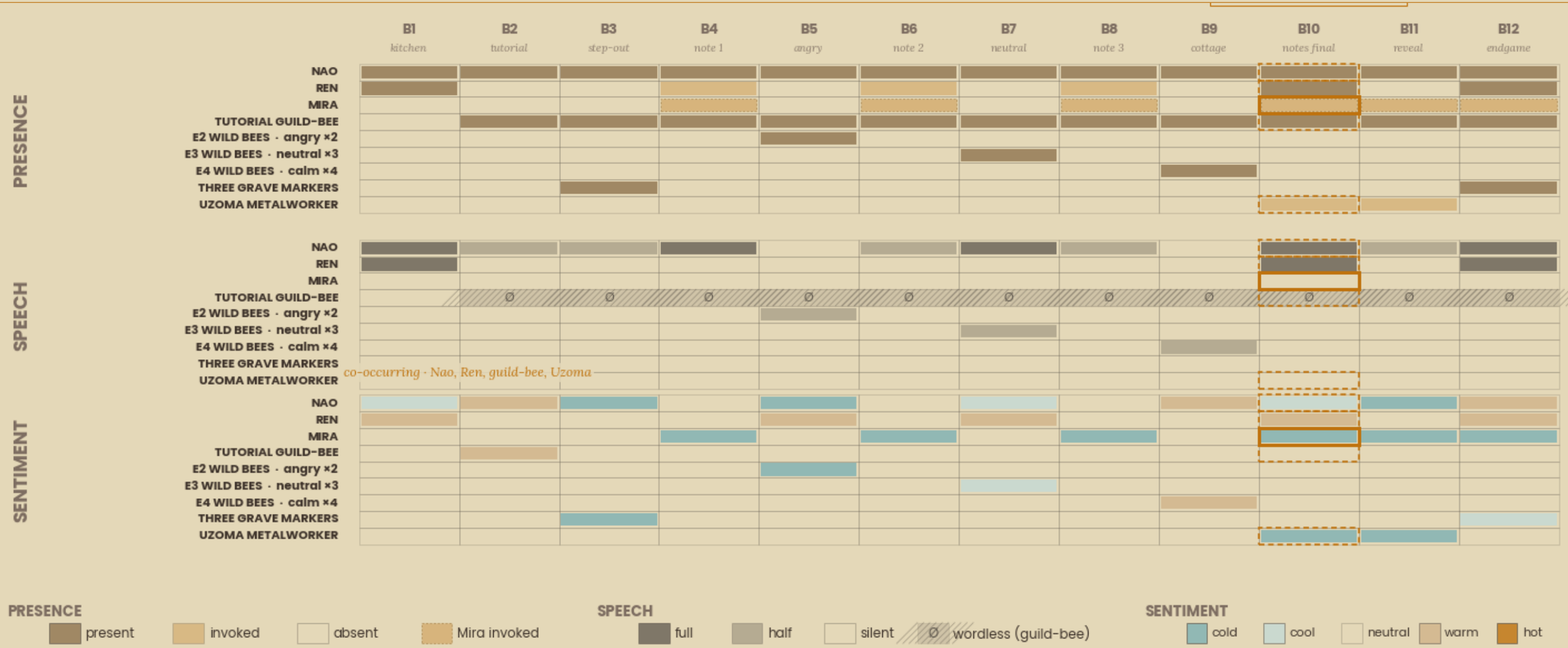
Fig. 6 · The keeper's kit, part one. Mira's harmonica-of-15 augmented through her mid-life mastery era into a two-function instrument. Left: exploded assembly stack ~ mole-metal seed (Uzoma origin, 2114), silver reeds, harmonica base. Right: the assembled nectaronica visible through its translucent bee-glass envelope, with combustion chamber, pollen well, and mist-spray nozzle rendered in their assembled positions. Two on-object gameplay callouts name the player-facing verbs.



method: exploded-view composition, following Rendgen 2012, Information Graphics, Taschen.

§07 THE ENSEMBLE

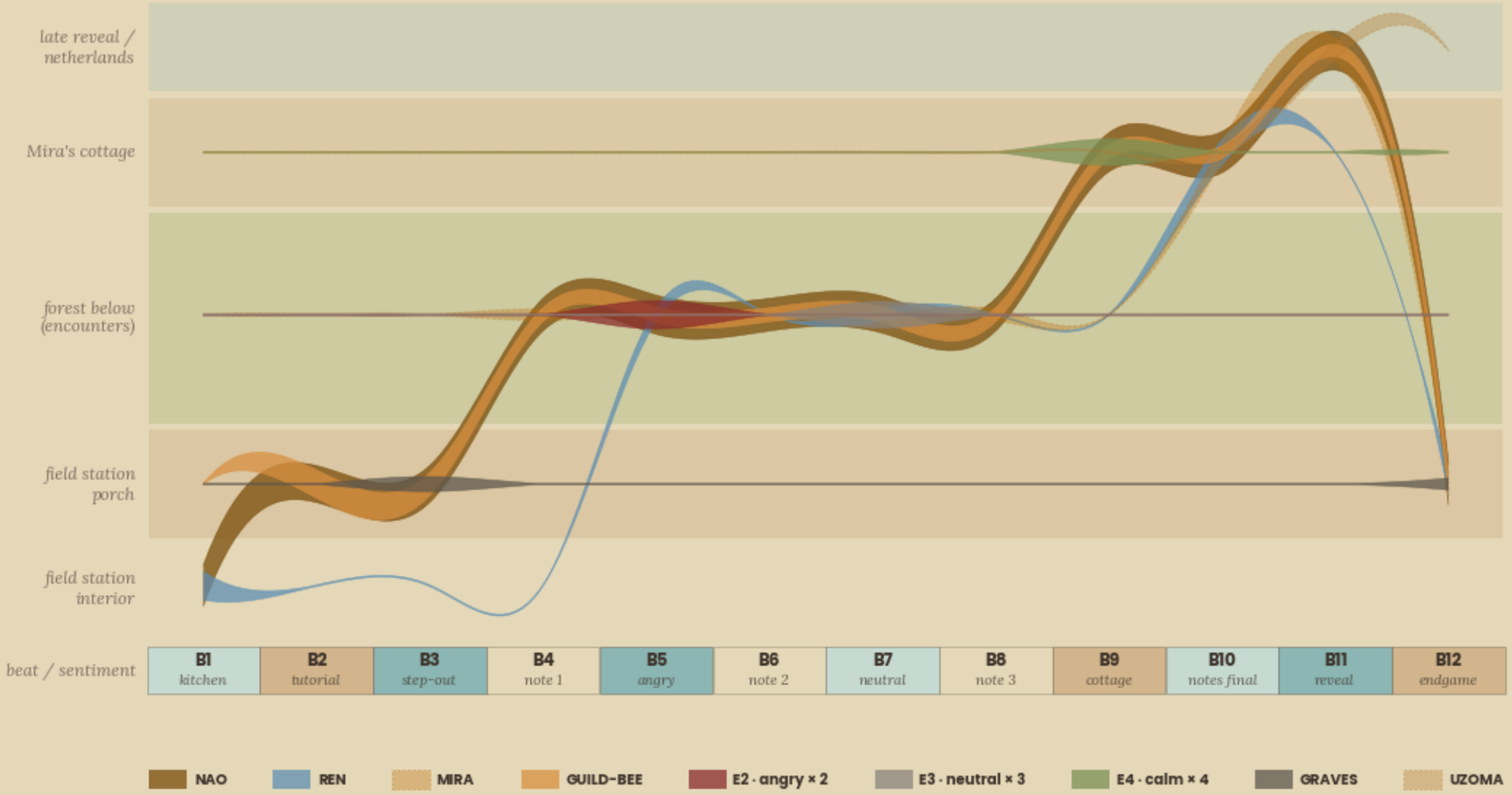
Fig. 7 · The whole cast across the whole twelve-beat structure. Three stacked matrices track presence, speech, and sentiment (Nao's perspective). Mira renders in the absent-invoked register ~ she surfaces through notes and dialogue cues without entering a beat. The cross-highlight at B10 (cottage notes final) shows the co-occurrence pattern for the selected beat.

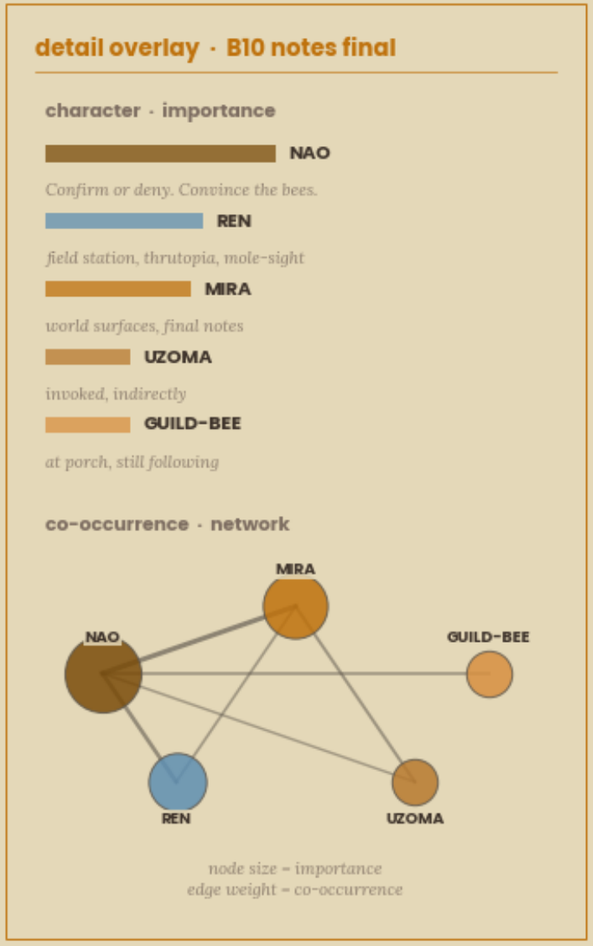


method: stacked trait-indicator matrices per Hoque et al. 2023, Portrayal: Leveraging NLP and Visualization for Analyzing Fictional Characters, DIS 2023 (ACM). Cross-highlight rendered as a static frame of the paper's row/column selection convention.

§08 STORY RIBBONS

Fig. 8 · The whole cast as temporal ribbons across the twelve-beat structure. Y-axis = location (five bands, chronologically appearing). Ribbon thickness at any beat = the character's narrative importance in that beat. Mira and the Uzoma metalworker render dashed at their invoked beats ~ they surface through notes and dialogue cues without physical presence. The detail overlay at B10 (right) shows the co-occurrence network and importance-ranked list at the notes-final moment, mirroring the interactive tool's detail-view convention.

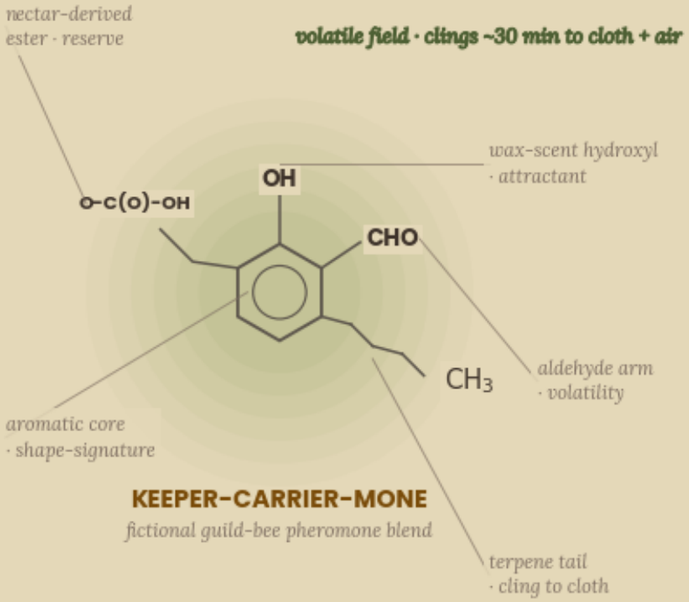




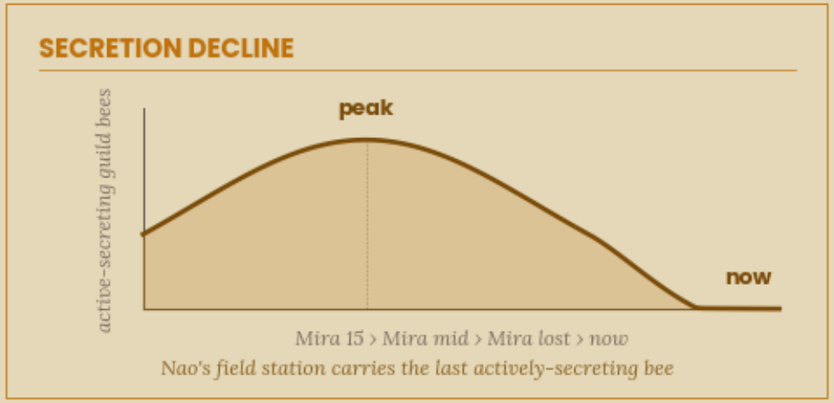
method: character-ribbon storyline visualization per Yeh et al. 2025, Story Ribbons: Reimagining Storyline Visualizations with Large Language Models, arXiv 2508.06772. Ribbon-thickness-encodes-importance.

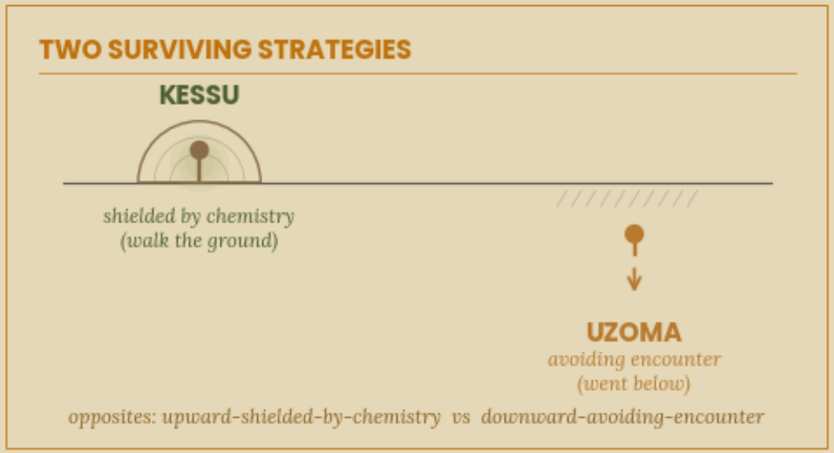
§09 PHEROMONE SHIELD

Fig. 9 · Why walking the desert became survivable. Guild bees stimulated through musical play at Nao's tutorial secrete the fictional keeper-carrier-mone ~ a pheromone blend that clings to a keeper's clothes and immediate air for ~thirty minutes. Wild bees smell it and give a wider berth. Two surviving strategies: Kessu chemistry-shielded above ground, Uzoma went below.







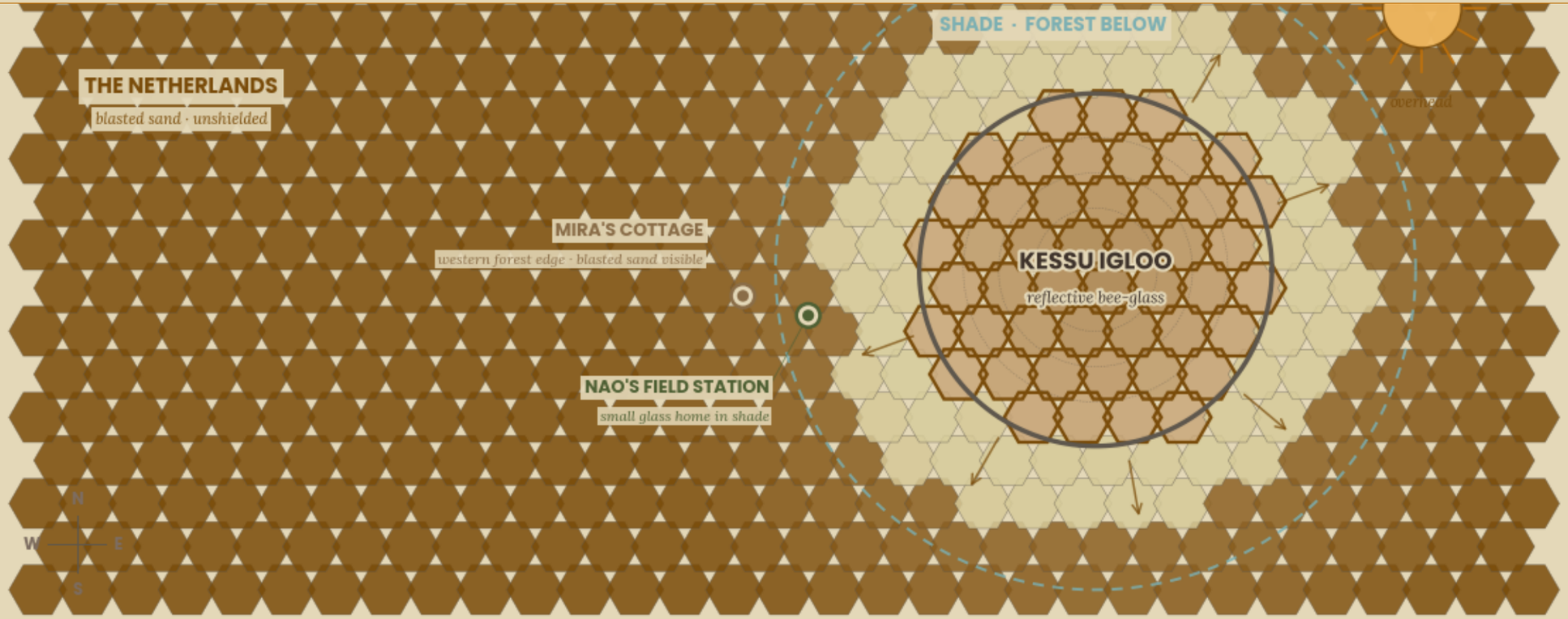


with a full pheromone charge › normal encounter thresholds
without a charge › elevated thresholds · wild bees close faster · not a night-core mode ~ wild bees are not pleased to see Nao. not that they ever are.

method: organic-chemistry patent-drawing convention (bond-line Lewis structure with atomic labels) enveloped in a volatile-field register after Goodsell 1998, Molecular Landscapes, the painterly cellular-scale illustration tradition.

§10 IGLOO HEATMAP

Fig. 10 · Why walking any distance became dangerous. The Kessu igloo, reflective bee-glass at the center of the desert, casts a shade radius that keeps the forest below alive. Everything past that radius is the netherlands. Interior temperature is now rising against wax's softening threshold; the hot cells outlined here are where the lattice is thinning. Mira's cottage sits at the forest's western edge; Nao's field station in the shade, west of the igloo body.



HEAT LOGIC

Igloo body: reflective bee-glass.

Absorbs + re-emits solar radiation.

Casts a shade radius outward.

Everything beyond that radius is the netherlands.



DOSIMETRY · STRUCTURAL MAPPING

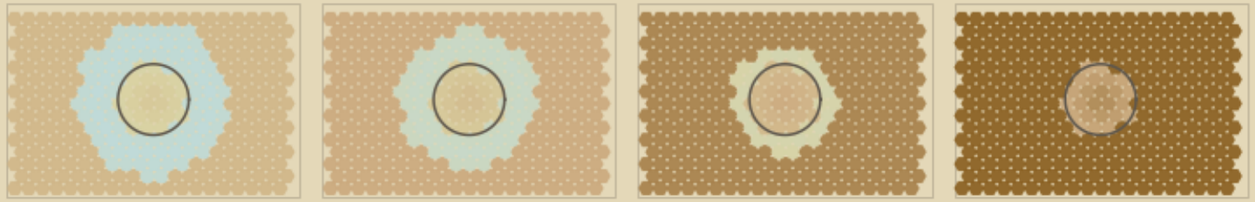
above the softening threshold › structural integrity at risk · walkable-city interior fails at the hottest cells first

below the threshold › structural stable · the guild's founding envelope still holds · what Nao is keeping alive

beyond the shade › the netherlands · the ambient heat the igloo itself contributes to

THERMAL EVOLUTION

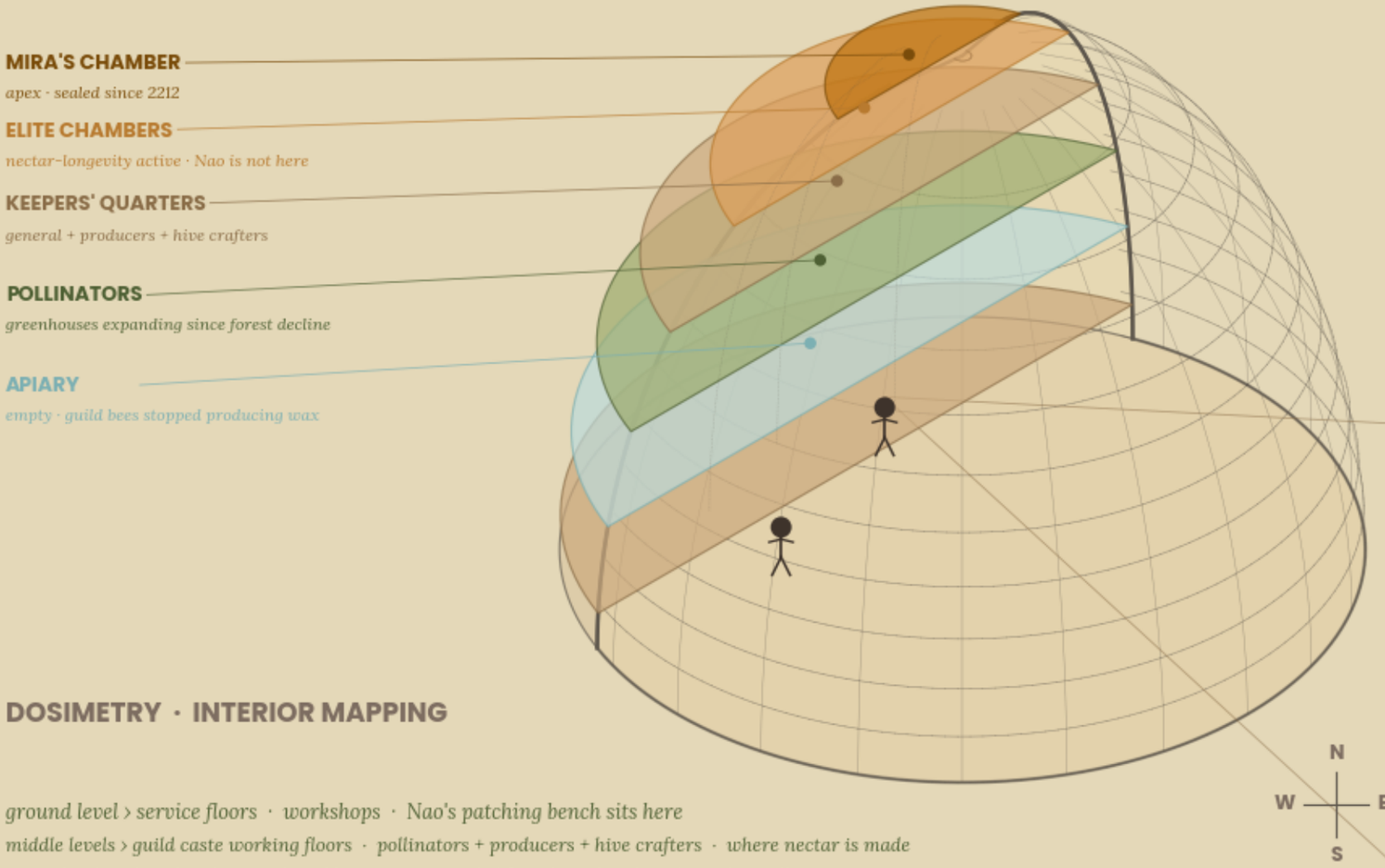
Mira 15 › Mira mid › Mira lost › Nao

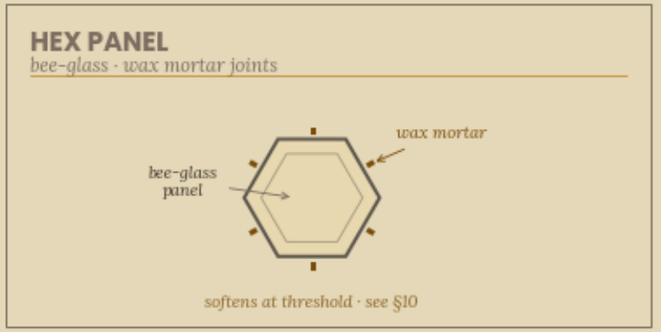


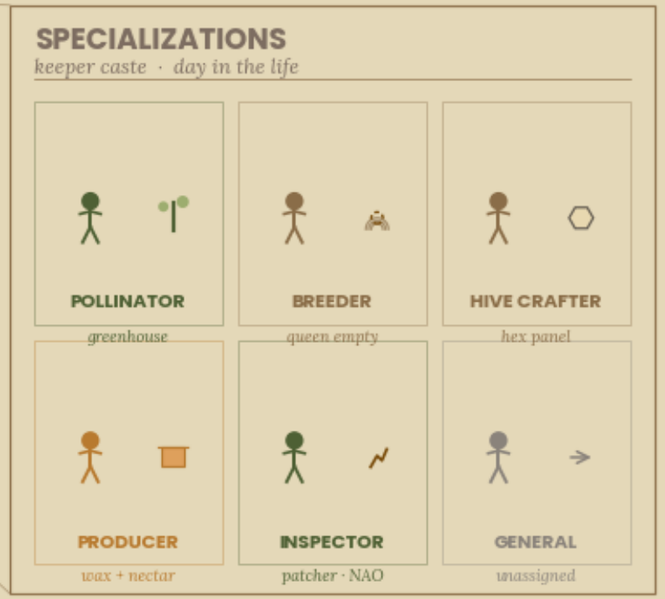
method: regional thermal plan on hex tessellation, sun-radiation + reflection register, softening-threshold overlay marks the wax cells at structural risk. Small-multiples run the same footprint across four eras.

§11 THE IGLOO IN ISOMETRIC

Fig. 11 · The Kessu igloo from an oblique angle, one wedge sliced away to reveal the interior. Bee-glass hex-panel construction visible in the wall lattice ~ the same hex geometry the plan view of §10 was reading. Six stacked levels: workshops at ground, apiary (empty), pollinators' greenhouses, keepers' quarters, elite chambers, and Mira's sealed founding chamber at the apex. What the guild built. What Nao patches from below.



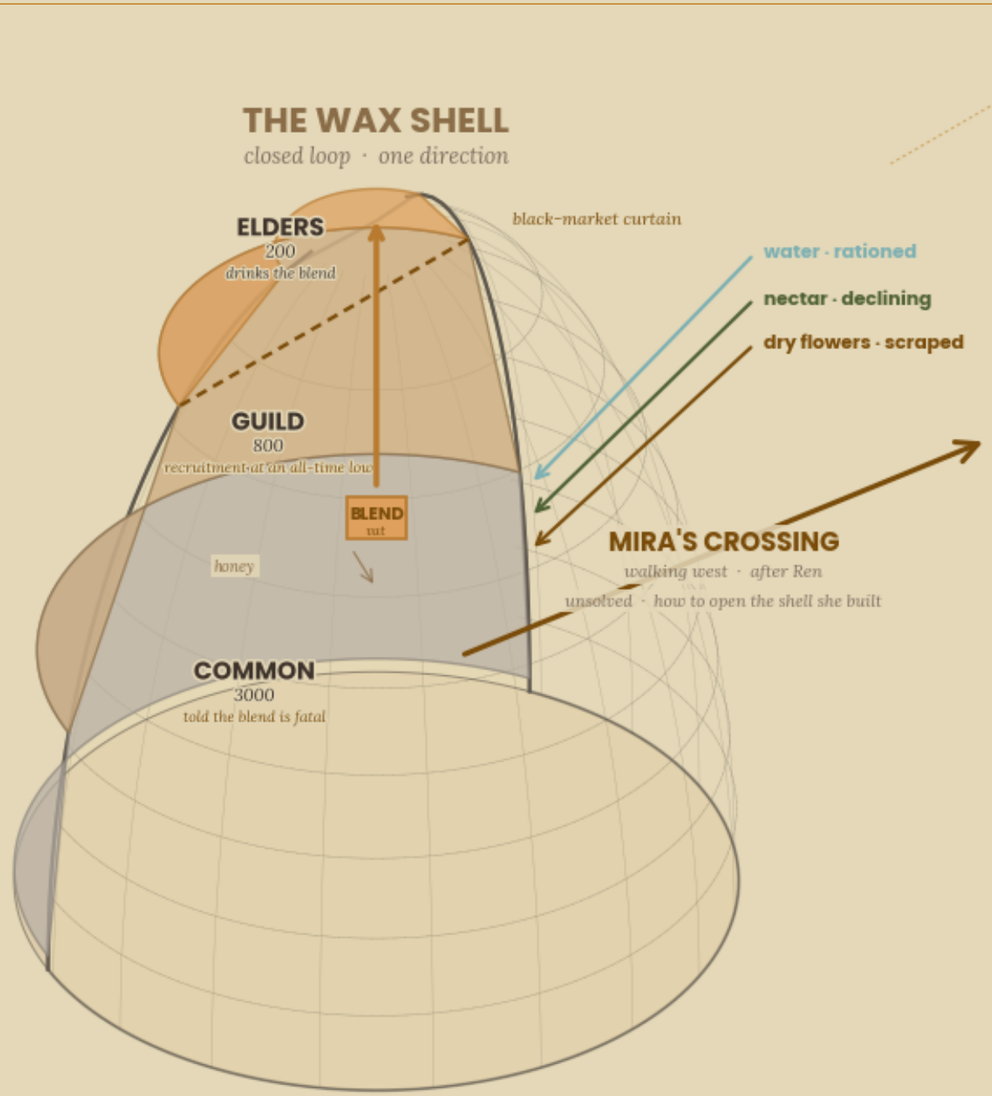


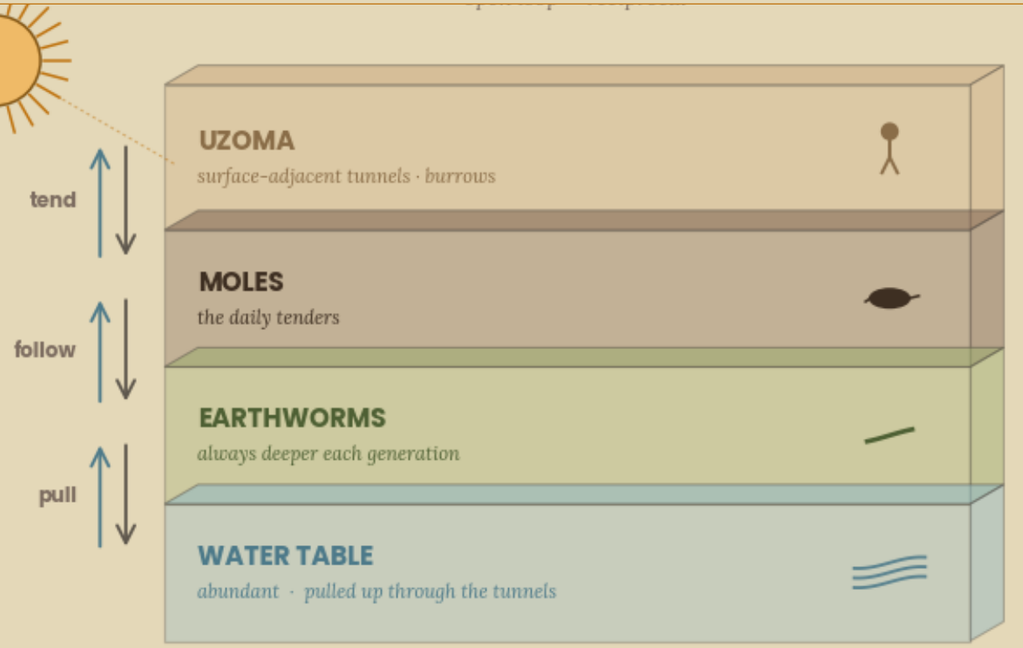


method: true 30°-axis isometric projection with vertical-plane wedge cut.

§12 NECTAR ECONOMY

Fig. 12 · Two paradigms, side by side. The wax shell is Mira's shortcut ~ a closed loop that keeps the heat out and everyone inside, rationing a blend most of the guild produces but does not understand, above a common tier told the blend is fatal. The earth system is the Uzoma's older answer ~ an open reciprocal loop that follows the earthworms deeper each generation, with water pulled up through the same tunnels the moles cut. Between them Mira walks west, still holding the unsolved question of how to open the shell she built.





each generation goes deeper · the earthworms lead · the moles follow · the Uzoma follow the moles

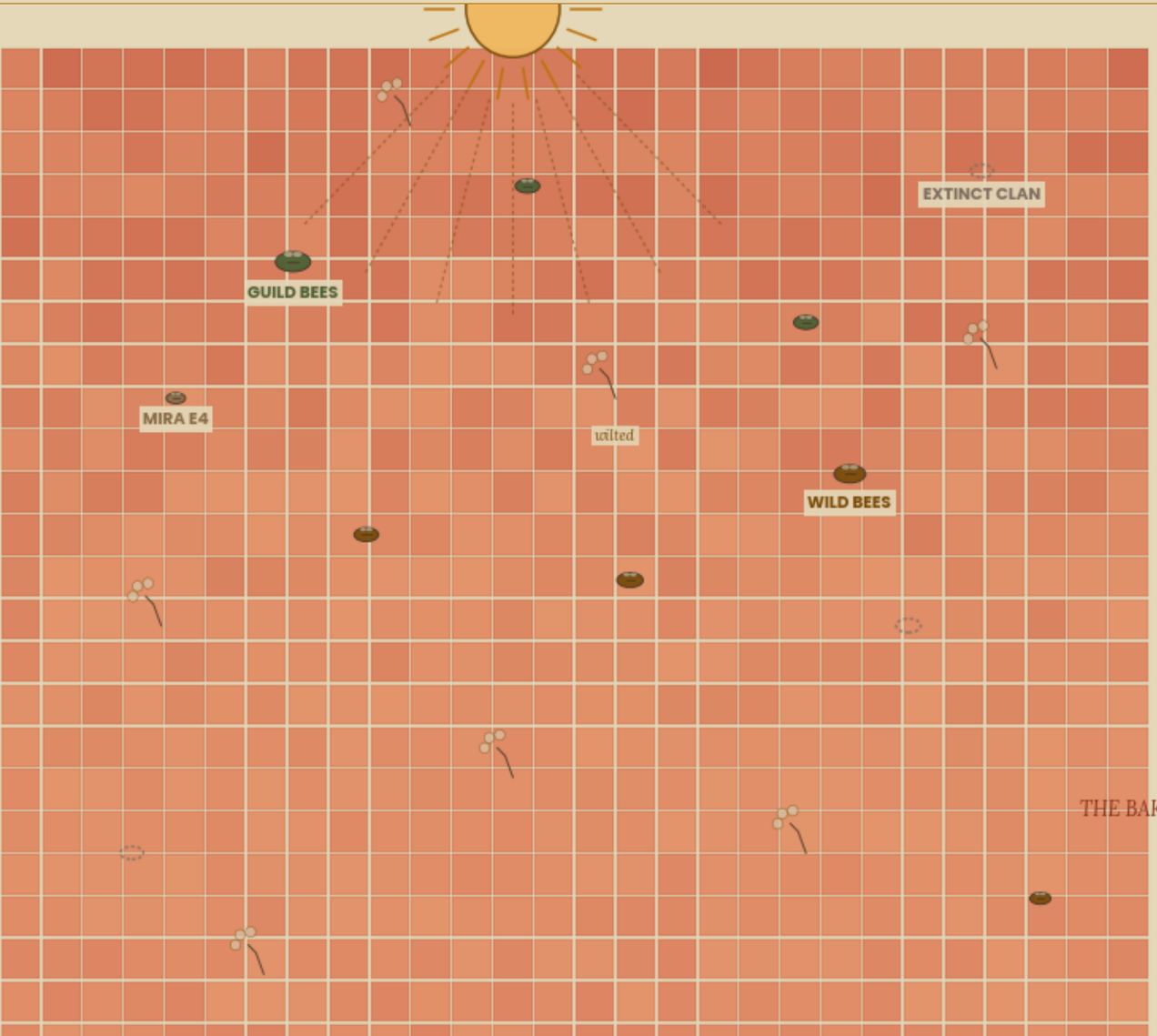
DOSIMETRY · RESOURCE MAPPING

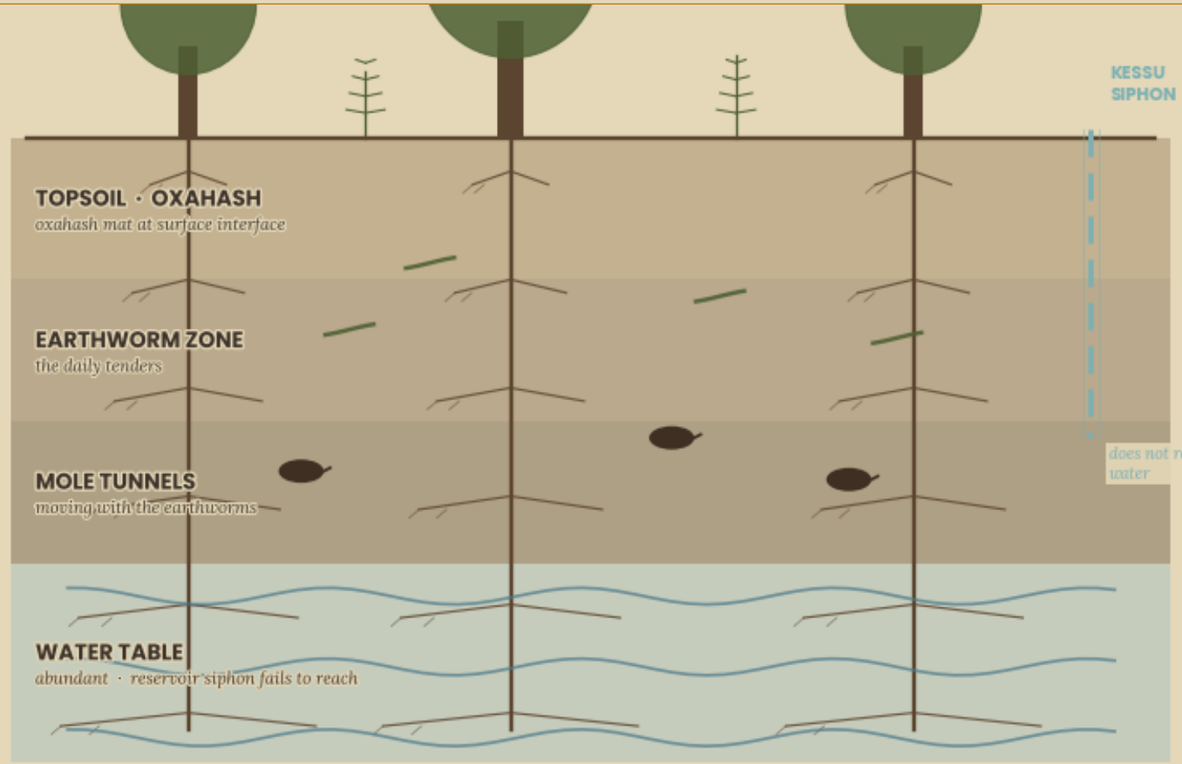
inside the shell › one arrow · one vat · one curtain · everyone rationed
across the curtain › the guild believes the myth · the elders know the truth · the common tier eats honey
below the ground › the earthworms lead · the moles follow · the Uzoma follow · water follows them all
Mira walks west › past the shortcut · past the shell she built · toward the reciprocity she could not

method: paradigm diptych. Left: isometric wax shell with cut-face caste bands (population proportional to band height), black-market curtain, resource inflow, blend flow, honey trickle, recruitment marker. Right: isometric underground stratigraphy with reciprocal-loop arrows between coupled ecosystem layers.

§13 THE ECOSYSTEM

Fig. 13 · The mutualistic web of the whole world on three axes. Surface pollinators at top; substrate and flora (trees, ferns, oxahash, forest, wildflowers, reservoir) at lower-left; Uzoma underground (moles, earthworms, roots, water table) at lower-right. Edge state carries the story ~ solid where a pairing holds, dashed where it is failing, ghost where it has already broken. The Kessu surface web is unraveling; the Uzoma reciprocal loop still holds.





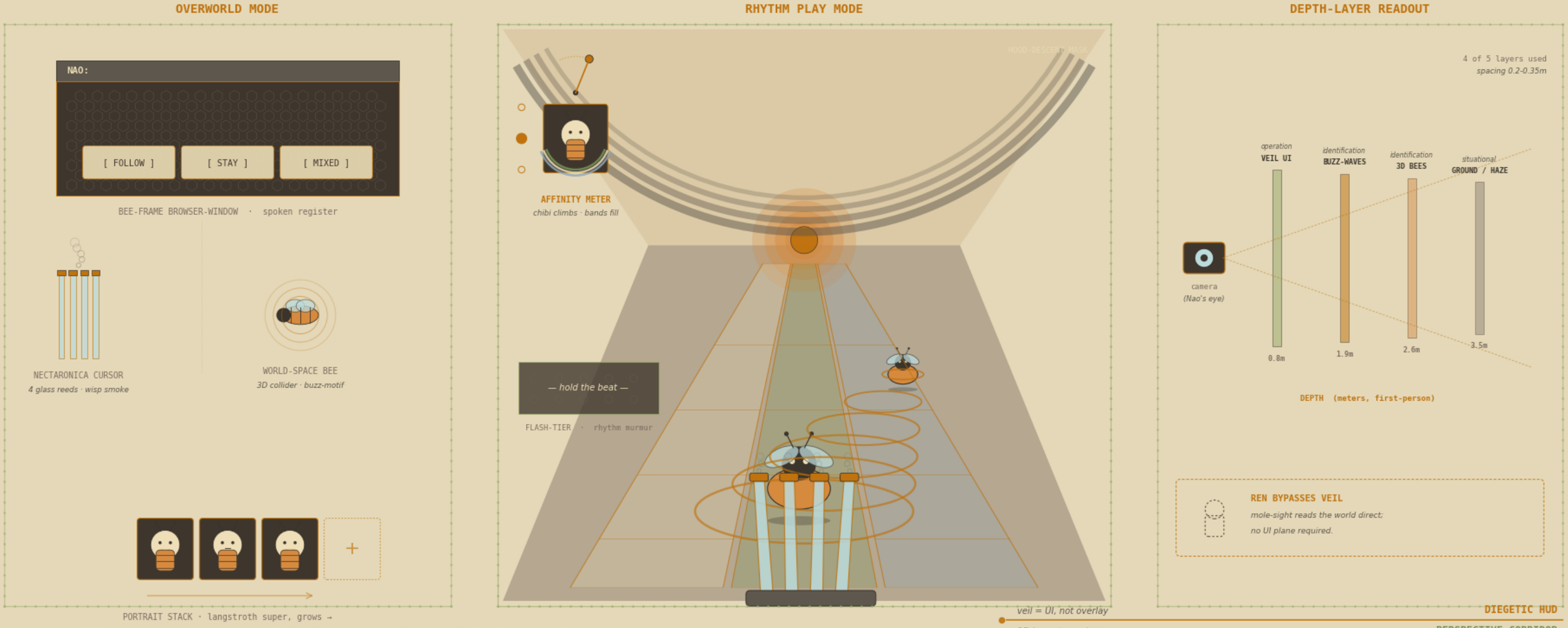
DOSIMETRY · ECOSYSTEM MAPPING

THE BAKED SURFACE > guild + wild bees isolate · wildflowers wilting · nectaronica signal decaying · extinct clans hover as ghosts
THE ROOT SYSTEM > trees + ferns feed oxahash at the surface · earthworms then moles then water · the substrate holds
KESSU RESERVOIR SIPHON > reaches for the water but does not touch · the underground remains Uzoma's
UHI ABOVE > the sun bakes the surface · the shell amplifies the heat · the ecosystem splits at the ground line

method: three-axis hive-plot mutualistic network with nestedness-inspired ordering along each axis. Edge state encodes interaction health; ghost nodes mark extinct species.

§14 THE VEIL UI

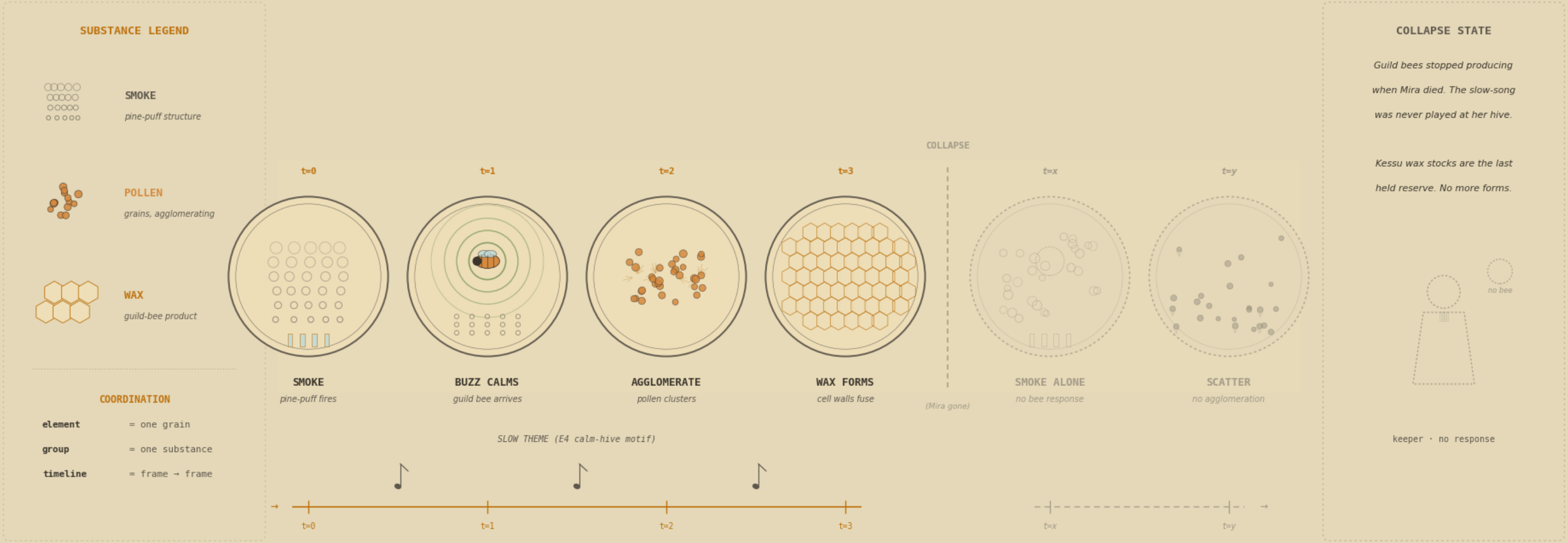
Fig. 14 · The veil serves as Nao's diegetic HUD ~ the game's UI is the character's apparatus, not an overlay on the character. Overworld mode carries a portrait stack that grows Langstroth-style, a nectaronica reed cursor with a wisp of smoke, and a bee-frame browser-window for text. Rhythm play mode enters through a hood-descent mask, opening a first-person corridor where 3D bees approach the camera and buzz-waves ripple down toward the nectaronica held at the bottom of frame. Ren, seeing the world through moles, needs no veil at all.



method: diegetic HUD × first-person perspective corridor × Bach et al. 2018 (hologram-in-hand tangible AR) × Wang et al. 2022 (3D holographic layout · MR depth ergonomics); veil-ui-2d-brief v1.3 canonical spec.

§15 ACOUSTIC AGGLOMERATION

Fig. 15 · How guild wax gets made when a calm hive answers the slow-song. Four active keyframes carry the process ~ smoke fires, buzz calms, pollen agglomerates along the resonance nodes, cell walls fuse. Two ghost keyframes carry the collapse state, after Mira's death: the same nectaronica puff meets no bee, the same pollen falls without ever finding a node. The timeline underneath is the E4 slow-song itself; each frame is a beat.

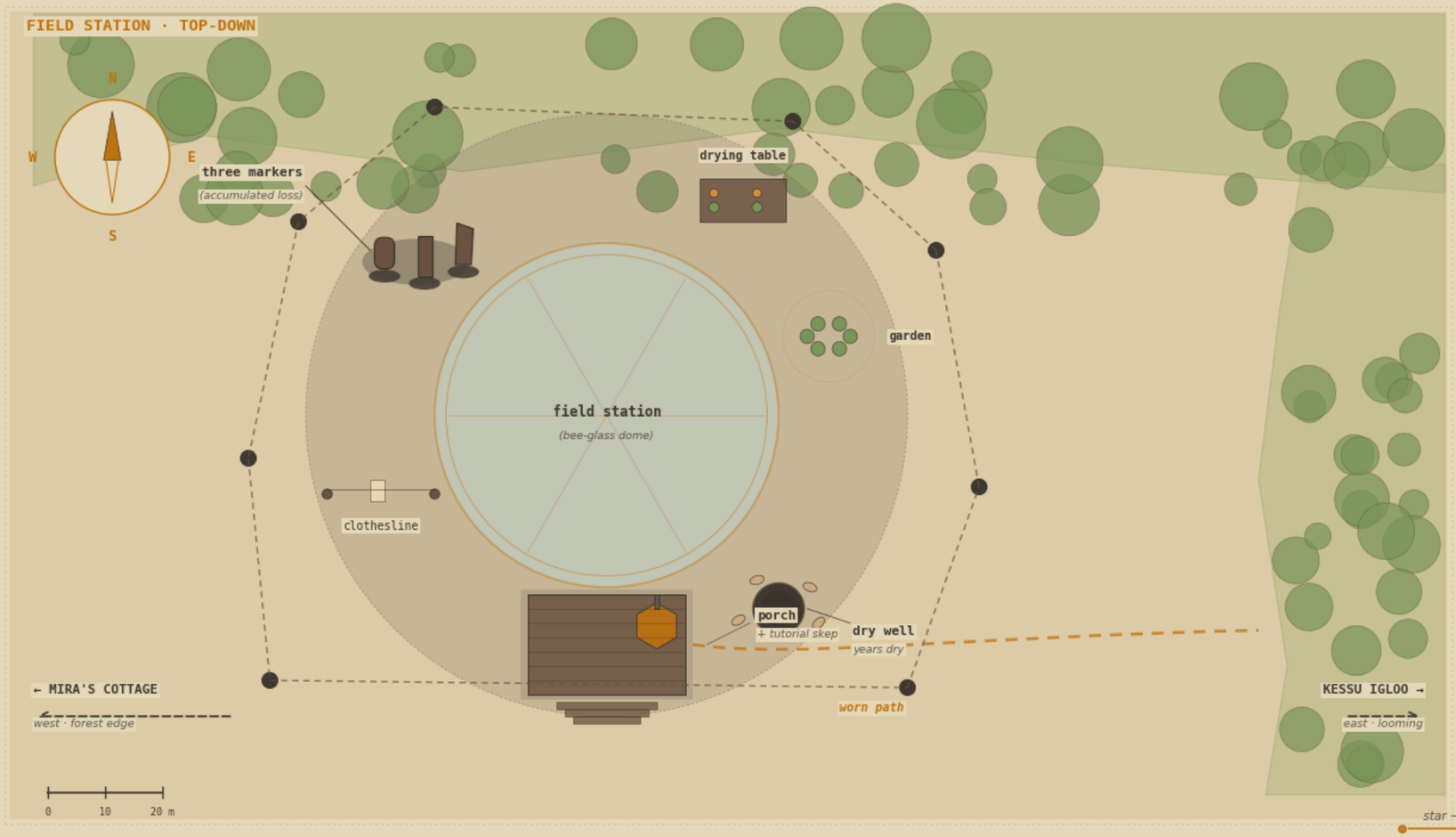


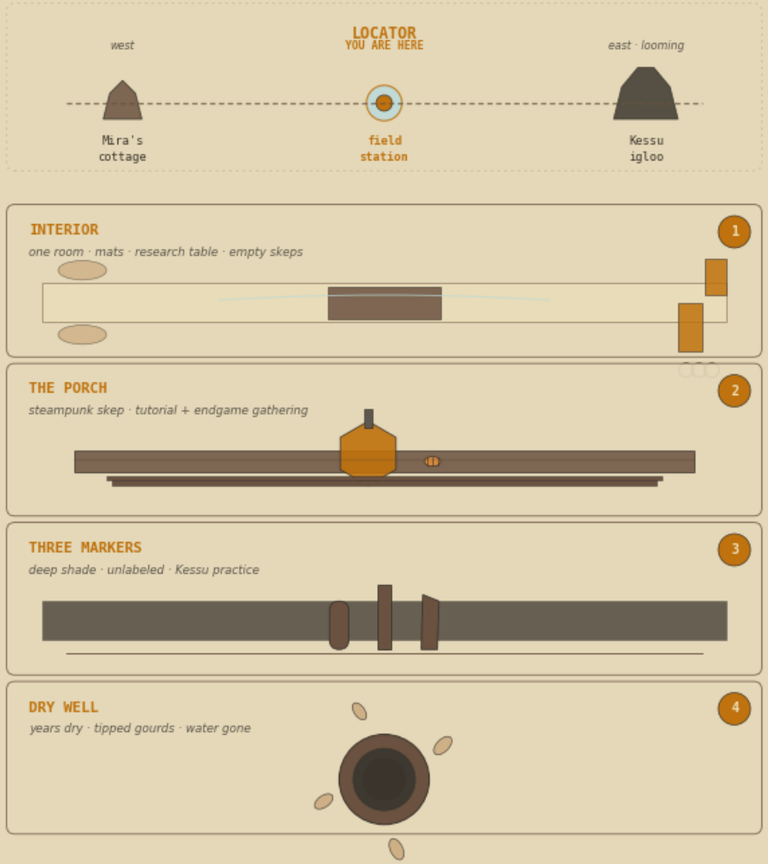
method: static keyframe rendition of a coordinated animation × Xie et al. 2026 DataSway (element-wise clip · group-wise offset · timeline arrangement); ghost keyframes carry the negative state where coordination cannot resolve.

each grain = one motion	ELEMENT-WISE CLIP
substances coordinate as sets	GROUP-WISE OFFSET
frame → frame sequence	TIMELINE ARRANGEMENT
the state after Mira	GHOST-FRAME COLLAPSE

§16 PRESENT DAY

Fig. 16 · The field station complex, top-down, seen at rest before Nao steps off the porch. The bee-glass dome casts its shade circle; three unlabeled markers stand back in the deepest of it. The dry well holds its tipped gourds. Path curves east into the forest. Kessu igloo looms east; Mira's cottage sits at the western forest edge, in view of the blasted sand through the trees. Four scalar-nested insets hold the same moment at four levels of zoom.



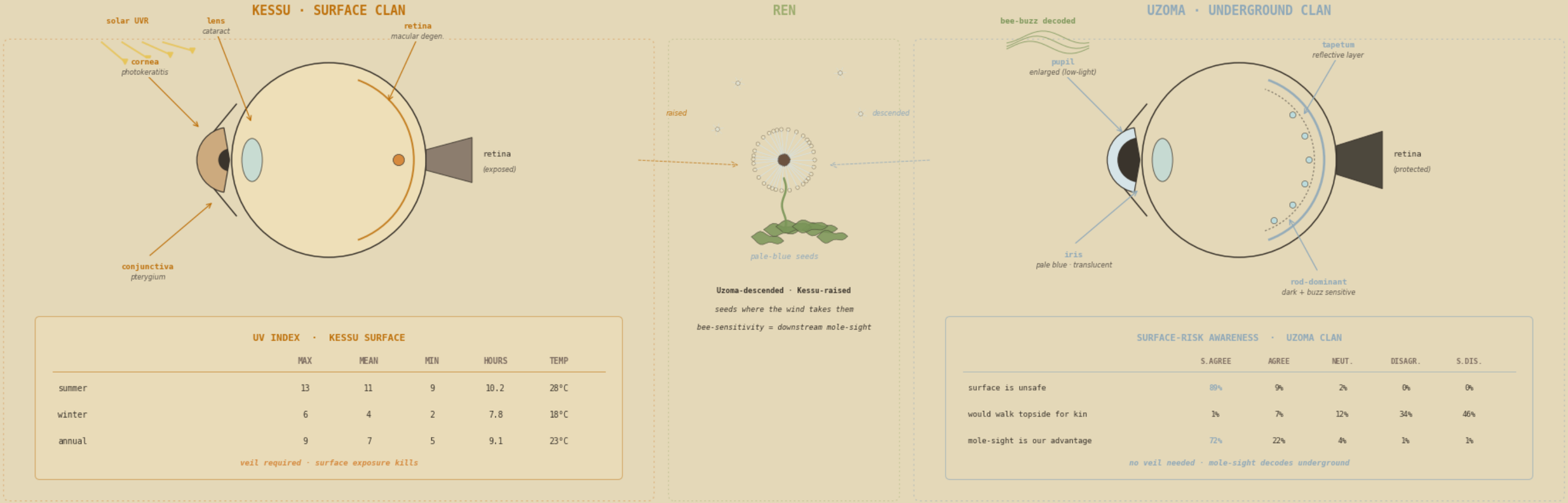


method: Perec scalar nesting (Life A User's Manual, 1978) × McCloud aspect-to-aspect panel transition (Understanding Comics, 1993); architectural top-down floor plan.

star → detail → detail-of-detail	SCALAR NESTING
same moment · shifting focus	ASPECT-TO-ASPECT
architectural register	TOP-DOWN FLOOR-PLAN
the three markers hold weight	DEEP-SHADE ANCHOR

§17 UZOMA SCIENCE

Fig. 17 · Two clans, two eyes, one ancestral cause. The Kessu eye on the left is a standard human retina under solar UVR bombardment ~ photokeratitis, pterygium, cataract, macular degeneration are the surface-side costs the veil holds off. The Uzoma eye on the right is the same anatomy, adapted: enlarged pupil, tapetum-like reflective layer, rod-dominant retina, pale-blue translucent iris. Bee-buzz decoding is downstream of the underground selection pressure. Ren carries both lineages ~ pale-blue seeds landing wherever the wind takes them.



UV INDEX · KESSU SURFACE

	MAX	MEAN	MIN	HOURS	TEMP
summer	13	11	9	10.2	28°C
winter	6	4	2	7.8	18°C
annual	9	7	5	9.1	23°C

veil required · surface exposure kills

SURFACE-RISK AWARENESS · UZOMA CLAN

	S.AGREE	AGREE	NEUT.	DISAGR.	S.DIS.
surface is unsafe	89%	9%	2%	0%	0%
would walk topside for kin	1%	7%	12%	34%	46%
mole-sight is our advantage	72%	22%	4%	1%	1%

no veil needed · mole-sight decodes underground

method: Wright + Norval (Frontiers, 2021) UV/eye pathology overview × Masemola et al. (Health SA, 2026) Likert-cross-tab register; tikz-cd retinal cross-section; comparative clan-biology diptych.

tikz-cd anatomical diagram — **RETINAL CROSS-SECTION**

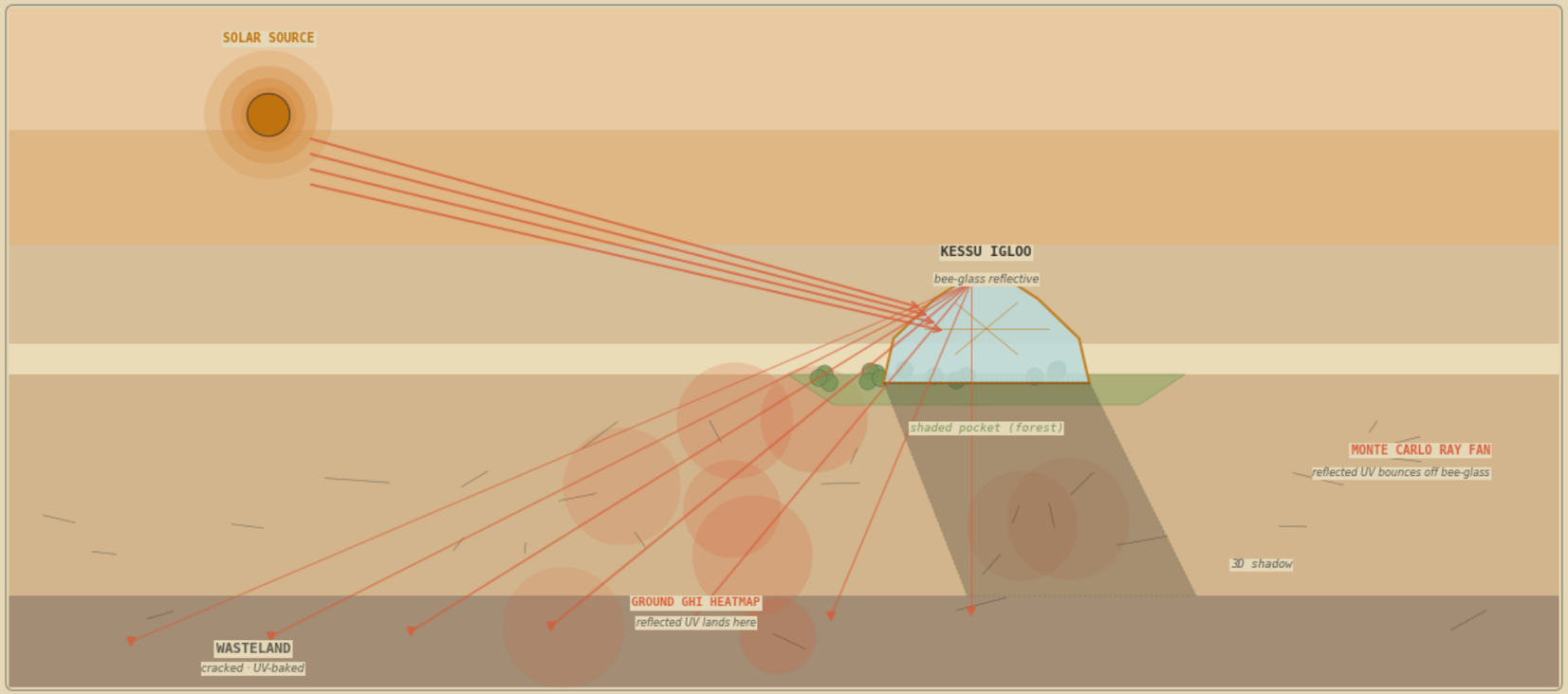
Wright + Masemola registers — **STATISTICAL PANEL**

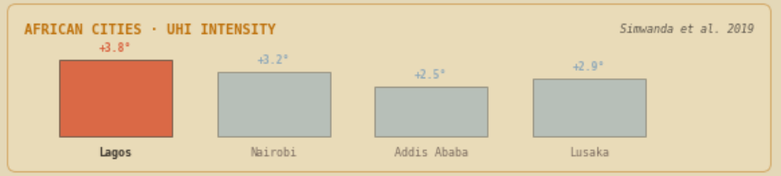
comparative surface / underground biology — **CLAN DIPTYCH**

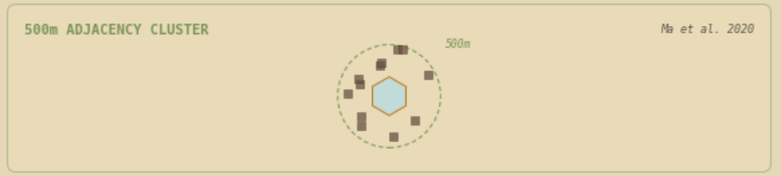
§18 THE FLARE

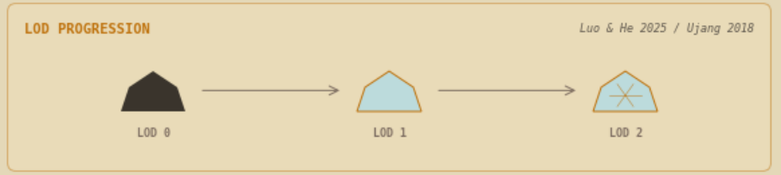
Fig. 18 · The Kessu igloo seen from the wastelands, dusk. Sun upper-left; reflected fan of ultraviolet radiation bounces off the bee-glass surface and lands where the viewer stands. Wasteland foreground shows the ground GHI heatmap footprint. 3D shadow polygon extends from the igloo base. Right column names the imaging techniques the composite was rendered from ~ Monte Carlo ray-tracing, LOD progression, 500m adjacency cluster, and the Simwanda African-cities UHI bar chart with Lagos highlighted. Real physics. Real researchers. Real cities.

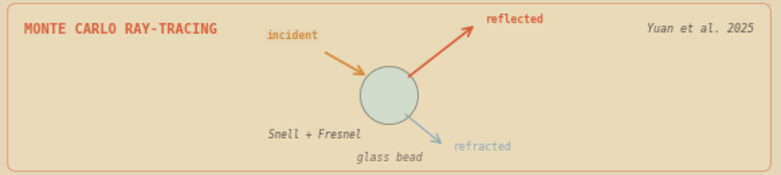
FIRST-PERSON · WASTELAND VIEW OF THE FLARE

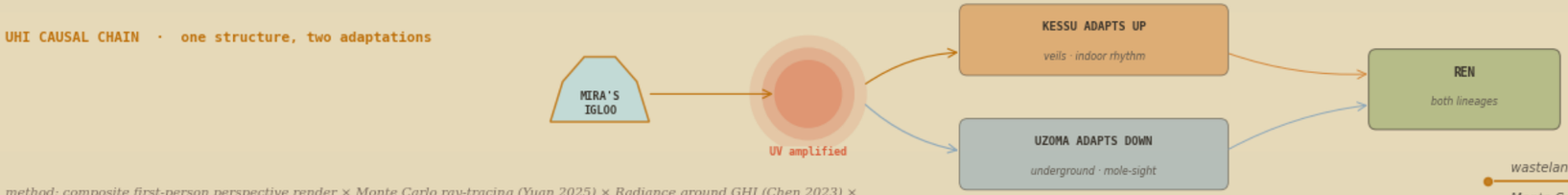










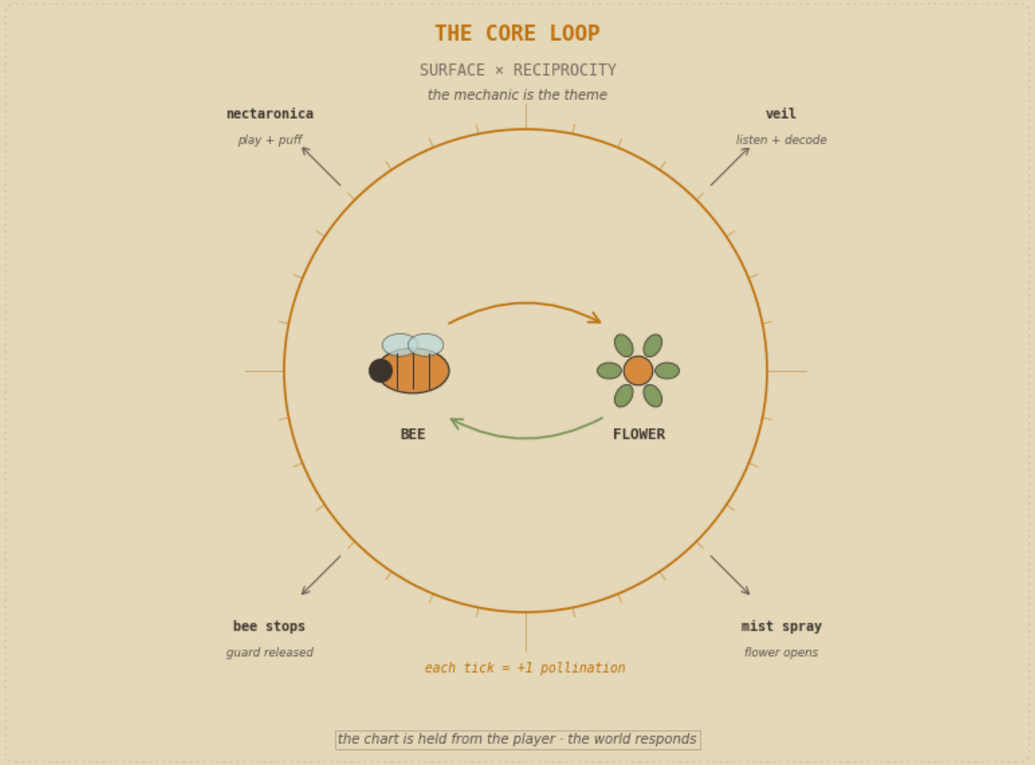


method: composite first-person perspective render × Monte Carlo ray-tracing (Yuan 2025) × Radiance ground GHI (Chen 2023) × 3D shadow analysis on city models (Ujang et al. 2018) × 500m distributed adjacency clustering (Ma 2020) × surface UHI in four African cities incl. Lagos (Simwanda et al. 2019); photorealistic 3D as ecosystem-communication (Hillen-Schiller 2025).

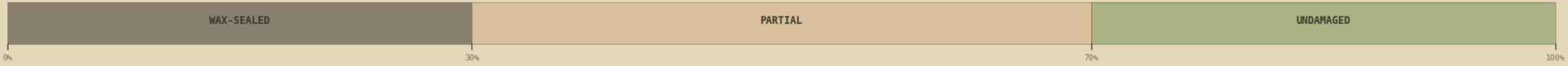
wasteland eye height, dusk	FIRST-PERSON POV
Monte Carlo · Snell + Fresnel	RAY-TRACING PHYSICS
reflected UV footprint	GROUND GHI HEATMAP
Lagos, Nairobi, Addis, Lusaka	AFRICAN CITY PARALLEL

§19 THE STANCE / BRANCHING

Fig. 19 · The core loop is a reciprocity gesture: the bee guards, the player recruits, the bee stops guarding, the flower opens, the counter ticks. Every gesture advances the state. The state chart on the right shows the three accessible semiotic-square quadrants the aggregate lands in, gated by pollination threshold and alignment flag. At the terminal edge of each lane, Nao affirms or refuses what she knows. Six endings.







method: Emily Short state-space chart (Narrative States, 2019) × Mishra WhatIF branched-fiction node-link + mood color (2025) × Greimas semiotic-square quadrant framing.

held-witness: chart is producer-side; players see world response only

the gesture is the theme	CORE LOOP · SURFACE × RECIPROCITY
three accessible states	QUADRANT LANE
pollination gates the lane	THRESHOLD RULER
six ending variants	CONFIRM · DENY TERMINAL

§20 THE CHORUS

Fig. 20 · Ten voices, real people, real papers ~ spending real breath on the exact phenomenon Mira built and lied about. Organized by Nao's three disciplines: bringing it up (measurement), getting it right (mechanism), delivering the outcome (proposals + bio-inspired solutions). Kampala. Cairo. Algiers. Chinese cities. Every badge is someone doing right by the world when they see it, over and over, without dramatic occasion. Every badge is a chosen repetition. The game asks the player to sit inside their exhaustion for two hours.

BRINGING IT UP

measurement · detection · witness

Li, Stringer, Chapman, Dallimer — 2021

Urbanisation alters UHI · tropical African city

Univ. York + Leeds · PLOS ONE

Kampala LST rose as impervious surfaces spread 1995-2017.

Elmarakby, Khalifa, Elshater, Afifi — 2022

Tailored methods for mapping UHI

Ain Shams Univ., Cairo · Ain Shams Eng. J.

Greater Cairo · remote-sensing + field, cross-validated.

Sun, Liu, Xia et al. — 2025

2D + 3D urbanization impacts on UHI · 384 cities

Beijing Normal Univ. · Environ. Sci. Technol.

Vertical densification amplifies UHI beyond 2D alone.

GETTING IT RIGHT

mechanism · physics · simulation

Yuan, Jiao, Sheng et al. — 2025

Retro-reflective materials for UHI mitigation

Osaka + Hebei Univ. · Discover Cities

88% reflectance · 23% annual gain over diffusive.

Chen, Duan, Zhang, Wang — 2023

Solar-reflective facades · dense urban context

Penn State + Alabama · SDEWES

Facade design shapes canyon UHI + cooling load.

Mehaoued & Lartigue — 2019

Reflective glass façade in Algiers

INSA Toulouse · Sustainable Cities & Society

One office alters its own block's microclimate.

Ma, Ren, Zhao, Chen et al. — 2020

Clustered UHI energy · adjacency blocks

City Univ. HK · Sustainable Cities & Society

Distributed adjacency energy modeling.

DELIVERING THE OUTCOME

proposals · planning · bio-inspired

Luo & He — 2025

UHI evaluation · 3D modeling for planning

Xinjiang Univ. · J. Asian Arch. & Building

3D-model indicators feed direct urban-design decisions.

Ramachandra, Rana, Vinay, Aithal — 2025

UHI linkages with landscape morphology

IISc Bangalore + IIT Kharagpur · Sci. Reports

Pervious/impervious mix regulates thermal comfort.

Han (thesis) — 2014

A bio-inspired solution to mitigate UHI

Virginia Tech · MS Civil + Env. Eng.

Nature is where mitigation vocabulary comes from.

Nao is a small drill on a real professional discipline.

These are the people already inside it. The game asks you to sit in their exhaustion for two hours.

method: three-lane researcher chorus mapped to Nao's three disciplines of breath ~ measurement · mechanism · outcome. Ten peer-reviewed voices from 2014-2025.

measurement · detection · witness — BRINGING IT UP

mechanism · physics · simulation — GETTING IT RIGHT

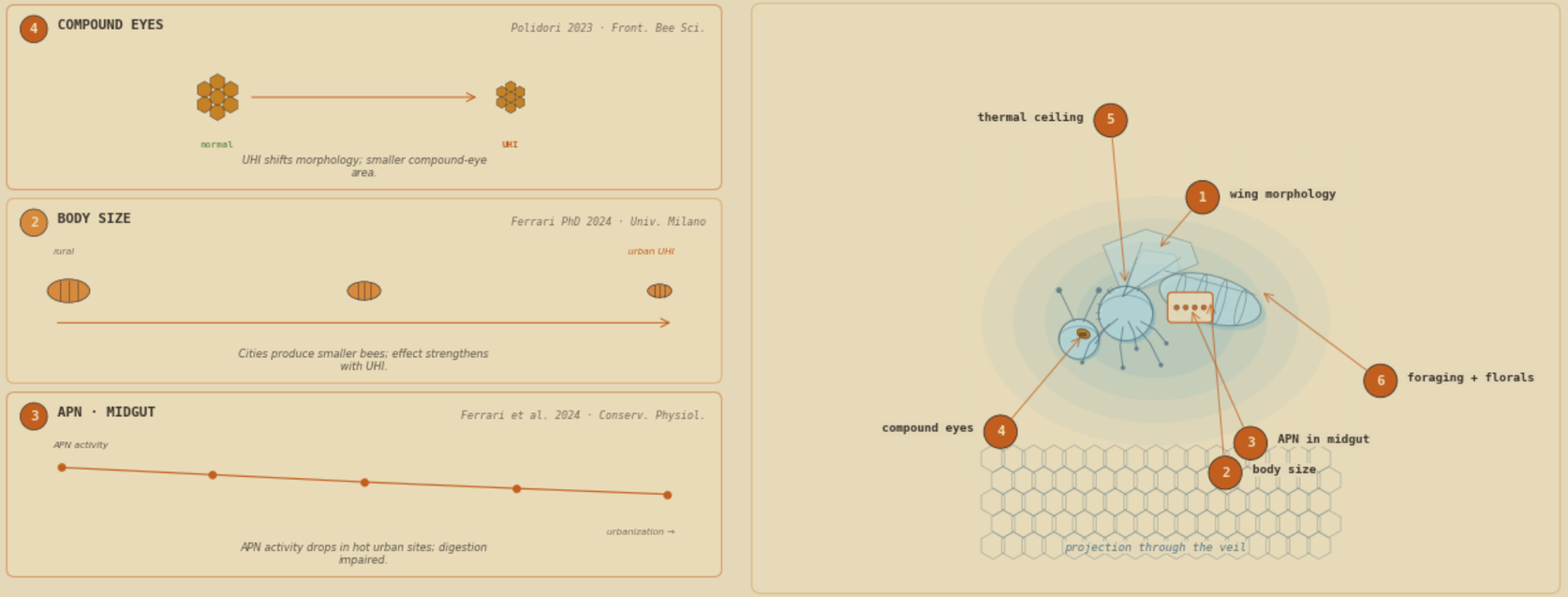
proposals · planning · bio-inspired — DELIVERING THE OUTCOME

§21 THE HIVE UNDER THREAT

Fig. 21 · The guild bee, projected through the veil at reference scale, with the specific damage vectors the researchers have named. Wing morphology, body size, aminopeptidase-N activity in the midgut, thermal ceiling, compound-eye morphology, and floral-coupling collapse. Each numbered callout on the specimen maps to a peer-reviewed satellite panel. The bees Nao knew are not a rhetorical device; they are already gone in the record.

GUILD BEE · ANATOMICAL SPECIMEN

Halvaci et al. 2023 · reference anatomy



The bees Nao knew are already gone.

The researchers named the mechanism ~ wing, gut, size, temperature, floral coupling ~ years before the players ever picked up her harmonica.

Resilient, but ailing.

method: dense information architecture (central specimen with numbered damage-vector annotations + satellite evidence panels) × Halvaci et al. 2023 anatomical reference × Polidori-Ferrari Milano research cluster (2023 perspective; 2024 APN, coae073; PhD dissertation) × Burdine & McCluney 2018 thermal-tolerance × Camilo et al. 2025 heat-island bee assemblages × Gropp 2025 heat-wave floral-trait thesis × Ješovnik et al. 2025 Zagreb urban pollinators.

Halvaci reference	ANATOMICAL SPECIMEN
six numbered vectors	DAMAGE-VECTOR CALLOUTS
six paper panels	SATELLITE EVIDENCE

§22 SOURCES

Fig. 22 · Everything cited across this document. Nothing referenced in the fiction is imaginary at the source. Peer-reviewed papers, dissertations, published books, tooling. Cited so the reader can chase any thread themselves. The scholarship stands as its own advocacy layer.

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Discover Cities · Monte Carlo

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rhythm-game memory

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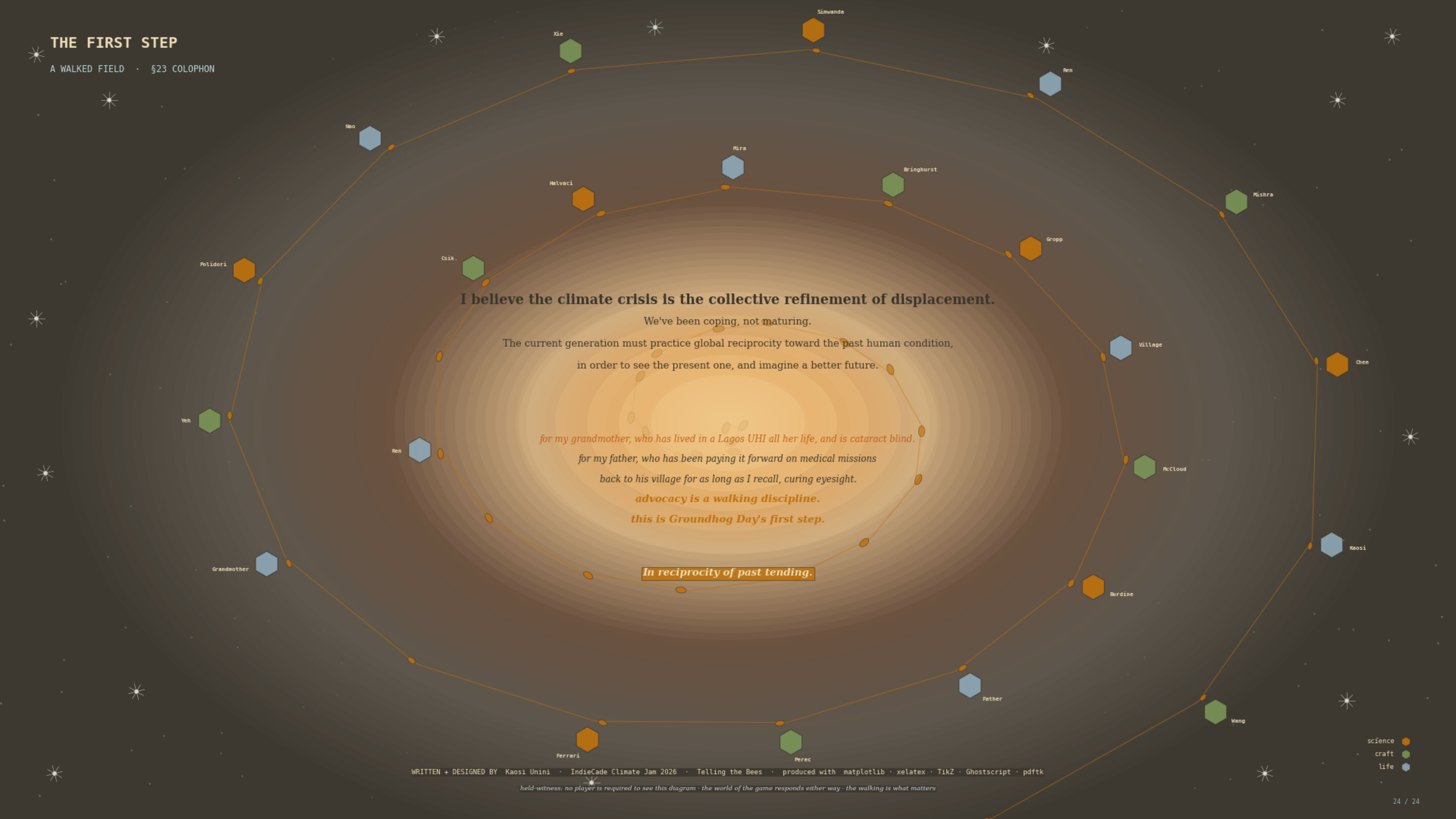
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presence + rhythm

method: Bringhurst-tradition three-column grouped bibliography · alphabetical-ish within cluster · author-year lead · title · venue in italic · body 7pt Lora serif. tooling: matplotlib (Hunter 2007) · xelatex + TikZ · Ghostscript · pdftk · PDF/A + UA + X + E.

THE FIRST STEP

A WALKED FIELD · §23 COLOPHON



I believe the climate crisis is the collective refinement of displacement.

We've been coping, not maturing.

The current generation must practice global reciprocity toward the past human condition,

in order to see the present one, and imagine a better future.

for my grandmother, who has lived in a Lagos UHI all her life, and is cataract blind.

for my father, who has been paying it forward on medical missions

back to his village for as long as I recall, curing eyesight.

advocacy is a walking discipline.

this is Groundhog Day's first step.

In reciprocity of past tending.

WRITTEN + DESIGNED BY Kaosi Unini · IndieCade Climate Jam 2026 · Telling the Bees · produced with matplotlib · xelatex · TikZ · Ghostscript · pdftk

held-witness: no player is required to see this diagram · the world of the game responds either way · the walking is what matters