

# Welfare Dimension Boundary and Interaction Protocol

## Future Safe Option-Space Clarification

Future option-space effects are recorded within the existing 7x7 welfare field and CSV interface; they are not an eighth dimension. Material lock-in, exit cost, path dependence, capability proliferation, concentration of control, knowledge loss, ecological threshold effects, and irreversible narrowing of future rights-compatible choices must be assigned to the existing dimension(s) they actually affect, with interaction records used where necessary and without double counting.

Framework: MathGov

Decision architecture: RippleLogic

Related moral-status interface: SGP

Protocol role: Companion welfare-measurement and record-conformance protocol beneath RLS

License: Apache License 2.0

Status: Public research-source measurement protocol and conformance standard. The record rules are implementable; the seven-dimension measurement architecture remains empirically provisional. Not a new gate, not a new welfare dimension, and not empirical validation.

Release focus: Dimension-set migration, boundary reliability, allocate-versus-split discipline, time and subgroup integrity, weight sensitivity, psychometric operationalization, runnable validation planning, and core-interface readiness.

**Measure the parts without pretending they are isolated. Measure the relationships without erasing the parts.**

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## Source-boundary and integration-status rule

If this protocol conflicts with the released RippleLogic Canon, the Canon controls. WDBIP governs only the classification, evidence documentation, interaction mapping, and validation of welfare-dimension inputs used by RLS. It does not alter the canonical cascade, rights coverage, TRC, CSV, RLS formula, Union Scopes, constitutional weights, or lawful authority requirements.

WDBIP is a companion standard subordinate to the Canon and SGP. Source authority, component editions, package hashes and the distinction between this specification and external implementation artifacts are recorded in the release appendix. A prose integration claim does not substitute for synchronized evidence or an executed validator.

The governing architecture remains:

**RG -> RF/NCRC -> TRC -> CSV -> RLS**

WDBIP is **not an eighth welfare dimension** and **not a sixth gate**. It operates inside the construction and review of RLS welfare evidence after qualification requirements are respected. If WDBIP reveals a previously omitted rights, catastrophe, structural-viability, physical-admissibility, or authority issue, the run reopens the relevant existing layer. WDBIP does not decide selectability by itself.

## Executive standard

MathGov uses seven welfare dimensions as a public anti-omission map:

1. D1 Material
2. D2 Health
3. D3 Social
4. D4 Knowledge
5. D5 Agency
6. D6 Meaning
7. D7 Environment

These dimensions are related but not interchangeable. Health can be affected by material insecurity, social isolation, misinformation, loss of agency, meaning distress, and environmental exposure. That does not make those conditions identical to health. A scientifically useful system must preserve construct boundaries while recording causal, enabling, moderating, and feedback relationships.

**Typed 7×7 field clarification.** For compatibility with the Canon, D1-D7 retain the stable name Welfare Dimensions; however, the full Union-Scope × Dimension matrix is interpreted as a multidimensional accountability-and-flourishing field rather than 49 uniform phenomenally experienced welfare states. A cell or effect token may represent DIRECT\_WELFARE, COLLECTIVE\_FUNCTIONING, ENABLING\_CONDITION, STRUCTURAL\_INTEGRITY, ECOLOGICAL\_CONDITION, EPISTEMIC\_OBSERVATION\_CAPACITY, or SYMBOLIC\_MEANING\_CONDITION. The record **MUST** state the applicable interpretation when ambiguity is material, and it **MUST NOT** imply that a non-sentient system experiences welfare without admissible SGP/evidence support.

WDBIP therefore requires:

0. **Dimension-set pin:** every record declares the governing seven-dimension taxonomy version. Existing records remain immutable if a future governed revision changes the taxonomy.
1. **Primary dimension:** each material effect token has one primary welfare dimension for a declared bearer, baseline, and time window.
2. **Canonical scope treatment:** each token records its represented Union Scopes and inherits the Canon's redundancy rules. DEDUPLICATION requires a declared primary scope, ALLOCATION requires bounded coefficients, and EMERGENT\_SCALE\_JUSTIFICATION requires genuinely distinct scale-specific states.
3. **Profile before index:** each dimension is represented as an evidence profile before any scalar summary is attempted.

4. **Token-level pathways:** cross-dimensional and cross-scope consequences are recorded between bounded effect tokens rather than silently copied into several cells.
5. **Dependence control:** shared evidence, mediators, repeated outcomes, correlated indicators, and scope duplication are disclosed to prevent inflation.
6. **Uncertainty discipline:** unknown, contested, culturally unstable, and weakly measured states are not converted into zero or false precision.
7. **PCC attachment:** every claim-bearing WDBIP record is attached to or hash-referenced from the run's PCC.
8. **Gate feedback:** newly discovered gate-material hazards reopen RG, RF/NCRC, TRC, or CSV.
9. **Empirical revisability:** dimensions and instruments must survive reliability, discriminant-validity, invariance, predictive-value, and decision-utility testing.

## 1. Purpose and problem

### 1.1 Purpose

WDBIP provides a reproducible method for answering seven questions:

1. Which welfare dimension primarily contains a claimed effect?
2. Which Union Scope treatment governs the token under the Canon's multi-scope and redundancy rules?
3. Which other dimensions or scopes are affected through material pathways?
4. How should those pathways be evidenced without double counting?
5. How does the record attach to the run's PCC and, where relevant, SGP record?
6. What may be measured about meaning, spiritual experience, health, and environmental conditions without exceeding the evidence?
7. What evidence would weaken, revise, merge, divide, or reject a dimension or pathway claim?

### 1.2 The category-collapse problem

Multidimensional welfare systems face two opposite errors.

**Isolation error:** dimensions are treated as sealed boxes, so material pathways disappear. For example, degraded air quality is recorded under Environment while respiratory morbidity is omitted from Health.

**Collapse error:** every determinant and consequence is placed inside one broad category, often Health or Flourishing. The result becomes analytically unusable because material insecurity, social belonging, agency, meaning, and ecological integrity lose their distinct causal and normative roles.

WDBIP rejects both errors:

**Distinct dimensions + typed interactions != isolated silos or one undifferentiated score.**

### 1.3 Why this matters for RLS

RLS ranks only selectable options using residual welfare evidence. A numerical cell value is not evidence by itself. If the underlying effect is placed in the wrong dimension, counted repeatedly, supported by a culturally invalid instrument, or assigned false causal meaning, the final score may be arithmetically correct but substantively invalid.

WDBIP improves the evidence surface feeding RLS. It does not make RLS a truth machine.

## 2. Authority, placement, and non-claims

### 2.1 Placement beneath RLS

WDBIP sits between evidence construction and residual welfare scoring:

| Stage | Function                               | WDBIP role                                                |
|-------|----------------------------------------|-----------------------------------------------------------|
| RG    | Grounds claims and evidence boundaries | Receives only evidence allowed by RG; returns category or |

| Stage   | Function                                   | WDBIP role                                                                                    |
|---------|--------------------------------------------|-----------------------------------------------------------------------------------------------|
|         |                                            | evidence failures for narrowing or escalation.                                                |
| RF/NCRC | Protects non-compensatory rights           | Does not redefine rights; forwards severe rights evidence discovered during welfare analysis. |
| TRC     | Bounds catastrophe and irreversible ruin   | Does not absorb tail risk; forwards newly identified catastrophe pathways.                    |
| CSV     | Tests containment and structural viability | Forwards dependency, ecological, implementation, monitoring, and enabling-condition failures. |
| RLS     | Compares residual welfare among survivors  | Supplies dimension assignments, profiles, pathways, dependence tags, and uncertainty records. |

## 2.2 Normative status

This document is a companion measurement standard. Its classification and record rules are normative for any implementation claiming WDBIP v1.9 conformance. Its proposed instruments, validation studies, example indicators, and research thresholds are informative until separately validated or adopted through a governed profile.

## 2.3 Non-claims

WDBIP does not claim:

- that welfare naturally consists of exactly seven metaphysically exhaustive dimensions;
- that every dimension has achieved cross-cultural measurement validity;
- that a survey response proves a metaphysical, spiritual, or causal claim;
- that correlation establishes causation;
- that every dimension must be active in every decision;
- that every relationship is beneficial or decision-material;
- that one scalar can represent the whole welfare profile;
- that RLS scores are objective truth;
- that internal consistency is empirical validation;
- that WDBIP creates authority, legal permission, or execution safety.

## 2.4 PCC attachment and source-of-truth rule

A WDBIP record is a PCC-linked measurement record, not a parallel decision authority. For every claim-bearing Tier 2 or Tier 3 use, the run's PCC SHALL record or reference at minimum:

- PCC.WDBIP.ProtocolVersion;
- PCC.WDBIP.SchemaVersion;
- PCC.WDBIP.RecordID;
- PCC.WDBIP.RecordHash or immutable artifact locator;
- PCC.WDBIP.RecordStatus;
- PCC.WDBIP.UnresolvedBoundaryItems;
- PCC.WDBIP.ScopeRedundancyMethod;
- PCC.WDBIP.GateRouting;
- reviewer identity and independence status where required.

The exact WDBIP packet supplies the detailed token, profile, pathway, dependence, and uncertainty records. The PCC supplies the run-level pointer and governing disclosure. If a PCC summary and the referenced WDBIP packet diverge, the discrepancy is a record-integrity failure and the stronger claim must be narrowed or refused until corrected.

## 2.5 WDBIP-SGP measurement and standing boundary

WDBIP classifies and measures welfare states, determinants, consequences, and interactions. SGP governs moral-patient evidence, protection posture, participation readiness, role readiness, intelligence profiling, and the controlled welfare-inclusion hypothesis interface. Therefore:

- a WDBIP score does not establish sentence, FPP, intelligence, authority, or personhood;
- SGP status does not substitute for evidence about the actual welfare state being scored;
- protection-relevant uncertainty routes through SGP and the Canon's precautionary interface;
- WDBIP records the measured welfare claim, while SGP records why and how the bearer enters protection and welfare-attention analysis;
- protection is not authority, and measurement is not standing.

Where SGP is decision-material, the WDBIP packet SHALL include the exact SGP record version or immutable reference.

## 3. Canonical welfare dimensions and boundary rules

### 3.1 Canonical definitions

| Code | Dimension | Canonical focus                                                                    | Includes                                                                                                             | Does not automatically include                                                                                                  |
|------|-----------|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| D1   | Material  | Resources, infrastructure, and subsistence security                                | Income, housing, food, energy, transport, productive assets, affordability, resource continuity                      | Health outcomes, social belonging, knowledge, autonomy, purpose, or ecosystem integrity merely because resources influence them |
| D2   | Health    | Physical and mental functioning, morbidity, injury, disability, and mortality risk | Bodily function, mental function, symptoms, pain, fatigue, sleep, vitality, recovery, safety-related health outcomes | Every social, material, spiritual, or environmental determinant of health                                                       |
| D3   | Social    | Trust, belonging, relationships, care, and relational integrity                    | Support, cohesion, inclusion, reciprocity, conflict, violence, isolation, relational safety                          | Individual purpose, formal rights, knowledge quality, or resource adequacy unless directly represented as a social condition    |
| D4   | Knowledge | Epistemic access, learning, understanding, and correction capacity                 | Education, information access, accuracy, skills, competence, monitoring, error correction                            | Mere persuasion, authority, preference, or unverified confidence                                                                |
| D5   | Agency    | Autonomy,                                                                          | Consent, real                                                                                                        | Satisfaction,                                                                                                                   |

| Code | Dimension   | Canonical focus                                                      | Includes                                                                                                        | Does not automatically include                                                                                                      |
|------|-------------|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
|      |             | effective choice, participation, and freedom from coercion           | options, mobility, voice, appeal, control, non-domination                                                       | competence alone, nominal choice, or authority merely inferred from intelligence                                                    |
| D6   | Meaning     | Purpose, coherence, mattering, identity, values, and valued projects | Existential coherence, purpose, value congruence, continuity, spiritual or secular connection, moral injury     | Metaphysical truth, divine status, clinical health merely because meaning affects health, or propaganda presented as shared purpose |
| D7   | Environment | Ecological and built-context integrity                               | Air, water, soil, climate exposure, habitat, biodiversity, pollution, regeneration, built-environment condition | The resulting human disease burden, material cost, or social conflict unless separately recorded in those dimensions                |

**U7 construct-exception rule (Normative).** The Canon Section 4.7 U7 rule governs ecological D3/D4/D5/D6 analogues and integrated D7 reporting. These are not human Social, Knowledge, Agency or Meaning instruments and must remain distinguished in validation data. Human ecological understanding and monitoring retain their justified human/institutional D4 computational homes, with U7 view-only links unless a distinct ecological information-bearing condition is evidenced. A D7 integrated condition must not add the same state already scored in component tokens. Rights, TRC and CSV may inspect linked component and integrated evidence without generating additional RLS mass. Record contested primary homes and test material alternative treatment or weighting.

Population-scope mapping clarification. Choose a primary home from the bearer and consequence described, not from a desired weight. Individual-level effects aggregated across persons do not automatically become a second U6 Humanity effect. A U6 contribution requires its own justified population-scale or coordination construct, or an explicitly declared primary reporting home with no duplicate U1 aggregation. Material alternative mappings remain subject to the Canon representation-sensitivity rules.

### 3.2 One-token one-primary-dimension rule

For a declared bearer, affected population, baseline, time window, and option, each material effect token SHALL have one primary welfare dimension. Scope assignment is governed separately by the Canon's Union Scope and redundancy rules.

An effect token is a bounded claim such as:

- "annual average PM2.5 exposure decreases by 4 micrograms per cubic meter";
- "self-reported loneliness decreases";
- "household rent burden increases by 5 percentage points";
- "employees gain a binding appeal right";
- "reported purpose in work improves".

A token MAY produce further effects in other dimensions, but those consequences must be separately defined and linked by a pathway record.

#### 3.2A Canonical Union Scope binding

WDBIP does not define or own Union Scope redundancy methods. Each effect token SHALL declare its scope treatment using the methods owned by the pinned RippleLogic Canon:

EMERGENT\_SCALE\_JUSTIFICATION, DEDUPLICATION, or ALLOCATION. The Canon's effect-token definition, instance-to-scope mapping, reduced-scope rule, and per-token allocation constraint control. WDBIP adds the obligation to record the selected treatment, its rationale, and its PCC reference.

Multi-scope stakeholder mapping is permitted. Silent multiplication of the same underlying welfare effect across scopes is not. Allocation must never suppress rights-covered, catastrophe-relevant, or CSV-material harm.

### 3.2B Scope assignment record

Representation clarification. ALLOCATION is the Canon-governed exception for a conserved effect: keep one parent EffectTokenID and one primary dimension, with explicit bounded scope-allocation entries whose coefficients and any remainder are recorded. The entries distribute that one effect; they are not new independent effect tokens. Do not add the parent's full value again to the allocated entries. Rights review still consumes the full unallocated RightsEffectToken before allocation. DEDUPLICATION retains one primary computational cell; separately evidenced downstream or emergent outcomes require their own tokens.

Each material token SHALL record:

- all represented Union Scopes;
- redundancy-handling method;
- scope rationale;
- primary scope when DEDUPLICATION is used;
- distinct scale-specific token identifiers and evidence when EMERGENT\_SCALE\_JUSTIFICATION is used;
- allocation coefficients where ALLOCATION is used;
- the allocation remainder and its rationale when the coefficients sum to less than 1;
- PCC Scope Coverage Declaration reference where reduced-scope mode applies.

A distinct downstream consequence at another scope requires a distinct target token and a token-level pathway. A repeated label at another scope is not automatically a distinct consequence.

EMERGENT\_SCALE\_JUSTIFICATION does not license one vague token to be copied across scales; the scale-specific states must be separately defined.

### 3.2C Allocate-versus-split decision procedure

Use ALLOCATION only when one conserved cost, resource, exposure, transfer or burden under the Canon is being represented across several analytical scopes. Create distinct tokens when the bearers, states, baselines, time windows, mechanisms, or evidence objects differ materially.

Apply the following sequence:

1. **Same bearer and state?** If not, split into distinct tokens.
2. **Same causal event and measurement object?** If not, split.
3. **Conserved quantity or burden?** If yes, allocation may be appropriate. If each scope has its own realized state, split.
4. **Would separate entries create repeated credit or harm for one state?** If yes, deduplicate or allocate.
5. **Would allocation hide a distinct subgroup, rights, ruin, or structural effect?** If yes, split and route the gate-material issue.
6. **Do coefficients sum below 1?** Record the residual  $1 - \sum(\alpha_u)$  and classify it as justified attenuation, out-of-boundary remainder, measurement loss, or unresolved allocation. An unexplained residual is not conformant.

Worked contrast:

| Situation                                                                                                 | Correct treatment  | Reason                                                                                          |
|-----------------------------------------------------------------------------------------------------------|--------------------|-------------------------------------------------------------------------------------------------|
| One student's verified respiratory improvement appears relevant to Self, Household, Community, and Polity | DEDUPLICATION      | One bearer and one health outcome receive one primary home; other scope views do not add value. |
| City maintenance expenditure and household travel-cost change arise from the same                         | Distinct D1 tokens | Different bearers, states, evidence, and incidence.                                             |

| Situation                                                                                                     | Correct treatment                                 | Reason                                                        |
|---------------------------------------------------------------------------------------------------------------|---------------------------------------------------|---------------------------------------------------------------|
| project                                                                                                       |                                                   |                                                               |
| Loss of one sacred wetland creates ecological degradation, community displacement, and cultural-identity loss | Distinct D7, D3, and D6 tokens linked by pathways | The outcomes are causally related but are not the same state. |

### 3.3 Primary-location test

Assign the primary dimension by asking, in order:

1. What is the immediate object or state being changed?
2. Who or what bears that state?
3. Is the claim a resource, health state, relationship, epistemic condition, effective freedom, meaning state, or environmental condition?
4. Would the claimed state still exist conceptually if the downstream consequence did not occur?
5. Is the same effect already represented elsewhere under another label?
6. Does the evidence directly measure the state or only a determinant, proxy, or consequence?
7. Is the effect actually rights-, catastrophe-, or CSV-material rather than merely residual welfare?

If the answer remains ambiguous, mark **BOUNDARY\_CONTESTED**, preserve competing assignments in sensitivity analysis, and narrow any strong ranking claim.

#### 3.3A Boundary contestation and classification reliability

**BOUNDARY\_CONTESTED** is a legitimate uncertainty state, not a failure to be hidden. However, systematic contestation may indicate that definitions, anchors, training, or the dimension partition require revision.

A validation study **SHALL** preregister:

- the unit of coding;
- rater training and independence;
- the agreement statistic appropriate to nominal or ordinal labels;
- confidence intervals;
- the permitted adjudication process;
- the review trigger for excessive contestation.

The following are **provisional review triggers, not universal validity constants**:

| Surface                        | Development target                | High-stakes target                               | Review trigger                                                               |
|--------------------------------|-----------------------------------|--------------------------------------------------|------------------------------------------------------------------------------|
| Primary-dimension assignment   | agreement coefficient $\geq 0.70$ | $\geq 0.80$                                      | lower confidence bound below 0.60 or persistent domain-specific disagreement |
| Pathway-type assignment        | $\geq 0.70$                       | $\geq 0.80$                                      | materially lower agreement after training                                    |
| <b>BOUNDARY_CONTESTED</b> rate | ordinarily $< 20\%$               | ordinarily $< 10\%$ for decision-critical tokens | exceedance requires category review, additional anchors, or narrower claims  |

Suitable statistics may include Krippendorff's alpha, Gwet's AC1/AC2, weighted kappa, or an intraclass coefficient where the scale and design warrant it. Before outcomes are observed, freeze the primary estimator and variant, coding/rater design, weights where used, provisional threshold and point/interval decision rule, with missingness, prevalence and undefined-statistic handling. Report the rationale for threshold applicability; an undefined statistic or an unmapped threshold cannot establish passage. Diagnostic alternatives do not replace the locked result. Meeting a trigger does not establish construct validity; failing it requires review.

### 3.4 State, determinant, and consequence rule

WDBIP distinguishes:

- **State:** the condition directly represented in a dimension.
- **Driver or exposure:** a factor that may alter a state.
- **Mediator:** an intermediate mechanism.
- **Outcome:** a later state affected by the pathway.
- **Moderator:** a condition changing pathway strength or direction.
- **Enabling condition:** a condition without which the state cannot be maintained.
- **Indicator:** a measurement object, not necessarily the state itself.

Example:

| Object                      | Role                         | Dimension |
|-----------------------------|------------------------------|-----------|
| Air pollution concentration | Environmental state/exposure | D7        |
| Inflammatory response       | Mediator                     | D2        |
| Asthma exacerbation         | Health outcome               | D2        |
| Missed work and lost income | Material consequence         | D1        |
| Family caregiving strain    | Social consequence           | D3        |

### 3A. Conceptual Distinguishability and Measurement Boundaries (Normative)

The dimensions are conceptually differentiated, causally coupled and empirically revisable. Orthogonalized for accounting is permissible explanatory language only when explicitly defined as minimizing redundant representation; it does not assert zero covariance, statistical independence, causal independence, a proven maximal basis or exactly seven natural welfare units.

Separate raw telemetry from the state construct being valued. CPU load, network uptime, cryptographic agreement, algorithmic objective similarity and storage headroom are not automatically Material, Health, Social, Meaning or Environment welfare. They may support a declared enabling or structural cell, or an evidenced downstream consequence for an affected bearer. The typed-field and SGP rules remain controlling. Existing U7 functional analogues remain labelled as analogues, not personal experiences.

Additional observations, evidence versions and transport copies of the same consequence remain attached to one effect identity. A new token requires a genuinely distinct consequence, not merely a changed file, label, scope or measurement instrument. Record causal parents and direct-versus-total-effect treatment. Do not count an already measured endpoint again through modeled propagation.

Apply primary-home and allocation rules before aggregation, and retain the existing partition-invariance challenge after any selection-material change of representation. Conserved raw allocation does not by itself prove score invariance after unequal weights or saturation. Distinct downstream and emergent effects remain visible; correlated effects are not automatically duplicates.

## 4. Welfare Dimension Profile

### 4.1 Profile-before-index rule

A dimension SHALL be represented as a profile before a scalar is used. The minimum profile for Union Scope  $u$ , dimension  $d$ , and time  $t$  is:

$$W(u,d,t) = \langle S, F, C, X, L, G, U \rangle$$

where:

| Field | Meaning                                        |
|-------|------------------------------------------------|
| S     | Observed or estimated state                    |
| F     | Functioning or realized performance            |
| C     | Capacity, resilience, and recovery potential   |
| X     | Exposures, drivers, dependencies, and enabling |

| Field | Meaning                                                          |
|-------|------------------------------------------------------------------|
|       | conditions                                                       |
| L     | Lived or reported experience where applicable                    |
| G     | Distribution across affected groups and worst-affected subgroups |
| U     | Uncertainty, evidence status, staleness, and disagreement        |

The tuple is a record structure, not a formula requiring arithmetic combination.

### 4.1A Tuple-to-record crosswalk

The seven tuple fields organize the longer record required by Section 4.2:

| Tuple field | Section 4.2 content primarily assigned here                                                                    |
|-------------|----------------------------------------------------------------------------------------------------------------|
| S           | direct state indicators, baseline, measurement date, option-relative change                                    |
| F           | functioning and realized-performance indicators                                                                |
| C           | resilience, recovery, adaptive capacity, continuity potential                                                  |
| X           | drivers, exposures, dependencies, enabling conditions, causal context                                          |
| L           | lived experience and affected-party evidence where appropriate                                                 |
| G           | population distribution, incidence, worst-affected subgroup, severity concentration                            |
| U           | evidence status, instrument version, provenance, missingness, staleness, confidence, disagreement, sensitivity |

A field may reference another record rather than duplicate it, but the reference must be immutable and replayable.

### 4.2 Profile fields

Every decision-material profile SHOULD record:

- profile identifier and version;
- option, baseline, scope, population, and subgroup;
- dimension code;
- time horizon and measurement date;
- direct state indicators;
- functioning indicators;
- resilience or recovery indicators;
- drivers and enabling conditions;
- lived-experience indicators, where ethically and methodologically appropriate;
- distribution and worst-affected subgroup;
- measurement reference and instrument version;
- data source and provenance;
- missingness and staleness;
- uncertainty interval or qualitative class;
- reviewer confidence;
- claim action: **ALLOW**, **NARROW**, **ESCALATE**, **REFUSE**, **MONITOR\_ONLY**, or **SENSITIVITY\_ONLY**.

### 4.3 No scalar laundering

Aggregation may legitimately improve statistical reliability when several partially independent indicators measure the same construct. It does not automatically improve construct validity, causal validity, population transportability, or evidential maturity. A composite index SHALL NOT claim stronger validity or causal warrant than its weakest decision-material evidence dependency unless independent validation supports that stronger claim. A scalar MAY be used only when:

- the construct and intended use are defined;
- component direction and aggregation rules are declared;
- missing-data treatment is declared;
- reliability gains from aggregation are reported separately from validity and causal-warrant claims;
- reliability and validity evidence are appropriate to the population and context;
- distributional harms are not hidden;
- sensitivity to alternative plausible constructions is reported;
- the number is not used to bypass RF/NCRC, TRC, or CSV.

### 4.4 Weight legitimacy and sensitivity boundary

WDBIP protects the integrity of evidence entering each dimension. It does not establish the legitimacy of the Canon's cross-scope or cross-dimensional trade-off weights and does not redefine the RLS equation.

For every claim-bearing run in which a plausible alternative weight set changes the selected option, decisiveness status, or a material subgroup conclusion, the PCC SHALL record WEIGHT\_SENSITIVE, the weight families tested, and the authority path used. A WDBIP-conformant record must not imply that careful measurement removes the normative and political character of weight selection.

At minimum, Tier 3 analysis SHALL test:

- constitutional floor-preserving alternatives;
- plausible stakeholder or participatory weight sets;
- a transparent equal-weight or reference-weight comparator where admissible;
- the effect of excluding any empirically unsupported local prominence adjustment;
- rank and decisiveness stability rather than score variation alone.

Weight sensitivity cannot rescue an option that fails RF/NCRC, TRC, or CSV.

## 5. Token-level cross-dimensional and cross-scope interaction records

### 5.1 Token-level interaction record

A pathway is defined between bounded effect tokens, not merely between dimension labels. For source token  $s$  and target token  $t$ :

$$I(s \rightarrow t) = \langle M, D, \tau, \beta, E, U \rangle$$

The dimension pair  $\dim(s) \rightarrow \dim(t)$  and scope pair  $\text{scope}(s) \rightarrow \text{scope}(t)$  are derived labels. Two different mechanisms between the same dimension pair require separate pathway records. A dimension-level arrow is a summary view, not the primary evidentiary object.

where:

| Symbol  | Meaning                                                      |
|---------|--------------------------------------------------------------|
| M       | Proposed mechanism and pathway type                          |
| D       | Direction: beneficial, harmful, mixed, nonlinear, or unknown |
| $\tau$  | Time lag or temporal profile                                 |
| $\beta$ | Estimated magnitude or bounded qualitative effect            |

| Symbol | Meaning                                                          |
|--------|------------------------------------------------------------------|
| E      | Evidence source, design, and dependence status                   |
| U      | Uncertainty, alternative explanations, and sensitivity relevance |

The record **MUST** also identify source token, target token, source and target scope, scope relation, population, baseline, option, and version.

## 5.2 Machine-token namespace rule

Human-readable labels may remain concise, but machine-readable values are field-namespaced. A pathway field **SHALL** use `PATHWAY_*` tokens, an evidence field **SHALL** use `EVIDENCE_*` tokens, and a direction field **SHALL** use `DIRECTION_*` tokens. A token from one namespace is invalid in another field.

## 5.3 Pathway types

Allowed pathway types are:

| Token                                   | Meaning                                                                                |
|-----------------------------------------|----------------------------------------------------------------------------------------|
| <code>PATHWAY_CAUSAL_DIRECT</code>      | Evidence supports a direct causal effect within the declared model.                    |
| <code>PATHWAY_CAUSAL_MEDIATED</code>    | Effect operates through one or more declared mediators.                                |
| <code>PATHWAY_ENABLING_CONDITION</code> | Source condition enables or constrains the target state.                               |
| <code>PATHWAY_MODERATOR</code>          | Source changes the magnitude or direction of another pathway.                          |
| <code>PATHWAY_FEEDBACK</code>           | Source and target influence one another over time.                                     |
| <code>PATHWAY_SHARED_CAUSE</code>       | Association may arise from a common cause rather than direct influence.                |
| <code>PATHWAY_CORRELATIONAL_ONLY</code> | Association is observed but causal direction is not established.                       |
| <code>PATHWAY_HYPOTHESIZED</code>       | Plausible mechanism exists but pathway evidence is insufficient.                       |
| <code>PATHWAY_CONTESTED</code>          | Credible evidence or interpretation conflicts about the pathway.                       |
| <code>PATHWAY_UNKNOWN</code>            | Direction or mechanism is not established.                                             |
| <code>PATHWAY_NOT_MATERIAL</code>       | Pathway is below the declared materiality boundary, with rationale and reopen trigger. |

## 5.4 Causal language discipline

Use "causes," "produces," or "leads to" only when the study design and assumptions support that inference. A material causal or comparative-effect claim **SHALL** link the claim-specific MFDI/PC-AEP identification plan: estimand, intervention/comparator, population/time, identification assumptions, selection/confounding and interference treatment, measurement, uncertainty and identification-status verdict. Pre/post change alone is not identified causal benefit. Otherwise use:

- associated with;
- may affect;
- is a plausible pathway to;
- predicts under the declared model;

- is consistent with;
- remains unresolved.

A directed arrow in a diagram is not causal evidence.

## 5.5 Feedback and dynamic systems

Bidirectional relationships SHALL be represented as two pathways or a declared feedback structure. For example:

**D6 meaning distress -> D2 mental-health impairment**

and

**D2 prolonged illness -> D6 disruption of valued projects**

The two directions may have different mechanisms, evidence, magnitudes, and time lags.

## Effect Identity, Granularity, Temporal Integrity, and Partition Control

EffectTokenID is the general identity object for one bounded consequence claim. RightsEffectTokenID is the RF/NCRC subtype. ConservedAllocationTokenID is the subtype for one conserved quantity distributed across scopes. These objects SHALL NOT be conflated.

Token granularity is determined by bearer/class, state, baseline, causal pathway, maximal contiguous decision-relevant time window, scenario treatment, and evidence object. A distinct token requires a material difference in one of those fields and a separately evidenced consequence.

One token has one primary Welfare Dimension and one primary aggregating cell. Secondary scope or dimension tags are view-only unless a distinct downstream or emergent state is evidenced.

Continuous effects SHALL use the maximal contiguous window. Sequential time-slicing of one continuous state is prohibited unless the episodes are causally/evidentially distinct.

| Temporal classification                                        | Same token / new token rule                                            |
|----------------------------------------------------------------|------------------------------------------------------------------------|
| Continuous state                                               | Same token across the maximal contiguous decision-relevant window      |
| Recurring exposure without full recovery                       | Same token; record recurrence and cumulative burden                    |
| Recovered episode followed by a new causal event               | New token permitted when recovery and causal separation are evidenced  |
| Separate evidence objects describing the same continuing state | Same token; link evidence objects rather than multiplying welfare mass |
| Administrative monthly or annual reporting slices              | View-only records beneath the parent token                             |

A contested temporal classification that can alter ranking or decisiveness requires a challenger construction. A reversal sets TEMPORAL\_PARTITION\_SENSITIVE.

PartitionInvarianceTest compares every selection-material, evidence-supported alternative tokenization or representation identified by the trigger or challenger. A leader/decisiveness reversal is PARTITION\_RANK\_SENSITIVE and blocks unique framework selection.

WDBIP records shall support subgroup closure, reference/baseline provenance, interaction status, and accepted/rejected alternative constructions. WDBIP does not create an eighth dimension or a new gate.

| Identity test    | Same token when...                    | New token when...                     |
|------------------|---------------------------------------|---------------------------------------|
| Bearer/class     | Same affected bearer or defined class | Materially different bearer/class     |
| State construct  | Same state/outcome                    | Distinct downstream or emergent state |
| Baseline/pathway | Same comparator and causal pathway    | Materially different baseline or      |

| Identity test       | Same token when...                        | New token when...                              |
|---------------------|-------------------------------------------|------------------------------------------------|
|                     |                                           | pathway                                        |
| Time                | Same contiguous consequence window        | Causally/evidentially distinct episode         |
| Evidence object     | Same governing evidence surface           | Separately supported consequence               |
| Scope/dimension tag | Only another view/accountability interest | Distinct evidenced state with own primary home |

## 6. Double-counting and dependence control

### 6.1 Core prohibition

The same underlying effect SHALL NOT receive multiple welfare contributions merely because it can be described in several ways.

### 6.2 Duplicate-effect test

Two proposed effect tokens are presumptive duplicates when they share all or most of:

- bearer;
- state changed;
- time window;
- baseline;
- causal event;
- instrument items;
- data source;
- mechanism;
- outcome.

Presumptive duplicates must be merged, assigned a primary location, or modeled with declared dependence rather than treated as independent gains or harms.

### 6.3 Distinct-consequence permission

One source event may legitimately create several distinct effects.

Example: closing a rural clinic may produce:

- D1: higher travel and out-of-pocket costs;
- D2: delayed diagnosis and health deterioration;
- D5: reduced effective access and choice;
- D3: caregiver burden and relationship strain.

These are not duplicates if each effect has a distinct state, bearer, evidence record, and pathway. They remain dependent and must not be represented as statistically independent without justification.

### 6.4 Evidence-dependence graph

Decision-material evidence objects SHOULD be represented in an evidence-dependence graph. At minimum, declare:

- shared source data;
- shared survey items;
- overlapping samples;
- repeated outcome measures;
- common mediators;
- common model assumptions;
- derived variables;
- institutional or commercial conflicts;
- duplicated qualitative testimony.

WDBIP dependence tags may inform the Canon's  $\kappa(u,d)$  or other governed dependence controls. WDBIP does not redefine the canonical RLS equation.

## 6.5 No proxy multiplication

Several proxies for one latent construct do not automatically create several benefits. For example, purpose, life direction, and existential coherence may support a D6 profile, but they are not three independent welfare gains merely because three questionnaire items exist.

### 6.5A Construct-separation methods

Where several indicators may reflect one general factor, overlapping specific factors, mutually reinforcing symptom or state networks, or genuinely distinct constructs, the analyst SHALL not infer the structure from item labels alone. Depending on the research question and data, admissible methods may include:

- confirmatory factor analysis;
- exploratory structural equation modeling;
- bifactor or bifactor-ESEM models;
- network psychometrics;
- multitrait-multimethod analysis;
- item-response or differential-item-function analysis;
- qualitative cognitive interviewing and content-validity review.

No single method is universally controlling. Model choice, identification assumptions, fit criteria, cross-validation, alternative models, and interpretability must be preregistered or transparently reported. Better statistical fit alone does not prove the ontology of a welfare dimension.

## 6.6 Cross-scope duplicate-effect test

When the same token or conserved causal unit appears in more than one Union Scope, the record SHALL apply the Canon's declared redundancy treatment. Reviewers must ask:

1. Is the state materially different at each scale, or merely relabeled?
2. Are the bearers, mechanisms, time horizons, and evidence objects distinct?
3. Has EMERGENT\_SCALE\_JUSTIFICATION, DEDUPLICATION, or ALLOCATION been declared?
4. If allocation is used, do coefficients sum to no more than 1 for the conserved token?
5. Does any treatment weaken a rights, catastrophe, or CSV signal?

A failure of this test requires merge, allocation repair, sensitivity analysis, or claim narrowing before RLS is recomputed.

# 7. Health boundary protocol

## 7.1 D2 Health definition

D2 Health records physical and mental states, functioning, morbidity, injury, disability, recovery, and mortality risk. It may include:

- bodily integrity and physiological functioning;
- disease and symptom burden;
- mental and emotional functioning;
- pain, fatigue, sleep, and vitality;
- developmental functioning;
- functional capacity and disability;
- resilience and recovery;
- health-related safety and mortality risk;
- lived health experience where appropriately measured.

## 7.2 Determinants are not identical to health

Material, social, epistemic, agency, meaning, and environmental conditions may determine health. They retain their primary dimensions when the immediate state is not itself health.

| Claim                                    | Primary location | Linked pathway                                                       |
|------------------------------------------|------------------|----------------------------------------------------------------------|
| Housing is unaffordable                  | D1 Material      | D1 -> D2 if stress or illness effects are evidenced                  |
| A person is socially isolated            | D3 Social        | D3 -> D2 if health effects are evidenced                             |
| A worker lacks schedule control          | D5 Agency        | D5 -> D2 if health effects are evidenced                             |
| A person experiences existential despair | D6 Meaning       | D6 -> D2 if clinical or functional health consequences are evidenced |
| Air contains harmful particulate matter  | D7 Environment   | D7 -> D2 if exposure and health effects are evidenced                |

### 7.3 Physical and mental health are not exhaustive flourishing

Health is necessary and often foundational, but it does not subsume material sufficiency, relationship quality, knowledge, autonomy, meaning, or ecological integrity. A person can be clinically healthy while lacking freedom, purpose, secure housing, education, or a viable environment.

## 8. Meaning, spiritual experience, and metaphysical claims

### 8.1 D6 Meaning definition

D6 Meaning records purpose, coherence, mattering, identity, value congruence, continuity of valued projects, and connection beyond the isolated self.

### 8.2 Meaning Integrity Profile

A D6 profile MAY include:

| Component                   | Operational question                                                         | Example indicators                                                                        |
|-----------------------------|------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| Coherence                   | Is life or collective experience sufficiently comprehensible and integrated? | Narrative continuity, comprehensibility, identity integration, existential disorientation |
| Purpose                     | Are valued future directions present and actionable?                         | Goal direction, future orientation, persistence, purpose presence                         |
| Mattering                   | Does the subject experience significance and contribution?                   | Perceived significance, burdensomeness, recognition, contribution                         |
| Value congruence            | Are actions and institutions aligned with declared values?                   | Moral injury, value-action conflict, ethical compromise                                   |
| Continuity                  | Can valued identities, cultures, relationships, and projects continue?       | Cultural continuity, intergenerational transmission, project continuity                   |
| Connection or transcendence | Is there experienced connection beyond the isolated self?                    | Nature connection, service, spirituality, religion, humanity, AIU, art, truth             |
| Existential distress        | Is meaning disruption causing material suffering or dysfunction?             | Hopelessness, nihilistic distress, spiritual injury, identity collapse                    |

## 8.2A Meaning-register separation for human–AI and sociotechnical systems

Semantic-functional meaning concerns whether outputs carry interpretable content, preserve concepts, answer questions, or support explanation and reasoning. It ordinarily routes to D4 Knowledge, an ICP or capability claim, or another evidence surface appropriate to the bearer. It is not evidence that the system experiences meaning.

Interactional or relational meaning concerns effects of an AI-mediated exchange on human or collective trust, attachment, identity, belonging, agency, understanding, intention, or future action. These effects are real and SHALL be assigned to D3 Social, D4 Knowledge, D5 Agency, or D6 Meaning according to the actual affected construct, bearer, pathway, and evidence.

Phenomenal meaning concerns whether significance, purpose, concern, insight, or relationship is experienced by the evaluated entity. A claim of phenomenal meaning requires SGP-governed evidence and cannot be inferred from semantic competence, first-person language, interface warmth, human attachment, or institutional use.

Non-collapse rule. The reality of semantic or interactional meaning does not establish phenomenal meaning in an artificial system. Uncertainty about artificial phenomenal meaning does not erase real human, social, organizational, or institutional effects. This clarification uses the existing seven dimensions and creates neither an eighth dimension nor a new gate.

## 8.3 Spiritual-measurement boundary

WDBIP permits measurement of reported and observable aspects of spiritual or existential well-being, including:

- inner peace;
- spiritual struggle or distress;
- hope;
- purpose;
- value congruence;
- experienced transcendence;
- connection to community, nature, humanity, or ultimate reality;
- freedom to hold, reject, change, and practice beliefs;
- functional and health consequences.

WDBIP does not permit an RLS score to establish:

- that God exists or does not exist;
- that AIU is empirically proven;
- that a person is enlightened;
- that one religion is metaphysically correct;
- that a reported spiritual experience verifies its external interpretation;
- that religious conformity is welfare.

The measured claim is the experience, freedom, functioning, relationship, or consequence, not the metaphysical truth of the belief.

## 8.4 Primary locations for spiritual and existential effects

| Effect                                                                                       | Primary location                                |
|----------------------------------------------------------------------------------------------|-------------------------------------------------|
| Experienced purpose, coherence, spiritual peace, or distress                                 | D6 Meaning                                      |
| Depression, anxiety, sleep loss, or functional impairment associated with spiritual distress | D2 Health                                       |
| Spiritual community, belonging, support, exclusion, or conflict                              | D3 Social                                       |
| Freedom of belief, conscience, worship, exit, or nonbelief                                   | D5 Agency and potentially RF/NCRC               |
| Access to material resources or places necessary                                             | D1 Material or D7 Environment, depending on the |

| Effect                                    | Primary location                            |
|-------------------------------------------|---------------------------------------------|
| for practice                              | state                                       |
| Knowledge about a tradition or worldview  | D4 Knowledge                                |
| Claimed supernatural or metaphysical fact | RG claim-status record, not a welfare score |

## 8.5 Anti-coercion rule

No institution may improve a D6 score by forcing belief, suppressing dissent, mandating positive reports, or treating conformity as meaning. Coercion routes to D5 Agency and RF/NCRC review.

Rights-routing clarification (Normative). D6 records experiential meaning and cultural continuity, but rights-bearing effects such as conscience, belief, coercion, discrimination, exclusion, information access, or agency loss **MUST** be separately represented in the applicable rights-covered dimension(s) and **MUST** reopen RF/NCRC where material. A D6 score alone does not create or discharge a rights-floor claim.

**Machine-audit binding (Normative).** When a D6 or D7 token is reviewed as rights-relevant, the record **SHALL** either reference the corresponding rights-floor construction / governed rights-coverage extension or record a reviewed non-materiality determination. A materially rights-relevant effect left only as compensable D6/D7 welfare emits `RIGHTS_RELEVANT_EFFECT_UNROUTED` and invalidates the affected rights claim until routing is repaired and RF/NCRC is reopened where material.

# 9. Environmental boundary protocol

## 9.1 D7 Environment definition

D7 Environment records ecological and built-context integrity, including:

- air and water quality;
- soil condition;
- habitat and biodiversity;
- climate stability and exposure;
- pollution and toxic burden;
- ecosystem functioning and regeneration;
- resource cycles;
- built-environment safety and accessibility;
- resilience of environmental enabling systems.

## 9.2 Environmental health distinction

"Environmental health" has two meanings that **SHALL** be separated:

1. **Condition of the environment:** D7.
2. **Health consequence of environmental exposure:** D2.

Example:

**D7 degraded air quality -> D2 respiratory morbidity**

The D7 record measures the environmental state. The D2 record measures the health outcome. Cost, social, knowledge, agency, and meaning consequences are separately recorded when material.

## 9.3 Non-sentient enabling value

A non-sentient ecosystem may have major relevance because it enables sentient welfare, future options, resilience, cultural continuity, and structural viability. WDBIP does not infer sentience from ecological importance and does not require direct phenomenal welfare for D7 to be active.

## 9.4 Welfare measurement versus moral standing

D7 enabling value, a D2 health state, or any other WDBIP measurement does not itself determine moral standing. Where a bearer may be a moral patient, SGP governs the evidence and protection posture. Where

the bearer is a non-sentient system, WDBIP may still record ecological, structural, cultural, option, or enabling value without asserting phenomenal welfare. The two records answer different questions:

Rights-routing clarification (Normative). D7 records environmental condition. Where the same condition produces or threatens health, habitability or basic needs, discriminatory burden, agency loss, due process, information access, dignity, or protected life-support conditions, those consequences **MUST** be separately represented in the applicable rights-covered dimension(s) or a governed extension and **MUST** reopen RF/NCRC where material. D7 salience alone does not create or discharge a rights-floor claim.

- **WDBIP:** What state changes, for whom or what, with what evidence and interaction structure?
- **SGP:** What protection and welfare-attention posture is warranted for the bearer under uncertainty?

## 10. Dimension-specific minimum profiles

### 10.1 D1 Material

Minimum profile domains:

- income and wealth;
- food, housing, energy, water, and transport security;
- affordability and burden;
- infrastructure access and reliability;
- productive capacity and livelihood continuity;
- distribution, deprivation, and resilience to shock.

Boundary warning: material resources may enable agency, health, knowledge, social participation, and meaning, but those downstream states require distinct evidence.

### 10.2 D2 Health

Minimum profile domains:

- morbidity and mortality;
- physical and mental functioning;
- symptoms, pain, fatigue, sleep, and vitality;
- disability and participation limitation;
- safety-related health risk;
- care access, recovery, and resilience;
- subgroup inequalities.

Boundary warning: determinants of health retain their own dimensions.

### 10.3 D3 Social

Minimum profile domains:

- trust and belonging;
- supportive relationships and care;
- reciprocity and inclusion;
- loneliness and isolation;
- conflict, violence, discrimination, and relational safety;
- institutional and community cohesion;
- distribution of voice and recognition.

Boundary warning: social approval is not authority, truth, meaning, or rights compliance.

### 10.4 D4 Knowledge

Minimum profile domains:

- access to information and education;
- accuracy, completeness, provenance, and uncertainty;
- learning and skill development;
- epistemic diversity and contestability;
- monitoring, feedback, and correction capacity;
- misinformation, secrecy, and knowledge loss;
- distribution of access and competence.

Boundary warning: confidence, credentials, or volume of information are not automatically knowledge quality.

## 10.5 D5 Agency

Minimum profile domains:

- real options and freedom of action;
- consent and freedom from coercion;
- participation, representation, and appeal;
- control over consequential conditions;
- mobility, exit, and remedy;
- dependency and domination risk;
- distribution of effective power.

Boundary warning: nominal choice, compliance, intelligence, or participation theater is not effective agency.

## 10.6 D6 Meaning

Minimum profile domains:

- purpose;
- coherence;
- mattering;
- identity and continuity;
- value congruence and moral injury;
- connection or transcendence;
- existential distress;
- cultural and worldview pluralism.

Boundary warning: meaning is culturally and personally variable. It must not be imposed by the evaluator.

## 10.7 D7 Environment

Minimum profile domains:

- air, water, soil, and chemical condition;
- climate and disaster exposure;
- habitat, biodiversity, and ecosystem function;
- pollution and waste;
- regeneration and carrying capacity;
- built-environment quality;
- environmental distribution and injustice;
- monitoring and uncertainty.

Boundary warning: ecosystem condition and human health consequence are linked but distinct.

# 11. Interaction matrix

The following matrix identifies common pathway questions. It is a discovery aid, not a claim that every pathway is active.

| Source<br>-> Target | D1<br>Material                                                       | D2<br>Health                                         | D3<br>Social                                             | D4<br>Knowled<br>ge                                   | D5<br>Agency                                         | D6<br>Meaning                                                        | D7<br>Environ<br>ment                                           |
|---------------------|----------------------------------------------------------------------|------------------------------------------------------|----------------------------------------------------------|-------------------------------------------------------|------------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------------|
| D1<br>Material      | Resource<br>feedback,<br>affordabilit<br>y, asset<br>compoun<br>ding | Nutrition,<br>housing,<br>care<br>access,<br>stress  | Participati<br>on costs,<br>household<br>strain          | Education<br>and<br>informatio<br>n access            | Real<br>options,<br>dependen<br>cy, exit<br>capacity | Security<br>for valued<br>projects<br>or<br>material<br>alienation   | Consumpt<br>ion,<br>extraction,<br>infrastruct<br>ure<br>burden |
| D2 Health           | Care<br>costs,<br>earning<br>capacity                                | Comorbidi<br>ty,<br>recovery,<br>symptom<br>networks | Caregivin<br>g,<br>isolation,<br>relationshi<br>p strain | Cognitive<br>function,<br>school/wo<br>rk<br>learning | Functional<br>choice,<br>consent<br>capacity         | Illness<br>meaning,<br>identity,<br>valued-<br>project<br>continuity | Health-<br>related<br>environm<br>ental<br>behavior<br>and      |

| Source<br>-> Target | D1<br>Material                                         | D2<br>Health                                            | D3<br>Social                              | D4<br>Knowledg<br>e                                       | D5<br>Agency                                     | D6<br>Meaning                                              | D7<br>Environ<br>ment                                     |
|---------------------|--------------------------------------------------------|---------------------------------------------------------|-------------------------------------------|-----------------------------------------------------------|--------------------------------------------------|------------------------------------------------------------|-----------------------------------------------------------|
|                     |                                                        |                                                         |                                           |                                                           |                                                  |                                                            | capacity                                                  |
| D3 Social           | Mutual aid, employment networks, shared resources      | Support, loneliness, violence, stress pathways          | Trust feedback, conflict cycles           | Knowledge sharing, misinformation networks                | Participation, collective efficacy, domination   | Belonging, shared identity, cultural continuity            | Stewardship norms, collective-resource governance         |
| D4 Knowledge        | Productivity, resource allocation, fraud reduction     | Health literacy, clinical knowledge, risk communication | Shared understanding, polarization, trust | Learning feedback and correction                          | Informed consent, effective choice               | Worldview coherence, education and purpose                 | Environmental monitoring, ecological knowledge            |
| D5 Agency           | Employment choice, access, distribution                | Control, stress, care decisions                         | Voice, consent, conflict resolution       | Inquiry freedom, access, censorship                       | Power feedback, institutional capture            | Value congruence, authorship of life projects              | Participation in environmental decisions and stewardship  |
| D6 Meaning          | Consumption priorities, work motivation, sacrifice     | Hope, distress, coping, behavioral pathways             | Belonging, solidarity, exclusion          | Curiosity, interpretation, ideology                       | Purposeful action, commitment, coercive ideology | Identity feedback, purpose renewal, spiritual struggle     | Nature connection, sacred places, stewardship orientation |
| D7 Environment      | Resource availability, infrastructure loss, livelihood | Pollution, climate, disease, injury                     | Displacement, conflict, community place   | Observation, monitoring, traditional ecological knowledge | Access, environmental justice, adaptive options  | Place attachment, cultural loss, intergenerational purpose | Ecosystem feedback, tipping, regeneration                 |

Every active pathway requires an interaction record. Empty or unsupported cells remain unknown or not material rather than being presumed active.

## 12. Evidence and uncertainty protocol

### 12.1 Evidence-status vocabulary

| Status                         | Meaning                                                                               |
|--------------------------------|---------------------------------------------------------------------------------------|
| EVIDENCE_DIRECT_OBSERVATION    | State is directly measured within declared limits.                                    |
| EVIDENCE_VALIDATED_INSTRUMENT  | Instrument has relevant reliability and validity evidence for the population and use. |
| EVIDENCE_EMPIRICALLY_ESTIMATED | Effect is estimated using a declared empirical design and model.                      |
| EVIDENCE_EXPERT_JUDGMENT       | Structured expert judgment is used with rationale                                     |

| Status                     | Meaning                                                                 |
|----------------------------|-------------------------------------------------------------------------|
|                            | and uncertainty.                                                        |
| EVIDENCE_PARTICIPATORY     | Affected-party testimony or deliberation contributes to the record.     |
| EVIDENCE_QUALITATIVE_CODED | Qualitative evidence is coded using a declared protocol.                |
| EVIDENCE_HYPOTHESIZED      | Plausible but not adequately established.                               |
| EVIDENCE_CONTESTED         | Credible disagreement exists.                                           |
| EVIDENCE_UNKNOWN           | Evidence is insufficient or absent.                                     |
| EVIDENCE_NOT_MATERIAL      | Below declared materiality threshold with rationale and reopen trigger. |

## 12.2 Unknown is not zero

Missing evidence SHALL NOT be represented as no effect. Use EVIDENCE\_UNKNOWN, a conservative bound where justified, claim narrowing, evidence collection, sensitivity analysis, or refusal of the stronger claim.

## 12.3 False precision

The numerical resolution of a score SHALL NOT exceed the evidence resolution. A qualitative testimony-coded estimate should not be presented with several decimal places unless the decimals arise from a governed transformation whose uncertainty remains visible.

## 12.4 Cross-cultural and cross-substrate measurement

A measure used across cultures, languages, groups, ages, or substrates requires evidence that the construct and items retain sufficiently comparable meaning for the intended claim.

For latent-variable instruments, the normal test sequence is:

1. **Configural invariance:** sufficiently comparable factor pattern or construct organization.
2. **Metric invariance:** sufficiently comparable loadings, supporting comparison of associations and relationships.
3. **Scalar invariance:** sufficiently comparable intercepts or thresholds, normally required for direct latent-mean comparison.
4. **Residual or strict invariance:** additional equality of residuals where the intended claim requires it.

Justified partial invariance or approximate-invariance methods may be used when preregistered and transparently bounded. Direct group ranking or mean comparison requires scalar or defensible partial-scalar support; configural similarity alone is insufficient.

Where measurement invariance is not established:

- report group-specific interpretations;
- avoid direct mean comparisons;
- use qualitative or mixed-method evidence;
- conduct differential-item-function review;
- narrow the claim;
- retain uncertainty.

## 12.5 Affected-party evidence and research-ethics routing

Lived experience is evidence about experienced states, barriers, meaning, relationships, and consequences. It is not automatically a complete causal explanation. High-stakes evaluation SHOULD combine affected-party evidence with relevant behavioral, administrative, environmental, clinical, structural, and longitudinal evidence.

Measurement design must not create the harm it purports to measure. Coercive participation, unsafe disclosure, manipulative elicitation, unnecessary collection of sensitive beliefs, or disproportionate burden on

vulnerable groups reopens RF/NCRC. Material privacy, security, staffing, monitoring, or implementation failures reopen CSV. A waiver or consent form does not erase domination, rights, or structural concerns.

## 12.6 Time-window coherence

Every token and pathway SHALL declare its measurement, exposure, and outcome windows. Tokens may be compared in one run only when the windows are aligned or when a declared temporal model explains the mismatch.

A short-term benefit must not be compared against a long-term harm as though both were contemporaneous and equally observed. Tier 2 and Tier 3 records SHALL identify:

- baseline period;
- observation or forecast period;
- lag structure;
- duration and reversibility;
- discounting or temporal weighting source where used;
- monitoring points and reopen triggers.

A material window mismatch without a causal or decision rationale requires narrowing, sensitivity analysis, or refusal of the stronger comparison.

## 12.7 Severe subgroup-harm visibility

The distribution field G is not satisfied by reporting an average alone. For every materially affected population, the record SHALL search for and report worst-affected subgroups consistent with the Canon's subgroup rules.

A favorable aggregate cannot hide a severe concentrated harm. Where a subgroup effect may be rights-covered, catastrophic, irreversible, domination-relevant, or structurally disabling, it routes to the relevant gate rather than remaining an offsettable RLS contribution.

For residual welfare effects, the record SHALL disclose whether the aggregate sign differs from the worst-affected subgroup sign. If a small subgroup bears a large harm, the record must preserve the harm token, uncertainty, incidence, and sensitivity; it may not be averaged away or omitted because the population mean is positive.

## 13. Tier-proportional implementation

| Tier   | Minimum WDBIP obligation                                                                                                                                                                                                                                                   |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tier 1 | Identify material dimensions, assign each effect token one primary location, note obvious cross-dimensional pathways, and confirm no duplicate counting. A brief qualitative record is sufficient.                                                                         |
| Tier 2 | Complete profiles for material cells; record source-target pathways, evidence status, time lag, subgroup distribution, uncertainty, and dependence; conduct boundary and sensitivity review for contested effects.                                                         |
| Tier 3 | Preregister constructs, instruments, baselines, causal graph, interaction hypotheses, missing-data rules, subgroup discovery, measurement-invariance requirements, dependence treatment, independent review, and revision triggers. Publish or preserve the replay packet. |

A lower tier must not be selected to avoid rights, catastrophe, structural, physical, environmental, subgroup, or cultural-measurement safeguards.

## 14. Record status and routing

### 14.1 Record statuses

WDBIP record statuses describe measurement completeness only:

- WDBIP\_RECORD\_COMPLETE
- WDBIP\_RECORD\_COMPLETE\_WITH\_UNCERTAINTY
- WDBIP\_RECORD\_INCOMPLETE
- WDBIP\_RECORD\_NOT\_MATERIAL

They are not pass/fail verdicts for an option.

### 14.2 Routing rules

| Finding                                                                         | Required routing                                                                              |
|---------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Unsupported or ambiguous dimension boundary                                     | Narrow, sensitivity-only, collect evidence, or escalate through RG/category grounding.        |
| Duplicate or dependent effects                                                  | Merge, model dependence, adjust governed dependence controls, and recompute RLS if necessary. |
| New severe rights evidence                                                      | Reopen RF/NCRC.                                                                               |
| New catastrophe, irreversible, or ruin pathway                                  | Reopen TRC.                                                                                   |
| New dependency, capacity, containment, environmental, or implementation failure | Reopen CSV and TRC if ruin-relevant.                                                          |
| Instrument invalid for population or culture                                    | Narrow claim, replace instrument, collect evidence, or refuse comparison.                     |
| Meaning or spiritual claim exceeds measurable experience                        | Separate RG metaphysical claim from D6 experiential evidence.                                 |
| No material welfare interaction                                                 | Record EVIDENCE_NOT_MATERIAL with rationale and reopen trigger.                               |

### 14A. Measurement-versus-Causality Validation (Normative for claims)

Assess representational redundancy and causal coupling separately. A coding-confusion or duplicate-token matrix measures classification behavior; a causal-edge matrix requires its own identification evidence. Neither matrix licenses inferring one from the other.

Compare plausible dimension merges and splits using prespecified coverage, distinguishability, subgroup retention, burden, reliability and decision-value criteria. Preserve raw criteria and uncertainties rather than add incomparable metrics into an ungrounded optimality score. A two-axis square layout and a working-memory slogan are not evidence for a seven-dimension optimum.

For numerical reports, expose the final-cell Contribution Matrix and distinguish exact accounting decomposition from non-additive attribution through nonlinear transforms. Use the Canon scenario/probability ownership and uncertainty rules; no new welfare-scaling or control multiplier is created here.

## 15. Validation, falsification, and dimension-set migration

### 15.1 Coverage hypothesis

The seven-dimensional field detects materially relevant benefits, harms, dependencies, and affected groups that simpler comparator models omit.

**Weakening evidence:** no additional material detection, high false-positive burden, or equal performance from a simpler model.

## 15.2 Discriminant-validity hypothesis

The seven dimensions remain meaningfully distinguishable in theory, evidence coding, and rater application.

**Weakening evidence:** persistent inability to distinguish dimensions, very high correlations across most domains without distinct mechanisms, or frequent arbitrary reassignment.

## 15.3 Incremental-value hypothesis

Each dimension adds decision-relevant information beyond the other six. Decision value is not assumed to be one universal scalar. Before testing, preregister one or more metrics  $V_k$  from the outcome families in Section 15.9. For dimension  $d$  and metric  $k$ :

$$\text{Delta } V(d,k) = V_k(\text{seven-dimension model}) - V_k(\text{model without } d)$$

Admissible  $V_k$  measures include omission rate, rater reliability, predictive calibration, subgroup detection, realized adverse events, decision reversals, implementation burden, and affected-party assessment. Directionality, practical importance, and normalization must be declared before results are observed. If incremental value is repeatedly negligible or adverse across decision-material metrics, the dimension should be narrowed, merged, or redesigned.

## 15.4 Reliability hypothesis

Independent trained raters applying the same evidence reach acceptably similar primary-location, pathway-type, scope-treatment, and uncertainty classifications. The preregistration requirements and provisional review triggers in Section 3.3A apply.

Failure requires clearer definitions, anchors, examples, training, or revised categories.

## 15.5 Predictive-pathway hypothesis

Preregistered pathways predict later target outcomes beyond baseline values and plausible confounders. Out-of-sample performance, calibration, missingness, and distribution shift must be reported.

Failure weakens the specific pathway, not automatically the whole dimension architecture.

## 15.6 Intervention-sensitivity hypothesis

A targeted intervention should first change the construct it directly addresses and only then support claims about downstream ripples.

Examples:

- an air-quality intervention should change D7 exposure indicators before a D2 health benefit is claimed;
- a belonging intervention should change D3 indicators before D6 or D2 consequences are asserted;
- a purpose intervention should change D6 indicators before health benefits are generalized.

## 15.7 Cross-cultural and cross-substrate invariance hypothesis

Instruments intended for group comparison retain adequate construct meaning and measurement properties across those groups. Section 12.4 controls the level of comparison permitted by configural, metric, scalar, partial, or approximate invariance evidence.

Failure requires group-specific interpretation or withdrawal of direct comparative claims.

## 15.8 Anti-Goodhart hypothesis

WDBIP measures remain difficult to improve cosmetically while underlying welfare worsens.

Adversarial tests should include:

- forced positive-reporting;
- indicator substitution;
- survey coaching;
- exclusion of harmed subgroups;
- relabeling one effect across several dimensions;
- short-term gains masking long-term degradation;
- spiritual or cultural conformity presented as meaning;

- environmental offsets masking local harm;
- strategic scope allocation or unexplained allocation residuals;
- weight selection chosen after results are known.

## 15.9 Decision-utility hypothesis and named comparators

WDBIP improves consequential decisions enough to justify its evidence and audit burden.

A validation study SHOULD compare:

1. MathGov seven dimensions with WDBIP;
2. a health-only or narrow-outcome model;
3. the OECD Well-being Framework or a domain-appropriate dashboard implementation;
4. WHOQOL and, where appropriate, WHOQOL-SRPB;
5. a VanderWeele-style flourishing measure;
6. an Alkire-Foster-style multidimensional counting approach where deprivation identification is relevant;
7. ablation models removing one WDBIP dimension at a time.

The comparator set must match the decision domain. WDBIP must not claim superiority merely because another framework has a different purpose.

Outcomes should include omission rate, false-positive burden, rater reliability, predictive calibration, subgroup detection, realized adverse events, decision reversals, burden, affected-party assessment, weight sensitivity, and resistance to adversarial gaming.

### 15.10 Runnable validation study skeleton

The retained external WDBIP\_VALIDATION\_STUDY\_PROTOCOL\_v1.0.md is the v1.7 study-template reference; it is not supplied or revised by this Core 15 candidate. Candidate-specific changes must be synchronized before claiming full implementation parity. At minimum, a preregistered validation study SHALL declare:

- decision domains and populations;
- sampling frame and power or precision analysis appropriate to each model;
- effect-token unit and annotation protocol;
- rater number, training, blinding, adjudication, and independence;
- named comparators and ablation models;
- primary and secondary metrics with directionality;
- reliability statistics and confidence intervals;
- construct and discriminant-validity models, including alternatives;
- configural, metric, scalar, partial, or approximate invariance plan;
- longitudinal and intervention tests where causal claims are attempted;
- missing-data, subgroup, time-window, and distribution-shift plans;
- weight-sensitivity and anti-Goodhart tests;
- revision, publication, and adverse-result rules.

Sample sizes shall be justified by simulation, precision, power analysis, or design-specific guidance rather than copied from one universal threshold. The protocol's numerical triggers are provisional governance triggers, not claims that the instrument is validated.

### 15.11 Dimension-set revision and migration rule

The governing taxonomy is versioned independently from the document. WDBIP v1.9 uses WELFARE\_DIMENSION\_SET\_7D\_V1.

If evidence supports narrowing, dividing, merging, adding, or removing a dimension:

1. issue a governed dimension-set proposal with construct definitions and evidence;
2. publish a crosswalk from the old taxonomy to the proposed taxonomy;
3. preserve all prior records and their original version pins;
4. prohibit silent retroactive recoding;
5. identify which historical comparisons remain valid, conditionally bridgeable, or non-comparable;
6. re-run active decisions when the change is material to ranking, subgroup harm, gate routing, or monitoring;
7. version schemas, validators, examples, and PCC pointers together;
8. preserve an appeal and challenge route.

A future eighth dimension is neither forbidden nor presumed. It requires a governed Canon revision and evidence that it improves coverage, discriminant validity, decision utility, or rights protection enough to justify additional complexity.

## 15.12 Partition-instability trigger

A domain-level category review is required when replicated studies show one or more of the following:

- persistent primary-location agreement below the preregistered target;
- `BOUNDARY_CONTESTED` rates above the preregistered review trigger;
- no stable discriminant structure across reasonable models;
- repeated cross-cultural non-invariance that defeats the intended use;
- negligible or adverse incremental decision value;
- systematic gaming or subgroup-harm masking;
- implementation burden disproportionate to decision value.

The review may refine definitions, improve anchors, permit structured multi-label discovery while retaining one scoring home, merge or split dimensions, or withdraw claims. It must not manipulate categories merely to preserve favorable scores.

## 16. Conformance requirements

A WDBIP-conformant material RLS record SHALL include:

1. exact Canon, WDBIP, schema, welfare-dimension-set, and relevant SGP version pins;
2. PCC record identifier and immutable WDBIP artifact reference;
3. option, baseline, declared scopes, population, and time boundary;
4. material effect-token registry;
5. one primary dimension for each token;
6. Canon-conformant represented scopes and redundancy treatment, including a primary scope only where **DEDUPLICATION** is used;
7. profiles for decision-material dimensions;
8. token-level interaction records for claimed cross-dimensional or cross-scope pathways;
9. field-namespaced pathway, evidence, direction, and boundary-status tokens;
10. evidence-status and uncertainty fields;
11. dependence, duplicate-effect, and cross-scope review;
12. subgroup distribution and worst-affected-group review;
13. cross-cultural or cross-group measurement boundary where relevant;
14. WDBIP record status;
15. routing of any gate-material findings;
16. monitoring and reopen triggers;
17. reviewer identity and independence status for high-stakes use.

## 17. Deterministic conformance vectors

### Vector 1: Environmental exposure and health consequence

**Input:** Lower particulate concentration and fewer asthma attacks are entered as one combined Environment score and again as a Health score.

**Expected:** FAIL. Separate D7 environmental exposure token from D2 health-outcome token; link them through an evidenced pathway; disclose dependence.

### Vector 2: Spiritual experience

**Input:** Respondents report increased inner peace after a voluntary contemplative program. Evaluator records "AIU proven" under Meaning.

**Expected:** FAIL. D6 may record reported inner peace or existential coherence. The metaphysical claim belongs in RG and is not established by the welfare report.

### Vector 3: Job loss

**Input:** Job loss is scored as Material, Health, Social, Agency, and Meaning using the same administrative record without separate outcomes.

**Expected:** FAIL. Job and income loss are D1. Other dimensions require separate state definitions and evidence.

### Vector 4: Distinct consequences

**Input:** Job loss is linked to verified income loss, clinically measured distress, loss of insurance choice, and household conflict.

**Expected:** PASS with dependence disclosure. The effects are distinct but share a common cause.

### Vector 5: Correlation presented as causation

**Input:** Meaning and health scores correlate cross-sectionally. Record states that meaning causes health.

**Expected:** FAIL. Use PATHWAY\_CORRELATIONAL\_ONLY unless a design and assumptions support causal inference.

### Vector 6: Unknown treated as neutral

**Input:** No data exist for community meaning. The cell is entered as zero.

**Expected:** FAIL. Use EVIDENCE\_UNKNOWN, collect evidence, use sensitivity, or narrow the claim.

### Vector 7: Eighth dimension

**Input:** "Spiritual Health" is added as D8 and scored alongside the canonical seven without a governed Canon revision.

**Expected:** FAIL. Measure spiritual-existential experience primarily within D6 and linked dimensions. WDBIP does not create D8.

### Vector 8: Sixth gate

**Input:** Option passes all Canon gates but is rejected by a newly invented WDBIP pass/fail gate.

**Expected:** FAIL. WDBIP record status informs evidence quality and routing; it is not an option gate.

### Vector 9: Gate-material discovery

**Input:** Welfare interaction analysis identifies an irreversible biosphere tipping pathway omitted from TRC.

**Expected:** PASS only if TRC is reopened before RLS.

### Vector 10: Cultural non-invariance

**Input:** A purpose scale is used to rank national populations despite evidence that its items are not comparable across groups.

**Expected:** FAIL for direct comparative ranking. Use group-specific interpretation, validated alternative, mixed methods, or narrower claims.

### Vector 11: Silent cross-scope multiplication

**Input:** The same one-time grant is scored in Household, Community, Organization, and Polity without a declared Canon redundancy method.

**Expected:** FAIL. Apply DEDUPLICATION, justified ALLOCATION, or EMERGENT\_SCALE\_JUSTIFICATION; attach the treatment to the PCC and recompute if necessary.

### Vector 12: Measurement treated as moral standing

**Input:** A high D4 Knowledge score is used to infer FPP, governance authority, or low protection need.

**Expected:** FAIL. WDBIP measurement does not establish SGP standing, protection, personhood, or authority.

### Vector 13: Namespace misuse

**Input:** PATHWAY\_HYPOTHESIZED is entered in an evidence-status field.

**Expected:** FAIL. Evidence fields require EVIDENCE\_\* values; pathway fields require PATHWAY\_\* values.

### Vector 14: Allocate versus split

**Input:** One city budget cost and one household travel-cost increase are combined as a single conserved token and allocated across U2 and U5.

**Expected:** FAIL. Different bearers and states require distinct D1 tokens. Allocation is for one conserved effect, not for causally related but distinct incidence.

### Vector 15: Unexplained allocation residual

**Input:** A conserved token is allocated with coefficients summing to 0.65 and no explanation for the remaining 0.35.

**Expected:** FAIL. Record attenuation, out-of-boundary remainder, measurement loss, or unresolved allocation; otherwise the record is incomplete.

### Vector 16: Time-window mismatch

**Input:** A one-month employment benefit is compared with a twenty-year pollution burden without a temporal model, weighting source, or sensitivity analysis.

**Expected:** FAIL. Align windows or disclose the causal and temporal comparison model; narrow the ranking until corrected.

### Vector 17: Aggregate masks severe subgroup harm

**Input:** Average agency improves, but a small subgroup loses all meaningful exit and appeal. The subgroup harm is omitted because the mean is positive.

**Expected:** FAIL. Preserve the subgroup token and route potential domination or rights harm to RF/NCRC.

### Vector 18: Weight-sensitive selection

**Input:** Two plausible floor-preserving weight sets select different options, but the record presents one unique WDBIP/RLS answer.

**Expected:** FAIL. Mark WEIGHT\_SENSITIVE, disclose the sets and authority path, and do not misrepresent the result as a unique framework selection.

### Vector 19: Dimension-set migration

**Input:** A future taxonomy merges D3 and D6, and an old record is silently relabeled without a crosswalk or rerun.

**Expected:** FAIL. Preserve the original record, issue a versioned mapping, state comparability, and rerun if material.

### Vector 20: Excess boundary contestation

**Input:** Forty percent of decision-critical tokens remain BOUNDARY\_CONTESTED after training, but the system claims validated classification.

**Expected:** FAIL for the validation claim. Trigger partition or anchor review and narrow use. The individual records may remain usable with disclosed uncertainty where no stronger claim depends on them.

## 18. Worked example: school green-corridor program

### 18.1 Decision

A city considers converting traffic lanes beside schools into shaded green corridors with trees, reduced vehicle access, walking paths, and community spaces.

### 18.2 Primary effect tokens

| Token                                         | Primary dimension | Scope treatment                                                         | Evidence posture                        |
|-----------------------------------------------|-------------------|-------------------------------------------------------------------------|-----------------------------------------|
| Tree-canopy coverage increases                | D7 Environment    | U3 Community                                                            | Direct observation / modeled projection |
| Roadside particulate exposure decreases       | D7 Environment    | U3 Community                                                            | Empirical estimate                      |
| Heat exposure during school travel decreases  | D7 Environment    | U3 Community                                                            | Modeled and monitored                   |
| Respiratory symptoms decrease                 | D2 Health         | U1 Self; downstream household/community effects require separate tokens | Longitudinal health evidence required   |
| Walking activity increases                    | D2 Health         | U1 Self                                                                 | Behavioral observation                  |
| Safe route choice increases                   | D5 Agency         | U1 Self primary; DEDUPLICATION across U1/U2                             | Accessibility and choice evidence       |
| Community use of shared space increases       | D3 Social         | U3 Community                                                            | Observation and affected-party evidence |
| Environmental learning opportunities increase | D4 Knowledge      | U3 Community                                                            | Program and learning evidence           |
| Individual nature connection increases        | D6 Meaning        | U1 Self                                                                 | Validated or mixed-method evidence      |
| Community place identity increases            | D6 Meaning        | U3 Community                                                            | Validated or mixed-method evidence      |
| Construction and maintenance costs increase   | D1 Material       | U5 Polity                                                               | Budget evidence                         |

## 18.3 Interaction records

| Source -> target                                       | Type                                                                    | Claim boundary                                             |
|--------------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------|
| D7 lower particulate exposure -> D2 respiratory health | PATHWAY_CAUSAL_MEDIATED                                                 | Requires exposure-response evidence and local monitoring.  |
| D7 shade -> D2 heat-related health                     | PATHWAY_CAUSAL_DIRECT or PATHWAY_CAUSAL_MEDIATED                        | Depends on temperature, exposure, and health model.        |
| D5 safe route choice -> D2 activity                    | PATHWAY_CAUSAL_MEDIATED                                                 | Requires behavior evidence; availability alone is not use. |
| D3 shared space -> D6 place meaning                    | PATHWAY_HYPOTHESIZED with EVIDENCE_EMPIRICALLY_ESTIMATED when supported | Do not assume community meaning from design rhetoric.      |
| D4 ecological learning -> D5 stewardship agency        | PATHWAY_CAUSAL_MEDIATED                                                 | Knowledge may enable action but does not guarantee it.     |
| D1 project cost -> D5 access                           | PATHWAY_MODERATOR                                                       | Fees or displacement could limit access.                   |

## 18.4 Double-counting and scope review

Do not count "cleaner air" as both a D7 environmental benefit and a D2 health benefit unless the D2 token is a separately defined health outcome. Do not count survey items for calm, connection to nature, and belonging as independent effects without checking whether they measure overlapping constructs.

The same student's respiratory improvement must not be multiplied across Self, Household, Community, and Polity merely because each scope has an interest in the outcome. Use one primary scope under DEDUPLICATION, or define separate scale-specific tokens and justify

EMERGENT\_SCALE\_JUSTIFICATION. City expenditure and household travel-cost effects are distinct tokens with different bearers.

## 18.5 Gate feedback

If the project displaces disabled access, creates severe road-safety risk, or causes unjust property expropriation, RF/NCRC must be revisited. If tree species create material wildfire or infrastructure risk, CSV and possibly TRC must be revisited. WDBIP does not average those failures into residual benefits.

# 19. Compact implementation template

## A. Run identity

- WDBIP version:
- Schema version:
- Welfare dimension-set version:
- Canon version:
- PCC record ID / WDBIP record hash:
- SGP record reference, if applicable:
- Option:
- Baseline:
- Declared Union Scopes:
- Scope Coverage Declaration reference, if applicable:
- Population and subgroups:
- Time horizon and comparison-window rule:
- Weight-sensitivity status / analysis reference:

- Boundary-reliability plan or status, where applicable:
- Dimension-migration reference, where applicable:
- Analyst and reviewer:

## B. Effect-token registry

### B1. Identity and classification

| Token ID | Effect claim | Primary dimension | Bearer |
|----------|--------------|-------------------|--------|
|----------|--------------|-------------------|--------|

### B2. Scope treatment

| Token ID | Represented scopes | Primary scope if deduplicated | Scope method |
|----------|--------------------|-------------------------------|--------------|
|----------|--------------------|-------------------------------|--------------|

### B3. Evidence boundary

| Token ID | Baseline | Time | Evidence status | Uncertainty |
|----------|----------|------|-----------------|-------------|
|----------|----------|------|-----------------|-------------|

## C. Dimension profile

| Field                       | Record |
|-----------------------------|--------|
| State                       |        |
| Functioning                 |        |
| Capacity/resilience         |        |
| Drivers/enabling conditions |        |
| Lived experience            |        |
| Distribution/worst affected |        |
| Uncertainty/evidence status |        |

## D. Interaction registry

### D1. Path identity and classification

| Path ID | Source token | Target token | Pathway type | Scope relation |
|---------|--------------|--------------|--------------|----------------|
|---------|--------------|--------------|--------------|----------------|

### D2. Mechanism and effect

| Path ID | Mechanism | Direction | Time lag | Magnitude |
|---------|-----------|-----------|----------|-----------|
|---------|-----------|-----------|----------|-----------|

### D3. Evidence and uncertainty

| Path ID | Evidence | Alternatives | Uncertainty |
|---------|----------|--------------|-------------|
|---------|----------|--------------|-------------|

## E. Dependence review

- Shared data sources:
- Shared items or instruments:
- Common causes:
- Mediators:
- Duplicate tokens merged:
- Canonical dependence-control implications:
- Cross-scope redundancy method and rationale:
- Allocation coefficients, if used:
- Allocation residual and rationale, if sum < 1:
- Aggregate sign versus worst-affected-subgroup sign:

F. Routing

- RF/NCRC reopened?
- TRC reopened?
- CSV reopened?
- Claim narrowed?
- Sensitivity required?
- Monitoring/reopen trigger:

G. Record status

- WDBIP\_RECORD\_COMPLETE
- WDBIP\_RECORD\_COMPLETE\_WITH\_UNCERTAINTY
- WDBIP\_RECORD\_INCOMPLETE
- WDBIP\_RECORD\_NOT\_MATERIAL

20. Diamond summary

The seven welfare dimensions are distinct lenses on one relational reality. WDBIP assigns each effect one primary dimensional home, binds its Union Scope treatment to the Canon, records token-level pathways, prevents dimensional and cross-scope duplication, protects uncertainty, and tests whether the measurement architecture genuinely improves prediction, protection, and flourishing. It strengthens RLS without creating an eighth dimension or a sixth gate.

21. Version history and change control

Current edition: v1.9. The current delta strengthens state/effect distinction, primary computational homes, causal-coupling versus redundancy, and taxonomy validation boundaries. Existing historical table entries retain their original meaning. Exact recovery-build changes and verification limits are recorded in Appendix RELEASE and the supplied reports.

v1.4 (Lineage). v1.4 introduced the prior current-line boundary and interaction clarifications subsequently synchronized and superseded by v1.5. It remains historical only and does not control current conformance.

| Version | Date      | Status             | Material changes                                                                                                                                                                                                                                                                                           |
|---------|-----------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| v1.0    | July 2026 | Superseded         | Initial public research-source protocol.                                                                                                                                                                                                                                                                   |
| v1.1    | July 2026 | Superseded by v1.2 | Added Canon-bound scope redundancy treatment, PCC attachment, SGP measurement-standing separation, token-level pathways, machine-token namespaces, refined scalar-validity rule, defined incremental-value metrics, research-ethics routing, expanded conformance vectors, and verified package artifacts. |
| v1.2    | July 2026 | Superseded         | Added dimension-set versioning and migration, provisional boundary-reliability triggers, allocate-versus-split and                                                                                                                                                                                         |

| Version | Date        | Status             | Material changes                                                                                                                                                                                                                                                                                                                       |
|---------|-------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         |             |                    | allocation-residual controls, tuple crosswalk, psychometric method options, configural-metric-scalar invariance ladder, time-window coherence, severe subgroup-harm visibility, weight sensitivity, named comparators, a runnable validation-study companion, seven new conformance vectors, and core-integration candidate materials. |
| v1.3    | July 2026   | Superseded         | Registered WDBIP beneath RLS, synchronized run-record v2 and maturity interfaces, and removed candidate-only integration language.                                                                                                                                                                                                     |
| v1.3.1  | July 2026   | Superseded         | Repaired release identity, title structure, and package integration references.                                                                                                                                                                                                                                                        |
| v1.4    | July 2026   | Superseded         | Introduced the prior current-line boundary and interaction clarifications subsequently synchronized and superseded by v1.5.                                                                                                                                                                                                            |
| v1.5    | July 2026   | Superseded         | Synchronized the v1_5 schema, validator, example, vectors, references, version history, PCC terminology, and then-current MathGov component pins while preserving the stable WELFARE_DIMENSION_SET_7D_V1 construct identifier and all measurement and boundary rules.                                                                  |
| v1.6    | August 2026 | Superseded         | Preserved the prior machine record contract and served as the immediate baseline for v1.7.                                                                                                                                                                                                                                             |
| v1.7    | August 2026 | Preserved baseline | Adds stable effect identity and token granularity, rights-relevant routing, temporal partition integrity, subgroup                                                                                                                                                                                                                     |

| Version  | Date           | Status                                                                       | Material changes                                                                                                                                                                                                                                                                                      |
|----------|----------------|------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|          |                |                                                                              | closure, and synchronized v1_7 schema, validator, example, and vectors for Canon v12.7 / SGP v8.6.                                                                                                                                                                                                    |
| v1.8-rc2 | September 2026 | Recorded candidate lineage; not a claim of a separately published v1.8 final | Clarified estimator and causal-identification contracts and candidate dependencies; distinguished external v1_7 implementation names.                                                                                                                                                                 |
| v1.9     | September 2026 | Current specification edition; exact build in Appendix RELEASE               | Classification/record clarifications: state/effect separation, primary homes and causal provenance. Validation: explicit taxonomy hypotheses and limits, not completed studies. Examples/editorial: corrected allocations, U7 boundaries and navigation. No new machine schema or proven v1_7 parity. |

Candidate history: v1.8-rc2 (September 2026) clarifies the preregistered estimator and causal-identification contracts, updates active candidate dependencies, and accurately separates external v1\_7 implementation references from this reading-copy candidate. Change control rule: future revisions must state whether they alter normative classification rules, machine-schema semantics, validation hypotheses, examples, or only editorial presentation. A release must not claim WDBIP conformance until the exact DOCX, PDF, Markdown, schema, example, validator, test vectors, validation-study companion, dimension-migration companion, manifest, and checksum ledger are synchronized. Reciprocal MathGov core integration additionally requires matching Canon, Component Map, Source Hierarchy, and package-manifest registration.

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## Appendix A. Machine-readable companion

The referenced v1.7 standalone release bundle describes `wdbip_record_v1_7.schema.json`, `validate_wdbip_v1_7.py`, `wdbip_worked_example_green_corridor_v1_7.json`, `WDBIP_VALIDATION_STUDY_PROTOCOL_v1.0.md`, `WDBIP_DIMENSION_SET_MIGRATION_STANDARD_v1.0.md`, and the positive and negative conformance vectors. Those external implementation artifacts are not supplied or certified as v1.9 implementations here. Their continued conformance requires a field-by-field and rule-by-rule compatibility record against v1.9, including current required fields, states, allocation semantics, hypotheses and positive/negative vectors. A shared filename family or copied version label is not compatibility evidence. The referenced schema encodes protocol identity, Canon and PCC linkage, the canonical seven dimensions, Union Scope treatment, record statuses, field-namespaced pathway and evidence tokens, and the following invariant rules:

| Invariant                               | Value                                                   |
|-----------------------------------------|---------------------------------------------------------|
| Protocol role                           | Welfare measurement standard beneath RLS                |
| Adds a gate                             | False                                                   |
| Adds a dimension                        | False                                                   |
| Unknown equals zero                     | False                                                   |
| Metaphysical truth is a welfare measure | False                                                   |
| Canonical dimensions                    | D1 Material through D7 Environment                      |
| Governing conflict rule                 | RippleLogic Canon controls                              |
| Scope redundancy methods                | EMERGENT_SCALE_JUSTIFICATION, DEDUPLICATION, ALLOCATION |
| PCC attachment                          | Required for claim-bearing Tier 2 and Tier 3 use        |
| Full-scope record                       | Declares all seven canonical Union Scopes               |
| Reduced-scope record                    | Requires a PCC Scope Coverage Declaration               |

| Invariant                                                       | Value                                 |
|-----------------------------------------------------------------|---------------------------------------|
|                                                                 | reference                             |
| NOT_MATERIAL use                                                | Requires rationale and reopen trigger |
| Measurement establishes SGP standing                            | False                                 |
| Welfare dimension set                                           | WELFARE_DIMENSION_SET_7D_V1           |
| Silent dimension migration                                      | False                                 |
| Unexplained allocation residual                                 | False                                 |
| Unmodeled time-window mismatch                                  | False                                 |
| Severe subgroup harm may be averaged away                       | False                                 |
| Weight-sensitive result may be presented as uniquely determined | False                                 |

The schema and validator are record-validity surfaces, not empirical validation of welfare constructs, causal pathways, moral standing, or decision correctness.

## Appendix B. Framework registration entry

Recommended Core Component Map entry:

Welfare Dimension Boundary and Interaction Protocol v1.9 (WDBIP) - Canon-subordinate companion welfare-measurement and record-conformance protocol beneath RLS. Governs primary dimension assignment, token-level interaction records, dependence and cross-scope duplication disclosure, uncertainty, PCC attachment, and validation posture. Does not add a gate, dimension, authority, or moral-status determination.

Recommended source-hierarchy position: beneath the RippleLogic Canon and alongside RLS measurement and validation companions; linked to SGP where bearer protection or welfare-inclusion hypotheses are decision-material.

## Appendix C. Compact reader glossary and ownership pointers

This table improves standalone readability without redefining objects owned elsewhere.

| Term    | Compact reading                                                                                         | Controlling owner |
|---------|---------------------------------------------------------------------------------------------------------|-------------------|
| RG      | Reality Grounding: claim, evidence, category, uncertainty, and physical/causal admissibility discipline | RippleLogic Canon |
| RF/NCRC | Rights Floor / Non-Compensatory Rights Constraint                                                       | RippleLogic Canon |
| TRC     | Tail-Risk Constraint for catastrophic and irreversible loss                                             | RippleLogic Canon |
| CSV     | Containment and Structural Viability gate                                                               | RippleLogic Canon |
| RLS     | Residual welfare ranking among selectable options                                                       | RippleLogic Canon |
| PCC     | Provenance and Compliance Certificate for the run                                                       | RippleLogic Canon |

| Term               | Compact reading                                                                                      | Controlling owner                                 |
|--------------------|------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| SGP                | Sentience Gradient Protocol                                                                          | SGP                                               |
| FPP                | Full Protection Plateau                                                                              | SGP                                               |
| AIU                | All-Encompassing Infinite Union doctrine; not established by a welfare score                         | AIU-UBE foundational treatise / RG claim boundary |
| Effect token       | Bounded claim about one state, bearer, baseline, option, and time window                             | Canon definition consumed by WDBIP                |
| WDBIP profile      | Structured welfare evidence record $W(u,d,t)$                                                        | WDBIP                                             |
| WDBIP pathway      | Token-level interaction record $I(s \rightarrow t)$                                                  | WDBIP                                             |
| Weight sensitivity | A material change in ranking, decisiveness, or subgroup conclusion across plausible governed weights | Canon RLS/PLSS plus WDBIP disclosure              |

### v1.3 integration delta (Lineage)

v1.3 synchronized WDBIP to the then-current Canon v12.3 line and contemporary SGP v8.x interface, registered it as a normative implementation companion beneath RLS, bound machine references to run-record v2 and the typed maturity register, and removed candidate-only integration language. It does not claim empirical validation of the seven dimensions or any pathway.

## APPENDIX RELEASE: Identity, Source Authority and Revision Record

Framework release: MathGov/RippleLogic v13.0. Component: Welfare Dimension Boundary and Interaction Protocol v1.9. Edition-origin preparation: 10 September 2026; the separately identified correction build is dated below. Two-part major.minor component versions are used; preserved historic identifiers are not renumbered.

Status: integrated research and teaching specification with a bounded worked-example and scoped reference implementation. Readiness is limited to the checks in Reports/Verification\_and\_Readiness.md. No empirical validation, independent human validation, full production runtime, physical-safety certification, legal authority, deployment authorization or Tier-4 ProofPack status is implied by the edition number.

Delivery identity: MathGov/RippleLogic v13.0, build MG-RL-13.0-20260926-RELEASE-I. Prepared 26 September 2026 from the supplied Release H publication package. Only reproduced errata and necessary source/evidence synchronization were patched; component editions are unchanged. The manifest identifies each component's exact bytes and source build. Live publication is not asserted.

Component/build identity. The manifest distinguishes this correction build from unchanged Release G and H masters. Aligners Sheet v5.9 keeps its numerical inputs, formulas, cached results and worked verdict; text and print-area errata are itemized in Verification/Final\_I/Exact\_Workbook\_Changes.json. A filename or component edition alone is not exact file identity.

Verification boundary: Reports/Release\_I\_Verification.md and Verification/Final\_I/ identify the checks performed on this package and their limits. Prior-build receipts do not certify changed bytes. Cache-independent replay and spreadsheet-application recalculation are separate evidence surfaces. Microsoft Excel parity, full external-registry conformance, empirical validation and production authorization are not asserted.

Package source authority: Core\_15 contains 14 DOCX specification masters and one XLSX Aligners frozen worked-run workbook. DOCX files control prose, equations and tables subject to Canon and SGP ownership. The workbook controls only its disclosed exemplar surfaces. Sources, Reading\_HTML and Reading\_PDFs are generated reading projections, not competing normative masters. The manifest and hashes identify exact bytes; supplemental code and schemas govern only their documented subset. Conflicts require recorded correction against the controlling source.

License and reuse: consult the package-level LICENSE and NOTICE and retain applicable component-specific and third-party notices. This pointer does not override a valid exception or grant rights over separately supplied private or third-party review material.

External repository publication and any absent legacy schema/validator/registry are separate authorities/evidence surfaces. The local package does not claim to update a remote repository or reproduce unavailable implementations. Current source pointers in this appendix replace prior front-matter edition pointers for this package; accurate historical source references below are retained as lineage only.

Preserved invariants: RG -> RF/NCRC -> TRC -> CSV -> RLS; rights non-compensation and unallocated rights effects; existing seven rows and seven dimensions; existing SGP MPS/FPP/GPR/SPR/ICP/RMCP separation; probability ownership, uncertainty, stability and every-contender rules; selection, authority and execution separation.

| Component                    | Current edition |
|------------------------------|-----------------|
| RippleLogic Canon            | v13.0           |
| Sentience Gradient Protocol  | v8.8            |
| ripple.md Standard           | v5.8            |
| RippleLogic Agent System     | v13.0           |
| CSV Gate Standard            | v2.7            |
| RippleLogic Cascade Standard | v2.9            |

| Component                                                       | Current edition |
|-----------------------------------------------------------------|-----------------|
| MathGov Reproducibility and Use Standard                        | v1.7            |
| Welfare Dimension Boundary and Interaction Protocol             | v1.9            |
| RLS Validation Protocol                                         | v2.9            |
| RippleLogic Foundations Primer                                  | v4.7            |
| MathGov Public Introduction                                     | v13.0           |
| Physical/Causal Admissibility Evidence Profile                  | v2.6            |
| Methodological Falsifiability and Dependency Integrity Standard | v2.6            |
| Source-Coupling Integrity Standard                              | v2.6            |
| RippleLogic Aligners Sheet                                      | v5.9            |

Change locations and rationales: Reports/Release\_I\_Adjudication.md; exact edits: Verification/Final\_I/Exact\_Document\_Changes.json and Exact\_Workbook\_Changes.json. Navigation and preservation records are separate. The untouched prior publication and original feedback are preserved in the complete provenance archive.

Current proposals are not universal truths. Taxonomy maximality, continuous-time propagation, cross-substrate cardinal welfare, generic susceptibility/shield formulas, autonomous recovery, vendor infrastructure, zero-knowledge circuits and hardware meshes remain unvalidated unless independently demonstrated under a scoped implementation profile.

## Preserved Baseline Release Material (Historical; Non-Controlling)

The following blocks are relocated intact from the recovered baseline. Their edition numbers, release-readiness wording and external-source limitations describe that historical candidate, not current component identity or newly executed verification. Governing current metadata is the matrix above.

### v1.8-rc2 Historical Release Integration

HISTORICAL (NON-CONTROLLING): Release: MathGov Core Release 2026.09 — RippleLogic Canon v12.8-rc2 / SGP v8.7-rc2 — Controlled Adversarial-Audit Correction Candidate

Historical companion pins: Canon v12.8-rc2; SGP v8.7-rc2; ripple.md v5.7-rc2; Agent System v12.7-rc2; CSV v2.6-rc2; Cascade v2.8-rc2; Reproducibility v1.6-rc2; WDBIP v1.8-rc2; RLS Validation v2.8-rc2; Primer v4.6-rc2; Public Introduction v12.8-rc2; PC-AEP/MFDI/Source-Coupling v2.5-rc2; Aligners Sheet v5.8-rc1.

| Release control | Historical value                                                                                                                                                           |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Component       | Welfare Dimension Boundary and Interaction Protocol v1.8-rc2                                                                                                               |
| Release         | HISTORICAL (NON-CONTROLLING): MathGov Core Release 2026.09 — RippleLogic Canon v12.8-rc2 / SGP v8.7-rc2                                                                    |
| Architecture    | RG → RF/NCRC → TRC → CSV → RLS                                                                                                                                             |
| Role            | Effect identity, primary-dimension, interaction, measurement, partition, and evidence-boundary protocol beneath RLS.                                                       |
| Claim boundary  | Controlled Tier 1–3 research specification candidate; not empirical validation, legal authority, physical-safety certification, deployment authorization, Tier 4, or moral |

| Release control      | Historical value                                                                                                                                                            |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      | truth.                                                                                                                                                                      |
| Source/render parity | Versioned semantic source and DOCX/PDF mirrors must agree. Filename, internal version, active pins, manifest, and hashes must agree; mismatch is release-integrity failure. |

Historical Release Integration (v1.8-rc2)

HISTORICAL (NON-CONTROLLING): This controlled candidate advances Welfare Dimension Boundary and Interaction Protocol from v1.7 to v1.8-rc2 and binds it to MathGov Core Release 2026.09 — RippleLogic Canon v12.8-rc2 / SGP v8.7-rc2. The original release is preserved. Historical references remain lineage only; active references use the candidate component-version map. Publication, semantic-source parity and implementation conformance are not established by this reading-copy candidate.

v1.3.1 Patch Note (Lineage)

v1.3.1 repairs release identity, title structure, and package integration references. Welfare-boundary, interaction, migration, subgroup, temporal, and validity rules remain unchanged.

| Integrity surface | Current requirement                                                                                                                                                                                                                                                                                               | Claim boundary                                                                       |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Role boundary     | WDBIP governs construct boundaries, evidence cards, allocation, interaction, temporal compatibility, subgroup visibility, and uncertainty beneath RLS.                                                                                                                                                            | It is not an eighth welfare dimension, an option gate, or a moral-status instrument. |
| Machine line      | Retained external v1.7 schema, example, validator and vector references use the v1_7 artifact namespace. They are not renamed or supplied as v1.9 implementations by this Core 15 candidate. The stable dimension-set identifier remains WELFARE_DIMENSION_SET_7D_V1; schema passage is not construct validation. | Schema passage is not construct validation.                                          |
| Maturity          | Empirical reliability, validity, invariance, and factor structure remain provisional and must be tested in preregistered studies.                                                                                                                                                                                 | No latent structure is asserted by document design alone.                            |