

Fiscal Geometry in a Digitized Operating Environment

A Technical White Paper on Representation, Interfaces, and AI-Assisted Institutional Analysis

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Executive Summary

Digitized institutional environments generate unprecedented volumes of documentation—policy texts, budget reports, compliance manuals, disclosures, and audit narratives—yet most of this material remains difficult to analyze in a repeatable, auditable, and logically aligned way. The core limitation is not computational capacity, but representation.

This white paper presents **Fiscal Geometry (FG)** as a **technical interface layer** that renders narrative institutional artefacts into geometry-ready analytical objects prior to computation, scoring, or optimization. FG is designed to operate within digitized workflows and to support AI-assisted tools without delegating judgment, evaluation, or governance authority to automation.

The paper specifies:

- a minimal object model for institutional rendering,
- a representation grammar separating structure from interpretation,
- operating requirements for auditability and version control, and
- the precise role of AI as a downstream assistant contingent on structured inputs.

FG is not a decision system. It is a representational infrastructure that enables disciplined comparison and analysis under complex, text-heavy institutional conditions.

1. Problem Statement: Digitization Without Representation

Most contemporary institutional systems are digitized but not computable.

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1.1 Typical Inputs

- Long-form policy documents (PDF, HTML)
- Budget books and execution reports
- Compliance manuals and guidance notes
- Disclosure filings and audit narratives

These artefacts are optimized for **communication and accountability**, not for structured comparison or logical alignment across cases.

1.2 Typical Outputs (Without FG)

- Search and retrieval
- Summarization and paraphrase
- Thematic clustering
- Narrative comparison

These outputs are useful, but they do not support:

- repeatable cross-case alignment,
- auditable identification of procedural friction, or
- stable aggregation without re-interpretation.

1.3 The Representation Gap

The missing layer is a **representation discipline** that defines:

- what constitutes an analytical object,
- how objects relate procedurally, and
- how evidence remains traceable.

2. FG as a Technical Interface Layer

2.1 Definition of “Interface”

In this white paper, an interface is a **translation and coordination layer** that:

- does not replace upstream narrative interpretation,
- does not impose downstream evaluation,
- but stabilizes objects so computation becomes possible.

FG sits **between**:

- narrative interpretation (human, domain-specific), and
- computation or analytics (tool-assisted).

2.2 Design Principles

- **Additive:** integrates with existing workflows
 - **Non-normative:** no scoring by default
 - **Traceable:** every object anchored to source artefacts
 - **Auditable:** reproducible rendering rules
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3. Core Object Model (Minimal Viable)

FG requires a deliberately small set of analytical objects.

3.1 Event

A discrete institutional action that is:

- documentable,
- time-locatable,
- jurisdictionally or procedurally situated.

Examples:

- rule issuance
- budget appropriation
- reporting submission
- approval or authorization

3.2 Interface

A procedural gate where classification, validation, or transition occurs.

Examples:

- eligibility tests
- thresholds
- disclosure triggers
- approval stages
- audit checkpoints

Interfaces are where **institutional tension accumulates**.

4. Geometry-Ready Representation

Once events and interfaces are identified, FG renders four structural features.

4.1 Position

The state of an event relative to institutional coordinates (e.g., jurisdiction, category, program, tax status).

4.2 Movement

A transition across one or more interfaces.
Movement indicates **change of state**, not narrative change.

4.3 Density / Clustering

Reproducible aggregation of events in similar positions or paths.

4.4 Boundary Behavior

Activity concentrated near:

- thresholds,
- classification edges,
- reporting limits.

Boundary behavior often reveals strategic adaptation or structural friction.

5. Evidence Chain and Auditability

5.1 Evidence Chain Principle

Every rendered object must map to:

- a specific document,
- a paragraph, table, or clause,
- a publicly accessible source.

5.2 Why This Matters

- Enables third-party review
- Prevents interpretive drift
- Supports institutional trust

FG does not hide ambiguity; it **exposes it structurally**.

6. Separation of Representation and Evaluation

FG enforces a strict separation:

Layer	Function
Representation	Render objects and relations
Interpretation	Explain meaning and context
Evaluation	Score, rank, or judge (optional, downstream)

Optional protocols (e.g., SITI/SIDI) may operate **after** representation, but are not required for FG to function.

7. Operating Environment Requirements

FG operates effectively when the following conditions hold.

7.1 Minimal Technical Conditions

- Stable institutional artefacts
- Versionable rendering rules
- Controlled interface lexicon
- Persistent citation links

7.2 Version Control

- Event definitions
- Interface tags
- Rendering rules

All must be versioned to ensure reproducibility.

8. Human–AI Division of Labor

8.1 Human Responsibilities

- Define events and interfaces
- Validate rendering decisions
- Interpret structural patterns
- Maintain governance accountability

8.2 AI / Tool Responsibilities

- Retrieval over rendered objects
- Clustering and navigation
- Cross-case comparison
- Anomaly surfacing

8.3 Explicit Non-Delegation

AI systems:

- do not define objects,
- do not evaluate intent,
- do not assign normative meaning.

FG is **AI-compatible**, not AI-dependent.

9. Implementation Workflow (Template)

1. Ingest institutional artefacts
 2. Identify candidate events (human)
 3. Tag interfaces
 4. Render positions and movements
 5. Validate evidence chain
 6. Store rendered objects
 7. Apply tool-assisted analysis (optional)
-

10. Limitations

- Sensitive to input quality
- Requires disciplined tagging
- Does not infer causality
- Does not optimize outcomes

These are design boundaries, not deficiencies.

11. Conclusion: Representation as Infrastructure

Fiscal Geometry provides a technical interface that converts narrative institutional material into stable analytical objects. In digitized environments, this interface is the missing infrastructure that allows AI-assisted tools to function meaningfully without displacing human judgment or institutional governance.

Before computation, there must be representation.
Before automation, there must be structure.

FG exists to make that structure explicit.

Appendix A

A1. Core Object Schema (Logical Level)

A1.1 Event Object

```
Event {  
  event_id: string  
  event_type: enum  
  source_document: URI  
  source_location: string  
  jurisdiction: string  
  timestamp: date / period  
  description: text  
  tags: [string]}
```

Notes

- `event_id`: globally unique; hashable
- `event_type`: operational classification only, without value judgment (e.g., issuance, allocation, disclosure)
- `source_location`: page number, paragraph, or table reference
- `description`: intentionally low-interpretation, human-readable text

A1.2 Interface Object

```
Interface {  
  interface_id: string  
  interface_type: enum  
  rule_reference: URI  
  threshold_or_condition: text  
  jurisdiction: string  
  notes: text}
```

Key characteristics

- An interface is not an institution, but a point where rules take effect
- A single interface may be triggered repeatedly by multiple events

A1.3 Movement Object

```
Movement {  
  movement_id: string  
  event_id: string  
  from_interface: interface_id  
  to_interface: interface_id  
  axis_direction: enum (X / Y / mixed)  
  timestamp: date / period}
```

Notes

- Movement is the core analytical unit of Fiscal Geometry
- It records that a transition occurred, without explaining why

A1.4 Position Snapshot (Optional)

```
Position {  
  position_id: string  
  event_id: string  
  x_coordinate: category / code  
  y_coordinate: category / code  
  time_slice: date / period}
```

This layer is required only for geometric visualization or downstream analysis and is not mandatory.

A2. Evidence Chain Schema

A mandatory technical constraint of Fiscal Geometry is that all structural objects must be traceable back to original source texts.

```
EvidenceLink {  
  object_id: string  
  document_uri: URI  
  locator: string  
  version_hash: string  
}
```

Role of `version_hash`

- Prevents structural drift caused by source text updates
 - Supports ex post auditability and reproducibility
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A3. Separation Rules (Hard Constraints)

At the schema level, Fiscal Geometry enforces strict separation of the following:

Layer	Allowed
Value judgment	✗
Performance evaluation	✗
Causal inference	✗
Compliance / non-compliance conclusions	✗
Structural position	✓
Interface traversal	✓
Aggregation / density	✓

A4. Storage-Agnostic Design

The schema may be implemented in:

- relational databases
- graph databases
- document stores
- versioned flat files

Fiscal Geometry does not bind to a specific technology stack.
It binds only to logical constraints.

Appendix B

Applied Technical Examples

OECD / Family Office / Education Finance

This appendix provides **industry-facing exemplars** using purely technical demonstrations.
All examples are illustrative and do not reference or identify specific institutions.

B1. Cross-Border Tax Coordination

(OECD-type Operating Environment)

Rendered Events

- issuance of reporting standards
- filing submissions
- jurisdictional classifications

Interfaces

- residency determination
- disclosure thresholds
- information-exchange gateways

What Fiscal Geometry Renders Visible

- repeated compression of multi-jurisdictional reporting at the same interfaces
- path divergence produced by identical rules applied across different jurisdictions
- apparent formal consistency in compliance, alongside highly asymmetric movement densities

Technical Note

Fiscal Geometry does not assess whether tax avoidance occurs.
It renders **where structural accumulation and congestion take place**.

B2. Family Office / Intergenerational Structures

Rendered Events

- asset reclassification
- transfer into holding or intermediary vehicles
- philanthropic allocation

Interfaces

- valuation interfaces
- tax-recognition interfaces
- control versus ownership interfaces

Structural Output

- transformation of vertical pressure along the Y-axis
- into horizontal institutional displacement along the X-axis

AI-Assisted Boundary

This layer is naturally compatible with AI assistance:

- AI may compare movement patterns across cases
- AI cannot substitute for interface definition or validation

B3. Domestic Budget to Actual Execution

(Education Finance Context)

Rendered Events

- budget appropriation
- release of allocation formulas
- expenditure execution
- reporting submission

Interfaces

- eligibility rules
- matching requirements
- reporting classifications

Structural Insight

- the “budget–execution gap” is not a scalar value
- it manifests as recurring movement clusters at specific interfaces

This pattern is typically inaccessible to:

- narrative-only analysis
- single-indicator evaluation frameworks

B4. Why This Is AI-Compatible (but Not AI-Driven)

Across the three scenarios above:

Function	Human	AI
Define events	✗	
Define interfaces	✗	
Interpret structure	✗	
Path comparison		✓
Clustering		✓
Anomaly surfacing		✓

Role of Fiscal Geometry

Fiscal Geometry provides a constrained input space in which AI tools can operate without fabricating interpretation.

Final Technical Note

The relevance of Fiscal Geometry in digitized institutional environments lies not in increased intelligence, but in **structural alignment**.

It does not replace social-scientific narrative.
It converts narrative into structures that can be read, compared, and revisited repeatedly.
