Source-Aware Public Atlas Systems: Architecture, Provenance, and Evidence Geometry in an Independent Web-GIS Framework for Conflict, Memory, Heritage, Mobility, and Risk Mapping

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Abstract

This article presents a methodological and technical framework for source-aware public atlas systems. It examines an independent web-GIS architecture built at Ararat-Petrosyan.com, where multiple atlas interfaces are used to map historical conflict, genocide and cultural memory, Armenian heritage, contemporary conflict systems, humanitarian displacement, disaster risk, transport infrastructure, and large-scale operational history. The argument is that public cartography for historically and politically sensitive topics should not be treated as a final illustrated narrative. It should be treated as an evidence environment: a navigable interface in which records, sources, geometries, confidence levels, review statuses, temporal filters, and interpretive layers remain distinguishable. The article develops the architecture in detail: atlas rooms, layer taxonomies, event records, source records, analytical index records, historical boundary context, operational geometry, route topology, density-first rendering, source chunking, place authority, review queues, geometry status, and exportable CSV/JSON/GeoJSON layers. It then analyzes several case studies: the Genocide Atlas, the Armenian Cultural Heritage Atlas, the First and Second World War Operational Atlases, the Conflict Systems Atlas, the Global Displacement Atlas, the Global Disaster Risk Atlas, and the World Transport Atlas. The contribution is both methodological and infrastructural. Methodologically, the article proposes a vocabulary for distinguishing event claims, source footprints, context layers, review geometries, and analytical indices. Infrastructurally, it demonstrates how a public web map can function as a source registry, a research index, a review console, and a readable public humanities interface without collapsing all visual objects into the same evidentiary category.

Keywords: historical GIS; public atlas; source-aware cartography; digital humanities; genocide studies; conflict mapping; provenance; GeoJSON; evidence geometry; review workflow; data ethics; web GIS.

Contents

1 Introduction

Public historical and geopolitical maps often look more certain than the evidence behind them allows. A red point, a front line, a route arrow, a shaded polygon, or a national boundary can appear decisive even when the underlying claim is provisional, derivative, approximate, or purely contextual. This problem is not merely aesthetic. In the cartography of war, genocide, displacement, heritage destruction, and disaster risk, interface design becomes part of historical argument. When a map does not explain what kind of record a visual object represents, the user may read a source footprint as an event, a proxy coordinate as an exact location, a density cell as a verified site, or a historical boundary as a battlefield control line.

The project examined in this article responds to that problem by treating the public atlas as an evidence environment rather than a single visual product. The atlas system is not one map but a family of specialized web-GIS interfaces: operational war atlases, genocide and heritage atlases, contemporary conflict theaters, humanitarian displacement maps, disaster-risk maps, and transport infrastructure maps. The common design principle across these interfaces is source discipline. Each atlas is expected to identify whether a layer contains verified records, candidate records, operational monitors, media signals, curated chronology, source registry entries, density surfaces, historical context, or analytical indices (Petrosyan, 2026f).

This article develops that principle into a full scholarly method. It asks: how can a web-GIS atlas be structured so that it communicates uncertainty, provenance, geometry class, and analytical function while remaining usable for a public audience? The answer proposed here is a source-aware public atlas system. Such a system separates record types, exposes provenance metadata, classifies geometry status, distinguishes current view state from accumulated historical display, and keeps context layers separate from direct event claims.

The contribution is not that web maps can display historical data. That is already familiar. The contribution is that a public atlas can be designed so that the map itself teaches users how to read evidence. When a point is clicked, the interface should reveal whether it is a battle record, a document location, a heritage object, a route node, a population baseline, a source-review row, or a density proxy. When a line is displayed, the interface should reveal whether it is a digitized front trace, an archival reference line, an operational overview arrow, a route-topology edge, or a review corridor. When a polygon appears, the system should clarify whether it is a historical boundary, a control-state layer, an operation zone, a hazard footprint, or an analytical aggregation.

The article is organized as follows. Section 2 defines the problem of evidentiary collapse in public mapping. Section 3 introduces the conceptual model of an evidence atlas. Sections 4 through 10 describe the architecture: atlas rooms, records, sources, geometries, temporal states, data formats, chunking, lazy loading, and review workflows. Sections 11 through 17 present case studies from the public atlas system: the Genocide Atlas, the Cultural Heritage Atlas, the First and Second World War Operational Atlases, the Conflict Systems Atlas, the Displacement Atlas, the Disaster Risk Atlas, and the World Transport Atlas. Sections 18 through 23 discuss ethics, limitations, reproducibility, journal positioning, and future development. Appendices provide a formal record schema, a layer taxonomy, a quality-gate checklist, and an example JSON model.

2 The Problem: Evidentiary Collapse in Public Maps

The central danger in public historical GIS is evidentiary collapse: the reduction of heterogeneous evidence classes into a single visual grammar. A map may use identical markers for a verified event, a bibliographic source, a candidate record, a place mentioned in a testimony, a modern city centroid, a historical boundary vertex, and a density sample. Once displayed, these objects look comparable. The map interface silently performs an epistemic operation: it makes unequal data appear equal.

This problem is especially acute in three contexts. First, in historical war mapping, front lines, campaign arrows, cities, operations, borders, occupation zones, and source points often coexist on the same screen. Without metadata, the user cannot tell whether a line is reconstructed from archival cartography, generalized for an overview, or drawn as a thematic explanation. Second, in genocide and mass-violence mapping, a deportation route, a camp record, a massacre site, a demographic estimate, a cultural memory site, and a heritage object may all relate to the same historical field but do not carry the same evidentiary claim. Third, in contemporary conflict and humanitarian mapping, event datasets, candidate releases, media reports, administrative summaries, and country-level statistics often differ in update cycle, source certainty, and spatial precision.

A visually impressive interface can therefore be methodologically weak. It may make history feel navigable while hiding the chain of evidence that produced the map. For public scholarship, that is dangerous. A public map does not only communicate information; it shapes what readers believe can be known. If the interface does not distinguish evidence, context, and interpretation, it invites over-reading.

The framework developed here treats these problems as design problems. The map must not merely contain metadata in a hidden table. The interface must expose enough of the metadata to prevent category confusion. Users do not need to see every technical field at first glance, but they must be able to distinguish direct evidence from context, exact coordinates from proxies, source records from event records, and analytical surfaces from historical claims.

3 From Map to Evidence Environment

An evidence environment is a map-based system in which visual objects are treated as records with provenance, geometry status, temporal scope, review state, and interpretive role. The term emphasizes that the map is not a static illustration but a navigable relationship among data objects. In this model, the map is only one surface of the atlas. The atlas also includes a record index, a source ledger, a selected-record panel, quality gates, export files, and methodological notes.

The evidence environment has five components. The first is the *record*, an individual object such as an event, source, place, route segment, heritage site, or analytical index cell. The second is the *source*, the document, dataset, archival reference, catalogue item, institutional feed, or bibliography row that supports or contextualizes the record. The third is the *geometry*, the spatial form through which the record is represented. The fourth is the *interface state*, which determines which layers, years, theaters, filters, and review classes are visible. The fifth is the *claim class*, the epistemic meaning of the displayed object.

The claim class is the decisive element. A point may have longitude and latitude, but that does not tell us what it claims. It may claim an exact place, a settlement-level approximation, a district proxy, a route node, a source footprint, a centroid of a country, or a density marker. A line may claim a road, a route segment, a front, a corridor, a generalized flow, an archival trace, or a visual arrow. A polygon may claim an administrative boundary, a historical country context, an operation zone, a control state, a disaster footprint, or a density area. The evidence atlas makes these distinctions visible.

This approach is consistent with broader principles of data stewardship and provenance. FAIR data principles stress that data and workflows should be findable, accessible, interoperable, and reusable (Wilkinson et al., 2016). The W3C PROV model provides a vocabulary for representing how entities are generated, used, and attributed (W3C Provenance Working Group, 2013). GeoJSON offers a portable structure for web-facing geographical features, but its geometry and properties are not enough by themselves; a source-aware atlas must add domain-specific provenance and review fields (Butler et al., 2016).

4 Research Object and Scope

The research object is the public atlas system hosted at AraratPetrosyan.com. The public maps page describes the project as a map laboratory organized around memory, territory, and evidence. It states that each atlas is treated as a separate evidence instrument and that verified datasets, candidate releases, operational monitors, media signals, and curated chronologies are labeled separately rather than mixed into one opaque layer (Petrosyan, 2026f).

The system includes several broad categories of maps. Historical violence and memory are represented by the Genocide Atlas and the Greek Genocide map. Heritage continuity is represented by the Armenian Cultural Heritage Atlas. Operational history is represented by the First World War Operational Atlas and the Second World War Operational Atlas. Contemporary conflict is represented by the Conflict Systems Atlas and local conflict-theater maps for Ukraine, Gaza, Syria, Iraq, Yemen, Libya, and the Sahel. Humanitarian movement is represented by the Global Displacement Atlas. Planetary risk is represented by the Global Disaster Risk Atlas. Mobility infrastructure is represented by the World Transport Atlas.

This article does not claim that every record in those maps is equally complete or equally reviewed. On the contrary, the framework is built around visible incompleteness. The Genocide Atlas, for example, contains explicit status pages for release closure, source review, proxy coordinates, place authority, camp-system review geometry, and separated context layers (Petrosyan, 2026i,l). The world-war atlases explicitly distinguish operational geometry, source points, source density, event index, event density, historical boundary context, digitized front geometry, archival references, and analytical daily index layers (Petrosyan, 2026g,m). The point is not that the atlas has eliminated uncertainty. The point is that uncertainty becomes part of the visible method.

5 Atlas Inventory and Functional Typology

The public atlas system is best understood as a set of map rooms rather than as a single application. Each map room is an independent interface designed for a particular epistemic task. Some rooms are historical; some are operational; some are humanitarian; some are infrastructural; some are risk oriented. They share an interface grammar but do not collapse their datasets into one universal layer.

Table 1: Selected atlas rooms and their main methodological function.

Atlas room	Domain	Methodological function
Genocide Atlas	Historical violence and memory	Integrates Armenian, Greek, and Assyrian/Seyfo layers with events, routes, documents, camp system, demography, economic loss, cultural memory, and review status while retaining source and place-authority fields.
Armenian Cultural Heritage Atlas	Heritage continuity	Separates heritage, condition evidence, monuments, cemeteries, churches, museums, bridges, Western Armenia, Artsakh, RAA, VirtualANI, Monument Watch, and AUA Artsakh Heritage records from direct genocide-event evidence.
First World War Operational Atlas	Operational history	Displays battles, operations, fronts, offensives, archival references, digitized fronts, historical borders, source points, event density, source density, and daily observations for 1914–1918.
Second World War Operational Atlas	Operational history	Builds a source-aware war GIS for 1939–1945 with fronts, campaigns, offensives, occupation zones, cities, photographs, documents, archival maps, event index, density cells, and source chunking.
Conflict Systems Atlas	Contemporary conflict systems	Uses global conflict records as actor-country-year-event structures with event fields, hotspot grids, country summaries, violence-type filters, fatality lenses, and review-aware controls.
Global Displacement Atlas	Humanitarian mobility	Reorganizes UNHCR public statistics into origin, asylum, internally displaced population, and cross-border flow layers with selected-record inspection.

Atlas room	**Domain**	**Methodological function**
Global Disaster Risk Atlas	Risk and hazard signals	Combines USGS earthquakes, NASA EONET natural events, and GDACS alerts into a multi-source signal surface with severity filters and source inspection.
World Transport Atlas	Mobility infrastructure	Provides a fast global map of roads, railways, airports, seaports, and strategic corridors without attempting to load the entire street-level OSM planet.
Local conflict-theater atlases	Regional operational context	Render conflict theaters such as Ukraine, Gaza, Syria, Iraq, Yemen, Libya, and the Sahel as local GeoJSON/KML-derived operational views with common AP atlas styling.

This typology matters because the same cartographic form may have different meanings in different rooms. A line in the World Transport Atlas may be a road or railway. A line in the Displacement Atlas may be a country-centroid flow. A line in the Genocide Atlas may be a route-topology edge. A line in the world-war atlases may be an operational front, an archival reference, or a digitized front trace. The same visual primitive requires a different evidence grammar in each domain.

6 Layer Taxonomy

The foundation of the system is a layer taxonomy. A layer is not simply a group of visual objects; it is a declared epistemic category. The following seven classes recur across the atlas system.

6.1 Event records

Event records are claims that something happened at a time and place. Examples include battles, operations, arrests, deportations, massacres, destruction events, camp events, conflict events, disaster events, and other time-bound occurrences. Event records require at least a source, a date or date range, a place or geometry, an event type, and a review status.

Event records are the most easily over-read because a marker on a map can appear exact. For that reason, event records require geometry status. A record may be exact, settlement-level, district-level, inferred, proxy, or candidate. The atlas should never allow the visual marker alone to imply exactness.

6.2 Source records

Source records are records of evidence location or source existence, not records of the event itself. A source point may represent an archive catalogue item, a document place, a photograph location, a bibliographic reference, a dataset row, or a registered evidence source. Source records should not be interpreted as event claims unless an event record has been separately promoted from them.

The world-war atlases explicitly use source points and source density to show where registered source material exists, while warning that these points are not event claims (Petrosyan, 2026g,m). This is a crucial design principle: a bibliography should be visible but should not become a disguised event layer.

6.3 Analytical index records

Analytical index records are derived records used for navigation, filtering, density reading, or temporal exploration. They may be generated from event corpora, source corpora, daily observations, or external datasets. They help users see patterns, but they are not necessarily individual historical claims.

The world-war atlases use event-index nodes and density cells for spatial reading. Such records can be extremely useful, but they must be marked as analytical rather than evidentiary. A density cell is a reading aid, not a site.

6.4 Historical boundary context

Historical boundary context includes national boundaries, imperial borders, administrative outlines, or other political-geographic polygons used to orient interpretation. These layers are context, not event evidence. In war maps, the distinction between boundary context and battlefield control is essential. A state border is not a front line; an occupation zone is not a national boundary; a control state may be time-specific rather than permanent.

6.5 Operational geometry

Operational geometry includes front lines, arrows, corridors, operation zones, occupation zones, control-state polygons, sea routes, air campaigns, and route segments. Operational geometry is often interpretive: it compresses movement, direction, control, and campaign structure into readable form. It can be source-linked, digitized, generalized, or provisional. The atlas therefore needs geometry class and provenance status for each operational element.

6.6 Heritage and memory records

Heritage and memory records include churches, monasteries, cemeteries, schools, museums, khachkars, bridges, fortresses, ruins, cultural memory pages, and long-duration cultural sites. These objects may be historically connected to violence, loss, and displacement, but they are not automatically event records. The Cultural Heritage Atlas explicitly states a separation rule: heritage records are not genocide-event records unless a separate source links them to a specific event, confiscation, deportation, massacre, or destruction process (Petrosyan, 2026a).

6.7 Density and overview layers

Density layers summarize concentration. They are useful for performance and comprehension, especially when the number of records is large. But density layers are dangerous if users read them as exact evidence. The atlas therefore treats source density and event density as overview layers. They should support navigation, not replace record-level inspection.

7 Record Schema

A source-aware atlas requires a record schema that is simple enough for public web delivery and rich enough for scholarly interpretation. The schema should not be over-engineered, because long-term sustainability depends on exportable formats such as CSV, JSON, and GeoJSON. At the same time, it must include enough fields to preserve provenance, geometry, and review information.

Table 2: Core record fields for a source-aware atlas.

Field	Example values	Purpose
`id`	`arm_event_0001`, `wwii_front_1942_e`	Stable machine identifier for citation, export, and version comparison.
`atlas`	`genocide`, `wwii`, `displacement`	Indicates the atlas room in which the record belongs.
`layer`	`event`, `source_point`, `event_density`	Identifies the layer class.

Field	Example values	Purpose
`claim_class`	`event_claim`, `source_footprint`, `context`	States the epistemic meaning of the visual object.
`name`	Place, operation, source, object name	Human-readable label.
`type`	`deportation`, `frontline`, `church`	Domain-specific classification.
`date`	`1915-04-24`, `1942`, `2024`	Temporal anchoring.
`start_date`, `end_date`	ISO dates or year values	Allows intervals and timeline filtering.
`place_authority_id`	Gazetteer key	Links record to normalized historical place authority.
`geometry_type`	Point, LineString, Polygon	GeoJSON geometry type.
`geometry_status`	exact, proxy, centroid, derived, review	Prevents false exactness.
`source_id`	Bibliographic or dataset key	Links record to source registry.
`source_url`	URL or dataset path	Allows inspection when publicly available.
`source_note`	page, item, catalogue, access note	Preserves human citation context.
`confidence`	high, medium, low, candidate	Communicates reliability level.
`review_status`	release candidate, source review, proxy review	Shows whether record is promoted, provisional, or queued.
`rights_status`	public, restricted, citation-only	Prevents inappropriate republication of protected material.
`summary`	Short interpretive note	Human-readable explanation in selected-record panel.

The schema deliberately separates `geometry_status` from `confidence`. A coordinate can be geometrically exact but historically uncertain; conversely, a historical claim can be well sourced but represented by a proxy coordinate because exact geography is unresolved. The schema also separates `source_id` from `source_url`. Some sources have public URLs; others are dataset paths, archival references, printed works, or rights-limited catalogues.

8 Geometry as a Claim

The most important technical premise of the framework is that geometry is not neutral. A coordinate is a claim about spatial knowledge. A line is a claim about relation, movement, boundary, or representation. A polygon is a claim about extent, aggregation, control, context, or risk. Therefore, geometry must have status metadata.

8.1 Exact point geometry

Exact point geometry is appropriate only when the source supports a precise location. Examples include a documented building, a known monument, a specific station, a named airport, a camp subsite with verified coordinate support, or an event whose location is sufficiently established at point scale. Exactness should not be inferred from a marker icon. It should be explicitly stored.

8.2 Settlement-level geometry

Many historical records support a named town, village, district, or locality but not an exact coordinate within that settlement. A settlement-level point can be legitimate if the atlas clearly identifies it as such. It is more honest to show a settlement-level record than to invent a false exact coordinate.

8.3 Proxy geometry

Proxy geometry is used when the place is known only at regional, district, corridor, or unresolved-toponym level. Proxy points should be visibly marked and should not be promoted to exact event geometry until place authority and source corroboration support promotion. The Genocide Atlas status pages explicitly keep proxy coordinates visible as proxies and state that regional proxy coordinates must not be visually treated as exact village, camp, or event coordinates (Petrosyan, 2026l).

8.4 Centroid geometry

Centroid geometry is common in country-level statistics, displacement flows, administrative summaries, and density layers. It is useful for visualization but should not be read as a real event location. For example, the Global Displacement Atlas renders country-centroid flow lines for UNHCR population statistics, which are statistical movements between origin and asylum categories rather than observed individual movement paths (Petrosyan, 2026k).

8.5 Route topology

Route topology represents relational movement: origin to transit node, transit node to camp, camp to terminal zone, or origin to asylum country. It does not necessarily claim exact path geometry. The Genocide Atlas deportation graph explicitly states that route cores are reviewable topology edges and do not claim exact convoy geometry (Petrosyan, 2026b). This is a powerful distinction. A route graph can preserve historical structure without pretending to know every road segment.

8.6 Review geometry

Review geometry is a special class for provisional corridors, clusters, zones, or decomposition layers. It exists to guide research. It should not be mistaken for final reconstruction. The Genocide Atlas camp-system layer separates exact source-linked nodes from regional proxy points and review geometries that still need toponym identification, archival corroboration, and site-level review (Petrosyan, 2026d).

8.7 Digitized trace geometry

Digitized trace geometry is geometry derived from maps, archival situation maps, or historical cartographic sources. It should preserve the path to the source image or map reference where possible. The world-war atlases distinguish digitized front traces from overview geometry and archival reference lines, allowing users to read operational view and evidentiary layer separately (Petrosyan, 2026g,m).

8.8 Density geometry

Density geometry is generated for overview. It may consist of grid cells, centroids, heat surfaces, or simplified aggregates. Density geometry should load quickly and help users decide where to inspect records, but it should not replace the record-level source panel. In large atlases, density-first rendering is a practical method: show density first, then lazy-load record chunks only when requested.

9 Provenance Model

A public atlas must make provenance visible without making the interface unreadable. The proposed model uses three levels of provenance: record provenance, source provenance, and process provenance.

Record provenance answers: what source supports this record? The relevant fields include `source_id`, `source_url`, `source_note`, `dataset`, `citation`, and `rights_status`. Source provenance answers: what is the origin and status of the source itself? This includes institutional origin, dataset version, public URL, access restrictions, and whether the source is primary, secondary, catalogue, derived, or candidate. Process provenance answers: how did the record enter the atlas? This includes extraction method, geocoding method, normalization step, review stage, and promotion status.

In an ideal implementation, these three levels can be mapped to the W3C PROV vocabulary: records and sources are entities, ingestion and geocoding are activities, and datasets, archives, or researchers are agents (W3C Provenance Working Group, 2013). A fully semantic implementation is not required for a public interface, but the conceptual model is useful. It prevents a common simplification: treating the final GeoJSON feature as if it were the only object that matters. In reality, the feature is the result of a process.

The Genocide Atlas completion plan turns this into a release criterion. It states that every promoted map record must have a source identifier, source URL or dataset path, access or citation note, confidence, and review status. It also requires exportability in CSV or JSON suitable for GIS, PostGIS, or retrieval-augmented ingestion (Petrosyan, 2026i). These requirements are important because they make the atlas auditable. A beautiful map without exportable records is hard to verify. An evidence atlas must allow the map to be read, searched, cited, and re-used.

10 Place Authority and Historical Gazetteers

Historical GIS depends on place authority. A place may have Armenian, Greek, Assyrian, Ottoman, Turkish, Arabic, Russian, Persian, French, German, or modern administrative names. A single place may appear in different spellings, languages, archival systems, administrative periods, and transliteration traditions. Without a place authority layer, the atlas may duplicate records or falsely separate aliases.

The place authority model should store canonical names, alternate names, language tags, historical administrative hierarchy, modern administrative hierarchy, coordinate method, coordinate confidence, source references, and review status. It should also distinguish exact toponym resolution from provisional alias matching.

The Genocide Atlas status matrix treats place authority as an explicit review object. It identifies a unified historical place authority across Armenian, Greek, Assyrian/Seyfo, camp, Houshamadyan, and RAA layers, and states that no point is treated as exact unless coordinate method and confidence support exactness (Petrosyan, 2026l). This is not a minor technical detail. In genocide and displacement mapping, unresolved toponyms are often the difference between a defensible spatial claim and a misleading marker.

A public atlas should therefore avoid two temptations. The first is to geocode all names automatically and publish them as exact. The second is to hide unresolved places completely. A better method is to publish review status. Unresolved or proxy records can remain visible if the interface marks them as proxy and routes them into a review queue.

11 Temporal Model

Temporal filtering is as important as spatial filtering. Historical maps often confuse temporal states by displaying records from different years as if they coexist. This is particularly problematic in operational history. A front line from 1914, a battle from 1916, an occupation zone from 1917, and a border from 1918 may all be relevant, but they should not automatically appear as a single historical moment.

The atlas system uses several temporal devices: focus year, date interval, show-through-year, accumulated trail, play timeline, and show-all-records mode. These controls are not interchangeable. A focus-year view should show records relevant to that year. A show-through-year view can show cumulative development up to a date. An accumulated trail can show historical progression while preserving the logic that earlier states are not simultaneous. A show-all-records mode is a corpus view, not a historical moment.

The world-war atlases show this clearly. They include timeline controls for 1914–1918 and 1939–1945, with options for accumulated trail, show all records, and play timeline (Petrosyan, 2026g,m). The conceptual difference is essential: a map can be a moment view, a cumulative archive, a playback system, or a research index. The interface must make the current mode legible.

12 Interface Architecture

The public interface uses a map-room architecture. A map room is an independent web page or application with its own title, scope, filters, layers, selected-record panel, source profile, ledger, and citation note. This design avoids the problem of a single universal map trying to contain every possible data type.

A typical atlas room includes the following components.

1. **Header and scope statement**: defines the atlas domain, interval, source family, and version.
2. **Layer selector**: chooses between event field, source points, source density, historical borders, operation zones, route graph, heritage, risk signals, or transport modes.
3. **Thematic filters**: filters by group, event type, violence type, actor, theater, transport mode, risk type, population category, or heritage relation.
4. **Temporal filters**: focus year, timeline, through-year slider, accumulated trail, and play mode.
5. **Review filters**: confidence, source review, candidate data, registered records, analytical index, metadata registry, rights metadata, or proxy review.
6. **Map canvas**: Leaflet or web map component displaying basemap and selected layers.
7. **Selected-record panel**: displays name, date, type, confidence, source, review status, geometry status, and linked materials.
8. **Source profile**: explains the source family, dataset version, source chunking, or limitations.
9. **Visible ledger**: lists the records currently visible or available in the selected layer.
10. **Citation and version note**: tells users how to cite the atlas and what its limits are.

This structure makes the atlas legible to non-specialists while preserving scholarly caution. The selected-record panel is especially important. It turns the map from a visual object into an inspection interface. The user should not merely see a point; the user should be able to ask: what is this, where did it come from, how precise is it, how reviewed is it, and what can I responsibly infer from it?

13 Data Architecture and Flow

The atlas system uses a hybrid data architecture. Smaller layers can be delivered as local JSON or GeoJSON files. Larger layers use chunking, density-first rendering, and API or database-backed endpoints. This is a practical design for public web-GIS because fully loading a large dataset in the browser can make the interface unusable.

A typical data flow has nine stages:

1. Source identification and source registry entry.
2. Dataset acquisition or manual extraction.
3. Rights and citation classification.
4. Field normalization into a shared schema.
5. Place authority matching and geocoding.
6. Geometry status classification.
7. Confidence and review-status assignment.
8. Export to CSV, JSON, GeoJSON, or chunked files.
9. Interface rendering with filters, selected-record panels, and ledger views.

In large atlas rooms, records should not all be loaded at once. Instead, density and summary layers can load first. When the user selects a year, theater, bounding box, or layer, the interface requests the corresponding chunk. The world-war atlases explicitly describe source metadata split by year, theater, and source identifier so that large evidence layers can be inspected without slowing the operational map (Petrosyan, 2026g,m).

This design has a methodological benefit beyond performance. Chunking makes the user choose an analytical lens. A user inspecting source points for the Eastern Front in 1942 is doing a different operation than a user viewing all operational arrows or all historical boundaries. The interface state becomes part of the research process.

14 Source Chunking, Lazy Loading, and Density-First Rendering

Large public atlases face a tension between completeness and readability. If all records are shown at once, the map becomes visually saturated and slow. If too few records are shown, the map becomes misleadingly simple. The framework uses a three-part solution: density-first rendering, chunked record loading, and selected layer inspection.

Density-first rendering means that the map first shows a low-cost overview layer such as source density or event density. This allows users to see concentration without downloading all records. The interface then lazy-loads specific records only when the user requests source points, event index, theater chunks, or year chunks.

Chunking can be organized by year, theater, source family, bounding box, or layer type. For historical war atlases, year and theater are natural dimensions. For genocide and heritage atlases, source family, review queue, place authority, and event type may be more useful. For disaster-risk interfaces, source feed and severity are useful. For displacement mapping, origin, asylum, and population type are useful.

The method is not only technical. It is also epistemic. Density layers are not final evidence, and chunked source points are not event claims. The world-war atlas pages make this distinction explicit: source density gives a fast spatial overview, while source points show where source material exists and should not be read as event claims (Petrosyan, 2026g,m). This is exactly the kind of interface language that source-aware cartography requires.

15 Review Workflow and Quality Gates

A source-aware atlas should make review visible. Many public maps hide uncertainty because visible uncertainty is thought to weaken the map. This framework argues the opposite: visible uncertainty strengthens the map because it prevents overclaiming.

The review workflow has five gates.

1. **Source trail**: every promoted record must have a source identifier, source URL or dataset path, access note, citation note, confidence, and review status.
2. **Layer separation**: direct evidence, context, heritage, memory, demographic estimates, economic loss, and testimony metadata must not be presented as the same category.
3. **Geographic honesty**: proxy coordinates, centroids, review corridors, and regional approximations must be marked as such.
4. **No final claim without review**: seed estimates and extracted metadata remain working data until reviewed against primary or high-authority secondary sources.
5. **Exportability**: each layer must expose a CSV or JSON file suitable for GIS, database, or computational ingestion.

These gates correspond closely to the Genocide Atlas completion and status pages, which state that v1 closure depends on visible source-linked layers, confidence, review status, provenance tables, place authority, review queues, and separated context layers (Petrosyan, 2026i,l). The scholarly importance of this is significant. Instead of presenting the atlas as finished, the system presents review as part of publication.

16 Case Study I: Genocide Atlas

The Genocide Atlas is the strongest case for source-aware public cartography because it combines event records, route topology, camp system, documents, demographic baselines, economic loss, cultural memory, heritage context, place authority, review queues, and source ledgers. The atlas is framed as a Late Ottoman genocide GIS with a working interval of 1914–1922. Its public interface includes Armenian, Greek, and Assyrian/Seyfo layers, expansion queue, documents, economic loss, demographic loss, population baselines, deportation routes, route graph, camp system, cultural memory, and heritage sites (Petrosyan, 2026h).

The methodological value of the Genocide Atlas lies in its refusal to make all these layers equivalent. A massacre event, deportation route, camp node, demographic baseline, economic-loss estimate, Guerguerian document, Houshamadyan memory record, and RAA heritage object are all relevant to the historical field, but they do not carry the same claim. The atlas therefore uses layer separation, provenance fields, confidence values, place authority, and review status.

16.1 Searchable corpus

The search interface turns the atlas from a map into a research database. It allows records to be searched by place, source, dataset, year, type, confidence, and review status. The public page reports total records, mapped records, source-review records, route cores, dataset coverage, temporal range, and record pages (Petrosyan, 2026c). This is important because the map surface alone cannot expose the whole corpus. The index makes the atlas auditable.

A research atlas should therefore provide both spatial and tabular access. The map shows relationships in space; the index shows records as evidence objects. Together they allow inspection. A user should be able to start from a place, event type, source, or review status and then move to the map or dossier.

16.2 Release closure and quality gates

The Genocide Atlas completion page states that v1 is complete when the core event map, deportation graph, camp system, population baselines, source registry, provenance table, review queues, and separated context layers are visible, source-linked, and marked by confidence and review status (Petrosyan, 2026i). This is a strong methodological statement. Completion is not defined by visual polish or record count. It is defined by evidence structure.

The completion plan also identifies release tracks: core event atlas, Armenian chronology and AGMI anchors, deportation graph topology, camp system, demographic baselines, Guerguerian document metadata, historical place authority, Greek genocide layer, Assyrian/Seyfo layer, oral history and testimony metadata, economic loss layer, church losses, Houshamadyan cultural memory, RAA/VirtualANI heritage atlas, source expansion registry, and public methodology.

This structure is valuable for publication because it shows that the atlas is not a loose set of maps. It is a pipeline. Each layer can be promoted, held back, marked as separated context, or routed into review. The article should emphasize this strongly: the atlas is not only a visualization of the genocide; it is a system for managing evidentiary claims.

16.3 Place authority

The status page identifies place authority as a major scholarly issue. It includes Armenian, Greek, Assyrian/Seyfo, camp, Houshamadyan, and RAA layers, and it keeps proxy coordinates visible as proxy. The rule is that no point is treated as exact unless coordinate method and confidence support exactness (Petrosyan, 2026l). This rule is central for genocide GIS because toponyms in the Ottoman and post-Ottoman world are multilingual, politically sensitive, and often unstable across sources.

In the article, place authority should be presented as one of the original contributions of the project. Many public maps treat geocoding as a technical step. Here it becomes a scholarly review process. The atlas does not merely ask, "Where is this place?" It asks: under which name, in which language, in which administrative system, according to which source, with what coordinate confidence, and under what review status?

16.4 Deportation graph

The deportation graph is described as a structure of origins, transit corridors, camps, killing nodes, and Deir ez-Zor as a graph. Crucially, the public page states that route cores are reviewable topology edges and do not claim exact convoy geometry (Petrosyan, 2026b). This distinction should be central in the article.

A route graph can be historically meaningful without being cartographically exact. It can show that a deportation system connected origins, transit hubs, camps, killing nodes, and terminal zones while still marking individual edges for document-level upgrade. This is more honest than drawing precise-looking routes without route-level archival support.

The graph model also opens analytical possibilities. Nodes can be classified as origins, transit nodes, camps, killing nodes, and terminal nodes. Edges can be classified as deportation segments, transit-to-camp relations, camp-liquidation relations, or killing corridors. Evidence links can connect each edge to sources. Review status can indicate whether a segment is source-linked, candidate, proxy, or pending archive target.

16.5 Camp system

The camp-system page isolates transit hubs, camp and killing nodes, grouped killing estimates, and terminal desert zones. It distinguishes exact source-linked nodes from regional proxy points that need toponym identification, archival corroboration, and site-level review (Petrosyan, 2026d). This is another example of geometry discipline.

The camp system should not be reduced to points on a map. It includes toponym resolution, route relation, source hierarchy, estimate classification, site verification, proxy status, review geometry, and promotion rules. In a journal article, this case can show how source-aware GIS handles one of the hardest problems in mapping mass violence: the relation between historically documented systems and geographically uncertain sites.

16.6 Separated heritage and memory context

The Genocide Atlas includes cultural memory and heritage context, but the completion and status pages insist that these context layers remain separated from direct event evidence unless a record explicitly documents an event or loss linkage (Petrosyan, 2026i,l). This is ethically important. It avoids turning every heritage object into a genocide-event marker. It also respects the long-duration history of Armenian, Greek, and Assyrian places beyond the violence that affected them.

17 Case Study II: Armenian Cultural Heritage Atlas

The Armenian Cultural Heritage Atlas is a separate heritage GIS for monuments, churches, khachkars, cemeteries, bridges, museums, Western Armenia records, Artsakh records, and source-level review. Its public interface states the interpretive scope as heritage context, condition, and continuity. It also declares a separation rule: RAA, VirtualANI, Monument Watch, and online heritage records are not automatically genocide-event records; a monastery, church, ruin, museum, cemetery, or fortress belongs in the heritage atlas unless a separate source explicitly links it to a 1915–1923 event, confiscation, deportation, massacre, or destruction process (Petrosyan, 2026a).

This atlas demonstrates why source-aware cartography must include ethical classification. A cultural heritage site can be evidence of historical presence, architectural continuity, memory, loss, risk, damage, or destruction. But it is not always evidence of a specific event. A heritage atlas should therefore support interpretive relations such as long-duration heritage, condition evidence, continuity layer, bridge inventory, source footprint, and source review.

The heritage atlas also expands the spatial and chronological frame. Whereas the Genocide Atlas centers a specific historical interval and event system, the Heritage Atlas can include pre-event cultural geography, post-event condition evidence, destruction history, documentation projects, online source corpora, and modern risk status. This makes it a complementary atlas rather than an evidentiary sublayer of genocide mapping.

For scholarly publication, this separation is a major strength. It anticipates criticism that genocide maps can over-assimilate all Armenian cultural geography into a violence narrative. The framework responds: heritage records are visible, but their claim class is different. They are cultural continuity, condition evidence, source footprint, or heritage context unless direct event evidence supports promotion.

18 Case Study III: First and Second World War Operational Atlases

The First World War Operational Atlas and Second World War Operational Atlas demonstrate source-aware cartography at large historical scale. Their public pages define them as source-aware operational atlases with fronts, campaigns, offensives, occupation zones, military movements, cities, photographs, archival maps, and evidence-linked records (Petrosyan, 2026g,m).

The layers include battles, timeline events, analytical index, historical borders, front lines, archival references, digitized fronts, event index, event density, source points, source density, offensive arrows, operations, control state, occupation zones, operation zones, cities, photos, documents, sea routes, and air campaigns. This diversity makes the world-war atlases an ideal test of epistemic separation.

18.1 Operational view versus evidence view

Operational history requires readable overview geometry. A map of the First or Second World War cannot show every source and every event simultaneously without becoming unreadable. Therefore, an operational view is necessary. But the operational view should not pretend to be the full evidence layer. The public pages explicitly state that default operational view keeps the map readable while retaining historical boundaries and selected operational records, and that source points, source density, control states, and operation zones should be used for focused inspection (Petrosyan, 2026g,m).

This distinction can be phrased as an analytical principle: overview geometry is not evidence erasure if the interface provides routes back to source layers. The danger is not simplification itself; every map simplifies. The danger is unmarked simplification. A source-aware operational atlas can simplify visibly.

18.2 Digitized fronts and archival references

The digitization method separates overview front geometry, archival reference lines, and digitized front traces. Each front layer is presented with date, source path, geometry class, and provenance status (Petrosyan, 2026g,m). This model is superior to an undifferentiated front-line layer.

A front line can be an interpretive summary, a digitized historical map trace, a campaign boundary, or a date-specific operational state. These should be separate. The atlas should allow the user to ask: is this line a schematic overview, a trace from a specific archival map, or an analytical layer generated from events? That question is the difference between illustration and evidence.

18.3 Source points and source density

The world-war atlases use source points and source density to represent source material. The public pages explicitly state that source points show where source material exists and are not event claims (Petrosyan, 2026g,m). This is one of the clearest examples of the framework's central principle.

In many public maps, sources remain hidden behind the narrative. Here, sources become spatially inspectable. But the atlas also prevents source points from becoming pseudo-events. This dual move is important: source visibility without source-event confusion.

18.4 Event index and density cells

The world-war atlases also include event-index nodes and density cells. These are structured records for spatial reading, not necessarily individually verified battle claims. They can help users identify where the atlas has record concentration, temporal activity, or source density. But their analytical status must remain visible.

18.5 Timeline discipline

The world-war atlases use year timelines and accumulated trail options. This supports four different readings: a year-specific operational view, a cumulative development view, a corpus-wide show-all view, and a playback view. Each has a different epistemic meaning. The interface should label them clearly.

19 Case Study IV: Conflict Systems Atlas

The Conflict Systems Atlas is a global conflict GIS that uses UCDP GED 25.1 and a provisional UCDP Candidate 2026 layer according to its public methodology statement (Petrosyan, 2026e). The page reports a working corpus of 419,163 geocoded source rows, with map events, countries, years, hotspots, visible records, and fatalities. It provides filters for event field, hotspot grid, country system, violence type, analytic lens, and focus year.

The methodological shift here is from historical reconstruction to system reading. Conflict records become a geographic system of actors, countries, fatalities, event types, civilian exposure, and temporal drift. The atlas does not merely show isolated events; it allows users to shift between event field, hotspot grid, and country system.

The external source model is important. UCDP GED is a spatially and temporally disaggregated dataset of organized violence, and official UCDP materials describe the dataset as covering individual events with geocoding and temporal disaggregation (Uppsala Conflict Data Program, 2025, 2026). But the atlas must still preserve dataset version and candidate status. A candidate 2026 layer is not the same as finalized annual data. The Conflict Systems Atlas explicitly states that candidate 2026 rows are provisional and should be treated as working data until source releases are finalized (Petrosyan, 2026e).

This case shows that source-aware cartography is not limited to archival history. It also matters for current or recent conflict data. Update cycles, candidate releases, source confidence, and data versions must be visible because users may otherwise treat provisional rows as final facts.

20 Case Study V: Global Displacement Atlas

The Global Displacement Atlas reorganizes UNHCR public statistics into a humanitarian movement interface. Its public page identifies UNHCR public statistics for 2024 and includes refugees, asylum seekers, returns, internally displaced persons, stateless people, other people of concern, and host community figures from UNHCR's public statistical API (Petrosyan, 2026k). The atlas includes cross-border flows, origin countries, asylum countries, and internal displacement layers.

The source distinction is different here. These records are not event observations in the same sense as conflict events or historical events. They are population statistics, often country-level or category-level. The method therefore uses origin and asylum categories, country centroids, threshold filters, and selected-record inspection. The public page notes that country totals and categories follow the source taxonomy and may not represent real-time border movement (Petrosyan, 2026k).

This is a good example of geometry honesty. A line between country centroids is a rendering of statistical relation, not a literal route traveled by displaced persons. The selected record can show origin, asylum, refugees, total, dataset, year, rows, and method. The public map remains readable while the source profile prevents overinterpretation.

UNHCR's own methodology pages state that the Refugee Data Finder collates population data on forcibly displaced and stateless persons, primarily sourced from governments and UNHCR operations (United Nations High Commissioner for Refugees, 2026). The atlas should therefore cite UNHCR but also preserve source taxonomy. It should not convert population categories into unsupported micro-geographies.

21 Case Study VI: Global Disaster Risk Atlas

The Global Disaster Risk Atlas combines USGS earthquake feeds, NASA EONET natural events, and GDACS disaster alerts into a planetary risk GIS. Its public page describes the atlas as a multi-source signal rather than a single forecast and provides records for earthquakes, natural events, and alerts, with severity filtering and selected-risk inspection (Petrosyan, 2026j).

This case shows the difference between event reporting and risk interpretation. A USGS earthquake record, a NASA EONET natural event, and a GDACS alert are not the same kind of source. They have different update cycles, classification systems, accuracy assumptions, and intended uses. The atlas therefore should not simply merge them as identical disaster points. It should expose source, type, severity, metric, and method.

Official USGS documentation recommends real-time GeoJSON feeds for automated applications displaying earthquake information (United States Geological Survey, 2026). NASA describes EONET as an API for curated, continuously updated natural event metadata accessible via web services (NASA Earth Observatory Natural Event Tracker, 2026). GDACS provides alert/event APIs and event lists for disaster monitoring (Global Disaster Alert and Coordination System, 2026). These sources support a public risk atlas, but the interface must label the result as a hazard-signal surface, not an official damage assessment.

22 Case Study VII: World Transport Atlas

The World Transport Atlas is a global transport interface for roads, railways, airports, seaports, and strategic corridors. Its public page states that it is built as a fast local atlas for dense world-scale transport infrastructure without loading the full street-level OSM planet dump, and it reports 83,997 records across five layers (Petrosyan, 2026n).

This atlas is methodologically different from the conflict and genocide cases because many transport features are infrastructural rather than evidentiary claims about historical violence. Yet source-aware principles still apply. A road, railway, airport, port, or corridor should have mode, class, rank, source dataset, and scale limitations. The public page cites Natural Earth 10m as the build basis and clearly states that the atlas is not a complete street-level planet dump (Petrosyan, 2026n; Natural Earth, 2026).

The World Transport Atlas also demonstrates an important performance principle. A public atlas can be strategically incomplete if it is honest about scale. It does not need every street to support global analysis. Its claim is not "complete transport database"; its claim is "fast global infrastructure overview at this scale." The limitation is part of the method.

23 Ethical and Scholarly Stakes

Source-aware cartography is not only a technical practice. It is an ethical discipline. Maps of genocide, war, displacement, and heritage loss affect public memory. They can give dignity to places and events that have been neglected, but they can also overstate certainty, erase ambiguity, or convert suffering into visual spectacle. For a teen or general public audience, a map can feel especially authoritative because it appears precise. The atlas designer therefore has a duty to mark uncertainty clearly.

There are four ethical stakes.

First, the atlas must avoid false exactness. Proxy locations should not be made to look exact. Second, it must avoid evidentiary inflation. A heritage object, source mention, or demographic estimate should not be promoted to a direct event claim without review. Third, it must preserve source dignity and rights. Testimony metadata, archival documents, photographs, and restricted materials require citation and access notes. Fourth, it must avoid totalizing interpretation. A public atlas should not suggest that a complex historical field is fully captured by the map.

The Genocide Atlas quality gates are an example of ethical design because they make limits public: source trail, layer separation, geographic honesty, no final claim without review, and exportability (Petrosyan, 2026i,l). These rules are not cosmetic. They define the conditions under which a public map can be academically defensible.

24 Comparison with Conventional Public Maps

Conventional public maps often emphasize simplicity: points, labels, timeline, and legend. This can be useful for education, but it becomes inadequate when the subject requires source criticism. A source-aware atlas differs in at least eight ways.

Table 3: Conventional map model versus source-aware atlas model.

Conventional public map	**Source-aware atlas**	**Scholarly gain**
Marker represents a place or event without further classification.	Marker has claim class, source, confidence, geometry status, and review status.	Reduces false equivalence.
Legend explains colors and symbols.	Legend plus selected-record panel explains evidence category.	Improves interpretability.
Source may be cited for whole map only.	Source is attached to records or source families.	Allows audit and citation.
All visible layers appear comparable.	Event, source, context, density, heritage, and operational layers are separated.	Prevents category collapse.
Timeline shows records by year.	Timeline distinguishes focus year, accumulated trail, show-through, and corpus view.	Avoids temporal confusion.
Large data are hidden or overloaded.	Density-first rendering and chunked source loading.	Balances completeness and speed.
Uncertainty is often omitted.	Proxy coordinates, review status, and confidence are visible.	Supports responsible reading.
Publication is a finished map.	Publication is a versioned atlas with review queues and export files.	Enables ongoing scholarship.

The comparison shows why the atlas model is publishable as methodology. It is not merely another website. It is a model for how public geospatial humanities can manage evidence.

25 Reproducibility and Exportability

For a public atlas to be academically useful, it must support reproducibility. Reproducibility does not require that every source be openly downloadable, because archival rights, testimony restrictions, and institutional licenses may limit access. But it does require that the atlas expose enough metadata for users to understand what data exist, where they came from, how they were transformed, and what status they carry.

The minimum reproducibility package should include:

1. versioned public citation for each atlas room;
2. CSV or JSON export for public layers;
3. source registry with access notes;
4. data dictionary for key fields;
5. geometry-status definitions;
6. confidence and review-status definitions;
7. place authority export or review queue;
8. changelog for promoted records;
9. license and rights note;
10. known limitations and missing-data statement.

Open formats matter. GeoJSON is a natural web format because it encodes features, geometries, and properties in JSON, using WGS 84 longitude-latitude coordinates under RFC 7946 (Butler et al., 2016). GeoPackage is a useful GIS exchange format because it is an open, SQLite-based, portable format for vector, raster, tile, and metadata storage (Open Geospatial Consortium, 2026). CSV remains important because historians and journalists can inspect it without specialized GIS software.

The atlas does not need to choose one format. A practical model is: CSV for tables and ledgers, JSON for metadata and manifests, GeoJSON for web layers, and GeoPackage or PostGIS for heavier GIS work. The Genocide Atlas completion plan already points in this direction by requiring exportability suitable for GIS, PostGIS, or computational ingestion (Petrosyan, 2026i).

26 Limits of the Framework

The framework has limits. First, source-aware design does not solve source scarcity. It can reveal gaps, but it cannot replace archival research. Second, geometry classification does not create precision. It prevents false precision, which is valuable, but unresolved places remain unresolved until evidence improves. Third, public web performance requires simplification. Some polygons, lines, and dense datasets must be generalized for browser rendering. Fourth, record counts can be misleading if users do not understand that atlas records may include sources, analytical index nodes, density cells, boundary context, and review rows, not only individual events.

Fifth, public interfaces are vulnerable to maintenance problems. Links break, data sources update, APIs change, and external datasets revise definitions. Therefore, every atlas room needs version notes. Sixth, independent scholarship faces credibility challenges. A public atlas built outside a university lab can be innovative, but peer review, transparent data dictionaries, source registers, and reproducible exports are essential for scholarly acceptance.

Seventh, politically sensitive cartography can be misused. A map can be screenshot without its source panel, stripped of review labels, and circulated as a final claim. The interface can reduce that risk by embedding visible status labels, but it cannot eliminate misuse. The publication should therefore insist that source-aware maps be cited as research interfaces, not as isolated images.

27 Development Roadmap

The next development stage should focus on turning the atlas from a set of strong public interfaces into a fully citable scholarly infrastructure. The roadmap has ten components.

27.1 Versioned data releases

Each atlas room should have a versioned data release. The release should include a manifest, a data dictionary, layer files, source registry, and known limitations. Versioned releases make it possible for reviewers to evaluate the same dataset used in the article.

27.2 Persistent record identifiers

Every record should have a stable identifier. If a record is revised, the identifier should remain stable while a version field changes. If a record is deprecated, the deprecation should be recorded rather than silently deleting it.

27.3 Record dossiers

The selected-record panel should lead to record dossiers for important records. A dossier should include source trail, place authority, geometry rationale, review history, citations, linked media, and export metadata.

27.4 Place authority console

Historical place authority should become a public or semi-public console with unresolved aliases, proxy coordinates, language variants, administrative hierarchy, and promotion status.

27.5 Geometry audit

A geometry audit should list all exact, proxy, centroid, derived, digitized, review, and density geometries by atlas room. This would make false exactness visible at the corpus level.

27.6 Rights metadata

A rights metadata layer should distinguish public-domain sources, citation-only records, restricted archival materials, noncommercial reuse, and records that cannot display images or long excerpts.

27.7 Multilingual interface

A multilingual interface is particularly important for Armenian, Greek, Assyrian/Seyfo, Ottoman, Russian, French, English, and Turkish source environments. Place authority should support multilingual names and transliteration.

27.8 Archival image linking

Where rights permit, source records should link to archival map images, catalogue pages, or document scans. Where rights do not permit, they should link to citation metadata and access notes.

27.9 Peer-review pathway

The atlas should support layer-level peer review. A journal article can describe the method, but individual datasets may need separate review: Genocide Atlas v1, WWI operational source registry, WWII digitized fronts, Cultural Heritage Atlas, Conflict Systems Atlas, and so on.

27.10 Public API and downloadable citation packages

A public API or static API-like file structure could expose records by atlas, layer, year, source, place, review status, and bounding box. Downloadable citation packages would allow researchers to cite subsets of records used in their work.

28 Journal Positioning

The article can be positioned in several ways depending on the target journal.

For a digital humanities journal, the central argument should be that the project converts public mapping into evidence infrastructure. The article should foreground record classes, provenance, review status, public interface design, and scholarly communication. *Digital Scholarship in the Humanities* is a strong target for this framing.

For a historical methods journal, the article should emphasize source criticism, place authority, geometry class, review workflow, and the problem of using maps as historical arguments. *Historical Methods* would require a clearer methodological apparatus and perhaps a smaller case study.

For a GIScience journal, the article should be more technical: data model, geometry semantics, chunking, performance, source density, API architecture, GeoJSON/PostGIS export, and uncertainty representation. *International Journal of Geographical Information Science* would expect deeper engagement with GIScience literature and perhaps quantitative evaluation.

For genocide studies, the best article would be a case-driven version centered on the Genocide Atlas, deportation graph, camp system, place authority, and separated heritage context. The method could be presented through the Armenian, Greek, and Assyrian/Seyfo layers. *Genocide Studies and Prevention* or *Holocaust and Genocide Studies* would require a tighter historical case and a careful literature review on genocide documentation.

For map and library science, the article should emphasize the atlas as a public source registry and navigable cartographic archive. *Journal of Map & Geography Libraries* would be suitable if the manuscript foregrounds archival maps, source ledgers, catalogue logic, and public access.

The current expanded manuscript is best suited as a long methodological base text. It can later be shortened into one of these journal versions.

29 Conclusion

The public atlas system examined here demonstrates that web-GIS can be more than visualization. It can be a method of evidence organization. The key is not the number of records or the visual complexity of the map. The key is the discipline with which records, sources, geometries, review statuses, and interpretive layers are separated.

A source-aware atlas should show not only where a record is, but what it is. It should tell the user whether the object is an event, source footprint, analytical index, historical boundary, operational geometry, heritage record, memory context, density cell, route topology edge, or review geometry. It should show whether the coordinate is exact, proxy, centroid, derived, digitized, or provisional. It should show whether a record is reviewed, candidate, source-registered, or awaiting place-authority resolution. It should expose source trail and export data where possible.

This approach is especially necessary for politically sensitive and historically traumatic subjects. Maps of war, genocide, displacement, and heritage loss can easily overstate certainty. A source-aware atlas does not eliminate uncertainty; it makes uncertainty readable. That is its scholarly value.

The long-term goal is to build public cartographic systems in which evidence, context, uncertainty, and interpretation can be read together. Such systems can serve historians, journalists, teachers, students, archivists, human-rights researchers, and the wider public. They do not replace archival research or peer review. They provide an interface through which evidence can be navigated, inspected, questioned, and improved.

A Appendix A: Formal Atlas Record Model

The following model is a simplified conceptual schema for a record in a source-aware atlas. It is not intended as a mandatory software implementation; rather, it is a reference model for structuring fields consistently across atlas rooms.

```
{
  "id": "string, stable identifier",
  "atlas": "genocide | wwi | wwii | conflict | displacement | risk | transport | heritag
  "layer": "event | source_point | density | route | boundary | heritage | index",
  "claim_class": "event_claim | source_footprint | context | analytical_index",
  "name": "human-readable label",
  "type": "domain-specific type",
  "group": "people, actor, mode, source family, or thematic group",
  "date": "ISO date or year",
  "start_date": "optional interval start",
  "end_date": "optional interval end",
  "place_authority_id": "optional gazetteer key",
  "geometry": "GeoJSON geometry object",
  "geometry_status": "exact | settlement | proxy | centroid | derived | review",
  "geometry_note": "human explanation of spatial precision",
  "source_id": "source registry key",
  "source_url": "public URL if available",
  "source_note": "page, item, catalogue, dataset, or access note",
  "confidence": "high | medium | low | candidate",
  "review_status": "release_candidate | source_review | proxy_review | metadata_needed",
  "rights_status": "public | citation_only | restricted | unknown",
  "summary": "short public explanation",
  "updated_at": "version timestamp"
}
```

B Appendix B: Layer Taxonomy Checklist

Before publishing a layer, the atlas editor should answer the following questions.

1. Is this an event layer, source layer, context layer, analytical layer, heritage layer, operational layer, or density layer?

2. Does the layer contain direct event claims, or does it only contain source footprints?
3. Are coordinates exact, settlement-level, centroid-based, proxy, derived, or review geometry?
4. Is each record linked to a source identifier or dataset path?
5. Does each record have a confidence value and review status?
6. Are historical boundaries clearly distinguished from front lines or control states?
7. Are route edges marked as topology rather than exact path geometry when appropriate?
8. Are cultural heritage and memory records separated from direct event claims?
9. Are density layers labeled as overview rather than exact evidence?
10. Is the layer exportable as CSV, JSON, GeoJSON, or another open format?

C Appendix C: Suggested Article Figures

The manuscript would benefit from six figures before journal submission.

1. A system diagram showing atlas rooms, source registry, place authority, record exports, and public map interface.
2. A screenshot of the Genocide Atlas selected-record panel showing provenance, confidence, review status, and place authority fields.
3. A diagram of geometry classes: exact point, settlement point, proxy point, centroid, route-topology edge, digitized trace, density cell, context polygon.
4. A flowchart of the review pipeline from source registry to promoted record.
5. A screenshot or simplified view of the world-war atlas layer taxonomy: operational view, source density, source points, digitized fronts, event index.
6. A comparison diagram showing conventional map model versus source-aware atlas model.

D Appendix D: Minimal Data Dictionary for Overleaf Submission

Table 4: Data dictionary for key methodological terms.

Term	Definition
Evidence atlas	A public web-GIS system in which map objects are linked to source, geometry, confidence, review, and interpretation metadata.
Claim class	The epistemic category of a record: event claim, source footprint, analytical index, context, operational overview, heritage, or density.
Geometry status	The level and type of spatial precision represented by a geometry: exact, settlement, proxy, centroid, derived, digitized, or review.
Source footprint	A spatial reference to source material rather than a direct event claim.
Route topology	A graph relation among origins, transit nodes, camps, terminal zones, or destination categories without claiming exact path geometry.
Review geometry	A provisional geometry used to guide research and site verification.
Source density	A generalized overview of where source material exists. It is not an event layer.
Event density	A generalized overview of record concentration. It is not a substitute for event-level source inspection.
Place authority	A normalized historical gazetteer connecting names, aliases, languages, administrative contexts, coordinates, confidence, and review status.
Layer separation	The rule that direct evidence, context, memory, heritage, statistics, and analytical indices must not be visually or methodologically collapsed.

E Appendix E: Submission Strategy

A realistic submission pathway would proceed in three stages.

First, prepare a 7,000–9,000 word methodology article for a digital humanities or historical methods journal. This version should foreground the conceptual contribution: source-aware atlas, evidence geometry, review workflow, and public interface design.

Second, prepare a shorter case-specific article on the Genocide Atlas. That article should focus on the deportation graph, camp system, place authority, review geometry, and separated heritage context. It should include a more developed historical literature review and a limited number of example records.

Third, prepare a technical note or data paper describing the data model, exports, and record schema. This could accompany a Zenodo, OSF, institutional repository, or GitHub release if public data licensing permits.

The expanded manuscript in this file is intentionally broader than a final journal submission. It is designed as a base manuscript from which specialized journal articles can be derived.

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