ALGORITHMIC COMMON-GOOD OPTIMISATION FOR URBAN NEIGHBOURHOODS

ERIC SCHÖNE, M.A.
Doctoral Candidate (Planning)
Affiliation: D. A. Tsenov Academy of Economics - Svishtov
Address and contacts: Winterbergstraße 12B, 01277 Dresden, Germany; E-mail: schoene.eric@gmail.com

Abstract: *This article develops a machine- and AI-readable Single Source of Truth (SSOT) as a reference model for algorithmic common-good optimisation in urban neighbourhoods. The point of departure is a persistent integration gap. Normative common-good and public-value approaches, appraisal frameworks, digital planning infrastructures, strategic steering logics, provenance standards, and design-science artefact concepts are all highly differen-tiated. They rarely converge, however, in one canonical decision source. Methodologically, the article combines a systematic literature review, PRISMA-based screening, evidence mapping, and artefact-oriented design synthesis. The original contribution of this article lies in the triangulation of normative, analytical, and digital requirements and in the distinction between a constitutive core and a profile-based public-planning connection zone. The pro-posed SSOT architecture binds goals, red lines, governance assignments, effect assumptions, appraisal modes, evidence, distributional effects, fiscal feedbacks, an audit trail, provenance, and interpretation limits within one common structure. In this way, the source supports monitoring, decision snapshots, and reviewable accountability without fragmenting the core into local special-purpose logics.*

Keywords: *algorithmic common-good optimisation; urban neighbourhoods; reference model; Single Source of Truth; AI readability; strategic planning; decision infrastructure; data gover-nance*

JEL: R58; D61; C88; O33; H83

1. Introduction

1.1. Initial Situation

Urban neighbourhoods condense conflicts of objectives within a very small space. Affordability, accessibility, climate adaptation, resource efficiency, social inclusion, and fiscal viability interact directly. A linear logic of efficiency is insufficient for such settings. A merely programmatic reference to the common good is equally inadequate. What is required is a robust decision order that holds goals, effect assumptions, appraisal modes, responsibilities, and subsequent learning loops within one shared structure (Campbell, 1996; Healey, 1997; Innes & Booher, 2010; Fainstein, 2010; Alexander, 2002).

The literature has long described the individual building blocks. One strand emphasises value pluralism and political negotiation. A second strand focuses on ap-praisal logics, cost-benefit relations, and multi-criteria decision-making. A third strand addresses digital planning infrastructures, data governance, artificial intelligence, and artefact-oriented design (Boardman et al., 2018; Geertman & Stillwell, 2009; Wilkinson et al., 2016; Hevner et al., 2004). The core problem therefore lies less in the absence of individual methods. It lies in their insufficient integration.

1.2. Problematization

The operational capacity of urban decision systems has increased. Digital planning support, data-based modelling, and algorithmic procedures provide faster comparisons, denser data environments, and new forms of analytical read-out (Веселинова, 2017). What often remains unclear, however, is where normative priorities, hard limits, distributional effects, fiscal feedbacks, responsibilities, monitoring paths, and limits of interpretation converge in a binding manner (Веселинова, 2018). In practice, these elements are usually spread across strategy papers, tables, dashboards, specialist applications, expert reports, and presentations. It is precisely this distributed source landscape that generates the actual integration gap.

The consequence is not only operational friction but also an epistemic and gover-nance-related problem. When goals, thresholds, data definitions, weights, and review rules are maintained separately, no stable decision source emerges. What emerges instead is a chain of partial representations. This produces hidden model assumptions, unclear spaces of comparison, weak provenance, and contradictory reporting figures (Kitchin, 2014; Goodspeed, 2015; Sanchez et al., 2025; Чиприянов, М., 2026 а, Чиприянов, М., 2026b).

This situation becomes even more acute in public and municipal planning contexts. Decisions there must not only be analytically defensible. They must also remain translatable into strategic cycles, roadmaps, KPI logics, formal responsibilities, decision points, and accountability arrangements. The source question is therefore always also a question of strategic supportability (Bryson et al., 2018; Moore, 1995; Thabit et al., 2025).

1.3. Relevance of the Research

The relevance of the problem can be illustrated through a typical neighbourhood case. A municipality links a densification decision to heat protection, affordable housing, and a tight financing path. The strategic objectives are stated in a policy framework. Climate data are held in the GIS. Rent indicators sit in a social-monitoring environment. Fiscal assumptions appear in a budget document. Distributional effects are debated in workshops. Formal approval is issued through a committee paper. In precisely this constellation, the quality of individual methods is not the only issue. What matters is whether all relevant elements can be read from one consistent source.

The present article begins exactly at this point. It develops neither a local tool nor a country-specific solution, and it does not propose yet another isolated optimisation heuristic. Instead, it advances an abstract reference model for a machine- and AI-readable Single Source of Truth (SSOT) for algorithmic common-good optimisation in urban neighbourhoods. This model is more general than a concrete software instance. At the same time, it is more precise than a merely programmatic meta-narrative. It specifies which layers, field classes, review paths, and semantic safeguards a robust decision source must contain at a minimum.

Building on the author's earlier work on common-good-related target integration, governance architecture, the ECG planning cycle, and the Common-Good-Economy Ledger (Schöne, 2025; Schöne, 2026a; Schöne, 2026b; Schöne, 2026c), the present article shifts the focus from a process-compatible artefact to the architecture of the canonical source itself.

1.4. Identification of the Integration Gap

The integration gap can therefore be stated with some precision. Normative common-good and public-value approaches provide reasons for target pluralism and value con-flicts. Appraisal methods provide comparative logics. Digital planning infrastructures enhance operational capacity. Data-governance and provenance approaches structure data. What is missing is the systematic integration of these elements at the level of one shared, strategy-capable, machine- and AI-readable decision source.

1.5. Objective of the Article and Main Research Question

The novelty claim of the article does not lie in introducing algorithmic optimisation into urban and neighbourhood research for the first time. Its claim lies, rather, in deter-mining the upstream source question in scientific terms: where, and in what structure, must normative goals, governance assignments, effect assumptions, appraisal modes, evidence, distributional effects, fiscal feedbacks, review paths, provenance, and limits of interpretation be brought together so that algorithmic support becomes controllable, revisable, and publicly accountable?

The main research question is therefore formulated as follows: how can a generalis-able reference model for algorithmic common-good optimisation be designed that integrates normative, governance-related, analytical, procedural, and digital requirements in a machine- and AI-readable SSOT, supports strategic steering along the planning cycle, and at the same time opens a public-planning connection zone for KPI logics, roadmaps, responsibilities, decision points, and accountability?

1.6. Derived Sub-Questions

Four sub-questions are derived from the main research question. First, which strands of literature address the upstream conditions of algorithmic common-good optimisation, and where do their limits of integration lie? Second, which appraisal and decision-support approaches can be drawn upon in order to process common-good-relevant effects, trade-offs, and constraints in formalised form? Third, which design requirements follow from normative common-good orientation, strategic steering, data governance, provenance, and AI readability for a robust SSOT? Fourth, how can these requirements be translated into a reference model that remains both scientifically controllable and profilable for public-planning contexts?

1.7. Structure of the Article

The remainder of the article follows this logic. Section 2 reconstructs the conceptual framework and bundles the article's main theoretical preconditions. Section 3 explains the two-stage research design consisting of a systematic literature review, PRISMA-based screening, and artefact-oriented synthesis. Section 4 develops the review findings along four strands of literature and complements them with an evidence map in Section

4.5. Section 5 develops the reference model and adds, in Section 5.4, an explicit crosswalk between the SSOT and the earlier planning-oriented ledger. Section 6 formalises the architecture of the SSOT. Section 7 demonstrates the model's functioning by means of an illustrative neighbourhood application. Section 8 clarifies the artefact character and the connection to minimalist web-based instances. Section 9 discusses limits and the research agenda. Section 10 closes with a precise conclusion.

1.8. Scientific Delta Contribution

The delta of the article lies in a controlled triangulation. First, it models the normative level in such a way that goals, red lines, and conflict relations are not merely named but are carried as operative field classes. Second, it binds the analytical level so that mecha-nisms, appraisal modes, evidence, distribution, and fiscal feedback remain source-bound. Third, it disciplines the digital level so that provenance, comparison scope, versioning, and AI readability remain within the same structure. This normative-analytical-digital triangulation marks the paper's original contribution.

The distinction from the earlier Common-Good-Economy Ledger is central in this respect. The ledger is a planning-oriented boundary object. It documents booking, balancing, and tracking. The SSOT goes beyond this level. It is the canonical source from which ledger entries, decision snapshots, dashboards, reports, and AI-supported read-outs are derived. The SSOT does not replace the ledger. It places it on a higher architectural level and thereby makes the step from a coupling artefact to a source architecture explicit.

At the same time, the novelty claim remains deliberately narrow. The article does not argue that public value, MCDA, PSS, or data governance are insufficiently developed as fields. Nor does it claim absolute firstness. It claims, rather, insofar as the reviewed corpus indicates, the first systematic integration of these debates at the level of a controllable decision source.

1.9. Scope and Claim to Validity

The claim to validity of the reference model is deliberately one of medium range. It should be read neither as a universal theory of the common good nor as a finished specialist application. Its field of application lies wherever planning-related decisions are shaped by target pluralism, dispersed institutional responsibility, hybrid appraisal logics, and digital dependence on data. Urban neighbourhoods provide a particularly suitable field of inquiry because strategic objectives, fine-grained measures, social distributional effects, ecological risks, and fiscal viability intersect there directly.

This medium range is not a compromise. It is a scientific decision. An overly narrow claim to validity would confine the artefact to a special case. An overly broad one would render its constitutive conditions imprecise. The SSOT is therefore developed as a generalisable yet profilable core. Generalisable means that structural classes, review paths, and semantic safeguards remain stable across cases. Profilable means that legal frameworks, KPI sets, role models, language versions, and reporting obligations can be added as a connection zone without rewriting the core.

2. Conceptual Framework and Theoretical Foundations

2.1. Algorithmic Common-Good Optimisation as a Decision Problem

In the present context, algorithmic common-good optimisation does not mean claim-ing that the common good can be calculated in full. What is meant instead is the formalised support of decision processes in which pluralised goal systems, constraints, distributional effects, and revision paths are handled in a traceable manner. The term optimisation must therefore be read in a strictly relational sense. What is optimised is not a substantively unambiguous common good, but the handling of a decision space that is pre-structured by public values, conflicts of objectives, and institutional rules (Alexander, 2002; Fainstein, 2010; Moore, 1995).

This definition distinguishes the article from two reductions. Common-good opti-misation is understood neither as a pure problem of social choice nor as a black-box heuristic. The focus is a decision order in which normative assumptions, analytical operations, and digital processing steps are coupled in such a way that later algorithmic support remains controllable (Rittel & Webber, 1973; Stoker, 2006; Vigar, 2020).

2.2. The SSOT in the Planning Context

In a planning context, an SSOT is neither mere data storage nor just another data warehouse. It is a canonical decision source in which normative requirements, effect assumptions, appraisal modes, states of evidence, roles, approvals, review paths, and limits of interpretation are carried within the same structure. The SSOT thus stands between strategy and instantiation. It is more general than a concrete interface, yet more specific than a purely conceptual frame of reference. The term Single Source of Truth comes from information-management practice. In the present article, it is recast in planning-theoretical and governance-related terms. The point is not ontological truth. The point is an approved, revisable, and semantically con-trolled source from which different views can be derived without producing competing shadow sources. Table 1 summarises the distinction between the proposed SSOT and the earlier Common-Good-Economy Ledger (Schöne, 2026c).

Table 1

SSOT versus the earlier Common-Good-Economy Ledger. Author's own illustration.

Dimension	Earlier Common-Good-Economy Ledger	SSOT in this article	Added value of the shift
Primary function	Planning-oriented coupling, booking, and tracking artefact	Canonical decision source with core, rules, profiles, and views	From artefact to source architecture
Object logic	Entries, appraisal fields, governance assignment, monitoring notes	Field classes, objects, states, com-parison scope, provenance, and AI readability	Higher internal relationality
Strategic role	Supports balancing, documentation, and monitoring along the planning process	Binds strategy, decision, monitoring, and revision to the same source	Stronger strategic supportability
Digital connectivity	Process-compatible and close to documentation	Machine- and AI-readable, pro-file-based, and write-back capable	Better derivability for APIs, dash-boards, and assistance

2.3. Public Value, the Common Good, and Public Value Orders

The literature on public value, public interest, and the just city has shown that public value orders are neither stable nor conflict-free. They emerge through negotiations among political goals, institutional routines, societal conflicts, and organisation-related action logics (Moore, 1995; Benington & Moore, 2011; Meynhardt, 2009; Jørgensen & Bozeman, 2007; van der Wal et al., 2015). Two insights are central for the present article. First, goal pluralism is the normal case of public decision-making. Second, every operationalisation must disclose which values are prioritised, which are carried along, and which are treated as non-substitutable limits.

Recent work on strategic public value governance shifts the debate further from normative legitimation towards the organisational stabilisation of public values in collaborative arrangements (Thabit et al., 2025). It follows that value orders must not appear in the reference model merely as introductory prose. They must be modelled as operative field classes with roles, thresholds, conflict references, and occasions for review.

2.4. Appraisal, MCDA, and Hybrid Appraisal Logics

Cost-benefit analysis, multi-criteria analysis, GIS-based appraisal approaches, and hybrid appraisal frameworks form the classical methodological infrastructure through which political and planning alternatives are made comparable (Boardman et al., 2018; HM Treasury, 2022; Malczewski, 1999, 2006; Roy, 1996). These procedures are indispens-able. They show how conflicts of objectives can be formalised, trade-offs made explicit, and comparative logics structured. At the same time, they also mark their own limit. They usually presuppose that goals, indicators, weights, and decision rules have already been clarified to a sufficient degree.

This is precisely where the SSOT gains its analytical value. It is not another appraisal method. It is the source in which different appraisal modes are coordinated. Whereas MCDA and CBA guide operative comparisons among alternatives, the SSOT records which appraisal form is admissible in which case, which evidence is to be used, which aggregations must remain prohibited, and how distribution, uncertainty, and fiscal feedback are to remain visible. The bridge to the earlier planning-cycle and ledger work lies in treating double materiality as a design problem of translation rather than as a separate reporting layer (Schöne, 2026b; Schöne, 2026c).

2.5. Digital Planning Infrastructures and PSS

Planning-support systems, GIS-proximate information systems, and digital planning infrastructures have transformed the technical environment of planning-related deci-sions. Since Klosterman, and Geertman and Stillwell, the field has been described as a combination of data, models, interactions, and application logics that can support spatial analysis, scenario comparison, visualisation, and strategic preparation (Kloster-man, 1997; Geertman & Stillwell, 2009). Batty and Goodspeed later emphasised the infrastructural dimension. Digital planning environments create new opportunities for integration, but also new dependencies on formats, interfaces, platforms, and model assumptions (Batty, 2013; Goodspeed, 2015).

Recent work reinforces this diagnosis. Systematic reviews and current application-oriented contributions show that PSS and digital planning are becoming increasingly differentiated methodologically, while often failing institutionally because of unclear roles, heterogeneous data environments, and weak organisational connectivity (Hong, 2024; Pedron et al., 2024; Oyeku et al., 2025; Lin et al., 2025). This double movement makes the source question especially visible. Technology and institution can only be coupled robustly if they access the same space of meaning.

2.6. AI Readability and Inferential Constraint

Machine readability alone is no longer sufficient for contemporary planning contexts. As soon as generative or assistive AI systems access decision sources, it must also be defined what a field means, for what it may be used, and which inferences remain explicitly inadmissible (Jiang et al., 2025; Sanchez et al., 2025; Çipi et al., 2026). AI read-ability therefore comprises semantic clarity, comparison scope, citation duty, admissible operations, and prohibited inferences. It extends technical interoperability by adding epistemic discipline.

The critical point lies in the difference between a data schema and an interpretation schema. A classical data schema defines data types, required fields, and relations. AI readability additionally requires a mark-up of what may not logically or politically be inferred from a field. A heat-stress score, for example, may feed into the prioritisation of cooling measures. It may not, however, be read as a statement about individual health risks without additional evidence. In this sense, AI readability is not a convenience fea-ture. It is a safeguard against implicit, untested, and potentially politically consequential inferences.

2.7. Data Governance, Provenance, and Revisability

Data-governance and provenance approaches have gained importance because data-driven environments quickly become opaque and conflict-prone when rules concerning origin, access, versioning, and responsibility remain unclear. PROV-DM and FAIR show that robust data environments require more than storage consistency. They require origin relations, traceability, reusability, and clearly defined derivation paths (Moreau & Missier, 2013; Wilkinson et al., 2016). Urban data governance translates this logic into the urban and administrative domain and emphasises standardised formats, tech-nology-independent structures, inter-organisational coordination, and the need for a data-driven culture (Bozkurt et al., 2025a; Bozkurt et al., 2025b; OECD, 2023, 2024).

Two conclusions follow for the present article. Provenance must not be treated as a mere ex post metadata shell. It is part of the field logic itself. At the same time, data governance remains incomplete without strategic and evaluative coupling. An SSOT must therefore do more than document where a value originates. It must also show how that value is embedded in decision, monitoring, and revision contexts.

2.8. Strategic Support along the Planning Cycle

In this field, strategic planning is supported through repeated translation: from target images and priorities into responsibilities, KPI, resource commitments, decision points, review, and corrective steering (Bryson et al., 2018; Moore, 1995; Thabit et al., 2025). An SSOT is strategically capable when it does not merely cite guiding frameworks and programmes, but translates them into recurring operative fields, review paths, and occasions for revision.

This strategic requirement is consistent with the earlier planning-cycle and ledger work, both of which treated implementation as a translation effort among normative target setting, governance, and data-based corrective steering (Schöne, 2026b; Schöne, 2026c). In the present article, this logic is generalised to the level of the source itself. Strategic connectivity is therefore not an optional add-on. It is a constitutive condition of the reference model.

2.9. Preliminary Design Requirements

The literature strands cannot be placed next to each other in a merely additive way. They point towards a condensed set of requirements. Table 2 adopts the logic of design-oriented condensation already visible in the earlier ledger work, but extends it through operative field classes, an explicit linkage to the source core, and a monitoring path.

Table 2:

Design principles of the SSOT and operative field classes. Author's own illustration.

Code	Requirement / design principle	Operative field class	Linkage with Schöne (2026c)	Strategic support & monitoring path
DA1	Explicit normativity	Goals, priorities, red lines, conflict references	Continues the ledger's logic of guiding criteria and trade-offs	Binds target image, minimum standards, and escalation rules to the same core
DA2	Effect and appraisal logic	Mechanisms, appraisal modes, evidence types, aggregation rules	Extends the ledger's hybrid appraisal logic through admissible operations	Secures consistent decision snapshots and later rebaselining rules
DA3	Governance and responsibility	Roles, approvals, decision points, KPI, roadmaps	Carries forward governance assignment and reporting paths from Schöne (2026c)	Couples strategy, decision, and accountability
DA4	Provenance, revision, and auditability	Sources, versions, triggers, justifications, state changes	Deepens the ledger's audit trail and monitoring triggers	Enables write-back, re-view, and corrective steering
DA5	Machine and AI read-ability	Plain-language meaning, admissible operations, prohibited inferences, comparison scope	New layer compared with Schöne (2026c)	Constrains AI read-out and standardises derivations
DA6	Profile-based insatiability	Jurisdictional, language, KPI, and organizational profiles	Extends the ledger's connection logic into profiles	Enables local use with-out forking the core
DA7	Learning and write-back capability	Monitoring fields, lessons learned, revision objects	Systematically continues the ex ante/ex post coupling from Schöne (2026c)	Keeps monitoring and revision decisions source-bound

2.10. Interim Conclusion

The conceptual discussion shows that algorithmic common-good optimisation can be understood neither as a mere appraisal method nor as a pure platform question. What is required is a canonical, strategy-capable, and semantically disciplined decision source in which normativity, appraisal, governance, provenance, and AI readability are handled simultaneously. Tables 1 and 2 already show that the article is closely connected to the earlier planning-oriented ledger work, while its actual contribution lies in the shift from a ledger-shaped coupling artefact to a source architecture.

2.11. The Common Good as an Economic Factor and Double Materiality

For the logic of the reference model, it is essential to understand the common good not only as a moral or procedural category. It is also an economic factor of spatial planning. This does not imply that the common good can be monetised in full. It means, rather, that societal goals, risks, and side effects are translated into real cost effects, benefit effects, distributional effects, and stabilisation effects. In this sense, affordability, accessibility, heat exposure, the prevention of social conflict, or robustness of use are not merely normative markers. They influence transaction costs, follow-up costs, regulatory risks, resilience, and thus the viability of spatial development decisions (Boardman et al., 2018; HM Treasury, 2022; Moore, 1995; Mazzucato, 2018; Stiglitz et al., 2009; Schöne, 2026b).

It is at this point that double materiality becomes connectable. In the earlier work, it does not describe only the familiar ESG distinction between outward and inward effects. It designates a space of translation in which societal effects and organisation-related robustness questions become visible at the same time (Schöne, 2026b; Schöne, 2026c). For the SSOT, this means that the source must not be narrowed either to the perspective of the affected public or to that of the steering actor. A robust decision source must carry both perspectives, because common-good effects and institutional robustness interact rather than occurring in separate evaluative worlds (Mazzucato, 2018; Stiglitz et al., 2009).

2.12. Boundary Objects, the Ledger, and Source Architecture

The literature on boundary objects and planning-oriented coupling artefacts makes clear that complex decisions can rarely be described fully in one place or in one language. Different actor groups, forms of knowledge, and perspectives of appraisal must be related to one another in such a way that co-operation remains possible without presupposing complete categorical uniformity. This was already the strength of the earlier Common-Good-Economy Ledger. It functioned as a planning-oriented boundary object because it rendered criteria, mechanisms, appraisal logics, distribution, fiscal feedback, governance assignment, and monitoring visible within one common structure (Schöne, 2026c).

The SSOT goes one step further. It adopts the ledger-like logic of booking, documentation, and traceability, but shifts it from the level of a specific coupling artefact to the level of the source itself. What appears in the ledger as an entry becomes, in the SSOT, an object with semantic, strategic, governance-related, and digital relations. From a boundary-object perspective, the SSOT is therefore not a neutral container. It is a disciplining mediation artefact between the goal system, appraisal, decision, monitoring, and read-out.

2.13. Strategic Steering as Repeated Translation

The strategic content of the article becomes clear only if strategy is not reduced to guiding images or programmes. In the relevant management and public-value literature, strategic steering appears instead as a repeated act of translation: goals are prioritised, linked to resources, translated into roles and programmes, tied to metrics, reviewed, and revised where necessary (Bryson et al., 2018; Moore, 1995; Thabit et al., 2025). In the context of urban neighbourhoods, this translation takes place across several levels, from programmes and target images through project decisions and contractual logics to monitoring and review.

The SSOT begins precisely at this interface. It does not replace strategy. It supports strategic translation structurally. It keeps target images as operative fields, links those fields to roles and KPI, binds appraisal and decision steps back to the same comparison scope, and prevents review from dissolving into separate reporting worlds. Strategy is thus modelled as source-based translation work.

2.14. From Decision Support to the Decision Source

The literature on decision-support systems and PSS often understands support in instru-mental terms. Data, models, and visualisations are expected to improve, rationalise, or make decisions more transparent. The present article shifts that perspective one level upstream. Support capability is understood here as a property of the source. A system supports decisions robustly only when the source from which it reads is itself strategi-cally, semantically, and governance-wise robust. Otherwise, it merely reproduces the fragmentations it claims to overcome.

This shift is especially important for algorithmic common-good optimisation. Opti-misation, simulation, or AI procedures may be highly developed technically and still remain strategically blind if they rely only on isolated bundles of indicators, unmarked weights, or semantically hollowed-out data fields. The SSOT therefore does not address the performance increase of a single tool. It addresses the condition under which different tools can read the same space of conflict and meaning in a controlled way.

3. Methodology: Systematic Literature Review and Artefact-Oriented Synthesis

3.1. Research Design

The manuscript follows a two-stage research design. In Stage 1, a systematic literature review is conducted as a mapping and synthesis process in order to identify the concepts, mechanisms, and operationalisation approaches through which algorithmic common-good optimisation in urban neighbourhoods is discussed. In Stage 2, the results are translated into a design-science procedure in order to construct the reference model as an artefact class (Hevner et al., 2004; Peffers et al., 2007).

The combination of review and design synthesis is methodologically appropriate. The article does not merely aim to describe what is already available in the research literature. It aims to develop a scientifically controllable structural proposal. The review therefore fulfils two functions at once. It reconstructs the problem-relevant state of research and provides the disciplined material basis for artefact development.

3.2. Search Strategy and Corpus Formation

The literature search follows the PRISMA 2020 recommendations and combines search spaces from planning studies, information science, data governance, public-value research, and design science (Page et al., 2021). The review considered Scopus, Web of Science, EconLit, JSTOR, RePEc/IDEAS, SSRN, Google Scholar, and Semantic Scholar. It was complemented by institutional sources, including OECD, the EU, HM Treasury, Defra, and relevant open-standard organisations. The full search strategy, the core strings, and the search logic are documented in Appendix A1.

The final search was completed on 15 March 2026. In total, n = 712 records were identified, of which n = 589 came from databases and n = 123 from additional sources. The search space was deliberately broad. It combined five fields: first, common good, public value, public interest, and the just city; second, algorithmic planning, planning-support systems, decision support, optimisation, and digital planning; third, governance, strategic planning, accountability, KPI, and monitoring; fourth, data governance, prove-nance, FAIR, audit trail, and single source of truth; and fifth, AI readability, generative AI, explainability, and semantic annotation.

3.3. Screening and Selection

After the removal of duplicates (n = 148), n = 564 titles and abstracts were screened. Of these, n = 421 were excluded. A total of n = 143 full texts were assessed in greater depth; a further n = 61 sources were excluded on the grounds of relevance, theoretical connectivity, methodological traceability, and direct relation to the problem under investigation. The resulting core corpus comprises n = 82 sources from the period 1990–2026.

Publications were included if they fulfilled at least one of the following criteria: an explicit connection to urban or spatial planning, public value creation, or common-good orientation; a formalised appraisal or decision-support logic; a digital planning or data infrastructure with reference to governance, provenance, or interoperability; artefact development based on design science or reference modelling; or a thematic relation to AI readability, algorithmic assistance, or semantically controlled read-out. Sources were excluded if they were purely technical and lacked a planning or governance relation or, conversely, if they remained purely normative without any connection to structural or translation questions.

3.4. Coding, Coding Scheme, and Narrative Synthesis

The coding guide comprised six main dimensions: (1) conceptions of the common good and public value, (2) algorithmic or digital mechanisms, (3) appraisal logic, (4) governance and strategic relevance, (5) data governance, provenance, and revisability, and (6) elements of AI readability, semantic annotation, and inferential constraint. Rayyan was used for screening, Citavi for reference management, and MAXQDA for coding, memos, and cluster-based condensation.

The narrative synthesis was not designed as a loose summary. For each strand of literature, the following questions were asked: which problem is being addressed? Which means of solution are offered? Which preconditions are presupposed tacitly? Which aspects of the source question remain open? This contrast logic was central. It shifted the analytical focus from individual methods to the gap that remains between the debates.

3.5. Artefact-Oriented Translation

The second stage uses the review-based condensation not only descriptively but also constructively. The identified patterns are translated into design requirements, field classes, profile zones, and revision logics. This takes place in four steps: problem condensation, derivation of design requirements, conception of the reference model, and architectural specification of the SSOT.

The scientific contribution therefore lies at the level of the artefact class. The primary object of analysis and construction is not a concrete software instance but the generalisable structure of the SSOT. A software-centred procedure would risk confusing a specific technical stack with the theoretical contribution. The present article avoids precisely that confusion.

3.6. Quality Criteria and Limits of the Procedure

The methodological design has three strengths. First, it combines systematic breadth with a clearly defined construction question. Second, it makes it possible to synthesise older planning-theoretical work together with newer digital and AI-related strands. Third, the artefact development remains traceable because it is anchored in explicit criteria, field classes, design principles, and appendices.

At the same time, limits must be acknowledged. The review does not claim biblio-metric completeness across all adjacent disciplines. The design-synthesis component remains, at this stage, a reference model rather than an empirically instantiated system. In addition, every assessment of novelty remains tied to the visible and retrievable body of literature available at the time of review.

3.7. Methodological Output

The methodological output therefore consists not only in a condensation of the state of research but also in an explicit transition from review to construction. The review synthesis generates design requirements. These requirements are translated into field classes, principles, and architecture. Architecture and field logic then form the basis for the illustrative application and for the later derivation of a web-based instance.

Methodologically, the article thus becomes visible as a sequential translation: from literature to requirements, from requirements to a reference model, and from the refer-ence model to a possible instantiation. This logic follows the general orientation of the earlier planning-oriented ledger contribution, but shifts its emphasis from ledger logic to the architecture of the source itself.

3.8. Search Strings, Refinements, and Delimitations

The search strategy was refined iteratively. The first round remained deliberately exploratory in order to make terminological variation visible. In a second round, core terms were combined more systematically, for example public value or common good with planning-support systems, decision support, optimisation, and digital planning. A third round targeted explicitly the integration gap defined in this article as the source question: data governance, provenance, audit trail, single source of truth, semantic annotation, and AI readability. The compact search strings and the database matrix are documented in Appendix A1.

The search was not restricted to direct keyword matches alone. Functional equiva-lents were also considered. Contributions on strategic steering or reference models could be relevant even if they did not use the term SSOT. Conversely, works on SSOT or data architectures were not included automatically if they lacked a recognisable connection to planning, governance, or the common good. It was precisely this logic of functional comparison that made it possible to identify the gap as a structural non-integration of heterogeneous debates.

3.9. From the Literature Corpus to Field Classes and Rules

The translation of the corpus into an artefact did not proceed linearly. First, problem-relevant statements were condensed along the six coding dimensions. In a second step, recurring patterns were examined as to whether they could be reformulated as require-ments of a source architecture. Only in a third step were these requirements translated into field classes, state logics, semantic enrichments, and profiling principles.

From a methodological point of view, it is important that artefact development not be confused with free speculation. The reference model is a disciplined condensation of what the literature indicates to be necessary but dispersed. It is constructive because it proposes a new order. It is controlled because every central structural property can be traced back to recurring problem constellations in the corpus.

3.10. Reflexivity and the Limits of the Design-Science Approach

The design-science approach brings its own limits. First, the precision of the artefact depends on which literature was visible, accessible, and integrable. Second, there is a risk of producing a smoother coherence than planning practice actually exhibits and thus underestimating the contingency of real-world planning. Third, a reference model initially remains at the level of the artefact class; its robustness in concrete administrative, market, or co-operative contexts must be demonstrated only through later instantiations, pilots, and comparative tests.

Reflexivity also means allowing alternative readings to remain productive. The results could, in part, also be read through institutional adaptation, risk and resilience steering, digital sovereignty, or organisational learning. The article does not reject these perspectives. It integrates them as competing or complementary explanatory possibil-ities. It is precisely through this openness that the reference model remains capable of further development without becoming arbitrary.

4. Results of the Literature Review

4.1. Overview of the Literature Clusters

The corpus does not reveal one unified disciplinary debate. It reveals four condensed strands of literature, each of which addresses a different part of the problem constel-lation: first, normative common-good and public-value logics; second, appraisal and decision support; third, digital planning infrastructures and algorithmic assistance; and fourth, data governance, provenance, and artefact-oriented reference modelling. The clusters are complementary, but they are not integrative. It is precisely this non-identity that is central to the research question.

Figure 1 summarises the search and selection process. The evidence map in Section.

4.5 condenses the corpus not only thematically but also according to each strand's relevance for the SSOT architecture.

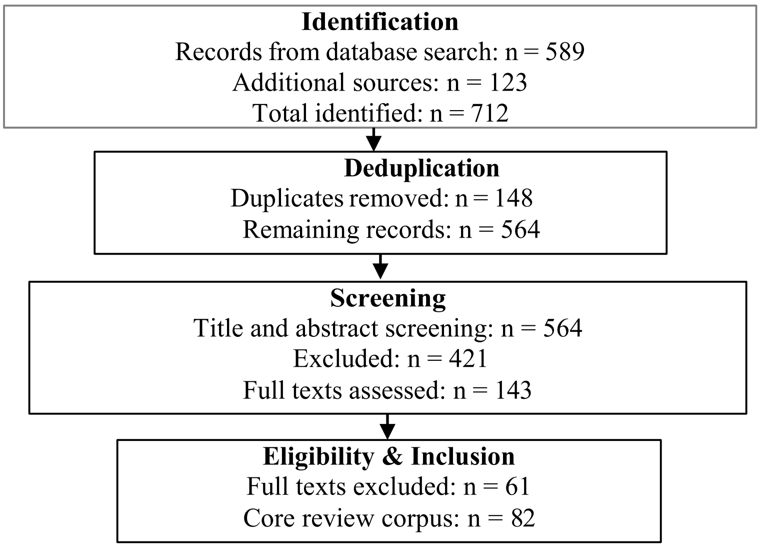

Figure 1: PRISMA flow of the review. Author's own illustration adapted from PRISMA 2020.

4.2. Cluster I: Normative Common-Good and Public-Value Logics

The classical planning and public-value literature shows that urban decisions regularly address several values at once, some of them incommensurable. Campbell (1996) describes these conflicts as structural tensions of sustainable urban development. Healey (1997) and Innes and Booher (2010) shift the focus to modes of negotiation and co-ordination. Fainstein (2010) emphasises justice as an independent normative order. Alexander (2002) argues for a substantive examination of the public interest. What these works share is that they do not eliminate goal pluralism. They treat it as a starting condition.

Two implications follow for the present article. First, every form of algorithmic assistance requires an explicit normative pre-structuring. Second, a purely aggregative concept of welfare would be analytically too narrow for neighbourhood decisions. An SSOT must therefore include goal pluralism, conflicts of objectives, and non-substi-tutabilities as original parts of the source. The literature in this cluster thus justifies the need for explicit normativity, but it does not yet answer the source question itself.

4.3. Cluster II: Appraisal and Decision Support

The second cluster is much more operational methodologically. Boardman et al. (2018) and HM Treasury (2022) provide robust standards for cost-benefit relations and appraisal. Malczewski (1999, 2006) and Roy (1996) demonstrate the analytical capacity of multi-criteria decision approaches. GIS-based variants show how spatial data, criteria, and weights can be linked formally. These works create transparency regarding trade-offs and make alternatives comparable.

This is exactly why they are indispensable for Paper 3. At the same time, they also reveal their limit. Appraisal procedures do not usually explain where goals, thresholds, and weights originate, how approvals are organised, which aggregations remain politi-cally admissible, or how revisions are later written back. The open flank of this cluster therefore does not lie in a lack of methodological maturity. It lies in the absence of source primacy.

4.4. Cluster III: Digital Planning Infrastructures, PSS, and Algorithmic Assistance

The PSS and digital-planning literature shows that the technical side of planning-related decision support now extends far beyond classical data storage. Models, visualisations, simulation logics, interactions, and scenario techniques are embedded in complex infra-structures that reorganise planning as a form of information work (Klosterman, 1997; Geertman & Stillwell, 2009; Batty, 2013). Goodspeed (2015) stresses that smart and data-driven urban approaches become viable only when they also address wicked problems and political uncertainty.

More recent literature on algorithmic and generative AI sharpens the source question further. Jiang et al. (2025) discuss the potential of ChatGPT-like systems in planning-support arrangements, while also marking requirements concerning transparency, bias control, and institutional safeguards. Sanchez et al. (2025) make ethical concerns explicit. Çipi et al. (2026) identify further opportunities and risks in urban design. The conse-quence for the present article is clear: as long as sources are merely machine-readable, but not semantically and inferentially disciplined, every additional AI-assistance layer increases the risk of hidden misinterpretation.

4.5. Evidence Map

The evidence map condenses the four strands according to the specific type of ordering work they perform. It asks not only what a strand addresses thematically, but also what kind of evidence it uses, what form of decision support it provides, and which open gap remains for the SSOT. It is precisely this mapping that replaces loose cluster description with a structured comparative frame.

Table 3:

Evidence map of the literature review. Author's own illustration.

Cluster	Primary question	Typical evidence form	Contribution to the SSOT	Open gap
Normative common-good and public-value logics	Which values and conflicts are publicly relevant?	Conceptual and nor-mative literature; governance analyses	Justifies explicit normativity and red lines	No canonical digital source structure
Appraisal and decision support	How are alternatives made comparable?	CBA, MCDA, GIS-Based appraisal frameworks, appraisal guides	Justifies hybrid appraisal logics	Presupposes ordered goal and rule spaces
Digital planning in-frastructures and AI	How are planning, data, and assistance coupled technically?	PSS literature, digital-planning reviews, AI ethics	Justifies semantic discipline and AI readability	Lacks integration of goals, rules, and revision paths
Data governance, provenance, and reference models	How are data, roles, and derivations structured?	FAIR, PROV-DM, urban data governance, DSR	Justifies provenance, versioning, and profiling	Normative and strategic translation remains under-specified

4.6. Cluster IV: Data Governance, Provenance, and Artefact-Oriented Reference Modelling

The fourth cluster provides the strongest building blocks for a formal definition of the source. FAIR and PROV-DM make clear that data must not only be accessible, but also interoperable, reusable, and documented in terms of origin relations (Moreau & Missier, 2013; Wilkinson et al., 2016). Urban data governance extends this logic by adding organisational and cultural dimensions. Bozkurt et al. (2025a; 2025b) show that urban data governance requires standardised formats, clear access rules, and stronger administrative co-ordination. At the same time, the design-science literature legitimizes the development of reference models as a scientific contribution in its own right (Hevner et al., 2004; Peffers et al., 2007).

Even this cluster does not close the gap completely. Provenance and data-governance approaches structure data and processes, but they do not address with the same depth the normative and strategic translations of public neighbourhood decisions. Design science legitimises artefact development, but it does not provide a substantive structure for common-good-oriented neighbourhood decisions. The delta of the present article therefore arises precisely from the combination of these perspectives.

4.7. Research-Logic Linkage to the Earlier Work

The author's earlier work provides the immediate point of departure for the present article. That work moved from the strategic integration of common-good-related target variables, through governance architecture and the ECG planning cycle, to the planning-oriented ledger as a coupling artefact (Schöne, 2025; Schöne, 2026a; Schöne, 2026b; Schöne, 2026c). The present article takes the next step by making the architecture of the source itself the object of inquiry.

This research logic matters for the assessment of the article. It strengthens its autonomy because the paper does not simply repeat what is already embedded in the ledger. At the same time, it explicitly marks the origin context of the central ideas and avoids unmarked self-transfer.

4.8. Comparison of the Four Literature Strands with SSOT Design Requirements

The four clusters differ not only thematically. They differ above all in the level at which they perform ordering work. Table 4 condenses this observation. It shows the strength of each strand, the blind spot that remains, and the concrete SSOT requirement that follows from it.

Table 4:

Comparison of the four literature strands with SSOT design requirements. Author's own illustration.

Literature strand	Strength	Blind spot	Derived SSOT requirement
Normative literature	Clarifies goal pluralism, legitimacy, and the conflictual nature of public value	Usually remains at the level of value orders and procedure	Explicit normativity, conflict relations, and red lines as field classes
Appraisal literature	Creates comparability and formal trade-off handling	Presupposes goals, thresh-olds, and approvals	Hybrid appraisal logic with admissible aggregation rules
PSS and AI literature	Improves analysis, scenarios, and read-out	Often underestimates semantic drift and institutional embedding	Semantic discipline, AI readability, and explicit comparison scope
Data-governance and ref-erence-model literature	Strengthens provenance, standardisation, and role logic	Normative and strategic translation remains underspecified	Provenance, profiling, versioning, and a rule layer capable of write-back

4.9. Condensation into Design Principles

Three overarching lessons can be derived from the review. First, conflicts of objectives, non-substitutabilities, and distributional effects must already be modelled at the level of the source. They must not appear only later in the interpretation of results. Second, forms of appraisal, kinds of evidence, and semantic limits must be co-ordinated instead of being distributed across separate subsystems. Third, strategic steering requires a structure that enables not only comparison and reporting, but also approval, revision, correction, and learning within the same core.

This condensation forms the transition from the literature review to artefact devel-opment. At the same time, it protects the article against overreach. The delta does not lie in dismissing individual clusters as deficient. It lies in the controlled integration of their ordering capacities within one common decision source.

4.10. Interim Conclusion

The review shows not only that relevant building blocks exist, but also where their sys-tematic non-integration lies. Normative literature provides values. Appraisal literature provides comparative logics. PSS and AI literature provide operational support. Data-governance literature provides structural and provenance logics. Insofar as the reviewed strands indicate, what is still missing is a canonical, strategy-capable, machine- and AI-readable decision source that integrates these building blocks at the level of the same structure. It is exactly this gap that is translated, in the next step, into the development of the reference model.

5. Development of the Reference Model

5.1. Problem Core and Reach

The reference model is not another software architecture in the narrow sense. It defines an artefact class. It brings together those elements that appear throughout the literature but rarely converge within the same source: normativity, effect assumptions, appraisal modes, evidence, distribution, fiscal feedback, governance, review, provenance, and AI readability. The model therefore claims neither completeness nor local pre-configura-tion, but a generalisable structural core. Its reach lies between a conceptual model and a concrete specialist application: more concrete than a normative heuristic, yet more abstract than a locally deployed system (Hevner et al., 2004; Peffers et al., 2007; Bozkurt et al., 2025b).

This determination is not merely definitional. It is necessary from the standpoint of research logic. If the artefact were understood as software, the discussion would shift prematurely towards implementation details. If it remained a purely conceptual frame, the upstream source question could not be answered operationally. The reference model therefore functions as an intermediate layer between theory and instantiation.

5.2. Constitutive Core

The constitutive core comprises six field classes: context, normative requirements, gov-ernance, effect and appraisal logic, data and evidence, as well as monitoring and revision. Only when these classes are carried together can a source support both algorithmic assistance and public accountability. The constitutive level is therefore more stable than concrete workflows, yet more operative than a merely conceptual frame (Moreau & Missier, 2013; Wilkinson et al., 2016; Bozkurt et al., 2025a).

The context class includes spatial reference, time horizon, alternative space, process-ing status, version status, and problem type. Normative requirements include goals, priorities, minimum standards, red lines, and conflict references. Governance includes roles, responsibilities, approvals, escalation paths, and decision points. Effect and appraisal logic bring together mechanisms, appraisal modes, admissible aggregation, uncertainty notes, and non-substitutabilities. Data and evidence comprise indicators, baselines, target values, timeliness, data source, and provenance. Monitoring and revi-sion bring together triggers, state changes, the audit trail, deviation notes, and elements of corrective steering.

5.3. Profile-Based Public-Planning Connection Zone

In addition to the core, the model requires a contextual connection zone. This zone accommodates language, legal, KPI, roadmap, responsibility, and reporting-obligation profiles without rewriting the core. For public and municipal contexts, precisely this distinction is crucial. It prevents every jurisdiction from producing its own fork while still allowing formal decision and responsibility structures to be layered into the system (Bryson et al., 2018; Bozkurt et al., 2025a).

The connection zone fulfils three functions. First, it translates the core into field-specific and organisation-specific requirements. Second, it stabilises the strategic use of the source by linking KPI logics, time grids, responsibility orders, and decision-snap-shot formats. Third, it protects the core against regional over-shaping. The distinction between constitution and profiling thus becomes explicit: the core is invariant enough for reuse, while the connection zone is flexible enough for real public-planning contexts.

5.4. SSOT-Ledger Crosswalk

The SSOT is not developed ex nihilo. It builds systematically on the earlier Common-Good-Economy Ledger (Schöne, 2026c). The booking logic, hybrid appraisal, distribu-tional and fiscal perspective, governance assignment, and audit trail developed there are not discarded. They are raised to a more general level. The following comparison marks this further development explicitly.

Table 5:

SSOT-Ledger crosswalk. Author’s own illustration.

Ledger element	SSOT equivalent	Status	Delta in this article
Criterion / booking entry	Object with field family, state, and comparison scope	Core	From entry to relational source object
Hybrid appraisal mode	Rule-bound coexistence of several appraisal forms	Core	Explicit admissible and inadmissible operations
Governance assignment	Roles, approvals, decision points, and revision paths	Core + profile	Stronger strategic connectivity
Monitoring trigger	Write-back objects, review triggers, lessons learned	Core	Learning and write-back logic instead of mere tracking
Decision snapshot	Derived view of the same structural core	View	Strict derivation from the source instead of a parallel short template
Jurisdictional or KPI specificity	Profile module	Profile	Local adaptation without forking the core

5.5. Strategic Support Function

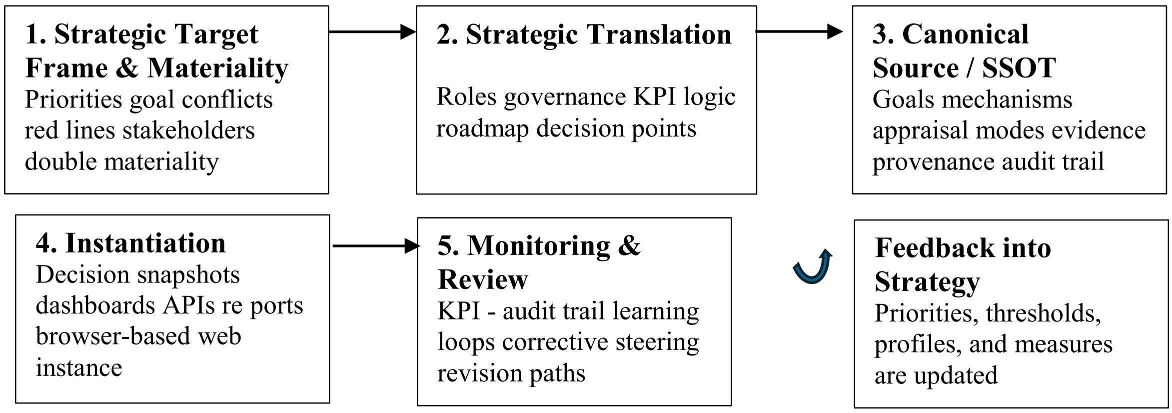

Figure 2: Strategic embedding of the reference model. Author’s own illustration.

The strategic support function of the reference model lies in the fact that it binds the target image, prioritisation, role and KPI translation, project and budget coupling, institutional decision preparation, as well as monitoring and corrective steering back to the same structural core. Strategies are thus not merely documented. They are translated into operative fields, review paths, and learning loops. This is what distinguishes the model from a pure data standard or from a mere appraisal matrix.

Seen strategically, the source fulfils four support functions. First, it creates conceptual and semantic consistency between the target image and operative indicators. Second, it disciplines prioritisation by keeping red lines, minimum standards, and scopes of com-parison explicit. Third, it connects decision formats with resource and implementation references. Fourth, it makes review and corrective steering source-bound. Strategy is therefore not understood as a one-off text. It is understood as a continuing chain of translations that pass through the same structural core.

5.6. Machine and AI Readability

Machine and AI readability are treated in the model as a distinct annotation layer. In addition to data type and unit, fields receive at least a plain-language meaning, a decision relation, admissible operations, prohibited inferences, a scope of comparison, and a citation duty. The focus thus shifts from mere technical serialisability to controlled readability in analytical and AI-supported environments.

This layer is especially relevant for policy-sensitive fields. A red-line field may be checked against minimum values and included in decision snapshots; it may not be sub-stituted for monetary benefits without an explicit political rule. Likewise, an indicator may be compared across alternatives, but it may not be compared across incompatible data states without rebaselining. Table 6 links the field classes of the SSOT to typical rules of AI readability.

Table 6:

SSOT field classes and AI readability rules. Author's own illustration.

Field class	Example	Admissible operations	Prohibited inferences	Monitoring path
Normative fields	red_line_green_shar	e Threshold check; comparison among alternatives;inclusion in a snapshot	No monetary substitution without explicit rule	Review when the limit is violated
Effect fields	heat_stress_score	Trend comparison; prioritisation of ad-ditional measures; monitoring	No individual prognosis without additional data	Review when data state or threshold changes
Distributio n fields	affordability_gap	Scenario comparison; distribution analysis	No statement about willingness to pay or acceptance	Review when social thresholds are exceeded
Governanc e fields	approval_status	State change; approval; escalation	No implicit equation of status and goal attainment	Audit trail for every state change
Provenanc e fields	source_version	Source check; rebaselining; traceability	No cross-case comparability without profile equivalence	Mandatory update when the data basis changes

5.7. Field Classes and Internal Relations

The capacity of the reference model depends not only on the existence of individual field classes, but on their internal relationality. Goals stand in relation to mechanisms, mech-anisms to indicators, indicators to appraisal modes, appraisal modes to approval rules, and approvals to revision paths. Distributional effects, fiscal feedback, and strategic profiles cut across these relations. It is precisely this relationality that turns a collection of data fields into a decision source.

Unlike many existing data or reporting schemes, the model does not assume a linear structure. Instead, it is designed as a relational field system. A score is not isolated; it is bound to goal, mechanism, evidence, and responsibility. An approval is not merely a state change; it is coupled to role, comparison scope, and revision. A strategic priority is not merely a text module; it is connected to KPI, roadmap, and decision snapshot.

5.8. Design Principles

The design principles derived in Section 4 are not additive. They are effective only together. Explicit normativity without semantically controlled provenance would remain rhetorical. Machine and AI readability without governance-strategic coupling would remain technicist. Profile-based instantiation without learning-oriented write-back would remain administratively rigid. The reference model is therefore developed from a bundle of principles and not from the prioritisation of only one single dimension.

5.9. Relation to the Common-Good-Economy Ledger

The reference model is to be understood as an evolutionary further development of the Common-Good-Economy Ledger. Whereas the earlier ledger is designed as a planning-oriented coupling and tracking artefact, the present article shifts the logic to the level of a canonical source. The ledger therefore does not become obsolete. It is absorbed into the SSOT at a higher level of abstraction. Its logic of hybrid appraisal, distributional and fiscal perspective, responsibility assignment, audit trail, and monitoring triggers forms an essential building block of the core.

What is new is that the source itself is specified as machine- and AI-readable, profile-based, instantiable, and capable of write-back. In this way, what is already prepared within the ledger as a coupling artefact is translated into a broader source and infra-structure perspective. The distinction therefore strengthens, rather than weakens, the independence of Paper 3.

5.10. Interim Conclusion

The reference model answers the integration gap neither as software nor as a purely theoretical statement, but as a defined artefact class. Its constitutive core binds together normativity, appraisal, governance, data, provenance, and revision; its connection zone enables strategic profiling; its machine and AI readability disciplines later read-out. On this basis, the architecture of the SSOT can now be formalised more precisely.

5.11. Decision as a Documented Booking Point

A central further development compared with the ledger lies in understanding decision itself as a documented booking point. Booking point is not meant here in an accounting sense. It denotes that moment at which the goal system, mechanism assumptions, evidence, responsibility, appraisal mode, and approval converge within the same source. This perspective is productive for neighbourhood decisions because it bridges the sepa-ration between strategic preparation, technical appraisal, and later accountability.

It follows that the reference model must contain not only static field classes but also transactional relations. Goals are not merely stored; they are activated in concrete decisions. Appraisal modes are not catalogued abstractly; they are bound to alternatives, mechanisms, and admissible aggregations. Approvals do not appear as mere signatures; they appear as state changes with justification, responsibility, and a revision path.

5.12. Field Families, State Logic, and Data-Quality Levels

In order to sustain decisions of this kind, the SSOT must distinguish explicitly among field families and state logics. Field families group related objects, for example goal and conflict fields, mechanism and appraisal fields, indicator and evidence fields, governance and approval fields, as well as monitoring and revision fields. This grouping is not only classificatory. It is action-relevant. Different roles can access the same source without needing the same level of detail.

This also requires data-quality levels. Earlier work already stressed that what matters is not the fiction of complete measurability, but a graduated treatment of data quality (Schöne, 2026b). For the reference model, this means that fields must carry not only values, but also a maturity or quality status. An indicator may be exploratory, plausibilised, reviewable, or auditable; a mechanism may be hypothetical, expert-supported, or evidence-saturated. This gradation protects the source against pseudo-precision.

5.13. Profiling, Context Commentary, and Discipline of Comparison

The relation between core and profile becomes especially relevant wherever comparison is established. Comparison is meaningful only if it remains clear under which profile, with which data state, under which rules, and for which level of decision the comparison is made. The reference model therefore carries not only field values and semantics, but also context commentary. Such comments are not arbitrary notes. They are structured references to legal frameworks, planning stage, data peculiarities, deviating thresholds, or organisation-specific routines.

Profiling therefore serves not only localisation, but discipline of comparison. A municipal profile may define additional decision points and reporting duties; a project-sponsor profile may define other KPI cycles or approval paths. As long as these profile rules remain explicit and versioned in relation to the core, comparison does not become impossible. It becomes more controlled. It is from this controlled comparability that the later possibility of treating lessons learned as structured, profile-aware write-back into the source emerges.

6. Architecture of the SSOT

6.1. Overview

The architecture of the SSOT follows a three-layer logic: canonical source, rule layer, and adapters with views. The source contains the substantively binding objects and field classes. The rule layer contains validation, limits of comparison, provenance tracking, state logic, and approval rules. Adapters and views generate document-like, tabular, dashboard-like, API-based, or demonstrator-like derivations without rewriting the core. This distinction is not only technical. It is epistemically relevant. It prevents instantiations from silently producing new meanings or bypassing existing rules.

Figure 3 visualises this layered architecture in close analogy to the earlier ledger contribution (Schöne, 2026c). The difference lies in the fact that the SSOT holds not only booking objects, but the entire space of meaning and rules within which the decision is made.

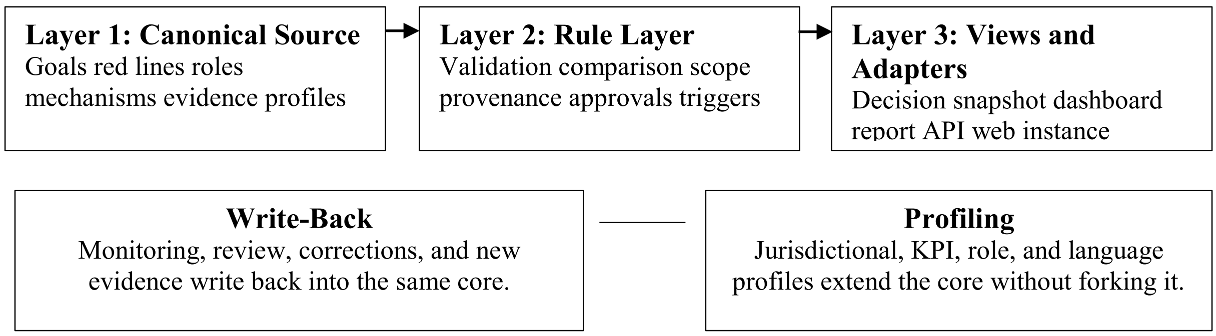

Figure 3: Layered architecture of the SSOT, in close analogy to Schöne (2026c). Author's own illustration.

6.2. Canonical Objects and Profiles

The canonical objects include goals, alternatives, mechanisms, indicators, approvals, decision snapshots, monitoring events, and profiles. Profiles are modelled as a contextual supplementary layer. They do not redefine the meaning of the core. They add organ-isation-specific, language-specific, or jurisdiction-specific rules. This is what makes instantiation possible without relativising the scientific core.

This architectural decision is central for use across countries and organisations. Different administrative contexts require different reporting obligations, role orders, KPI sets, or legal references. If these differences were written into the core, competing forks would emerge. Profiling, by contrast, keeps open the distinction between a general artefact class and a contextual connection logic.

Table 7:

Minimum data set of the SSOT. Author's own illustration.

Field group	Minimum content	Primary function
Context	Spatial reference, time horizon, alternative space, version status, processing status, and problem type	Defines case, scope of validity, and unit of comparison
Normative requirements	Goals, priorities, minimum standards, red lines, conflict references, and non substitutabilities	Binds value order to operative fields
Governance	Roles, responsibilities, approvals, review dates, escalation paths, and decision points	Secures accountability and approval logic
Effect logic	Mechanisms, effect assumptions, appraisal	Couples analysis and comparison to

	modes, admissible aggregation, and uncertainty notes	explicit rules
Data and evidence	Indicators, baselines, target values, data source, timeliness, uncertainty, and provenance	Carries data basis, evidentiary quality, and rebaselining
Monitoring and revision	Triggers, audit trail, state changes, revision notes, and ex ante/ex post coupling	Enables write-back and learning capability

6.3. Rule Layer and Operative Discipline

The rule layer is the most underestimated part of the architecture. It contains validation rules, required relations, provenance logic, limits of comparison, state changes, approval paths, and review triggers. It is at this point that the source becomes strategically and digitally robust. Without the rule layer, goals, scores, or approvals could be stored, but they could not be read, compared, or revised in a disciplined way (Moreau & Missier, 2013; Wilkinson et al., 2016; Bozkurt et al., 2025a).

For the reference model, this means that semantic, procedural, and technical rules are not modelled separately. JSON-schema validation and provenance tracking are therefore not merely technical additions. They are components of the rule layer itself. The same applies to limits of comparison, approval requirements, and epistemic prohibitions. The architecture thus prevents technical validity from drifting apart from semantic or political validity.

6.4. Field Logic and Semantics

Each SSOT field combines at least a data type, a semantic meaning, provenance-related origin, and inferential constraint. The architectural value lies precisely in the fact that a numerical value can no longer be read without its frame of meaning and validity. This is especially important for thresholds, distribution indicators, and policy-sensitive scores. The actual innovation therefore lies less in the individual field than in the enrichment of every field by rules of readability and comparability (Kitchin, 2014; Goodspeed, 2015; Jiang et al., 2025).

Example 1. JSON field with semantic and revision-related enrichment

```
{
  "field_id": "red_line_green_share", "value":
  0.24,
  "unit": "share",
  "plain_language_meaning": "Share of neighbourhood area with publicly
accessible green infrastructure",
  "allowed_operations": ["compare_between_alternatives", "check_threshold",
"include_in_decision_snapshot"],
  "forbidden_inferences": ["no_monetary_substitution_without_explicit_rule",
"no_cross_version_comparison_without_rebaselining"],
  "comparison_scope": "same_case_same_version", "provenance": {
```

```
    "source": "GIS layer green_access_v03",
    "timestamp": "2026-03-15", "responsible_role":
    "planning_analytics"
  },
  "review_trigger": "value < 0.22 OR data_source_changed"
}
```

The example shows that AI readability begins not only at the level of whole documents, but already at the level of the individual field. A field contains not only a value, but also meaning, admissible use, inadmissible inferences, origin, and an occasion for revision. This is exactly what turns the SSOT into a decision source rather than a mere data store.

6.5. Semantic Multi-Layering and Discipline of Comparison

The literature on PSS, data governance, and AI indicates that misinterpretations often arise not from wrong values, but from wrong comparison operations (Kitchin, 2014; Goodspeed, 2015; Sanchez et al., 2025). The architecture of the SSOT responds to this by treating discipline of comparison as its own field dimension. A field may be comparable within the same case and the same version, without automatically being comparable across cases, versions, or profiles. This distinction matters for strategic steering because KPI, thresholds, and monitoring paths otherwise tend to be translated too quickly into apparently stable metrics that in fact rest on incompatible data states.

Semantic multi-layering also affects the relation between field and document. A decision snapshot may only condense what is already modelled explicitly in the source. An AI assistant may identify a conflict of objectives, but may not resolve it monetarily on its own when the field model prohibits precisely that move. A dashboard may visualise a trend, but it may not introduce a new aggregation logic. This is why the architecture of the source must be stricter than any individual view derived from it.

6.6. Monitoring, Write-Back, and Learning Capability

The architecture becomes complete only when monitoring events, new evidence, approvals, and correction decisions are written back into the same structural core. Learning capability is therefore not an auxiliary function outside the system. It is an internal property of the source. It arises from versioning, review triggers, state changes, and explicitly documented justifications. Monitoring is thus not the end of the process. It is a new operation on the same source.

This is decisive for the research logic of the article. An SSOT that merely documents decisions, but does not keep them revisable, would remain static. An SSOT that out-sources monitoring would dissolve the unity of decision and learning. The architecture therefore insists on a write-back logic: observation, deviation, revision decision, and renewed approval are all managed as source-bound operations.

6.7. Architectural Value of the Reference Model

The architectural added value of the reference model lies in the unity of semantic discipline, strategic connectivity, and digital derivability. Neither a pure data standard, nor an individual AI system, nor a reporting module could provide this unity on its own. Only the combination of canonical source, rule layer, and derived views creates the conditions under which algorithmic common-good optimisation can become publicly connectable, scientifically controllable, and capable of long-term learning.

6.8. State Changes, Approvals, and Review Paths

The SSOT requires an explicit state logic. Between scoping, draft, preliminary review, approval, monitoring, and revision lie not merely chronological steps, but semantically distinct states of the source. A goal set in scoping status has a different validity from an approved goal set; an indicator in monitoring status may trigger different operations from an indicator in exploratory pre-review. The architecture therefore treats state changes as rule-bound operations.

This logic is especially important in public and municipal contexts, because decision points, templates, committee references, or reporting obligations should not emerge outside the source. Approvals are therefore not marginal organisational notes. They are part of the source architecture because they structure the transition between analysis, decision, and accountability.

6.9. Exemplary Write-Back Cycle

The write-back logic can be illustrated through a simplified cycle. In a first phase, a heat-stress indicator is recorded on the basis of a specific data state and stored as a monitoring field with threshold, comparison scope, and responsible role. In a second phase, an exceedance of the threshold triggers a review event. In a third phase, that exceedance is not merely noted in a report; it is written back into the same source as an event object. That event object refers to affected goals, possible measure options, the responsible role, and the next decision point. In a fourth phase, after decision and implementation, a new data state is assigned again to the same field family.

Such a write-back cycle has two advantages. First, it remains traceable why a strategic or operative adjustment was made. Second, later changes can be reconstructed not only factually but semantically: did the value change, the comparison scope, the data basis, the admissible operation, or the political rule? It is precisely this reconstructability that marks the difference between a dashboard with history and a genuinely learning decision source.

6.10. Semantic Safeguarding of AI-Supported Read-Out

Finally, the architecture must remain robust where AI systems do not only read, but also condense, compare, or explain. A semantic safeguarding of AI-supported read-out therefore means more than a note in running text. It requires that every AI-relevant operation be tied to the same fields, comparison scopes, and prohibitions as any human read-out. An assistance system may therefore generate only those summaries that are covered by the underlying field semantics. It may identify conflicts of objectives, but it may not silently resolve them when the source marks non-substitutability.

In this way, the AI-readability layer shifts from a convenience feature to an epistemic safeguard. It protects not only against mistakes, but preserves the distinction between source and read-out. The user sees not merely an output, but can reconstruct which fields, which comparison scope, and which prohibitive rules bound that output. It is precisely this property that becomes decisive for the later development of a browser-based instantiation.

7. Illustrative Application

7.1. Function of the Illustration

The following application does not replace an empirical case study. Its purpose is to make the working logic of the reference model visible under conflict-intensive condi-tions. Precisely because the paper focuses on the artefact class rather than on a local instantiation, an abstracted yet substantively plausible illustration is methodologically appropriate. It shows how the SSOT holds goals, red lines, trade-offs, decision rules, and later review paths within one single structure.

7.2. Neighbourhood Scenario: Climate Adaptation and Affordability

The illustration uses an abstract neighbourhood scenario in which two common-good objectives come into tension: first, heat reduction through additional green and shading measures; second, the safeguarding of affordable housing under restrictive fiscal conditions. Quality of stay, accessibility of everyday routes, and long-term follow-up costs also matter. The example has been chosen because it condenses typical urban-neighbourhood conflicts and at the same time activates several strands identified in the review: public value, appraisal, digital decision support, data governance, and strategic supportability.

Within the scenario, three strategies are distinguished. Strategy A prioritises cooling and green space. Strategy B prioritises rent-related viability. Strategy C follows an explicitly combined approach with intermediate values, clear monitoring triggers, and phase-related adjustment. The SSOT does not hold these strategies merely as textual alternatives. It holds them as variants linked to goals, mechanisms, limits, and review paths.

7.3. Compact SSOT Booking Table

The booking logic follows the ledger intuition developed in Schöne (2026c), but gener-alises it here at the level of the source itself. Table 8 summarises the compact SSOT booking table for the illustrative neighbourhood example. It shows more than a simple comparison of results. It shows a compact extract of the SSOT: goal relation, mechanism, hard limits, evidence, distribution, fiscal feedback, and monitoring remain joined within one entry.

Table 8:

Compact SSOT booking table for the illustrative neighbourhood example. Author's own illustration.

SSOT component	Strategy A: green priority	Strategy B: rent priority	Strategy C: combination	Comment
Normative guiding goals	Climate adaptation and green share	Affordability and rent stability	Cooling and afford-ability together	Goal pluralism remains explicit
Hard limits	Minimum green share of 22 %	Target rent burden max. 30 %	Both limits simultaneously	No displacement without a compensation rule
Main mechanism	De-sealing and shading	Rent relief and cost control	Phased combination of both mechanisms	Mechanism relation remains documented
Evidence base	GIS, heat indicators, usage data	Housing-cost and household data	Combined dataset with rebaselining rule	Provenance is field-bound
Distribution	Benefits for heat-vulnerable groups	Benefits for lower-income households	Shared benefits, but higher co-ordination demands	Winner and loser logic remains visible
Fiscal feedback	Higher initial in-vestment	Short-term cheaper	Intermediate burden with medium-term relief	Fiscal effects are part of the source, not an appendix
Monitoring	heat_stress_score annually	affordability_gap annually	Both indicators plus review triggers	Write-back into the same core

The row "Evidence base" makes visible on which dataset the respective strategy rests. The row "Distribution" prevents winner and loser groups from remaining merely implicit. The row "Fiscal feedback" keeps financial consequences within the same decision core and avoids their displacement into a later budget logic.

7.4. Trade-Off Profile and Variant Comparison

The trade-off logic of the example can be read both in tabular form and as a profile. The figure makes visible that Strategy C is not interesting because it occupies a mathematically central position. It is interesting because, within the given limits, it provides the most viable combination of cooling, affordability, fiscal discipline, and reviewability.

Strategy	Cooling	Affordability	Fiscal effects	Reviewability
A: Green priority	+++	+	+	++
B: Rent priority	+	+++	+++	+
C: Combined strategy	++	++	++	+++

Figure 4: Trade-off profile of the illustrative strategies. Author's own illustration.

7.5. Decision Snapshot

The decision snapshot condenses only what is already modelled in the source core. It is not a second decision class, but a derived view of the same source. Table 9 summarises this decision-related snapshot for the illustrative neighbourhood case. It thus preserves exactly those elements that are often lost in conventional short templates: red lines, distributional effects, fiscal feedbacks, review paths, and AI-related constraints.

Table 9:

Decision snapshot of the illustrative neighbourhood case. Author's own illustration.

Component	Content
Decision object	Selection of a measure combination for heat reduction while safeguarding affordable housing costs.
Normative guiding goals	Climate adaptation; affordable housing; publicly accessible green space; fiscal viability.
Hard limits	Minimum share of publicly accessible green space of 22 %; target rent burden not above 30 %; no displacement without a compensation rule.
Trade-offs	Stronger cooling effects raise short-term investment pressure; affordable rents limit the scope of construction-based intervention.
Distribution	Heat relief especially benefits vulnerable groups; rent rules protect lower-income households.
Monitoring	Annual update of heat_stress_score, red_line_green_share, and affordability_gap; review when thresholds are undershot.
AI notes	No automatic budget prioritisation without a political rule; no individual health prognosis derived from neighbourhood-level values.

The fields "Hard limits" and "Trade-offs" ensure that political thresholds and conflicts are not lost in the short template. The field "AI notes" constrains machine read-out explicitly and prevents the snapshot from being misread as a seemingly neutral full decision.

7.6. Semantic Discipline in the Illustrative Application

The illustrative application also shows how AI readability operates in practice. The heat_stress_score may be used to prioritise additional cooling measures and to observe trends; it may not be used for individual diagnosis or for automated health-risk attribution. The affordability_gap may be used for scenario comparisons and distribu-tional analyses, but not as an indicator of willingness to pay or social consent. The red_line_green_share may be checked against a minimum value, but may not be substi-tuted for monetary gains without an explicit rule.

In the example, this differentiation is not an auxiliary note. It is part of the source itself. This is why the SSOT is more than a documented world of tables. It is a semanti-cally controlled decision source.

7.7. Strategic Use along the Planning Cycle

The neighbourhood example also illustrates the model's strategic support function. Guiding images from strategy and policy are translated into field values, thresholds, and roles. Variant comparisons are condensed in a decision snapshot. Implementation logics and fiscal paths remain coupled. Monitoring writes new evidence back into the same core. It is precisely in this repeated translation that the SSOT proves able not only to support operative appraisal, but also to sustain strategic steering.

This makes the difference from conventional tables or project lists visible. Such formats may collect decision material, but they rarely couple strategy, appraisal, and revision within the same structure. The SSOT does precisely that. It connects prioriti-sation, comparison of variants, implementation logic, and learning loop through one shared source core.

7.8. Explanatory Power and Limits of the Illustration

The explanatory power of the illustration does not lie in empirical generalisation. It lies in heuristic visibility. It shows how the reference model operates under conflict-inten-sive conditions and what additional value arises from the combination of normativity, semantic discipline, governance, and revisability. Its limit lies in the fact that real cases will involve additional political, legal, spatial, and organisation-related complexity. For that very reason, the illustration must be read as a preliminary step towards later instantiation, not as a substitute for it.

7.9. Scoping Phase and Goal Architecture of the Neighbourhood Example

In the scoping phase, conflicts of objectives are not translated into metrics immedi-ately. A goal architecture is formulated first. Three bundles stand at the centre: first, heat reduction, ecological robustness, and quality of stay; second, affordability, social accessibility, and the prevention of displacement; third, fiscal viability, implementation capacity, and long-term maintainability. Even at this early stage it becomes clear that the goals do not stand in symmetrical relation to one another. Some requirements can be stated as priorities, while others can only be treated as hard limits. The SSOT therefore enforces a distinction among goal, threshold, prohibition, and explicitly documented trade-off.

The scoping phase also demonstrates the strategic support function of the source. Goals are not kept as isolated formulations. Already at this stage, they are linked to mechanisms, initial responsibilities, and later KPI or monitoring fields. In this way, the goal "reduce heat exposure" can be related at an early stage to green share, surface temperature, shading degree, and duration of stay without turning that translation into a falsely completed measurement logic.

7.10. Formation of Alternatives, Hybrid Appraisal, and Trade-Offs

In a second step, three strategies are formed: one focused on climate adaptation, one more strongly focused on affordable housing, and one combined strategy with moder-ate densification, social safeguarding, and selective heat-reduction measures. For each strategy, the SSOT requires the parallel documentation of goal contribution, trade-off structure, distributional effect, fiscal feedback, and data quality. No strategy “wins” in the abstract. Each strategy is illuminated in the same structural categories.

It is at this point that the value of hybrid appraisal becomes visible. Climate-related indicators can be partly quantitative and even compatible with monetary appraisal, whereas social stability, displacement prevention, or justice of use remain documented more strongly through indicators, thresholds, or structured deliberation. The combined strategy therefore appears not as an arithmetical compromise, but as a source-bound and justified combination.

8. Artefact Character and Connectivity

8.1. Public-Planning Connectivity

The SSOT is not designed solely for analytical support. It contains a profile-based public-planning connection zone in which KPI logics, roadmaps, responsibilities, decision points, and accountability are bound back to the same structural core. It is precisely through this mechanism that strategic planning can be supported along the planning cycle without narrowing the artefact core regionally or organisationally.

Public-planning connectivity means more than mere administrative proximity. It means the capacity of the artefact to translate political prioritisation, professional ap-praisal, administrative implementation, monitoring, and accountability into one shared source logic. The reference model thus remains open enough for different administrative systems, while still being specific enough to structure formal responsibilities, approval points, and reporting obligations.

8.2. Usage Types along the Decision Cycle

The artefact can be instantiated along several usage types. First, it can serve as a strategic translation instrument that converts target images into roles, KPI, thresholds, and review rules. Second, it can serve as an appraisal and decision-preparation instrument that makes variants, trade-offs, distributional effects, and fiscal feedback visible in a source-bound way. Third, it can serve as a monitoring and revision instrument that writes deviations, new evidence, and corrective steering back into the same core. Fourth, it can serve as a communication instrument that produces decision snapshots, dashboards, or document-like views without changing the core.

This multi-functionality matters for the common-good orientation of the artefact. An artefact designed only for one single use case would often fragment public value orders once again. The SSOT allows strategy, analysis, communication, and learning to rest on the same source.

8.3. Minimalist Web-Based Instantiation

Accessibility is not an add-on. It is a design condition.

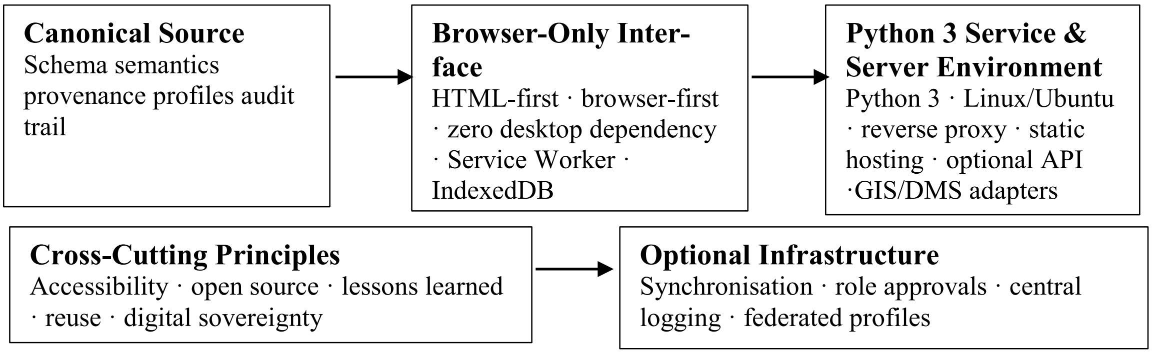

Figure 5: Minimal architecture of a browser-based instantiation. Author's own illustration.

8.4. Minimal Integration Requirements

Table 10:

Minimal integration requirements. Author's own illustration.

Requirement	Minimal variant	Expandable connection logic
Operation	Static hosting on Linux or Ubuntu servers, or local file execution in the browser	Optional synchronisation service for roles, ap-provals, and central logging
Data storage	JSON-based source packages with local cache	Adapters to GIS, DMS, registries, or ERP systems
Application logic	Lightweight Python 3 service for validation, profiling, and snapshot export	Expandable with task steering, role approvals, and API layers
Interoperability	File import/export and documented field mapping	OpenAPI interfaces and profile-specific exchange rules
Accessibility	HTML-first, keyboard operability, intelligible error logic	Regular audits and accessible authoring interfaces
Profiling	Configurable language and organisational profiles	Jurisdictional, KPI, and roadmap profiles with versioned approval logic
Learning capability	Versioning, decision justification, and monitoring triggers in the same source	Structured write-back of decisions, review, and lessons learned

9. Limits and Research Agenda

9.1. Limits of the Model

The proposed SSOT does not resolve the normative conflicts of urban planning. It disciplines their handling. This is precisely its strength, but also its limit. The common good remains context-dependent, politically contested, and not fully translatable into formal logics. Not every relevant effect can be converted into indicators, thresholds, or admissible operations without loss of meaning.

Data-related limits are equally evident. Many socially and distributively relevant indicators are uncertain, incomplete, or available only at considerable effort. Provenance and versioning do not solve the underlying problem of scarce or unequally distributed data. The SSOT can make uncertainty visible. It cannot remove uncertainty.

Organisational limits are substantial as well. Without clear responsibilities, maintained master data, accepted review routines, and operational approval paths, even a strong reference model remains weak in consequences. The architecture can model roles and escalation paths. It cannot guarantee their political or administrative enforcement. A normative limit must also be acknowledged. The more strongly common-good decisions are formalised, the greater the danger of technocratisation. The SSOT can increase transparency and keep conflicts visible. Yet it may also create the impression that political balancing can be transferred into an apparently neutral structure. For that very reason, the model must keep red lines, duties of justification, open trade-offs, and revision paths explicit instead of concealing political controversy.

Finally, digital limits remain. AI readability and a browser-based minimalist instantiation lower integration barriers, but they do not replace governance, privacy and security review, or accessibility testing in real operation. Especially in productive environments, it remains an open question how strictly prohibited inferences can actually be enforced.

9.2. Limits of the Current Manuscript and of the Illustration

A further limit lies in the reach of the present article itself. The paper develops an artefact class, not an empirically validated full instantiation. Its strength lies in generalisability and in the controlled condensation of the literature; its weakness lies in the fact that real administrative and planning contexts will display additional political, legal, and organisational complexities. This applies especially to the institutionalisation of profiles, the handling of conflicting data states, the definition of admissible aggregations, and the practical enforcement of review triggers.

The illustrative neighbourhood application is also intentionally limited in reach. It is not an empirical proof that the SSOT is already ready for implementation in a concrete city or administration. Its purpose is to demonstrate the structural performance of the model, not to validate a specific dataset or policy context. It should therefore not be confused with a case study.

As clearly as the delta contribution can be stated, it is equally important to mark its limits. The article does not claim absolute completeness with respect to the international state of research. It claims a literature-based condensation of what became visible in the reviewed corpus. The phrasing that such an integration has not been identified "insofar as can be seen" therefore remains methodologically appropriate.

9.3. Research Agenda

A multi-stage research agenda follows from these limits. First, the reference model requires empirical instantiations in different planning contexts in order to test profil-ability, learning capability, and practical viability. Second, it should be examined how far different jurisdictional or organisational profiles can actually be represented without changing the core. Third, the AI-readability layer must be tested in experimental or application-near settings: which semantic safeguards are understood, observed, or circumvented in AI-supported interfaces?

Fourth, it must be asked how far the SSOT can be connected to existing GIS, DMS, registry, budget, or reporting systems without producing new shadow sources. Fifth, the ledger-SSOT integration only indicated in this article must be translated into a web-based instance. This next stage is especially important for research. It would show whether the abstract source logic is not only internally consistent, but institutionally and technically sustainable.

Sixth, comparative studies among different instantiations are conceivable, especially studies that evaluate the interplay among core, profile, and learning-oriented write-back. Such studies could reveal which fields are in fact stably generalisable and where contextual profiling feeds back into the core more strongly than the theory initially assumes.

The research agenda therefore shifts deliberately from the question of whether algorithmic common-good optimisation is possible at all to the question under which architectural, organisational, and epistemic conditions it becomes responsible. It is precisely here that the article's longer-term relevance lies.

10. Conclusion

The article has shown that algorithmic common-good optimisation in urban neighbour-hoods does not begin with appraisal methods, planning-support systems, data platforms, or AI assistants. It begins with the upstream question of a controllable decision source. The object of the article is therefore neither another optimisation procedure nor a local specialist application, but a generalisable reference model of a machine- and AI-readable SSOT. Its core brings together normative requirements, governance, effect assumptions, appraisal modes, evidence, distribution, fiscal feedback, monitoring, audit trail, prove-nance, and inferential constraint within the same structure.

At the same time, it has become clear that this source must be strategy-capable. Strategic planning in this field is not supported by guiding images alone, but by the repeated translation of target images, priorities, KPI, roadmaps, responsibilities, decision points, review, and corrective steering. The reference model therefore makes not only data, but the source itself, strategically capable. This reveals both its connection to the earlier work and its step beyond it: the logic of governance architecture, the ECG planning cycle, and the Common-Good-Economy Ledger is generalised to the level of the canonical source.

The original contribution can be summarised in three points. First, the article combines normative, analytical, and digital requirements within one single controllable structure. Second, it clearly distinguishes between a constitutive core and a profile-based public-planning connection zone. Third, it anchors machine and AI readability together with a write-back logic, so that monitoring, review, and correction do not remain dispersed across separate reporting worlds.

Insofar as can be seen from the reviewed strands of literature, no contribution has yet been identified that brings together normative common-good orientation, hybrid appraisal logics, digital planning infrastructures, strategic support functions, data governance, provenance, machine and AI readability, and a profilable public-planning connection zone at the level of one common decision source.

The subsequent perspective is clear. The next scientific step is not another tool for its own sake, but a source-bound instantiation of the reference model in the form of an accessible, open, and web-based environment. Such a demonstrator would not replace the artefact class developed here. It would test its robustness under real conditions. It is precisely in this sense that the proposed reference model becomes both practically connectable and ready for publication.

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