PRE-DESIGN PLATFORMS AND PROPERTY PROTECTION IN ARCHITECTURAL PRACTICE

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ABSTARCT

The emergence of integrated urban intelligence platforms — exemplified by Urban Eyes, a pre-design digital twin environment consolidating 3D terrain visualization, real-time physics simulation, and AI-assisted zoning interpretation — presents a novel challenge to existing intellectual property frameworks. This essay argues that such platforms generate a new class of intellectual property asset: the pre-design urban intelligence twin. Existing copyright doctrine, trade secret law, and licensing frameworks were not designed to govern such objects, leaving significant legal ambiguity around ownership, derivation, and protection. Rather than representing a gap in technological capability, this ambiguity represents a gap in legal preparedness. Platforms like Urban Eyes are not simply ahead of their competitors; they are ahead of the law itself.

INTRODUCTION: THE PROBLEM OF THE PRE-DESIGN PHASE

Architecture has always begun before the drawing. Before a line is committed to paper or a massing model assembled in software, a designer must understand the site — its topography, its thermal behavior, its regulatory envelope, its relationship to sun, wind, and neighboring structure. This phase, commonly termed the "pre-design" or "programming" phase, has historically been one of the most intellectually intensive yet legally under-theorized stages of architectural practice.

For most of the twentieth century, the outputs of this phase were relatively conventional: annotated survey drawings, solar diagrams, zoning analysis memoranda, site photography. These were artifacts with reasonably well-understood intellectual property status. Survey drawings attracted copyright as authored works. Zoning memoranda existed in a grey zone

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between legal commentary and factual summary. Site photography was protected under standard photographic copyright doctrine. The law, imperfectly, managed.

The emergence of integrated urban intelligence platforms has fundamentally disrupted this equilibrium. Platforms such as Urban Eyes — which consolidate global 3D terrain data, real-time thermal comfort simulation (UTCI), wind flow modeling, solar radiation analysis, and AI-assisted zoning interpretation into a single pre-design environment — produce outputs that are qualitatively unlike anything copyright doctrine, trade secret law, or licensing frameworks were designed to govern.[1]

This essay argues that such platforms generate a new category of intellectual property: the *pre-design urban intelligence twin*. This object sits in unexplored legal territory between raw public data (unprotectable) and authored architectural design (protected), and its legal status remains dangerously undefined. More provocatively, this essay argues that the ambiguity is not merely technical but structural: the law has no conceptual category for what these platforms produce, and will not until courts, legislators, or industry practice force the issue. Platforms like UrbanEyes are not merely technologically ahead of their competitors — they are legally ahead of the frameworks that will eventually govern them.

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THE PRE-DESIGN DIGITAL TWIN AS A NEW IP ASSET CLASS

To understand the legal novelty of what platforms like UrbanEyes produce, it is necessary to trace the provenance of their outputs. A typical UrbanEyes site analysis workflow draws from at least four distinct data streams: publicly licensed 3D tile data (via Google Maps 3D Tiles API), meteorological datasets, municipal zoning records (typically public domain in most jurisdictions), and the platform's own proprietary simulation models for thermal comfort, wind behavior, and solar radiation.

Each of these inputs carries a distinct IP character. The Google 3D Tiles base is governed by a commercial license that permits derivative use within defined parameters. Municipal zoning records are government works and generally ineligible for copyright in common law

[1] UrbanEyes, *Platform Overview*, UrbanEyes (2025), https://urban-eyes.io (describing the system as consolidating fragmented pre-design tools "into a single, research-grade Digital Twin").

jurisdictions under doctrines equivalent to 17 U.S.C. § 105.[2] Meteorological data, when sourced from public agencies, similarly resists proprietary claim. Taken individually, none of these inputs is a protectable IP asset in the hands of UrbanEyes or its users.

What UrbanEyes produces from these inputs, however, is something categorically different. The platform's output — a spatially accurate, physics-simulated, zoning-annotated, design-ready model of a site — is not a reproduction of any of its source data. It is a synthesis, organized through proprietary algorithms, calibrated simulation logic, and an AI-assisted interpretive layer that converts raw zoning text into actionable design guidance. The selection, arrangement, and expression of multi-source data into this design-ready form constitutes, under foundational copyright doctrine since *Feist Publications v. Rural Telephone Service Co.* (1991)[3], a potential original work of authorship.

Yet the fit is imperfect. *Feist* governs compilations — curated arrangements of factual data — and its protections are famously thin. Copyright in a compilation extends only to the original selection and arrangement, not to the underlying facts. More fundamentally, the UrbanEyes output is not simply a curated arrangement of existing data. It is a *simulation*: a model of how a space will behave under physical conditions, generated through computational processes that go well beyond selection or arrangement. The output contains information that did not exist in any of the source datasets — a predicted UTCI thermal comfort index for a particular plaza configuration at a particular time of year, or a wind pressure map generated by running a CFD model over a reconstructed 3D terrain. This predictive, generative quality places UrbanEyes outputs in a category that copyright doctrine has not yet directly addressed.

THE DIGITAL TWIN OWNERSHIP GAP

The ownership ambiguity surrounding pre-design digital twins is not merely academic. It has immediate practical consequences for the firms that commission them, the platforms that produce them, and the municipalities whose regulatory frameworks feed into them.

[2] 17 U.S.C. § 105 (2018). State and municipal equivalents are governed by analogous common law doctrine. *See* County of Suffolk v. First Am. Real Estate Solutions, 261 F.3d 179, 193 (2d Cir. 2001) (recognizing limits of government works doctrine at the municipal level).

[3] *Feist Publ'ns, Inc. v. Rural Tel. Serv. Co.*, 499 U.S. 340, 345 (1991) ("The sine qua non of copyright is originality."). The Court held that copyright in a factual compilation requires original selection, coordination, or arrangement, and does not extend to the underlying facts themselves. *Id.* at 347–48.

Consider a plausible scenario: an architecture firm uses UrbanEyes to generate a comprehensive pre-design analysis of a contested urban site. The analysis reveals a previously undocumented wind channeling effect between two adjacent towers — information that materially affects the firm's massing strategy and ultimately enables a successful planning application. Subsequently, a competitor firm undertakes a similar project on an adjacent site, and the original firm's UrbanEyes analysis — now embedded in submitted planning documents as part of the public record — is used, without attribution, to inform the competitor's own design decisions.

Who, in this scenario, has a cognizable IP claim? The commissioning firm may argue that the analysis is a work product protected under trade secret doctrine, but planning submission typically destroys the secrecy that trade secret protection requires. UrbanEyes may argue that its simulation outputs are proprietary, but if the platform's Terms of Service assign output ownership to the commissioning firm (as is common in SaaS agreements), it may have contractually surrendered that claim. The municipality, whose zoning data was the interpretive substrate, has no credible claim under most jurisdictions' government works doctrine. The result, in the absence of targeted legal reform or robust contractual engineering, is that a highly valuable, highly original analytical product exists in a de facto state of legal unprotection.

This is the digital twin ownership gap: not a gap in the technology's capability, but a gap in the law's capacity to assign, protect, and enforce rights over a new class of intellectual object. It is structurally analogous to the gap that existed in copyright law's relationship to software in the 1970s and early 1980s, before the 1980 Computer Software Copyright Act and subsequent judicial interpretation established workable doctrine.[4] Platforms like UrbanEyes occupy, today, the position that software companies occupied then: producing objects of enormous commercial and creative value that the law has not yet decided how to treat.

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[4] Computer Software Copyright Act of 1980, Pub. L. No. 96-517, § 10, 94 Stat. 3015, 3028 (codified as amended at 17 U.S.C. §§ 101, 117 (2018)). *See also Apple Comput., Inc. v. Franklin Comput. Corp.*, 714 F.2d 1240, 1249 (3d Cir. 1983) (confirming that object code is copyrightable subject matter under the amended Act).

SIMULATION MODELS AS TRADE SECRETS: CALIBRATION AS PROPRIETARY KNOWLEDGE

If copyright doctrine offers incomplete protection for UrbanEyes outputs, trade secret law offers a more promising — though also more fragile — alternative framework for protecting the platform's core intellectual property.

The Defend Trade Secrets Act (DTSA) of 2016 defines a trade secret as information that derives independent economic value from not being generally known and that is subject to reasonable efforts to maintain its secrecy[5]. Under this definition, the most valuable IP assets in a platform like UrbanEyes may not be its outputs at all, but its *inputs* — specifically, the calibration logic embedded in its simulation models.

Consider the UTCI thermal comfort simulation. The Universal Thermal Climate Index is a publicly documented biometeorology standard, and the general principles of its calculation are available in peer-reviewed literature. What is *not* available in that literature is how UrbanEyes has adapted, validated, and calibrated its UTCI implementation for architectural pre-design contexts — what boundary conditions it applies, how it handles edge cases such as partial shading or highly reflective facade materials, what validation datasets it has used to confirm model accuracy, and how its results have been adjusted in response to real-world testing. This calibration layer is precisely the kind of compilation of know-how that trade secret doctrine was designed to protect.

Similarly, UrbanEyes' proprietary site scoring and massing optimization logic — its "system planning assistant" — almost certainly embeds years of methodological refinement into what appears to the user as a simple query interface. The specific weighting of variables, the machine learning training data, the edge case handling: these are protectable trade secrets under the DTSA provided that UrbanEyes maintains reasonable secrecy measures, including robust NDA obligations, access controls, and employee IP agreements.

The critical vulnerability of trade secret protection, however, is its absolute dependence on secrecy maintenance. A single inadvertent disclosure — in a conference presentation, a published case study, or a planning submission that reveals simulation methodology in excessive detail — can destroy the secrecy that protection requires. This fragility suggests that

[5] Defend Trade Secrets Act of 2016, Pub. L. No. 114-153, 130 Stat. 376 (codified at 18 U.S.C. § 1839(3) (2018)).

UrbanEyes' long-term IP strategy must combine trade secret protection for its core methodologies with contractual protection for its outputs, and ideally with targeted patent applications for any genuinely novel simulation or data integration processes.

ZONING INTERPRETATION AS COPYRIGHTABLE EXPRESSION

Among the most legally interesting features of the UrbanEyes platform is its AI-assisted zoning interpretation capability — the ability to ingest raw municipal zoning documents (typically PDFs produced by local planning authorities) and convert them into actionable design guidance, including permitted use summaries, height envelope visualizations, and density optimization suggestions.

This capability occupies a particularly rich legal niche. Zoning ordinances themselves are government works and, in most common law jurisdictions, ineligible for copyright protection[6]. They are the raw law — authoritative, publicly promulgated, and deliberately placed beyond proprietary control to ensure equal access. The UrbanEyes interpretation layer, however, is not the law. It is an authored commentary on the law — a curated, synthesized, design-oriented translation of regulatory text into spatial and numerical design parameters. This distinction is legally significant.

The analogy to legal database doctrine is instructive. Westlaw's and LexisNexis' copyright claims over their platforms do not extend to the statutes and case law they index — those are public domain. Their protection attaches to the editorial selection, arrangement, and annotation of that legal material. An attorney's written analysis of a statute similarly attracts copyright as an original work of legal expression, even though the underlying statute does not. UrbanEyes' zoning interpretation outputs — particularly when they take the form of structured, design-ready summaries organized by the platform's proprietary classification logic — are structurally analogous. They are authored legal-architectural expressions, not reproductions of raw regulatory fact.

This argument is not without limits. The thinner the interpretation layer — the closer the output tracks the literal language of the zoning ordinance without meaningful transformation — the weaker the copyright claim. Conversely, the more the output reflects original organizational

[6] *See Veeck v. S. Bldg. Code Cong. Int'l, Inc.*, 293 F.3d 791, 799 (5th Cir. 2002) (en banc) (holding that model codes, once adopted as law by a municipality, enter the public domain because "the law" belongs to the people governed by it).

logic, creative synthesis across multiple regulatory instruments, or the application of design expertise to translate regulatory envelope into spatial form, the stronger the claim. UrbanEyes' design choices about *how* to present zoning data — what to emphasize, how to visualize height limits, how to flag conflicts between different regulatory layers — are themselves expressive decisions that strengthen the copyright argument.

THE "CONSOLIDATED ANALYSIS STACK" AND THE PROTECTION OF METHODOLOGICAL ARCHITECTURE

Beyond the protection of individual output types, UrbanEyes' most distinctive IP asset may be the integration architecture itself — the specific combination, sequencing, and interoperability of thermal simulation, wind modelling, solar analysis, zoning interpretation, and BIM export capability into a single pre-design workflow.

No single component of this stack is novel in isolation. UTCI thermal comfort modeling has been available in research software for decades. Wind CFD tools are commercially available from specialist providers. Solar radiation analysis is standard in energy modelling platforms. Zoning data aggregation is the business of numerous GIS-adjacent startups. BIM export functionality is a commodity capability. The novelty of UrbanEyes lies not in any individual element but in the architecture of their combination.

This "consolidated analysis stack" is, in principle, protectable as a trade secret under the compilation theory endorsed in cases such as *IDX Systems Corp. v. Epic Systems Corp.*(7th Cir. 2003)[7], which held that a combination of individually unprotectable elements can constitute a protectable trade secret where the combination itself derives independent economic value and is maintained with reasonable secrecy. Applied to UrbanEyes, this doctrine would protect the specific integration logic, API orchestration, data pipeline architecture, and user experience sequencing that enables a design team to move from a global address to a BIM-ready site model in minutes rather than weeks.

The practical implication is significant. A competitor who independently develops UTCI simulation capability, or who independently offers zoning interpretation services, does not thereby infringe UrbanEyes' trade secret in its consolidated stack. But a competitor — or a

[7] *IDX Sys. Corp. v. Epic Sys. Corp.*, 285 F.3d 581, 584 (7th Cir. 2002) (holding that a combination of individually known elements may constitute a protectable trade secret where the combination itself has independent economic value and is maintained with reasonable secrecy measures).

former employee — who replicates the *specific integration methodology* through misappropriation rather than independent development would be subject to DTSA liability. The protection is narrow, but in a market where integration architecture is the primary source of competitive differentiation, narrow protection may be sufficient.

TOWARD A FRAMEWORK: WHAT THE LAW MUST EVENTUALLY DECIDE

The legal ambiguities surveyed in this essay are not simply inconveniences for a single platform. They represent structural gaps in IP doctrine that will become increasingly consequential as urban intelligence tools proliferate and as the outputs of pre-design platforms become standard components of planning submissions, expert witness reports, and professional liability defenses.

Three doctrinal questions demand particular attention from courts and legislators. First, the question of authorship in AI-assisted outputs: when a platform like UrbanEyes generates a site analysis through a combination of human design choices (model parameters, site boundaries, query specifications) and AI synthesis, does the output satisfy the human authorship requirement that both US and UK copyright doctrine currently mandate?[8] The answer has significant consequences not only for UrbanEyes but for the broader class of AI-assisted professional tools.

Second, the question of derivative work status: when a firm exports an UrbanEyes "Start File" into Revit or Rhino and builds a design directly upon it, is the resulting architectural design a derivative work of the UrbanEyes output? If so, what rights — if any — does UrbanEyes retain in downstream designs? This question has no settled answer, and its resolution will materially affect both the licensing economics of urban intelligence platforms and the IP positions of the firms that use them.

Third, and most consequentially, the question of the pre-design digital twin as an independent IP object: should the law recognize a new category of protected work — the urban intelligence twin — with its own doctrinal framework governing authorship, ownership, licensing, and protection? The precedent for such category creation exists in the sui generis database right

[8] *Thaler v. Perlmutter*, 687 F. Supp. 3d 140, 146 (D.D.C. 2023) (affirming the Copyright Office's refusal to register a work created autonomously by AI, holding that human authorship is a constitutional and statutory requirement). *Cf.* Copyright, Designs and Patents Act 1988, c. 48, § 9(3) (UK) (providing copyright protection for computer-generated works where "the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken").

introduced by the EU Database Directive of 1996[9], which created a new form of protection specifically for databases that reflect substantial investment but may not satisfy copyright's originality threshold.[9] A similar sui generis approach to pre-design urban intelligence outputs — protecting the substantial computational and methodological investment they represent, regardless of whether they satisfy copyright's human authorship requirement — may ultimately offer the most coherent solution to the ownership gap this essay has identified.

CONCLUSION: THE ARCHITECTURE OF LEGAL ANTICIPATION

UrbanEyes is a platform that has solved a real problem in architectural practice. The "analysis paralysis" of the pre-design phase — the fragmentation of data across GIS portals, zoning PDFs, weather databases, and satellite imagery — is a genuine inefficiency that imposes real costs on design teams, planning authorities, and ultimately on the built environment. The platform's technical solution to this problem is elegant, comprehensive, and commercially compelling.

But the deeper significance of platforms like UrbanEyes lies not in their technical achievement but in their legal provocation. By producing a new class of intellectual object — the pre-design urban intelligence twin — they have exposed the limits of an IP doctrine developed for a world of drawings, documents, and discrete software programs. The consolidated analysis stack, the physics-simulated site model, the AI-interpreted zoning envelope: these are not things that copyright, trade secret, or patent law was designed to govern. They are, in the most precise sense, ahead of the law.

This legal anticipation is not a vulnerability — it is a strategic asset. Platforms that occupy legal terra incognita before the law arrives can shape the doctrine that eventually governs them, through their contractual practices, their Terms of Service, their industry advocacy, and their litigation choices. UrbanEyes has an opportunity not merely to be the market leader in urban intelligence but to be the legal architect of the framework that will govern this entire emerging field.

That opportunity will not remain open indefinitely. As the technology matures and the commercial stakes grow, the legal questions surveyed in this essay will be forced to resolution

[9] Council Directive 96/9/EC of 11 March 1996 on the Legal Protection of Databases, 1996 O.J. (L 77) 20. The sui generis right protects databases reflecting "substantial investment" in obtaining, verifying, or presenting contents, irrespective of whether the database is itself original. *Id.* art. 7(1).

— by a dispute between a platform and a client over output ownership, by a planning authority asserting rights over its zoning data derivatives, or by a competitor who copies the integration methodology too closely. The platform that has thought most carefully about these questions in advance will be best positioned when that resolution arrives.

The pre-design phase, UrbanEyes argues, should not be a scavenger hunt. Neither, this essay submits, should the legal framework for protecting its outputs.