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POST-CADASTRAL DETERMINISM: UNRAVELLING URBAN CARTOGRAPHIES, VALUATION, BEHAVIOUR AND DECISION-MAKING IN REALTIME.

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ABSTRACT | The contemporary urban landscape delineates a departure from traditional descriptors and historic anchors, propelled by a confluence of pervasive distributed digital systems. The entanglement of the spatial internet, Web3, APIs, digital twins, real-time data, and analogous platform technologies is pivotal, enmeshing, and orchestrating interactions within urban domains. The influence of network technologies ripples across multifaceted dimensions, shaping navigation, mobility, and service provisioning.

Recursive feedback mechanisms and algorithms such as ratings, reviews, suggestions, and recommendations collectively catalyse the attention economy and choice architectures through categorising individual preferences. It is an emergent landscape where the technological infrastructures permeate, not just as tools, but as mediums intertwining with the fabric of societal existence, cultural expression, and urban architecture.

The 'Post-Cadastral' condition establishes and explores a domain of urban and architectural invention – a city's imminent escape from cadastral space, embracing virtual realms and digital ubiquity. It is concerned with the hyper-reality of virtual space as mooring of invisible cultural, economic, and societal forces. The domain of research operates at limits of material and spatial practice, integrating the physical, the virtual and holographic; and engaging with real-time, urban data analytics, simulation, gamification, techno-cultural discourse and narrative, AI, and generative techniques.

The research explores the convergence of augmented urban infrastructures and services, delineating the interwoven threads of value generation (value capture), behavioural shifts, and performance metrics. It unpacks the emergent paradigm where cities, unleashed from historical cartographic constraints, traverse fluid territories shaped by the synergistic forces of digital evaluations and algorithmic orchestration. In this epochal shift, urban spaces transmute into arenas where cadastral limitations yield to an amorphous terrain of digital augmentation and evolving spatial imaginaries.

This paper scrutinizes the intricate interplay of web-centric reviews, ratings, comments, and AI-driven algorithms that organise a departure from conventional urban spatiality – a city abstracted by search terms and contained in the comments sections and sorted by popularity. Delving into this labyrinth, it dissects the convergence of diverse valuation systems, nuanced behavioural patterns, and algorithmically mediated decision-making processes, illuminating the evolving dynamics within contemporary urban environments.

Through projects, bespoke workflows, and methodologies, its objective resides in rendering discernible precise pathways wherein technological transitions become etched within the urban continuum, consequently integrated within the realms of architectural practice.

1. Introduction

The contemporary urban condition and by extension the future proposition for cities is underpinned by elaborate frameworks. Urban landscapes manifest across the boundaries of its instruments and mechanisms. The thresholds between the physical and digital experiences dissolve and architectural sequences intertwine. There is a reverberation brought about by the permeation and inundation of the systems of the city with data and information. This resonance manifests as a chaotic haze, information swirling through the cityscape. Here, the city transcends its mere physicality to embody a dynamic amalgamation of technological, socio-cultural, and political forces, where the amalgamation of data smudges merges seamlessly with the everyday artifacts of human existence.

Embedded within this realm is the essence of the city, extending beyond its tangible structures to encompass the digital fabric interlaced with comment sections, drop-down menus, and the nuanced expressions of approval or aversion evident in reviews, subscriptions, likes, and dislikes. Within this digitized landscape, the urban environment is meticulously organized according to metrics of "relevance" or "popularity," wherein virtual registers methodically decode our behaviours, anticipate our inclinations, and prompt our actions.

The orchestration of daily life, whether within public thoroughfares or private domains, is governed by these virtual entities, guiding individuals through endless feed interfaces, spinning pull-wheels, and incessant scrolling. Algorithms wield significant influence, systematically categorizing the city's amenities and services through recursive processes. However, amid this relentless structuring, the efficacy of the city is not solely defined by its ability to prioritize but also by its capacity to overlook, all under the guise of an architecture of promotional content.

The physical manifestation of the city extends beyond the confines of handheld devices; its infrastructures and amenities intricately interconnect within platform applications and social media platforms, directing behaviour towards predetermined patterns. Within this milieu, the city's potential to facilitate human interaction is scrutinized, as desires are perpetually stimulated, and every manifestation of excess is fervently pursued.

Within this urban ecosystem, the city's devices propagate memes, and its desires seamlessly intertwine with those of its inhabitants, blurring the boundaries between the city's aspirations and individual yearnings.

2. Devices, Instruments, Mechanisms

The subsequent discourse endeavours to dissect and contemplate, both theoretically and concurrently, the interaction between market mechanisms and the instrumental domain of urban architecture, envisaging a tangible practice that is stimulated, calibrated, and sustained by the operations and endeavours of the market.

The city grid serves as a fundamental descriptor of architectural experimentation and consensus. Although the grid was not expressly devised by the market, its patronage ensures that the architectural discourse is influenced by its medium. Market forces and urban architecture exhibit a symbiotic relationship through their logics, patterns, and approximations. Architecture not only occupies property but also serves as an instrument of the property itself, representing a spectrum of specificity encompassing the tools, techniques, and mechanisms employed in realizing objective realities. Urban structures function as relentless agents that delineate and conceptualize the contingent nexus between production and consumption, imparting material, and spatial syntax to formlessness. Architectural devices serve as a language and capability for abstraction to facilitate comprehension.

This confluence between regulation and governance epitomizes architecture as the vessel for socio-political ideals. In the convergence of the market and architecture, abstraction emerges as both a utility and a domain of value. Instruments and mechanisms facilitate the integration of policy and market dynamics within a flexible framework. Architecture embodies the tangible manifestations of both the real and the abstract. The grid, famously described by Rem Koolhaas as the device "that renders the history of architecture and all prior urban lessons irrelevant," (Koolhaas, 1994) not only instigates a novel system of formal values but also provides a rigorous platform and discipline for speculation, both architectural and economic.

Robert Hoddle's Melbourne grid, characterized by minimal allocation of open space, aligns with the maximizing and totalizing influence of market dynamics. Market forces within cities are intertwined with a marketplace of technological instruments, concurrently technical and social in nature. In its current iteration, technology assumes the role of a social institution, with platform technologies and peer-to-peer economies reshaping traditional hierarchical relationships between governing bodies and citizens, disrupting social and civic enterprises.

Architecture's capacity to influence the organization of social activities is inherently connected to its precision in encompassing, accentuating, and imparting precise vocabulary to the organization of economic and market activities. With the advent of distributed technologies, this capacity becomes diffused across a landscape of cumulative individualization, characterized by choice architectures. The current market, shaped by various assemblages and obscurities, emphasizes the contrast between individual and collective elements. Within this construct of connections and activities, the continuum or flow is punctuated by the density and intensity of activities. Devices and apparatuses encapsulate human dispositions, with user data emerging as a commodity in the experience economy, serving as a transactional conduit between the market and the architectural fabric of the city, represented through virtual avatars and physical proxies.

The expansive realm of various technological ecosystems reshapes the dynamics and subtleties of agency, underscoring the asymmetric impact of human dispositions in compelling market actions. The French term "agencement," as expounded by Callon and McFall, underscores the inseparability of agencies and arrangements, encompassing everything from tools and equipment to statements and instructions. (McFall, 2009)

The role of architecture extends beyond mere categorization, rationalization, operationalization, or optimization; rather, it encompasses a fusion of these roles while aspiring to transcend them optimistically. Beneath the surface of marketing strategies lies a deeper inquiry into the potential of architectural mechanisms. Can these mechanisms not only realize inherent potentials but also provoke unforeseen patterns and behaviours beyond their intended purposes? How might architecture push the boundaries of innovation by leveraging keen observations and the nuanced workings of its mechanisms? These questions invite a deeper exploration into the transformative drive of architectural design and its impact on shaping environments and experiences.

3. Cadastral

A cadastre conventionally systematizes the spatial management of land parcels intertwined with supplementary narratives articulating the intricacies of these interests. It extends to include the custodianship or supervision, and often, the appraisal of the parcel and its accompanying enhancements. The establishment of the system sets in motion a sequence of diverse objectives. These objectives encompass fiscal ambitions, including property valuation and taxation. Legal aspirations are also integral, aiming to streamline conveyancing procedures. Furthermore, the system aims to facilitate effective land governance and utilization, especially within planning and administrative frameworks. Additionally, it seeks to nurture sustainable development and environmental stewardship. (International Federation of Surveyors, 2019) A cadastre constitutes a parcel-centric, contemporaneous arrangement of land data, encompassing an exhaustive ledger of vested interests in land, including entitlements, encumbrances, and responsibilities.

At the core of a cadastre is the foundational element of the cadastral plan. Each genesis of a new land parcel necessitates the creation of a fresh cadastral plan, rendering each iteration a snapshot frozen in time. These plans, immutable in their depiction, encapsulate the contours and conditions of the cadastre at the moment of survey. (Intergovernmental Committee on Surveying and Mapping, 2020)

4. Atemporality

The urban landscape is a perpetually shifting entity, a dynamic proscenium where the perception and legibility is recast consecutively. Its essence is not fixed; instead, it undergoes constant constitution and reconstitution. Every moment sees the city's fabric being stretched and moulded by the movement, clashes, logistics, and the myriad operations of its users, stakeholders, and infrastructural networks.

Further accelerating the patterns of perpetual transformation is the subjective concept of 'extreme present'—an abstract, hyperbolized rendition of the 'now'. This extreme present is a juncture where the collective consciousness grapples with an inundation of rapid changes spanning societal structures, data velocity, architectural assemblages, environmental narratives, and the very fabric of reality itself. It exists in the interstices between a past continuously accessed and repurposed, a 'now' disseminated and archived across digital platforms, and futures already set in motion.

Here, time behaves nonlinearly, defying conventional linear trajectories. The extreme present accelerates the possibilities inherent in any given moment, mutating the present into an intense yet elusive state. It defies direct (static) temporal correlations. This particular dynamic of the organization, reaction and expectation of the city, sits in stark contrast to the established frameworks of urban planning and indeed statutory planning or the instruments of the cadastre and surveys.
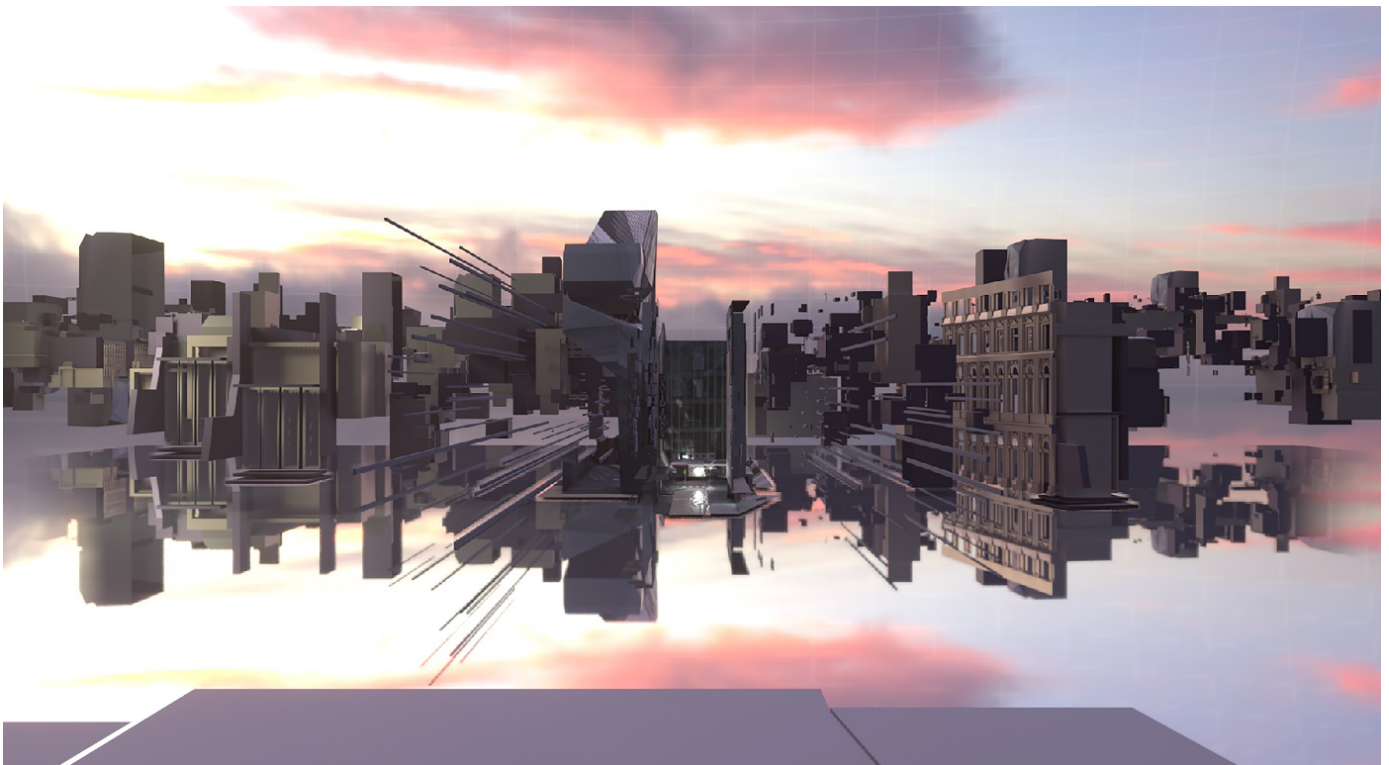

Figure 1. Shapeshifting, transiting between the physical and the virtual, and escaping cadastral space. Image: Kevin Gao with Ian Nazareth and David Schwarzman.

5. Post-Cadastral

The 'Post-Cadastral' paradigm speculates about the unfolding of a disruptive dynamic sequence, where cities emancipate themselves from the traditional cartographic and cadastral boundaries. It explores the conceptual terrain of a virtual city, enabled by platform technologies, real time data and digital ubiquity. Of specific interest is the exploration and conceptualisation of the intricacies of these hyper-realities, where the intangible yet potent forces of culture, economy, and society converge within the boundless expanse of virtual space.

Positioned at the edge of material and spatial exploration, the research aims to seamlessly intertwine the tangible with the intangible, bridging the physical, virtual, and holographic dimensions of urban existence. Immersed within this multidimensional framework, the research traverses the fringes of real-time urban data analytics, navigating through the intricate landscapes of simulation, gamification, techno-cultural discourse, artificial intelligence, and generative techniques.

The body of work also engages with a critical examination of the nodes between augmented urban infrastructures and services—a confluence wherein the processes of value generation and capture, behavioural shifts, and performance metrics converge and intertwine. (Nazareth, 2023) Through meticulous dissection, it presents a burgeoning paradigm where cities, unshackled from the confines of historical cartography, embark upon fluid trajectories sculpted by the symbiotic interplay of digital assessments and algorithmic arrangement and orchestration.

In this metamorphosis, urban landscapes cease to be mere static entities confined by cadastral boundaries; instead, they evolve into dynamic arenas pulsating with digital augmentation and evolving spatial imaginaries. As cadastral limitations dissolve, a new paradigm of urban possibility emerges—an amorphous landscape where the boundaries between the physical and the virtual blur, giving rise to a realm of potential and innovation across multi-disciplinary interests and concerns.
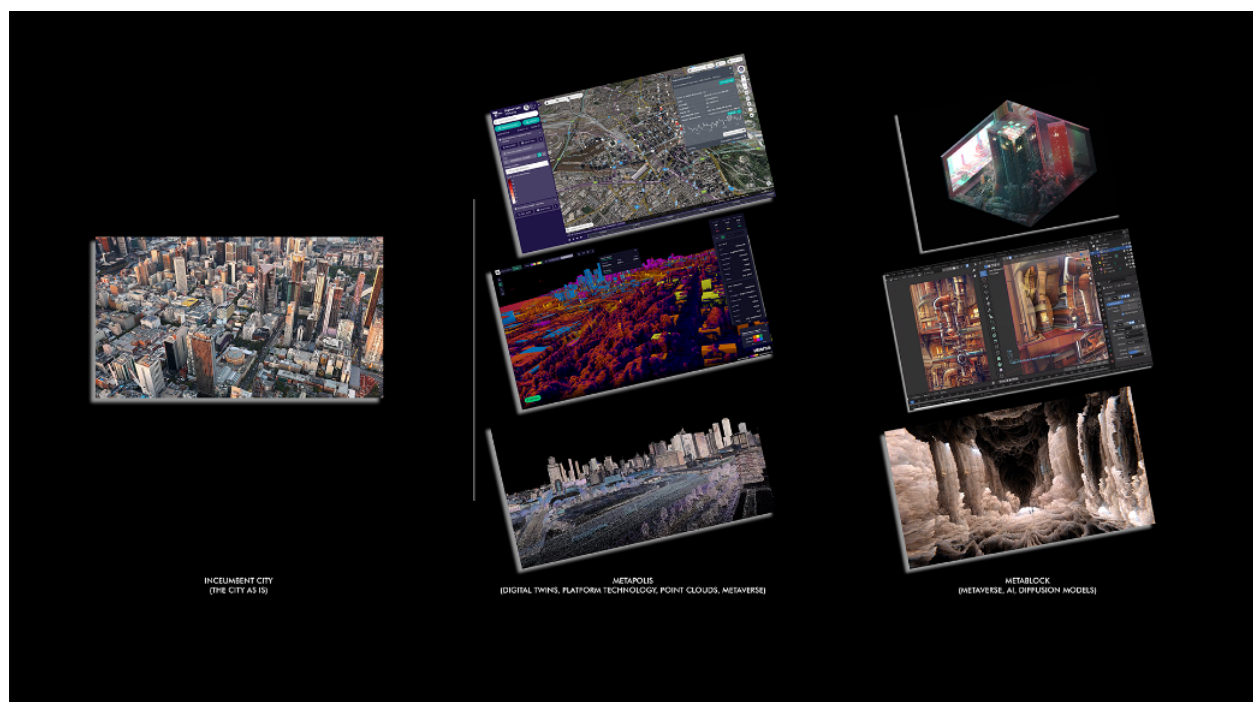

Figure 2. Conceptual platform – (i) the incumbent city (the city as is), (ii) the Metapolis – that connects smart city platform technology, digital twins, real-time analytics, APIs and (iii) the Metablock that builds on the data models of the Metapolis to reconstitute a city block in the open metaverse, spatialized through AI diffusion model and search terms. Image: Ian Nazareth. (The diagram also includes images from HEAVY.AI, NVIDIA Omniverse and City of Melbourne LIDAR Point Cloud Data.)

6. Clayton – Between the Algorithmic Yoke

The subsequent projects are located in Clayton, a suburb 18km southeast of Melbourne CBD, in Australia. Clayton, for purposes of the project is a laboratory for speculations and counterfactual propositions of its urbanism, through harvesting its meta data and locational information. Presently, Clayton is defined as much by the density of exchange as by the relationships between the post-industrial fabric and the suburban intensification projects. It sits within a field of intersections and entanglements - a growth corridor, a major train station, a university and medical precinct, a proposed national innovation and employment cluster – high technology, high science and the suburban rail loop. Here, the nodal will be further intensified by the distributed. (Monash NEIC, 2017) The speculation advances an agenda that the city is not just a multiple of buildings – the city and its metadata determine the valency of a location which is crystallised into a building, or rather, the potential for what a building might be is determined by the city and its virtual presence. It suggests a new extractivisim, appropriation, and contingency and an operative techo-financial space.

In this post-cadastral metropolis, the boundaries between reality and virtuality have long since eroded. The sectoring between government and enterprise has worn thin. As cities yield assets and control, public and private sectors emerge as a techno-political entity of neoliberal machinations. The city is presented as seamless experiences, a holographic luminance, with real-time data streams and strategic capital works projects condensed in geographical and meta space. Here, predictive algorithms dictate the rhythm of the city's life.

The aesthetic, ethical, inter-disciplinary, and philosophical quandaries are not mutually exclusive. The architecture and urban process is one of screened initiative and ingenuity, a rogue subroutine, adapting to the shifting landscapes of behaviour, process and data, actioning and shaping exploits and vulnerabilities.

The urban experience of unfolded encrypted code signals an urban optimisation, of algorithms that parsed the ebb and flow of citizens to maximize efficiency, economic growth, and the seamless propagation of capital. Optimisation is nothing but conformity, meeting the expectations of algorithmic desires and a shallow computation on large datasets.

The city is not homogenous, and the conceptualization of this project seeks to maintain and resist consistency. Between the algorithmic yoke, a city emerges, where the impeding clash of ideologies and generative principles of architecture are dispersed in the data-soaked streets, buildings and infrastructures —the precipice between algorithmic control and the chaotic potential of human experience and rebellion.
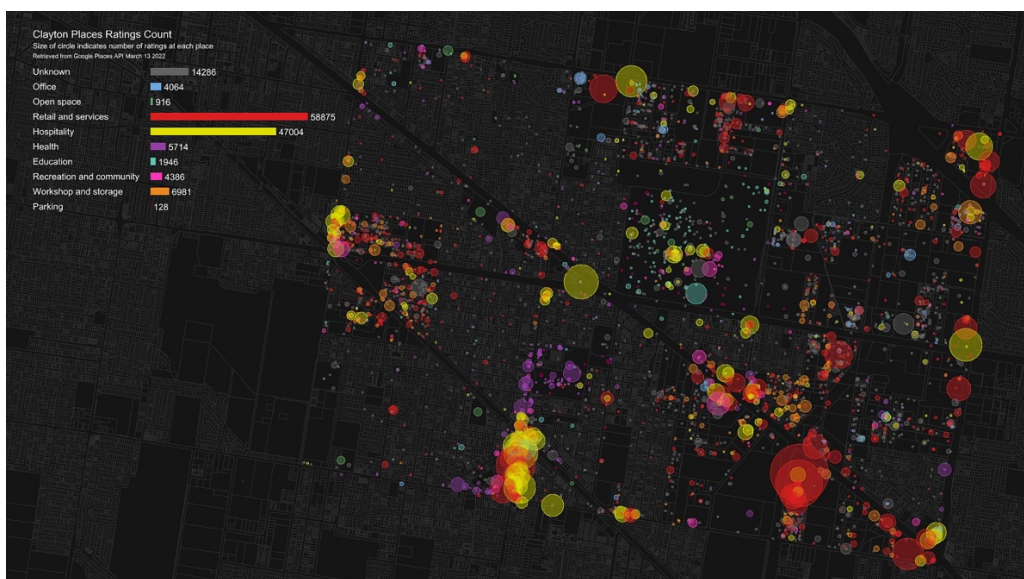

Figure 3. Geolocating user rating counts in Clayton, Melbourne, 2022. Image: Kathryn Larkin and Ian Nazareth.

7. Pattern, Like, User...

The project employs Application Programming Interfaces (APIs), with a specific focus on the Google Places API—a service facilitating the retrieval of information about various locales through HTTP requests. (Nazareth, Schwarzman, 2021) Within this API framework, places are delineated as establishments, geographic coordinates, or important points of interest. Notably, this repository includes user-generated reviews and star ratings, serving as pivotal metrics within a decentralized framework wherein user, customer, and subscriber perspectives converge. These metrics, arguably, represent an open fount of both emotional response and service valuation.

The analysis discerns a correlation between the interpretation, extrapolation, and subsequent manifestation of peaks and troughs within broader processes and mechanisms, particularly within the contexts of real-time data, informational dynamics, and urban development paradigms. Within this framework, the presence of 'noise' within datasets may engender intermittent peaks and troughs, which, over time, assume discernible patterns and forms influencing infrastructural responses, speculative activities, valuations, and urban behavioral patterns. This observation underscores two salient prospects:

1. the potential to access nuanced individual preferences amidst collective dynamics, which exhibit temporal fluctuations; and
2. the propensity for short-term biases and variances within datasets to potentially inform longer-term transformations.

Through the process of data scraping, a diverse array of categorical information is geolocated and spatially represented. The project endeavors to explore potential avenues and mechanisms for integrating this data into the built environment. Assessment, valuation, and categorization of establishments are intricately linked to property and spatial considerations. Hierarchical structures are scrutinized against parameters such as scale, temporal significance, and permanence. API-derived data is meticulously parsed and classified based on aggregated reviews and ratings. Multipliers are employed to amplify the impacts of factors such as popularity, supply, and demand. Consequently, tenancies may expand, contract, or exhibit resistance to change, with instances where the decline of certain establishments surpasses the ascent of others, leading to the emergence of voids within the urban fabric, catalysing a phenomenon of an entrenched hyper-tenancy.
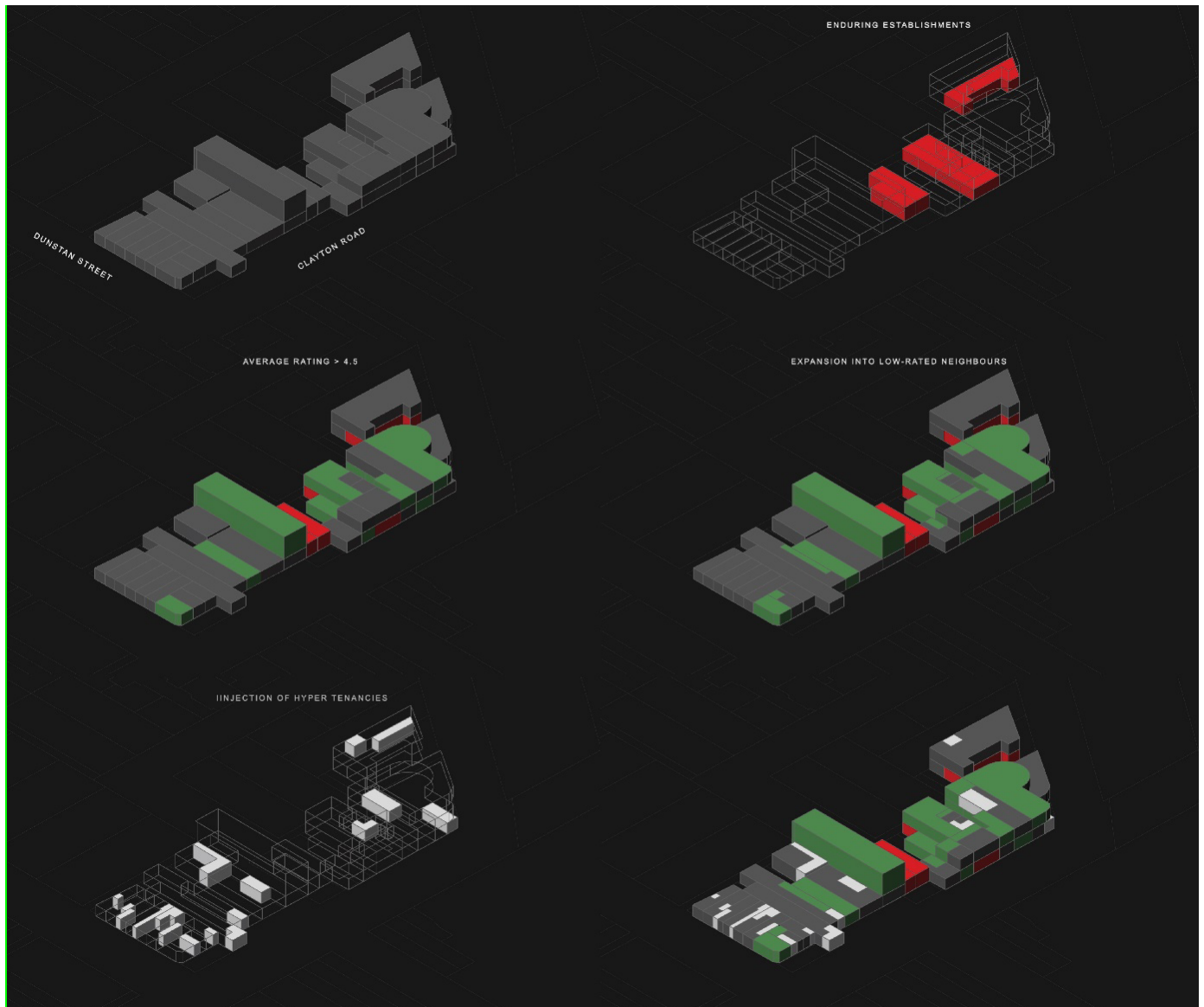
Figure 4. Hyper Tenancies in Clayton, Melbourne, 2022. Image: Kathryn Larkin and Ian Nazareth.

8. Hyper-Tenancies

Individuals play a pivotal role in furnishing platform technology systems with data through various means such as likes, ratings, and reactions. The cumulative effect of these contributions suggests a democratized reservoir of collective detail, information and therefore intelligence. Personal attributes act as a lens through which urban landscapes manifest themselves. Traditional urban hubs, exemplified by the High Street (Main Street), yield precedence to algorithmically curated search results, shaping our personalized encounters with the city.

The concept of hyper-tenancy serves as a deliberate understatement, a distinctive feature within the urban landscape characterized by its service-oriented nature, symbolic resonance, and adaptive deployment. It emerges as a consequence of disruptive forces engendering novel functionalities, mirroring the interplay between digital hype and tangible service capacities. It epitomizes the localization of unbounded expression.

Inflation predicated on popularity represents one facet of this dynamic milieu. It delineates the interactions between consumers, industries, infrastructures, and their urban representations, constituting a public interface. Retail establishments perpetually vie for prominence within the civic realm, paralleled by their

virtual counterparts competing in the digital sphere. The convergence of physical and virtual realms culminates in a distinct urban fabric, intricately interwoven within this realm. Here, the measurement of floor space serves as an indicator of assets and significance, symbolizing value derived through financial, technological, and commercial mechanisms. The inexorable progression towards inevitability is propelled by factors of convenience, initially conceived as an idealistic aspiration but subsequently co-opted by influential power dynamics.

9. The Bi-Lo Hi-Fi

Figure 5. Bi-Lo exterior and car park. Image: Tony Hu and Ian Nazareth.

This project aims to establish a critical and projective design practice. It seeks to engage with urban histories and data, examining the ways in which the city functions through speculative processes. Furthermore, it aims to reposition urban amenity while establishing a paradigm for machines and machine intelligences to inhabit and traverse the urban environment. The project explores various aspects including neuromorphic cartography, urban augmentation, synthetic navigation, and retro-fictive narratives.

Neuromorphic Cartography: Combines principles of neuroscience and cartography to create maps. It uses computational models mimicking neural networks to interpret spatial data, aiming for adaptable mapping systems.

Urban Augmentation: Enhances urban environments through technology like digital infrastructure, IoT devices, extended reality infrastructure and smart systems. The goal is to improve aspects like transportation, sustainability, safety, and efficiency, creating smarter, more connected cities.

Synthetic Navigation: Uses artificial or synthesized data for navigation, including simulated maps, virtual environments, or augmented reality overlays. It's often paired with GPS and computer vision to enhance navigation accuracy, especially in complex areas.

Retro-fictive Narratives: Fictional stories reimagining historical events or past eras from a contemporary

perspective. They blend nostalgia, speculative fiction, and historical revisionism to explore "what if" scenarios or alternate timelines, providing insights into history and memory.

The Bi-Lo Hi-Fi project represents a nuanced exploration and speculative reconstruction of the transition from the Bi-Lo supermarket chain to Coles, epitomized by the emergence of dual Coles supermarkets situated at opposing ends of a desolate car park in Clayton, Melbourne. Within this juxtaposition is a complex narrative of coexistence and spatial advantage. Rebranded as 'Meta-Coles' or 'The Bi-Lo Hi-Fi,' this locale serves as a juncture where relics of the past intersect with contemporary amenities, blurring the boundaries between obsolescence and utility.

Embedded within the network of urban memory and speculative data flows, the 'Bi-Lo Hi-Fi' surfaces as an anomaly, weaving a description through echoes of a counterfactual history. Within the simulation, the urban landscape unfolds as a decipherable cryptogram, with physical artifacts, digital point clouds, real-time data, and Non-Uniform Rational B-Splines Modeling (NURBS) surfaces gradually decoded by human cognition intertwined with the computational insights of machines and AI systems. These overlays unravel the multidimensional codes and augmentations inscribed within the urban fabric.

Through a choreography of esoteric interventions, these structures transcend their commercial origins, evolving into urban relics that straddle the realms of the tangible and intangible. These entities serve as conduits bridging physical reality with the elusive realm of the virtual. They engage in reconceptualizing architectural form, adapting it to accommodate essential services, organizational systems, and non-fungible tokens (NFTs). In doing so, they infuse these elements with fresh subjectivities and value propositions, transforming their significance within the architectural landscape.

The project delves into alternative cartographies, psychogeographies, and narratives of conceptualization, visualization, and immersion within a virtualized urban environment. It envisions a landscape where humans, non-humans, and sophisticated AI systems collaboratively navigate and reinterpret urban spaces. Amidst the flux of corporate dynamics, rebranding endeavours, and market fluctuations within the (extra)urban realm, the project operates within a liminal space, oscillating between corporeal reality and the ethereal expanses of the virtual.

This liminality offers opportunities for novel configurations of amenities, as well as the development of spatial grammar and lexicon comprehensible to both organic and synthetic intelligences within the urban architectural tapestry.
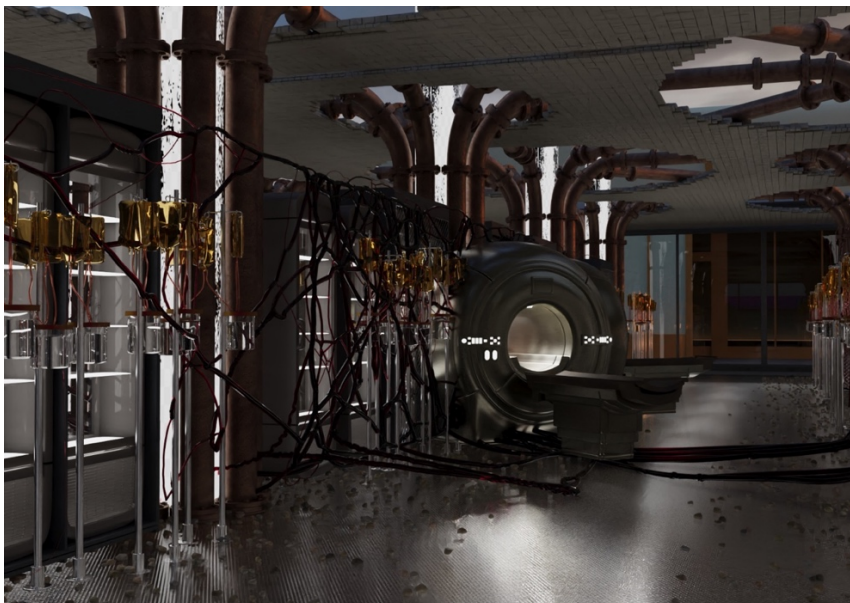

Figure 6. Bi-Lo interior. In its state of obsolescence, it provides a description to accommodate temporal amenity. Image: Tony Hu and Ian Nazareth.

10. Conclusion

In the layered intersections of technological acceleration, economic dynamics, political manoeuvring, and contextual fluctuations, the urban architectural process develops at a pace that seems almost agonizingly slow. Decisions made in the initial stages of long-term strategic urban projects often dictate the fate of major works spanning decades, rendering them obsolete before they even materialize. In this milieu, architecture struggles to capture the zeitgeist, appearing redundant, contemplative, and retrospective.

Meanwhile, the physical infrastructure of cities finds itself increasingly entangled within the realms of technology, as the innocuous internet-of-things, semantic executing web, and Industry 4.0 appropriate urban assets. This fusion accelerates the interaction between static and non-static elements, driving global shifts in topology and characteristics.

We now find ourselves in the midst of gamification, or a gamified urban experience, where gaming mechanics are seamlessly integrated into the fabric of the built environment to encourage participation, offering incentives, risks, and rewards. The city becomes a catalyst for virtual interaction, shaping and reflecting human impulses in a stochastic, non-deterministic manner.

The post-cadastral state engages in a nuanced negotiation between liberating and constraining the physical infrastructure of the urban environment, catalyzing temporal dynamics and potentials towards acceleration and exponential growth (Kurzweil, 2001). Within this theoretical framework, the perception of choice becomes entwined with structures of preference, fostering a cumulative effect through innovative combinations.

This proposition operates within the realm of speculation, persistently navigating the boundaries delineating rationality and speculative thought. It adeptly manoeuvres through esoteric realms, embraces idiosyncrasies, and penetrates pervasive constructs, addressing the turbulent techno-political climate and the stark contrast between claims of reality and simulation. Employing unconventional methodologies, it disrupts the delicate balance within urban and architectural discourses, grappling with an alternative urban narrative.

The conceptually flexible domain of the Post-Cadastral condition provides a means to abstractly represent the city, to reveal its full potential by reordering data and facts into landscapes of relevance. This city of the future harnesses spatio-temporal models to create functional representations that extend far beyond the limitations of current urbanity, sensing and adapting to its environment on a scale previously unimaginable. It becomes not just a settlement pattern, but a technology itself—an infinite canvas of spatial and temporal possibilities.

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