The metapolis – cities between a ripple and a blur

Ian Nazareth[1]

[1]RMIT University, Australia
ian.nazareth@rmit.edu.au

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Abstract

If the metaverse is the aggregated, embodied internet of experiences, applications, and products - a three-dimensional virtual world of decentralised interoperable networks, then, the Metapolis is the surrogate quasi-urban assemblage – a distributed scaffold and matrix of gateways and terminal experience architectures that coalesces in its wake. It contains the footprints, detritus, infrastructure and residue of our collective digital avatars and augmented experiences.

The Metapolis is without starting points or end points, an ambiguous and unstable category. The incumbent city and the Metapolis exist contemporaneously as contingent, unstable actions. The interaction between the post-industrial city, the metaverse and the Metapolis is not a logical Venn diagram but combustion. The city as particles and waves, that occur in superposition of each other, i.e., cities occupying the same coordinate infrastructures, organised by compatible data and metadata. Here, two seemingly distinct spatio-temporal phenomena converge upon the same reality, the conjuration and incursion of the 'built' environment into the internet.

The paper discuses s a conceptual framework and presents projects developed through a discrete combinatorial procedure - utilising data structures, spatialising APIs, point-clouds, and generative adversarial networks – an interface connecting the physical city, its digital twin and the open metaverse.

The Metapolis is manifested as a fluctuating spatio-temporal domain – a transient state between the incumbent city and the metaverse. Fundamentally, it is recognised as a 'realm' – operationally a physical territory and a formal category. It could be understood as a higher entity that provides a probability distribution and potential for the outcomes, mediating and inscribing the rules of play. It deploys a deep texture mapping – weaving together abstract and material signifiers. It appears as a seamless experience of consciousness – switching between, and burnishing over the folds amid real and symbolic, coupling the physical and virtual cities.

The Metapolis is an ordering of self-contained entities of functional significance. Complexity emerges from the consequential interactions of finitely bounded individual preferences. The city reacts more precisely to patterns and behaviours. Even objects are now subsets of the patters of utility. Emergent solution to emergent problems that, conserve historical layers. The Metapolis is the capacity to of urban infrastructures to abstract - a conceptual scheme to reconcile and map geography onto information, between the known and unknown. The metropolis and the Metapolis are a network of entangled infrastructures at a constituent level. They remain linked and share a common, unified state. Information and actions carry across the meta-physical breach. The Metapolis is an approximation and correlation to its physical counterpart.

Within this construct the paper also explores the potential for open-ended and user / operator / consumer generated architectures. As a spatial organised directory tree of information and unitary structure, the gravity of connections and intensity of uses delimit the temporal shape and form and restructure the potential of the city's network.

The research investigates the relationship between the embodied internet and its interaction with the incumbent city and the metaverse, and friction, challenges, and opportunities for machine intelligence in generative techno-social development.

Author keywords

Metaverse; AI; smart cities; digital twins; point-cloud; real-time analytics, urban narrative; cyber

Note: The style and language of the paper engages with the agency of critical, reflective, narrative, and descriptive text as well embracing socio-cultural and technological critique as a generative device for the qualitative design-research process.

Introduction

There's a world of goods and services, of extraction and making... and activities – Newtonian, Darwinian and perhaps Dickensian. Far beyond, there's an intangible sphere of hypothesis, conjecture and supposition – of accelerationism, dilation and escalation. Risk, liquidity, short sells, margin calls... volatility. Between, lies a proscenium where services are stages and goods are props. Sounds rather Machiavellian. Fungible commodities, tangible goods and intangible services synthesise a transactional event... i.e. the experience economy. The interaction between the two is not a logical Venn diagram but combustion. A breach that resists identity. This is the Metapolis.

Note, Clarification: The use of Metapolis, is the author - Ian Nazareth's own description of the term utilised in reference to the theoretical and design project, while Métapolis – references the use of the terminology by François Ascher

The economy emerges through intentional and arbitrary interactions and intersections of subjective factors, dispersed throughout a market and landscape of options. Usually, the city serves as the conduit and receptor for information encoding and extraction. Information is collected, categorised, and re-categorised at various scales and resolutions. The internet not only accomplishes this task but also feeds back into the city's physical substrate. This process produces an experiential reality that is both individual and collective. The challenges of abundance and scarcity reverberate back to the urban environment. There is no singular reality but an unavoidable technological singularity.

Data infrastructures, digital and physical artefacts - from low-poly forms to gradual high-resolution, high-fidelity architectures add a meta-layer, where forms become a representation of themselves, mirroring the technology that produces them. And vice-versa. The realm of the real and possible blur. The Metapolis occupies a conceptually flexible domain, to abstractly represent the city, in order to fully comprehend its potential. It is uncovering a future where variants can exist contemporaneously. It utilises spatio-temporal models of the existing as a comparative to manifold, heterogenous models for potential action and speculation. It creates a functional representation that stands in for the collection of objects and actions. It enables a city that senses far beyond normal limitations of the incumbent city.

The physical city in-turn provides a medium for strategic interactions with economic and other rational agents. The emergent choices are interdependent and produce outcomes corresponding to preferences - these outcomes are unintended or unknowable to the agents. (As discussed later, outcomes are contingent, and within certain parameters, possible only if they can be observed in the first place)
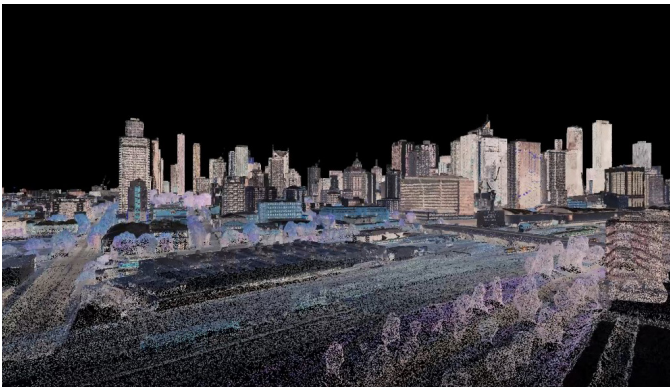

Figure 1. Visualising the temporal city through information modelling and data point clouds as a model of experiencing the mediated contemporary city. Image: Ian Nazareth and Lester Li. (Raw information extracted from the City of Melbourne LIDAR Point Cloud Data)

Deviation and slippage between the physical city and the virtual provide alternate modes of legibility. At present, it seems convenient that the two are not viewed or discussed in the same frame of reference. Its beneficial and indeed profitable to regard them as separate rather than coupled. The historic city *and* the benign metaverse. It is arguable naive, to assume the sensation to develop as separate categories, when in all likelihood, there is an embodied relationality, an eventual site

of contestation rather than resolution. The relationship is likely exploitative.

Spaces in the Metapolis are hybrid and augmented world's spawned between a concept and experimental demonstration, between the real and unfathomable. It exhibits surrealism or the hyper-realist temperament subjected to a slow process of assimilation by a situationist impulse.

The Vector of Information

The balance of exchange is always weighed and measured, calculated, taking into account a relation without exchange, an abusive relation. The term abusive is a term of usage. Abuse doesn't prevent use. The abuse value, complete, irrevocable consummation, precedes use- and exchange-value. Quite simply, it is the arrow with only one direction. _ Michel Serres

With Web3, the incumbent city and the metaverse (internet) are now working on the same axis - to shape normative desire. 'Use value' and in ever increasing share – 'exchange value' are deployed as an immutable characteristic of late-capitalism. However, the dynamic is compounded by variables of 'sign value' (Jean Baudrillard's concept that takes into account the stature and status imparted, over the material, utility or functional value) - and Michel Serres' claim of 'abuse value' – goods and services of inadequate utility.

The divide between the physical and virtual realms - the fissure and the overrun - serves as a nexus of interaction and exchange, which is both necessary and perplexing. Traffic does not flow without friction or in a single direction; it may be asymmetrical. The urban environment, as well as the metaverse, could exhibit hyper-parasitism, where the host and the parasite are both parasitic entities. It is critical to acknowledge and comprehend the control, ownership, and directionality of information and material flow in both the digital and physical cities. There are finite physical resources directed to breed indeterminable exchange, sign, and abuse value. Once things are untethered from physical or material reality, the possibility of something emerging from nothing becomes viable. When the vector is reversed, inoperable and unserviceable elements become harmful and treacherous.

There is an unacknowledged friction between the city and the city. Between the physical, incumbent city and its digital twin, its internal representative model and the metaverse. Between physical artefacts and virtual avatars, between particles and pixels. Between clarity and allusion. Between matter and event. The opposite of network effects (any situation in which the value of a product, service, or platform depends on the number of buyers, sellers, or users who leverage it) is likely chaos theory and the butterfly effect (the idea that small things can have non-linear impacts on a complex system) Digital scarcity and exuberance meets real world serviceability and cultic hysteria.

What happens when trim of autonomous selfhood is peeled back? What if the physical city and the virtual metaverse compete for space, time, resources and your finite attention? What if they are adversarial by nature? What if the city is not synonymous with its digital self? What if the interde-

pendencies are burdening? What happens when the physical city loses its centrality?
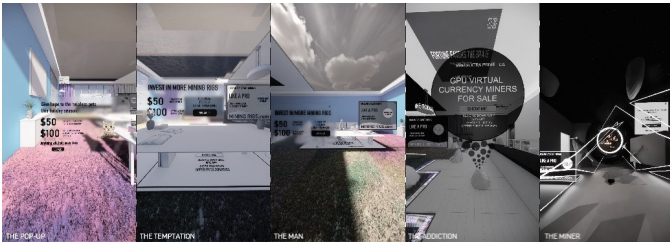
Post Internet, Web3

Figure 2. User Interfaces and spatio-temporal architecture, of the post-internet and Web3, merge in The Crypto Miner's Share-house project. Image: Ian Nazareth and Jason Ho.

Post Internet Reality describes a period that corresponds to an extreme present where the internet in its every manifestation - its perception, influence, fragmentation, polarisation, disruption, accelerationism, and speculation - is the milieu. It is where and when the microgenres and subcultures of the internet influence the aesthetic, form, and relational hierarchies of the architecture of the city. The semantic web, blockchain, digital ownership etc., in their universality and omniscience, cannot be separated from political, cultural, and economic reality. It presents the multiplicative, ratcheting effect of combinatorial innovation. It is the emancipation and burdening of the infrastructures of the city. It is when the virtual is inapparent yet imperious.

Web3 is the ensuing restatement of the conceptual narrative of the internet. It is the internet as a topological entity, through processes of decentralisation and tokenisation, that anticipates the proliferation of transparency and ownership - an internet of value, and transactions at the speed of thought. It is the web that already fractionally exists, but also a medium that suggests an interoperability across platforms, systems, and protocols. New codes, technologies and platforms are each incompatible ecologies, with non-transferable assets, and it remain to be seen how these systems integrate. Nevertheless, they embody an ever-changing topography that might produce discrete ontologies, rather than a unification.

The paradigm of the Post Internet Reality implies that even seemingly radical technologies enter the common parlance. It represents a space that is physical, tangible space but also intangible paradoxical realm. The spaces are seemingly contained within the medium and format of their genesis, but escape the cliché of abstracted data, as they realise a philosophical, socio-cultural reality. Between non-space and a sensorial stimulation.

The following project elaborates on these ideas through the mode of design practice research.

The Metapolis and the Metablock
So, they used brick instead of stone, and tar instead of mortar. – Genesis 11:3

Early descriptions of the *'métapolis'* attempt to capture a multi-faceted city, generated by accelerated changes and hypermodernity in contemporary society, and consequent
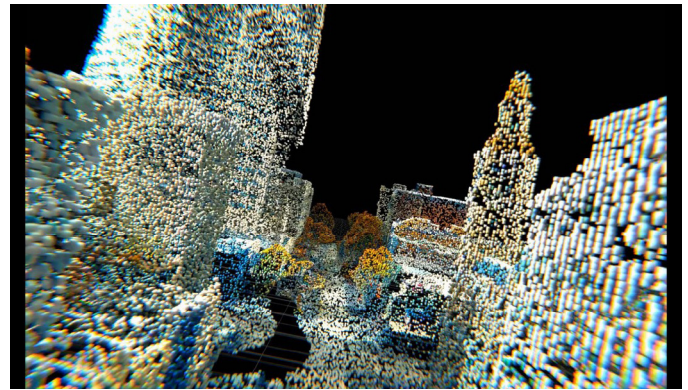

Figure 3. The Metapolis – visualized through modelling spatial architecture, meta-data and poin-cloud models where pixel refer to real-time usage statictics of programs within the built environment. Image: Ian Nazareth and Kevin Gao. (Raw data extracted from the City of Melbourne Open Data Portal, and City of Melbourne LIDAR Point Cloud Data)

transformation of the architecture of the city and urban arrangements. Urban sociologist François Ascher engaged the term *'métapolis'* to describe the phenomena of the urban experience that brings into view a discontinuous, heterogenous, networked model of the city. The spaces that make up a *métapolis* are highly mixed, though not necessarily contiguous. It extends beyond the conception of the metropolis. The Metapolis is extended and re-defined with the concept of the digital twins and the metaverse and utilised in reference to the theoretical and design project, while *Métapolis* is a reference to the use of the terminology by François Ascher.

The metaverse is not an escapism but an immersive interactive computer-generated reality where actions are performed. David Chalmers argues that virtual objects are real objects - that virtual reality is causal and real. It exists independently of us as individual or collectives and it's not an illusion. By extension, implying that interacting data structures are concrete, with evidence of cause and effect.

The conception of Metapolis subscribes to a scenario where entities have both spatial and temporal properties, substantive constraints and hence counterfactuals. To further interrogate and speculate about the concepualisation of the Metapolis, a block within the metaverse is utilised as an analogue to the city block in the physical incumbent city. As part of this project, data from the City of Melbourne (Australia)
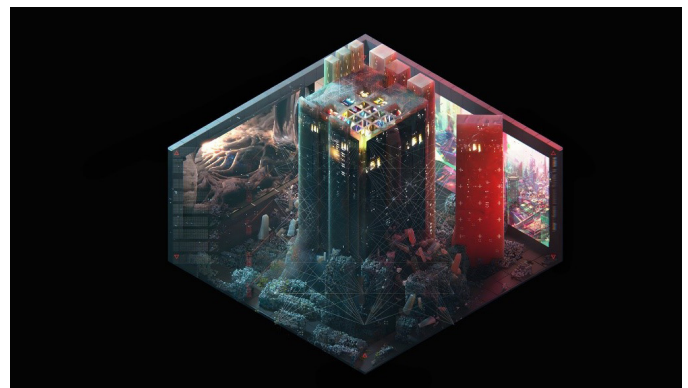

Figure 4. The Metablock – speculative digital city block in the metaverse, where growth and behavior are products of a real-time patterns of occupation with its the analogous city block in the City of Melbourne. Image: Ian Nazareth and Kevin Gao. (Raw data extracted from the City of Melbourne Open Data Portal)

and the Digital Twin Victoria are utilised to build operative data models.

The city-block in meta coordinate space presents a quandary. Not only for a system to navigate a frontier of manifold potential, but a querying of the ontology of the urban block itself. While the architecture of the traditional city block in a city grid is a dogmatic hypothesis for action, of abstract appropriation and exploitative economic expression, it is firmly bound within extractive material logics and structural etiquette. Discrete econometric conditions, carefully contrived scarcity and decentralised property ensure that hyperbolic free market conditions prevail within meta-space as well. *But released from other bounded topologies and relational network impulses, what forms the instructive conditions of spatio-temporal continuity in the meta block? What orthodoxies and archetypes will be revisited or generated?*

The dilemma for its spatial architecture begins with a challenge to orthodoxies of representations of formal characters that are in their new medium - immersive, experiential, spatial morphologies themselves. Unlike discrete representation, these are more immediate. The representation is the occupation. Space and time have a discursive relationship - as movement or mobility is perceptual and ambiguous, but also interactive.

Design is probabilistic or at the very least stochastic - generative conditions and communicative infrastructures that engender a likelihood of interaction, programmatic and social adjacency. Operationally and arguably, this is a qualitative, spatial agenda plotted on a probability matrix. Likelihood of encounters are increased by constraints of economics, scale, geometry, and materialism. Concentration is a human proclivity, recurrently mobilised through design. If the city is about the maximum things out can do in a day this poses further queries or variables - *Is the aggregate of (all) possibility conserved across meta and physical dimensions? And if possibilities are self-organised and limitless, what then defines a phenomenology? Or semiology? Are they closed loops or self-organised open-ended threads?*

The experience of the Metapolis is delivered across decentralised datascape through kinematic portals. These are frames that contain spatial references, the systems of motions and
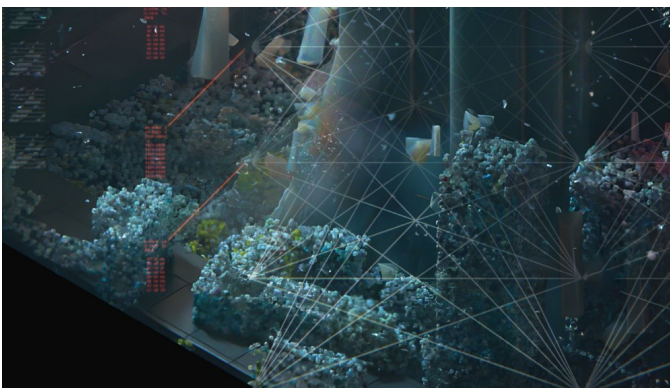
Figure 5. The Metablock – data architecture and spatial architecture are referenced, while a user interface overlays analytical models, data, usage statics, density and other parameters that offer an augmented reading of the city block in the physical city and metaverse. Image: Ian Nazareth and Kevin Gao.

relative timescale. A realm where the city's geometrical description, is subjected to force and movement through its expanse.

Spaces and programs within the block are products of self-conditioned contingency - associative, proportionate qualities and relational responses to and within its locality. Contiguity and the capacity for concentrations, combinations, dilations and alterations are a response to adjacent stimuli. The Metablock is an ecology of immediacy and an architecture of spasmodic bursts, abrasion and contact where a series of local (near-field) changes organise within a spatialised data cloud of loosely organised simultaneous geo-local behaviours. Between clustering and void-ing, an emergent geometry of continuous transformations, foments.

Connected into the city's digital twin platform, real-time city infrastructure, and open metaverse the Metablock's growth, availability and structure is linked to real-time models of usage and occupation - some of these behaviours are amplified. The city and the Metablock are a network of entangled infrastructures at a constituent level. It offers a dynamic re-distributed of the infrastructures of the city - instinctive, instructive and reactive. It processes the circumstance, use and occupancy of the city, the overlaps, and breaks.
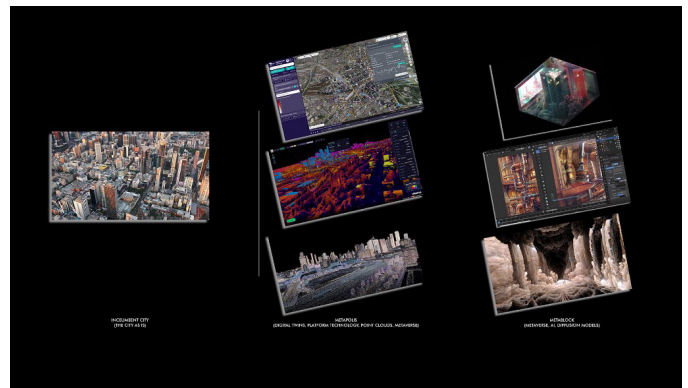
Figure 6. The Metapolis conceptual platform – (i) the incumbent city (the city as is), (ii) the Metapolis – that connects smart city platform technology, digital twins, real-time analytics, APIs and (iii) the Metablock that builds on the data models of the Metapolis to reconstitute a city block in the 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)

This is conceptually and operatively a platform to connect or tether the physical city, its digital twin and the metaverse, - experimenting with data clouds, real-time information, application programming interfaces (APIs) and real-time analytic platforms HEAVY.AI built on Nvidia Omniverse for collaboration and simulation. The project can further connect to other analytical platforms at a city or neighbourhood level – and consider their value to AI diffusion models. Looking across this emerges as a scaffold connecting the incumbent the service and the metaverse.

The Metablock is a spatially organised directory tree of information, a unitary structure - gravity of connections and intensity of uses delimit the temporal shape and form and restructure the potential of the network. Fissures in data structure clear margins for emergent categories. The metropolis and

the Metapolis are a network of entangled infrastructures at a constituent level. They remain linked and share a common, unified state. Information and actions carry across the meta-physical breach. The Metapolis is an approximation and correlation to its physical counterpart.

The incumbent city and the Metapolis exist contemporaneously as a contingent, unstable action. The city as particles and waves, that occur in superposition of each other, i.e., cities occupying the same coordinate infrastructures, organised by compatible data and metadata. Here, two seemingly distinct spatio-temporal phenomena converge upon the same reality. The Metapolis is perhaps isomorphic. It is a what the city could be, not merely what the city is. Its physical reality delineated by bits and a virtual reality circumscribed by matter and stuff.

Black box, Search terms, Prompts

The architecture of architecture in the metaverse recenters one's gaze. The possibility tends toward the implausible recreation of all conceivable expressions.

Could a spatial system iterate infinitely? Conversely, what if everything that can be imagined has already been designed? Does the infinite deny certain opportunities? What lies beyond the reach of iterability?

Like Jorge Luis Borges' 'La biblioteca de Babel' (Library of Babel) where a library (of infinite chambers is a repository for every permutation of the alphabet) metaphorically describes the universe, the Metapolis confronts the paradox of the infinite, to understand, control and visualise its boundlessness. There's an inherent futility contained in the irrationality – that limitless possibility exponentially reduces the probability of any meaningful experiences. Yet this scarcely detracts from the pursuit.

The architecture of the block is experimentally open-ended, and user/operator/consumer generated. It is therefore confined by the parameters of present mechanical and procedural reproductions. Despite any claims for highly differentiated and enunciated outputs, the process combines generalities, averaging out idiosyncratic products. In the context of language, where expressions cascades as genres, sub-genres and micro-genres, machine learning image generators are form of search engine. Debatably, an utterly original, authentic conception might be beyond comprehension.

The conception of a user generation city proposes a city recreated through the mind's eye, through text, prompts and suggestions. Expression and intention condensed through a flattened visual apparatus sewn together with the benevolence of generative adversarial networks and machine intelligence. This deploys language and perhaps 'design' as an automated combinatorial process. Like machines, human to are visual sampling machines, and a lexicon of words are lateral to a vocabulary of pictures.

Letters, words, phrases, styles, references are all equivalent and unitised – i.e., Search Terms – the fundamental indivisible component of spatial, visual comprehension. The terms are a stenography for a sequence of code and machine instructions, alphabets prearranged into pixels. Outcomes in the city depend on rank-ordering of search terms – the benign act of searching and observing from a distance changes reality. Consequences are contingent on whether they have been observed. Infinitely divisible spatial labyrinths are suspended in the gravity of the meta cities paring to the city's digital twin – the real. It seeks some description of an indivisible quantity within the infinite.

The two concepts utilised to further explore the spatiality of 'rooms' within the Metablock are described below. As discussed earlier, these spaces are linked to the data structure of the city block. This presents the possibility to link the volume and availability of meta spaces as a contingent function related to the behaviour of the city block in real-time.

Allegorical Space

In Book VII of 'The Republic', Plato presents a parable that would come to be known as 'The Allegory of the Cave' – Plato describes a group of prisoners, whose lives are confined to a cave without any connection to the world. A fire (or candle) behind them illuminates movements. Their experiences, consequently, are only determined through the shadows cast before them, scenes that preoccupy their fascination and experience of reality – they classify these illusions and phantoms as actual entities.

In the story one prisoner ventures outside the cave, to discover a world that is illuminated by the sun. He sees 'true' forms not just shadows of form, and details, and reflections, and colour and shadows too. Enlightened, he returns to the cave to help his companions mired in confusion and error – but his vision can now scarcely adjust to the darkness in the cave, while the group, firmly believe his travels to the outside have made him irrational and untrustworthy.

Figure 7. Allegorical Space – a conceptual image of spaces within the Metablock for meeting, gathering, hosting events etc., generated through the use of open-source AI diffusion models and search prompts, then re-modelled into interactive immersive three-dimensional environments through modelling, simulation and rendering, also utilising physics of gaming engines. Image: Ian Nazareth and Kevin Gao.

Of the numerous interpretations, this allegory submits that the things that are seen are flawed reflections of ideal forms, it highlights the problem of representation and a querying of the nature of reality. Plato's Cave is also a techno-philosophy - the fire as a technology that casts shadows to inform perception and make claims about reality. The metaverse and virtual reality experiences are conclusively a form of technol-

ogy that irradiates a perception on reality – between known and unknowable between real and simulated. *What insights might be gained from moving out of the real, into the meta, (and back into a cavern of the real)?*

The Allegory of Plato's Cave is a departure point for the ideas contained within the design process – of how spaces are conceptualised within the project as well as the expansive notion of outside world i.e., beyond the known. The language and hierarchies of the space seek utility in the imageability of illumination and shadows, the form making process, representation in a resonant interior. Here the potential to conceptualise, formalise and accentuate a space though the design of its sciography manifests in the material and textural effects. Each space deals with its own conception of reality, and a totalising, highly differentiated boundary condition.

Backrooms

The Backrooms are not an actual place. One might informally refer to it as a 'non-place'. It exists outside the boundary of programmable floor, beyond all accounts of area and coordinates of architecture. An unfathomable poche. The Backrooms are an infinite abandoned, unfurnished labyrinth or a rupture in the fabric of reality.
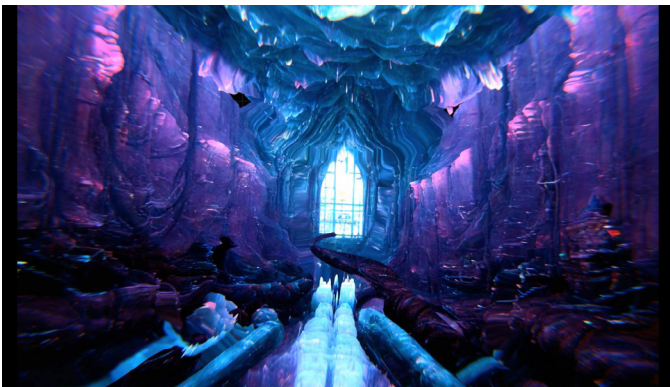

Figure 8. Backrooms – a conceptual image of spill out, circulation and ancillary spaces within the Metablock for meeting, collectivity etc., generated through the use of open-source AI diffusion models and search prompts, then re-modelled into interactive immersive three-dimensional environments through modelling, simulation and rendering, also utilising physics of gaming engines. Image: Ian Nazareth and Kevin Gao.

In the paradigm of video games, Backrooms are a space you might encounter if you pass through solid walls – i.e., 'no-clipping', a scenario where you navigate through a game environment with collisions disabled, to glimpse the other side – levels, sub-levels, easter eggs. In the contemporary city this is recognized as 'Junkspace' as described by Rem Koolhaas – 'not Modernity itself, but a residue and coagulation of products while modernization is in progress.'

The Backrooms emerged as an internet meme, but conceptually represent a physical and virtual dimension – real so long as you are in it, a space of prolonged neglect, a buffer, a ballast. It is a space between spaces, a spatial and informational breach. Free-roaming in open-world information landscape, where repetition is sought an instant remedy for infinite.

Conclusion

Presented through the artifice of an architectural project, the Metapolis associates fundamental urban processes, strategic, comprehensive, and statutory urban planning, zoning etc. with elementary digital subdivisions like blockchain, data analytics, machine learning, operating between physical and simulated fields. The research and speculations seek to gather agency in the 'territory' across the more established planning instruments and generative, emergent paradigms manifested by decentralisation and distribution. It empowers an exploration between the city and its digital counterpart – a space to contend with, simulate and augment the metropolis. The platform can serve as an analytical device and a space for collectivity, events etc.

The Metapolis is a dialogue among its temporary inhabitants and users. Logistically and operationally, it is the infinite recreation of interminable rearrangements. Like the city, in its quest for popularity and totality it is in a perpetual state of incompletion. The imagery and experience presented through the project is architectural, industrial, technological and landscape. The Metapolis is a conjuration of biological, mechanical, electronic, linguistic social ideas, and incursion of the built environment into the internet.

The Metapolis captures an emergent, fluctuating domain of architectural exploration catalysed by an internet of things (IoT), distributed platform technology, real-time analytics, Web3, the metaverse and AI. These technologies can be viewed as discrete but are here explored as interleaved variables that could collectively engender an augmented and immersive urban and architectural experience. The terminology and language respond to a landscape of socio-cultural, technological, and gaming syntax, borrowed, and deployed to extract a spatial grammar and advance contemporary architectural practice.

As we continue to allocate our time between physical, simulated, and virtual realms, we are edging closer to a scenario where a significant portion of our lived experience will be simulated rather than non-simulated. Although this is a groundbreaking and dynamic frontier, the research establishes a feasible framework and platform for unifying distinct entities and datasets, as well as a theoretical basis for navigating the transition and translation.

References

Pine, J., & Gilmore, J. (1998). *Welcome to the Experience Economy*. Harvard Business Review. https://hbr.org/1998/07/welcome-to-the-experience-economy

Serres, M., Schehr, L. R., & Wolfe, C. (2008). *The parasite*. Minnesota Univ. Press.

Edelman, G. (2021, November 29). *What Is Web3, Anyway?* Wired. https://www.wired.com/story/web3-gavin-wood-interview/

Baudrillard, J. (2019). *For a critique of the political economy of the sign*. Verso.

Serres, M., Schehr, L. R., & Wolfe, C. (2008). *The parasite*. Minnesota Univ. Press.

Stobierski, T. (2020, November 12). *What Are Network Effects?* Business Insights - Blog. https://online.hbs.edu/blog/post/what-are-network-effects

Ascher, F. (1995). *Métapolis, ou, L'avenir des villes*. Odile Jacob.

David John Chalmers, & Peacock, T. (2022). *Reality+ : virtual worlds and the problems of philosophy*. Allen Lane.

Home Page — CoM Open Data Portal. (n.d.). Data.melbourne.vic.gov.au. https://data.melbourne.vic.gov.au/pages/home/

Land.Vic. (2022, November 4). *Digital Twin Victoria*. Land.Vic. https://www.land.vic.gov.au/maps-and-spatial/digital-twin-victoria

Basile, J. (2018). *Tar for mortar : the library of babel and the dream of totality*. Punctum Books.

Jorge Luis Borges, DesmazièresE., Hurley, A., & Giral, A. (2000). *The library of Babel*. David R. Godine.

Droitcour, B. (2022, August 11). *The Trouble with DALL-E*. Outland. https://outland.art/dall-e-nfts/

Plato. (2016). *The Republic*. Gutenberg.org. https://www.gutenberg.org/files/1497/1497-h/1497-h.htm

TED-Ed. (2015). Plato's Allegory of the Cave - Alex Gendler [Youtube Video]. In *YouTube*. https://www.youtube.com/watch?v=1RWOpQXTltA

Rem Koolhaas. (2006). *Junkspace*. Notting Hill Editions.