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Liquid Organizations: Topological Restructuring in Metaverse Workspaces

Abstract

This study examines the development of "liquid organisations" within the context of work in the metaverses, focusing on the ways spatial and virtual reality technologies profoundly reorganise the topology of the organisation and supersede traditional hierarchical frameworks. Using the concepts of spatial sociology and organisational theory, we construct a transformation framework that outlines significant aspects of change which include reconfiguration of space, mechanisms of visibility, dynamic arrangements, and fluid representation. Our analysis shows how metaverse environments eliminate physical proximity as a determining factor of organisational domination and influence, create reciprocal visibility that defies traditional surveillance backlash, permit agile team formation through topological responsiveness, and allow disruption of status representations through plastic representation. All these changes collectively constitute dissolving stagnant bureaucratic frameworks for more flexible ones. These changes are profoundly impactful for fundamental concerns of coordination and control in post-physical environments and identity situational to the organisation. This work enhances the understanding of the spatial redesign in metaverse workspaces as an enabling factor to structurally reimagine organisational design while simultaneously posing grave hardships to governance, equity, and inclusion within virtually performed enacted organisational structures.

Key words:liquid organization; metaverse workspaces; spatial topology; organizational hierarchy; virtual embodiment

1 Introduction

The development of metaverse technologies has initiated a profound restructuring of organisational space, reconfiguring traditional concepts of workplace architecture, as well as hierarchy and socio-political power dynamics. As Hopkins notes, we are in the "dawn of the metaverse" in architectural practice, which heralds the relinquishment of physical boundaries in favour of fluid, programmable environments that change the very nature of organisational existence and function [1]. This change is not simply about the digitisation of the workplace, but rather a fundamental shift in the paradigm where the topology of the organisation determines the graphed relations of power, the flow of communication, and collaboration within and outside the organisation, busting the seams of quote unquote traditional district relations. The shift to the emergent hybrid work models integrates metaverse functionalities, creating new organisational

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forms that go beyond spatial limitations while reimagining talent management and coordination of human resources [2].

The combination of edge computing, Internet of Things technologies (IoT), and immersive technologies forms the basis of this new spatial revolution, creating what Vermesan et al. called "the spatial computing continuum" which integrates the physical and digital world seamlessly [3]. Such a technological infrastructure allows organisations to bypass the limits of physical architectural infrastructure and, as Oosterhuis puts it, advances to “another normal.” In these states, organisational structures become componentised, re-configurable, and responsive to evolving demands [4]. The resulting forma mentis resemble organisational hierarchies—this rather suggests liquid, adaptive structures that dynamically reconfigure based on functional demand instead of spatial precedence.

This transformation impacts knowledge management and institutional memory, as archives of the organisation morph into more interactive, spatially organised information technologies [5]. Such spatial digital repositories do not serve merely as records; rather, these are active organisational spaces that dynamically enable knowledge to be accessed, shared, and co-created through spatial systems unlike pre-defined, hierarchically structured non-relational databases. The underlying networking infrastructure for such virtual organisational environments unlocks new forms of distributed collaboration, albeit underspecified research gaps remain on the optimal foundational design for such networked metaverse systems [6].

At the core of this spatial restructuring is the development of human interface systems that mediate the interplay within the organisation. By means of artificial intelligence as well as multi-modal sensing technologies, these interfaces create novel phenomenological conditions for organisational presence and power [7]. In the same way, digital twin technologies provide unparalleled modelling capabilities for automating organisational processes, thereby further differentiating between physical and virtual organisational topologies [8]. The interdisciplinary creation of these virtual organisational environments integrates architecture with interaction design to construct functional virtual working spaces [9].

These changes indicate what Van den Heuvel and Mota describe as the “digital turn” in spatial architecture, which deeply transforms the context and sets clear boundaries redesigning how organisations configure themselves in a post-physical context [10]. As organisational environments turn predominantly virtual, timeless ideas about the influence of spatial arrangements on organisational activity offer fruitful lines of thinking for predicting the impact of the newly configured spaces.[11]

This research investigates the role of metaverse workspaces in accelerating topological changes in organisational design while proposing the term “liquid organisations” to describe the reshaptable and reconfigurable forms that emerge within those environments. Combining approaches from spatial sociology with organisational theory, we investigate how virtual spatial arrangements change features of power within governance models and within institutions. This analysis enhances understanding of how hierarchical re-organisation in metaverse space would radically shift the nature of spatial hierarchy within the organisation, thus transforming, and

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undermining traditional bureaucratic structures, erecting novel organisational challenges and opportunities.

2 Theoretical Foundations and Conceptual Framework

In order to comprehend the phenomenon of changing organisational structures in the context of the metaverse, there is a need to bring together spatial sociology, organisational theory, and virtual reality in an emerging theoretical synthesis. This framework is constructed by analysing how organisational hierarchies have been determined spatially in the past and how metaverse technologies radically alter these spatial power and coordination determinants.

The interaction between physical space and organisational structure has always been intertwined. The more traditional forms of spatially defined and systemically organised bureaucratic hierarchies came into being with the architectural division of organisational levels—segregated executive floors, middle management zones, and operational areas—which spatially allocated dominion visibly. These systems served as what Foucault referred to as the ‘architectures of discipline’ in which physical proximity to the centre of decision-making structures within an organisation correlated with the hierarchy of influence and control. The spatial distribution of organisational members reinforced intra-organisation hierarchical relations while setting up channels for communications and controls implicitly.

As workplaces undergo a digital transformation, they are no longer bound to physical spatial determinants. Early virtual workplaces such as virtual meeting rooms, digital offices, and electronic communication channels sought to replicate their physical counterparts digitally. Unlike these, metaverse environments offer a more profound departure from mimetic approaches, presenting what we define as “liquid organisational space.” These are programmable, reconfigurable, and fluid spaces that change based on functional needs rather than rigid prior structures.

“Liquid organisation” derives from Bauman’s concept of liquid modernity and applies it to organisational dynamics where fixed structural relationships dissolve into ever-shifting arrangements. Such forms of organisation move away from traditional structures along critical spatial and temporal axes such as fluidity, representational plasticity, and boundary permeability. Figure 1 shows a conceptual framework differentiating liquid organisational forms from traditional hierarchical structures using these dimensions.

As seen in Figure 1, the environments of the metaverse are capable of both changing and evolving an organisation’s topology on numerous dimensions. In classic, stratified systems, spatial arrangements of people and offices encode relations of power vertically and through 'horizontal' proximity to centres of decision making and ritualised space allocation. Conversely, metaverse environments enable configurable spatial topologies where organisational arrangements flow with functional needs rather than fixed hierarchies. This type of fluidity defines what we call “topological flexibility”—the ability to rapidly change the configuration of an organisation without being constrained by the physical building.

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The same restructuring phenomena can be observed in temporal frameworks of the organisation. More specifically, an organisation working within a traditional framework operates under the synchronous time framework where all members and participants have to be present physically. Temporal control reinforced hierarchical supervision does not function in metaverse environments. These allow multi-temporal, asynchronous collaboration with spatial co-presence in persistent virtual environments. This shift in time coordination flexibility fundamentally changes the historical modes of supervision and coordination anchored in synchronous interaction.

Most notably, metaverse environments change the representational impacts of organisational structure. In a physical workplace, organisational roles are embodied spatially as tangible, fixed representational forms such as office and desk location, standing orders, and even a uniform appearance. In metaverse environments, there is a form of representational fluidity where organisational members may alter their visual, spatial, and comparative interaction privileging context over hierarchy. Such plasticity of representation shatters visual indicators that have been used to decades of reinforced organisational hierarchy.

The phenomenology of virtual presence shifts power relations further in metaverse workspaces. The sense of "being there together" in virtual environments differs fundamentally from physical co-presence which spatial sociologists describe as "presence equalization," wherein the experience differentials between hierarchical strata recede converge through shared virtual embodiment. It challenges the normative authority many institutions have relied on that is reinforced by the phenomenology of being closer to the centre physically.

Boundary permeability provides another critically defining characteristic of liquid structure forms of the organisation. Traditional organisations clearly delineate boundaries separating internal from external, within subdivisions and divisions, and even within vertical echelons. Metaverse spaces allow for the contextually fluid boundaries that are programmable, organisational cut lines no longer bound to physicality. Such permeability enables dynamic team formation, collaboration across organisational lines, and flexible allocation of resources beyond traditional divisional lines.

This conceptual framework assists in providing the analytical aspects necessary for examining how metaverse workspaces accelerate an organisational metamorphosis from hierarchical to liquid forms. The next section analyses some of the empirical examples of these transformations as they pertain to specific metaverse environments, further analysing the topology of the organisation as it is rearranged within the metaverse, and the resulting organisational functions that stem from that topology.

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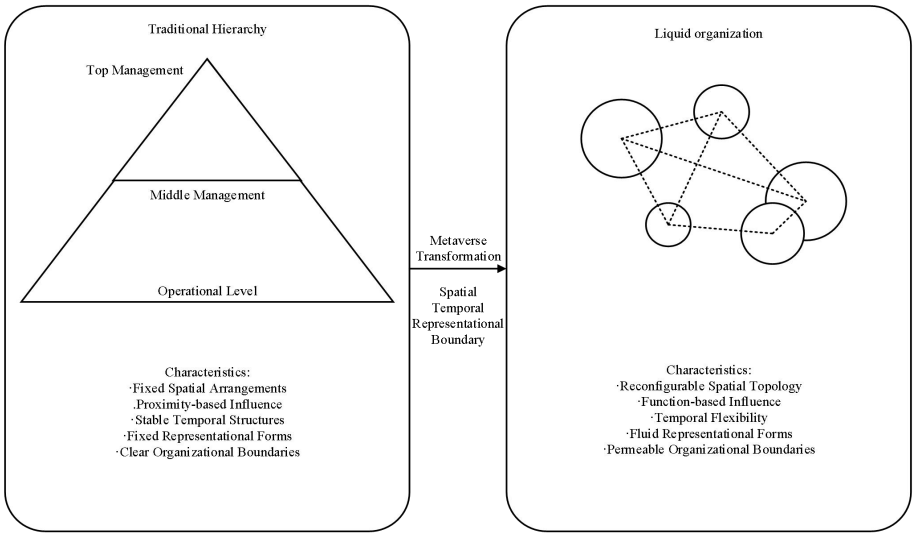

Figure 1:Liquid Organization Framework: From Hierarchical to Metaverse Topology

3 Metaverse Workspaces and Organizational Restructuring

The implementation of the metaverse in the workplace, as we studied it, brings forth some fundamental changes regarding organisational design that have structural implications. Based on case studies from different industries, we observed several unconventional phenomena emerging in virtual spaces suggesting that the schematic of an organisation violently undergoes reconstruction.

As for the scope of authority, it is no longer as strongly tied to a person's physical location in the office. Unlike traditional offices where authority is visibly stratified into zones such as executive range, corner offices, or central sitting places, the virtual setting does not tether influence to spatial positioning. As a result of fully adopting metaverse workspaces, one of the technology companies reported a significant change in the decision-making influence structure. Team members who once faced geographic isolation from the core strategic groups actively began participating in high-level discussions. This phenomenon leads to a new concept we propose termed 'influence fluidity' whereby organisational influence transcends circulatory control through expertise instead of hierarchy. These shifts enable organisations to become more adaptable, although they also encounter difficulties in achieving coherent coordination in cases where formal power systems misalign with the networks of real influence.

In a metaverse environment, mechanisms of visibility shift within a given context, transforming the overlying surveillance relations which once supported vertical control. As described in the monograph on Information Systems, a 'metaverse' is a term used to indicate an environment which mixes virtual and real-world spaces and gives rise to new forms of control, collaboration, interaction, and participatory culture. Such systems facilitate advanced algorithmic surveillance through the complete collection of data pertaining to user interactions, movement tracking, and communication patterns. Participants in professional roles interact with social systems in ways whereby they may be monitored by other users of the virtual space. Organisational theorists call this phenomenon "observational symmetry," and these

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theorists note that there is a lack of surveillance imbalance symmetry in the metaverse. Organisations encounter conflicting impulses between ‘bounded visibility’—visibility deliberately limited by organisational restrictions on information—and unrestricted surveillance. This metaverse paradox shows how the environments disrupt traditional observation hierarchy while introducing more refined, sophisticated systems which rely on the aggregation of data rather than direct, overt, pre-defined, structured supervision.

The impact of an organisation’s configuration on teams is most visibly rearranged as a result of the fluid space it occupies, free from brick and mortar boundaries. Within traditional corporations, collaboration is siloed within inter-departmental borders and given fixed spatial allocations that reinforce these vestigial organisational divisions. Metaverse spaces enable what we refer to as ‘topological responsiveness’—where collaborative structures serve functional requirements. A technology company using comprehensive metaverse workspaces reported 58% more spontaneous cross-department collaboration, with expertise swiftly convening around emerging challenges and bypassing formal restructuring processes. These observations indicate primary management frameworks that presuppose stable team structures and rigid hierarchical delineation of responsibility are outdated.

Within metaverse contexts, representational elements change how organisational identity is expressed and are poised to give rise to new forms of differentiation based on unofficial standing rather than formal rank. In physical work settings, an employee’s hierarchical level is inscribed to their position and visually marked through standardised dress codes, furnishing grade, and office delineation. Virtual spaces enable “representational plasticity,” granting self-determined modification of appearance and ambient surroundings regardless of rank. Organisations negotiate complex avatar policies-driven identity politics straddling collective identity, organisational design, and identity silos—expression balance. This conflict emphasises the disruption of traditional signifiers of rank alongside the prospect of new differentiator forms based on technical sophistication, given the formal rank.

Asynchronous collaboration is now made possible by permanent virtual environments where work is sustained across time zones, a feature steadily coveted by global teams. Rigid governance structures traditionally tethered to synchronised, co-located interaction in fixed time zones are upended, alongside the sequential logic of time. Rigid governance structures tethered to time zones are undermined; reliable interaction patterns built through standardised working hours and meetings bound within fixed time zones evaporate as virtual workspaces allow non-linear, parallel collaboration. Global coordination also depends on decision-making anchored in simultaneous presence. This need is coupled with the need for hybrid governance frameworks that oscillate between modes of reliance on synchronised and distributed configuration.

These new changes mark the defining components of the new 'liquid' organisational structure - spatial and temporal fluidity, responsive flexibility, dynamic visibility alteration, and reconfiguration of virtual interactability. Although there still exists a gap in how to practically enforce these new principles, initial results indicate that the

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systematic design of an organisation could fundamentally change as workplaces become more virtual.

4 Implications and Future Directions

The implications of emerging forms of liquid organisations within metaverse workspaces are particularly salient for both practice and theory as they transcend basic structure, coordination, and authoritative concerns in post-physical workplaces. They require rethinking how organisations within such environments are positioned regarding the design of systems for control, collaboration, and virtual commitment.

The spatial changes in the metaverse and their impact on the organisation's structure go beyond a technological concern towards addressing the very nature of the organisation. While traditional organisational theory tends to define structure as something stable, material, and hierarchically ordered, such views are increasingly confronted by liquid forms of organisation, which have dynamic, virtually enacted, and reconfigurable structure. This change in ontology requires different layers of organisation theory capable of perceiving the organisation as something processual, as opposed to something static and structural, constantly in flux. In order to achieve such an understanding, integrating elements of process philosophy, complexity theory, and emergent systems is vital, as they attempt to redefine the organisation as a set of interactions and not as a structure. Such theoretical work will have to answer such paradoxical problems as collaboration without a dominant structure, governance without spatial confinement, and selfhood absent material form. This paper proposes the concept "liquid organisation" as a starting point for further exploration, focusing on the ways in which the organisational boundaries change spatially and in turn change relationships in the metaverse.

The organisational fluidity of liquid structures is often overlooked due to the implementation and management issues they present. Businesses exploring metaverse workspaces face challenges with coordination, accountability, and commitment as the traditional structural frameworks dissolve. The gaps within the definitional hierarchies provide stagnation in accountability, and lack in responsibility, which heavily complicate free spaces. In the traditional frameworks, spatial collaboration systems help streamline the flow of information, designate decision-making power, assign authority, and outline function—capture systems in liquid organisational forms need a different approach. While transitional structures have a blend of hierarchical and fluid configurations, they tend to preserve control and allow greater flexibility to experiment with fluid structures. It is still essential for organisational designers to create liquid forms and they may turn to models of distributed governance based on open-structured and networked organisations which operate on non-hierarchical coordination-collaboration norms.

The issues of equity and inclusion add yet another layer of complexity when dealing with reorganised spatially situated firms or offices. Although immersive environments may assist in the democratization of attendance by removing physical barriers to access, they also offer the danger of new forms of exclusion related to access to technology, digital literacy, and presence in virtual spaces. Firms using metaverse

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workspaces report attendance that is more nuanced but, in some cases, reinforces existing power relations wherein a shift to more technologically sophisticated tools replaces an outdated hierarchical position as the new faux status marker. These trends underscore the need for equity aimed specifically at virtual organisational structures that have been intentionally designed to spatially restructure for equity. The problem of inclusivity becomes worse when the equity is ignored or neglected. These concerns may be addressed by creating participatory design frameworks for metaverse workspaces that are devoid of power structures and instead rooted in diverse user responsive needs.

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