Beyond Blame

On Responsibility in Reconfigurable Robotic Architecture through Michael Rothberg's Ethics of Implication

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Architecture is often framed as the production of discrete works by individual architects, removed from the wider systems that shape the built environment. Contemporary practice, however, unfolds within interdependent systems where agency is distributed and outcomes emerge through complex interactions. As AI and robotic fabrication help dissolve the lone genius myth, a profession built on singular authorship and concentrated accountability increasingly produces outcomes through networks in which computational and robotic systems participate in generating what is built rather than executing it. How should responsibility be understood within architectural design processes conducted through such mediated networks?

Drawing on Michael Rothberg's concept of the implicated subject, this thesis extends the framework of implication to architectural practice; responsibility becomes a collective and forward-looking condition, understood here as implicated responsibility, residing not in the architectural object alone but in the decisions, processes, and networks through which it is produced. Rather than accepting the existing conditions of practice as presupposed, this thesis argues that responsibility cannot be concentrated in any single actor or outcome. It is examined through TetraGora, an architectural system for robotic assembly, where the absence of a fixed final state offers a place from which to think about responsibility.

Keywords: Implication, Responsibility, Accountability, Authorship, Mediated Networks, Non-Human Agency, Automated Assembly, Liquid Modernity

representative image

TetraGora: Reconfigurable Robotic Assembly. Render by the author, 2026

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Introduction: Culture, Automation, and the Dissolution of Authorship

The conditions under which any discipline operates are rarely of its own making. Technology, culture, economics, and the broader forces structuring society shape the terms of professional practice before any individual decision is made. As Joel White observes, these conditions are frequently presupposed rather than examined, treated as neutral or inevitable rather than as the product of specific historical and cultural forces.[1] Architecture is no exception. The profession operates within a plurality of pre-existing conditions that determine what is built, how it is evaluated, and what constitutes success, yet these conditions are seldom subject to the same scrutiny as the outcomes they produce.

Among the most significant of these conditions is the growing integration of artificial intelligence and robotic fabrication into design and construction. This is not an architectural development in isolation, but reflects a broader cultural shift in how authorship and agency are understood across disciplines. The lone genius model, long central to conceptions of creative and professional work, describes less and less of how work is actually done, as outcomes increasingly emerge through distributed networks of human and non-human actors interacting rather than from a single point of origin. Architecture is subject to this shift, and the questions it raises extend beyond technical and aesthetic concerns to the conditions of professional obligation.

Under these conditions, existing frameworks begin to show their limits. Architectural practice has long concentrated responsibility in the figure of the architect, treating it as the

1 Joel White, "The Questions Concerning the Ethics of AI," *Triple Ampersand* (&&&), February 22, 2026.

primary bearer of accountability for what is designed and built. As outcomes increasingly emerge through networks that exceed individual control or intent, this model becomes less able to account for the range of forces shaping architectural production and its effects. The question of where responsibility resides within these networks, and what it asks of those who participate in them, remains insufficiently addressed by the existing frameworks.

This thesis takes that condition as its point of departure. It does not treat responsibility as fixed or self-evident, but as something to be reconsidered in relation to the distributed, automated, and adaptive practices reshaping architectural production. In doing so, it seeks to move beyond the presupposed conditions of the profession toward a framework capable of accounting for the complexity of contemporary practice and the obligations it entails.

1. Architecture and Concentrated Responsibility

1.1 The Built Environment as Cultural Product

The built environment is easily read as a collection of physical objects, but that reading leaves its conditions unexamined. It is the material expression of the cultural, political, and economic forces under which it is produced, forces that extend far beyond the decisions of any individual architect or practice. To understand architecture only through the lens of its formal or technical outcomes is to misread what the built environment actually is and how it comes to be.

Architecture takes shape within conditions it does not set. Government policy determines what can be built, where, and under what conditions, shaping the distribution of space and the priorities of development before a single design decision is made. Media shapes what gets celebrated and what becomes desirable, establishing the visual and cultural currency through which architectural work is evaluated and recognised. Cultural trends determine what is considered innovative, prestigious, or socially valuable at any given moment, influencing not only individual projects but the norms, conventions, and ambitions of the profession as a whole. These forces do not merely provide a backdrop against which architecture operates. They actively participate in determining what architecture is, what it does, and what it is expected to achieve.

What gets built, how it is evaluated, and what counts as success in architecture is therefore never purely architectural. It is always already shaped by the conditions that structure society more broadly. The built environment is the site where these forces become material and consequential, where the abstract pressures of policy, media, and cultural convention are translated into the physical fabric of cities and communities.

It is within these conditions that the architectural profession has developed its own models of practice, authorship, and recognition.

1.2 The Promethean Architect and the Lone Genius Myth

Modern architecture has long positioned the architect as a figure of singular agency, credited as the sole author of the built environment. This designation drives professional focus toward prestige and recognition, which depend on visible, notable output rather than the broader impacts the work produces. As Kengo Kuma observes, architecture often prioritises visual recognition, producing iconic objects rather than mediating lived experience and environmental outcomes.[2]

By centring the individual architect as the source of a project's success, the profession ties recognition to what can be attributed, and what can be attributed is the discrete object. Architecture is therefore evaluated primarily as an isolated design object, its recognition granted mainly for the qualities of the object itself. Even where a building's wider performance is rewarded, whether environmental, social, or economic, it tends to be measured as a property of the object, a rating or a metric, rather than as a question of the consequences the work sets in motion. Acclaim for these objects sustains the same mode of evaluation, rewarding work that performs well as a recognisable artifact while sidelining its wider effects. Careers are built within this system, which registers the artifact and not what follows from it.

This disconnect between recognition and consequence is not simply a professional tendency, but reflects the conditions under which architecture is communicated and circulated. The systems through which architecture is communicated have historically favoured objects, concentrating value in discrete, attributable works rather than in the processes and relationships through which they are produced.[3] Kuma notes that photography, the dominant medium for architecture's circulation, reinforces this condition by demanding buildings whose character remains invariable, unaffected by their relationship to their environment or the people who inhabit them.[4] Within this system, the discrete object and the singular author become mutually sustaining. The object is legible because it has an author, and the author is legible because there is an object to attribute. This reciprocity is actively produced. The architect is staged as singular author, circulated through the media that canonise the figure (fig. 1-1), while the building stands as the object that confirms the attribution (fig. 1-2). Architects who sought recognition outside the object model found themselves unable to secure it, ultimately having to offer attributable objects to the world in order to establish their status as practitioners.[5] The Promethean figure of the lone genius is sustained not simply as a cultural ideal but as a structural condition of the profession's systems of recognition, one that concentrates the appearance of responsibility in a single visible source while the broader consequences of architectural production fall outside what the system registers.

2 Kengo Kuma, *Anti-Object: The Dissolution and Disintegration of Architecture* (London: AA Publications, 2013).
3 Kuma, *Anti-Object*, 144.
4 Kuma, *Anti-Object*, 145.
5 Kuma, *Anti-Object*, 98.

Figure 1-1: Ludwig Mies van der Rohe with Models of His Lake Shore Drive Apartments, 1956, Frank Scherschel / The LIFE Picture Collection / Getty Images

Figure 1-2: 860–880 North Lake Shore Drive, Mies van der Rohe, Chicago, 1948–49, Richard Nickel, Richard Nickel Archive, Ryerson and Burnham Archives, The Art Institute of Chicago

1.3 Liquid Modernity and the Collapse of the Visionary

This disjunction between recognition and responsibility reflects a broader transformation in the social conditions under which architecture is produced. In *Liquid Modernity*, Zygmunt Bauman describes a shift from the "solid modernity", a mid-twentieth-century condition structured by stable institutions and long-term commitments that sought permanence, to "liquid modernity", our contemporary condition of constant flux in which structures such as jobs, relationships, and identities are no longer fixed but remain continually reformulated.[6] The same shift can be read in architectural practice. As Bauman notes, "to 'be modern' means to modernize... forever 'becoming', avoiding completion, staying undefined", reflecting the constant flux and instability of contemporary society.[7] For architects, this condition of perpetual reforming dissolves the Promethean vocation, the ideal of the lone visionary architect shaping society.[8] Consequently, architecture, long imagined as a social contract for building society, is now expected to gratify immediate demands of visibility, novelty, and career progression rather than achieve enduring social value.

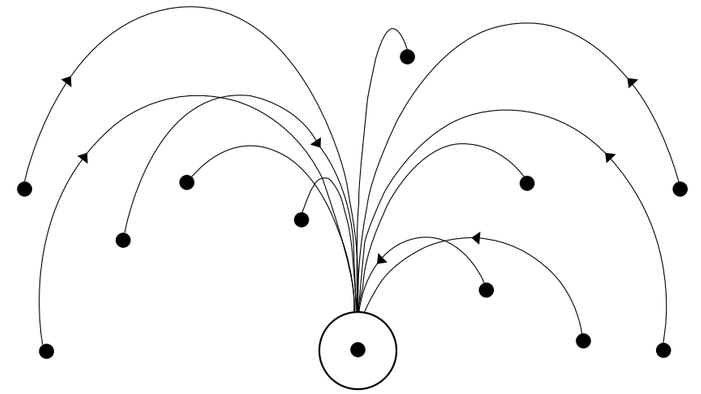
This change creates a crisis of accountability. Architects operate within networks shaped by economic, political, and cultural pressures, yet they are still culturally recognised as singular visionaries. As Bauman observes, "work has drifted... to the realm of a game", where short-term objectives dominate over long-term consequences.[9] The architect's agency is diffused, but the expectation that they answer for what is built persists, producing tension between systemic influence and individual attribution.

1.4 Accountability and Responsibility: A Working Distinction

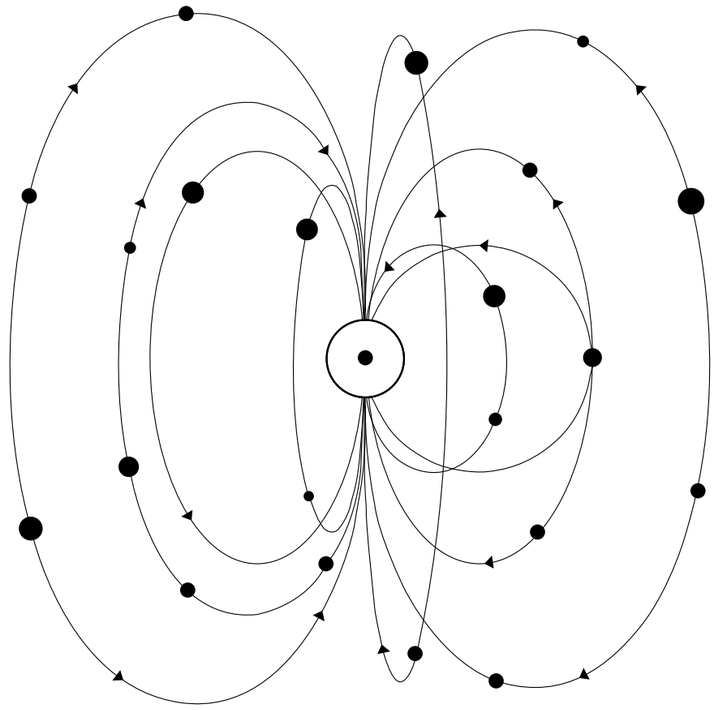
Before addressing responsibility within architectural practice, it is necessary to establish a working distinction between responsibility and accountability. While the terms are often used interchangeably, they will be treated here as distinct but related conditions, each describing different relational and structural forms.

Accountability concerns the ownership of actions and outcomes, becoming legible through evaluation against defined criteria, and is typically bounded and assigned to identifiable actors. Responsibility, by contrast, concerns the broader obligations carried through action; it is ongoing, distributed, and extends beyond any single instance to encompass consequences that exceed clear attribution. The distinction can be drawn as much as stated (fig. 1-3): accountability bounded and brought to a point, responsibility diffuse and circulating beyond it.

6 Zygmunt Bauman, *Liquid Modernity* (Cambridge: Polity Press, 2000).
7 Bauman, *Liquid Modernity*, 2.
8 Carlo Ratti and Matthew Claudel, *Open Source Architecture* (London: Thames & Hudson, 2015), 12.
9 Bauman, *Liquid Modernity*, 138.



Accountability



Responsibility

Figure 1-3: Accountability and Responsibility, a working distinction, the author, 2026

Within architectural practice, accountability is formalised, evaluative, and bounded. It refers to obligations assigned through professional, legal, and contractual frameworks, including the delivery of a brief, the management of budget, compliance with building regulations, and the satisfaction of a client. These obligations are activated through evaluation at defined points during and after a project, and remain attached to specific outcomes and identifiable actors. In this sense, accountability operates at the level of the project rather than the broader conditions of practice.

Responsibility operates across a different register. It is relational, continuous, and diffuse, extending before, during, and beyond any single project. Where accountability is concerned with whether defined criteria have been met, responsibility extends to what architectural outcomes produce over time. It is concerned with the ways in which buildings shape social relations, condition behaviour, and participate in environmental transformation. These effects are not secured through contractual commitment or regulatory enforcement, yet they remain inseparable from the material and cultural reach of architectural production.

This distinction is not merely semantic. Architectural practice has historically treated accountability as the limit of professional obligation, when obligation extends well beyond it. The broader consequences of architectural production, its social influence, its environmental impact, its cultural weight, extend beyond what the existing frameworks are structured to evaluate. To distinguish between accountability and responsibility is therefore to recognise that architectural obligation extends beyond the boundaries of any single project, and cannot be fully contained within established mechanisms of evaluation.

1.5 The Implicated Subject: Rothberg and Forward-Looking Responsibility

If responsibility extends beyond what accountability captures, it requires a way of understanding architecture that does not treat it as a detached discipline producing isolated works. Architecture can instead be understood as an implicated subject operating within networks of culture, media, technology, and political economy.[10] The practice is shaped by these networks, as decisions, norms, and trends are influenced by external pressures. This interdependence positions architects as participants within a system rather than isolated creators, raising questions about how responsibility should be understood within such networks.

In *The Implicated Subject*, Michael Rothberg draws on Hannah Arendt's distinction between guilt and responsibility to develop a framework for understanding implication.[11] For Arendt, guilt is always individual, linked to a specific act through a linear chain of causation, and looks backwards toward a harm already done. Responsibility, by contrast, emerges from participation in a collective way of life, in which our actions contribute to conditions

10 Michael Rothberg, *The Implicated Subject: Beyond Victims and Perpetrators* (Stanford, CA: Stanford University Press, 2019).
11 Rothberg, *The Implicated Subject*, 41.

and consequences that exceed individual intent.[12] Architects are implicated not because they are individually guilty, but because they operate within and contribute to the systems through which architectural outcomes are produced. Rothberg further develops this through Iris Marion Young's refinement, arguing that responsibility arises not from mere membership in a profession but from participating in the processes and networks through which structural outcomes emerge.[13] Responsibility requires reflection on how architectural decisions influence human experience, the environment, and the broader social conditions that practice both operates within and shapes.

While Rothberg's argument originates outside the field of architecture, its application to architectural practice is not incidental. The diffusion of agency across distributed networks of production mirrors precisely the structural conditions Rothberg describes, where outcomes derive not from distinct individual actions but from the accumulated sum of complexly interacting behaviours.[14] Architectural responsibility, understood through this framework, is a condition that is always present, always oriented toward current practice and its future consequences. Responsibility of this kind is met through a forward-looking engagement with the conditions through which architectural outcomes emerge, rather than through the retrospective attribution of blame.

Extending Rothberg's framework to architecture involves a shift in temporal scope. Rothberg traces implication from past to present, as his implicated subject participates in conditions formed before them, and implication names their relation to what produced those conditions. The extension developed here carries that relation forward, from the present into the future. The architect, so implicated, still inherits the conventions of past practice. The decisions taken within them, however, continue to act long after any single project ends. Implication, extended in this way, describes a relation not only to the conditions a practice receives, but to what that practice produces beyond it.

1.6 The Limits of Accountability: Concentration as Structure

Accountability operates less as a reflection of agency and more as a structural requirement. It is concentrated in the architect not because they alone control what gets built, but because the frameworks through which architecture is governed need a point at which obligations can be assessed and assigned. Professional, legal, and contractual structures cannot operate without identifiable actors to hold, and the architect is the position those structures are built around. The concentration is therefore functional rather than descriptive. It reflects what the frameworks require, not the distributed conditions through which architectural outcomes actually emerge.

12 Rothberg, *The Implicated Subject*, 50.
13 Rothberg, *The Implicated Subject*, 50.
14 Rothberg, *The Implicated Subject*, 50.

What allows this arrangement to hold is that the figure it requires is already available. The lone genius supplies exactly what the structures need, a single visible source to which the work of many can be attributed, and the concentration in turn keeps that figure useful. Recognition and attribution reinforce one another. The myth makes the concentration appear natural, since a profession that credits one author can hold one author to account, and in return the concentration gives the myth a purpose beyond prestige. Neither force alone would sustain the arrangement. Together they hold it in place while the broader social, economic, and technical forces that shape architectural outcomes distribute influence across actors the frameworks never register.

2. AI, Robotics, and the Dissolution of the Author

2.1 The Automated Turn: Architecture's Present Condition

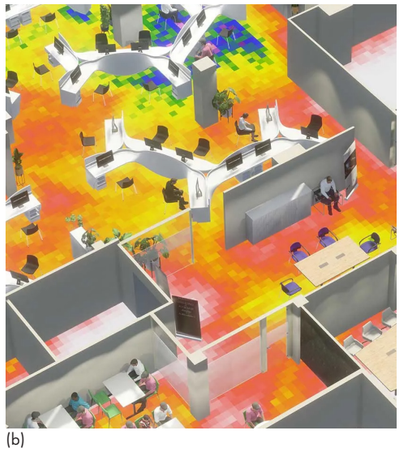
The integration of artificial intelligence with architectural practice is no longer a speculative condition. Across the profession, at varying levels of complexity, AI tools have become embedded in how architecture is conceived, optimised, and produced. At the most basic level, AI is now routinely used for rendering and concept visualisation, enabling architects to generate and communicate spatial ideas at a speed and resolution that would have been impossible through conventional means. These tools are widely adopted across practices of all scales, and their usage is no longer considered experimental but standard.

Further along the spectrum, AI tools are applied to the optimisation of architectural layouts and site designs. Parametric workflows, now common across a broad range of practices, use computational systems to evaluate and refine design proposals against constraints such as daylighting, energy performance, and building code compliance. What was once a process of manual iteration is delegated to systems capable of generating and assessing thousands of design configurations simultaneously, at a scale no conventional process could match.

At the most advanced end of this spectrum, machine learning and predictive simulation models are beginning to shape how architectural systems are designed for robotic fabrication and assembly. Algorithms developed for autonomous systems research are increasingly being applied to architectural production, enabling the training of robotic processes through simulated environments before they are deployed in physical ones. These are not isolated experiments but the leading edge of a trajectory that is reshaping the relationship between design intent and material outcome across the profession.

This spectrum of integration, from basic visualisation to autonomous fabrication, reflects the breadth and pace of the automated turn in architecture. It is not a future condition being anticipated but a present one being navigated. Each stage places the outcome at a further remove from any single hand (fig. 2-1).

(a)



(b)

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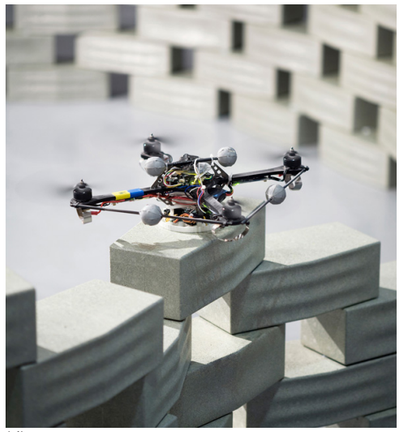


(d)

Figure 2-1: Four points on the spectrum of architectural automation. (a) AI-generated design study, Zaha Hadid Architects, 2024; (b) Workplaces.ai, generative workplace design, Zaha Hadid Architects, 2021; (c) 3D-printed residential building, PERI / COBOD BOD2, Beckum, 2020; (d) Flight Assembled Architecture, Gramazio Kohler Research and Raffaello D'Andrea, 2011

2.2 The Automation of the Author: AI and the Curator of Computational Processes

What this integration changes is not only how architecture is produced but who produces it. Design mediated by AI shifts the architect from singular form-giver to curator of computational processes. Generative systems produce iterations that optimise outcomes beyond conventional human reasoning. As Mario Carpo observes, "information retrieval... is more effective than the traditional, deductive application of scientific formulas".[15] Rather than executing predefined intentions, these systems generate outcomes that cannot be fully attributed to human intent. As a result, these architectural outcomes can no longer be understood as the product of a singular authorial vision.

The distinction between earlier computational tools and current AI systems is not merely technical but fundamental. Where parametric and generative tools of previous decades executed the logic of the architect, translating defined rules into formal outcomes, contemporary AI systems operate through processes of inference and optimisation that are not fully transparent even to those who deploy them. A generative design system trained on datasets of existing buildings does not execute an architect's intentions but proposes solutions derived from patterns that exceed any single designer's knowledge or reasoning. The architect's role within this process shifts accordingly, from the originator of form to the selector and curator of outputs, making decisions about which generated options to develop, refine, or reject. Design becomes less an act of creation and more an act of navigation, conducted within a field of possibilities that the system itself has produced.

Carpo describes this as a posthuman complexity that exceeds traditional small-data logic, making interpretation difficult to trace.[16] When design emerges through the selection and negotiation of learned datasets rather than an act of sole human authorship, the architect's status as author is structurally undermined. The role of the singular visionary persists as a performance, but it no longer reflects how decisions are made across complex, AI-mediated networks. This shift in role does not simply redistribute creative agency but complicates the very basis on which architectural decisions can be attributed, raising questions about where authorship ends and where responsibility begins.

2.3 Robotic Fabrication and the Mediation of the Outcome

Robotic fabrication amplifies the diffusion of agency from digital design into material production. Programmers, robotics teams, and automated systems shape the outcome alongside the architect, whose control over material realisation is increasingly mediated by the systems that carry it out. As Carpo notes, "the [agents] now tasked to deliver that human touch may not be entirely human anymore", suggesting the architect as one participant within a post-human network.[17]

The architect negotiates with robotic behaviours, as design becomes a dialogue

15 Mario Carpo, *The Second Digital Turn: Design Beyond Intelligence* (Cambridge, MA: MIT Press, 2017), 46.
16 Carpo, *The Second Digital Turn*, 48.
17 Carpo, *The Second Digital Turn*, 67.

between pre-programmed logic and physical constraint. This expansion of the network further increases the architect's distance from the physical outcome. As Carpo states, "instruction to behavior-based fabrication, marks the end of the modern separation between design and building".[18] If the architectural vision is largely shaped by these automated behaviours, the architect's status as the sole author comes into question.

This shift transforms design from a purely human-driven act into a collaborative process between human and non-human agents. As the boundary between conception and execution dissolves, it unsettles not only the conventional model of authorship but the basis on which responsibility has traditionally been assigned.

2.4 The Dissolution of Authorship and the Mediated Network

Historically, architects have been perceived as the singular authors of architectural vision, despite the distributed processes through which buildings are actually produced. Authorship persisted as a singular attribution not because production was ever truly individual, but because architecture has been culturally framed as an authorial discipline in which a single name becomes synonymous with the project itself, collapsing the contributions of many into the identity of one, regardless of how distributed the project.

What AI and robotic fabrication change is not the plurality of production but its visibility. Machine learning systems generate forms and spatial arrangements from selected parameters, while autonomous robotic systems respond to environmental or behavioural data to shape, place, and articulate architectural components. These systems participate in generating and evaluating design decisions rather than simply executing them, and the outcomes they produce cannot be fully anticipated or directly traced to any singular source. This shift is a technological reflection of Bauman's notion of liquid modernity, where traditional boundaries of professional authority dissolve into fluid networks of evolving responsibilities.[19] As the role of the architect liquefies, authorship can no longer be understood as a role assigned to a single actor. It emerges collectively across the actors and systems that constitute the network. A network of this kind, in which computational and robotic systems participate in generating outcomes rather than executing them, is what this thesis terms a mediated network.

Paul Baran's models offer a picture of this (fig. 2-2).[20] The centralised model describes not how architectural production has worked but how its authorship has been attributed; the distributed model fits the mediated network, making a longstanding plurality visible.

The liquefaction of authorship extends beyond credit to obligation. Where design decisions emerge through the mediated network rather than a singular author, the responsibilities they carry can no longer concentrate in a single actor.

18 Carpo, *The Second Digital Turn*, 68.
19 Bauman, *Liquid Modernity.*
20 Paul Baran, *On Distributed Communications: I. Introduction to Distributed Communications Networks* (Santa Monica, CA: RAND Corporation, 1964).

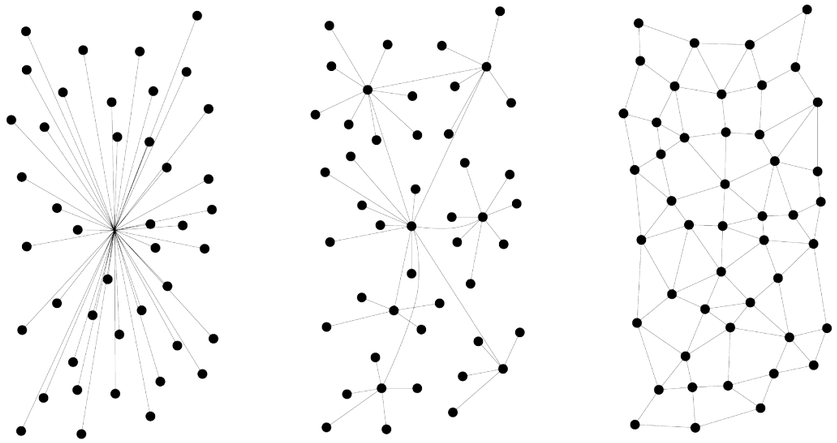


Figure 2-2: Centralised, Decentralised, and Distributed Network Models, Paul Baran, 1964

2.5 The Question of Responsibility in the Mediated Network

Architectural practice has long operated within frameworks that concentrate responsibility in identifiable actors, evaluated against defined criteria and bounded by the limits of a single project. Those frameworks correspond to a model of practice in which the architect occupied a legible and central role, and in which the boundaries between design, fabrication, and outcome remained relatively distinct. They are not structured for the mediated network, where decisions emerge through interactions that no single position directs.

The difficulty is not that these frameworks are too narrow to accommodate what mediation adds. It is that they rest on an assumption mediation removes. Attribution works by locating the actor whose decision produced an outcome, which presumes that agency and attribution coincide, that wherever a decision was made there is someone who made it. A generative system proposing solutions from patterns no designer holds, or a robot positioning a component according to conditions it reads on site, is a decision without that correspondence. The agency is real and the outcome follows from it, but no position at which it was authored in the sense the frameworks require. Extending the frameworks to cover more actors does not address this, since the problem is not the number of positions but the assumption that each decision has one. It is within this context that the following question emerges:

How should responsibility be understood within architectural design processes conducted through mediated networks?

3. The Implicated Architect: Rothberg and the Age of Automation

3.1 From Detachment to Implication: Reconsidering Agency

Recognising architecture as a distributed practice raises questions that extend beyond the organisation of design and production. When outcomes cannot be traced to a singular author, and when agency is shared across human participants, computational systems, and material processes, the frameworks through which responsibility has traditionally been assigned no longer hold. These frameworks were designed for a model of practice in which a singular author could be identified as the origin of decisions and held accountable for the consequences. What is needed is a way of understanding responsibility that does not depend on locating a single cause or a single bearer, but that accounts for the conditions through which architecture is produced.

Building on the understanding of distributed agency, architecture can be understood as an implicated subject operating within networks of culture, media, technology, and political economy, rather than a detached discipline producing isolated works.[21] The practice is shaped

21 Rothberg, *The Implicated Subject.*

by these networks, as decisions, norms, and trends are influenced by external pressures. This interdependence positions architects as participants within a system rather than isolated creators, raising questions about how responsibility should be understood within such networks.

Implication, as Rothberg understands it, does not assign guilt but calls for a recognition of one's position within systems that produce consequences beyond individual control.[22] For architects operating within distributed networks of human and non-human actors, this recognition is structural. It is embedded in the conditions of practice, and the responsibility it entails is forward-looking rather than reactive, collective rather than singular.

3.2 Responsibility Across a Multi-Agent Network

The network through which architectural outcomes are produced extends beyond the immediate actors of design and fabrication. Forces such as government policy, media representation, and cultural convention are not external influences on architecture but participants within the same overarching system, each shaping and being shaped by the conditions they collectively produce. It is through this system that what gets built, what gets celebrated, and what becomes normalised within the profession is determined. Implication is therefore not defined by direct relationships between individual actors, but by shared participation in a system whose conditions each contributor shapes and is subject to in equal measure.

These forces shape the conditions of practice from outside the studio. AI and robotic fabrication introduce participants that operate inside it, according to fundamentally different logics. Computational systems generate and evaluate design decisions through processes that are neither fully directed by human intent nor fully autonomous, while robotic systems respond to environmental and material inputs in ways that increasingly resemble adaptive, behavioural responses. Together, these actors constitute a plural, multi-agent network in which agency is distributed across participants that reason, act, and respond according to different logics. Responsibility within this network cannot be assigned through conventional models of attribution, as the links between decisions and outcomes are shaped by interactions that exceed any single actor's control or intent.

Recognising the full scope of this network does not simplify the question of responsibility but deepens it. When architectural outcomes are produced through interactions between human participants, computational systems, and robotic processes, each operating according to different logics, the distribution of responsibility becomes difficult to trace and impossible to concentrate in a single actor. Those interactions sit within the wider conditions of policy, media, and convention the network also contains. It is this difficulty that the following section addresses directly.

22 Rothberg, *The Implicated Subject.*

3.3 The Responsibility Gap: Hindriks and Veluwenkamp and the Autonomous System

Frank Hindriks and Herman Veluwenkamp's examination of autonomous machines and the attribution of responsibility offers a useful framework for understanding how responsibility operates across distributed networks. Their argument challenges the assumption that responsibility can be located at the moment an autonomous machine causes harm. Instead, they propose that responsibility shifts toward the broader network of actors whose decisions shaped the conditions under which that outcome became possible, including the designers, engineers, programmers, and regulators who created and maintained the systems involved.[23]

The self-driving car, the example Hindriks and Veluwenkamp themselves turn to, reads its environment and acts on it without a person directing each decision (fig. 3-1). When it causes harm, responsibility does not vanish but reaches back to the prior decisions through which its conduct was shaped.

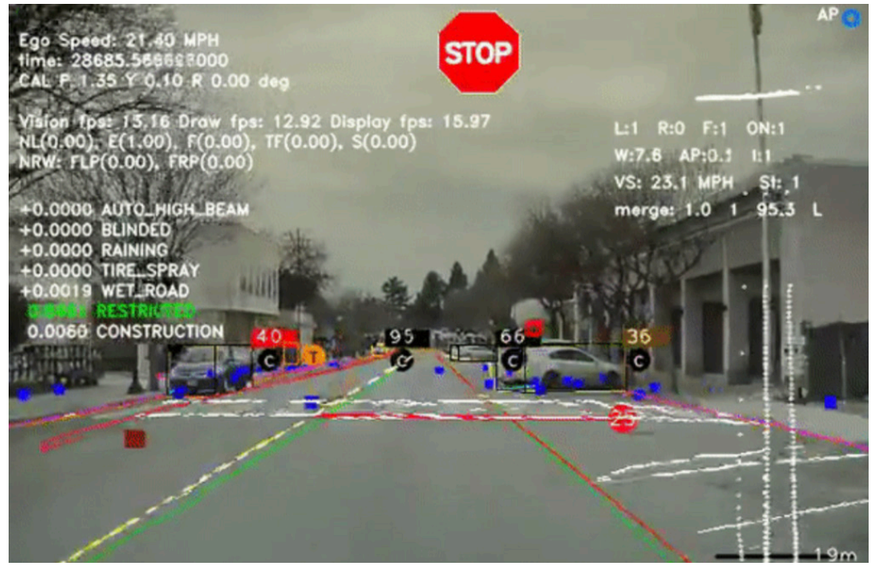


Figure 3-1: Autonomous Vehicle Perception System Classifying a Driving Environment, image capture from video, 2020

23 Frank Hindriks and Herman Veluwenkamp, "The Risks of Autonomous Machines: From Responsibility Gaps to Control Gaps," *Synthese* 201, no. 1 (2023).

What this reveals is that the introduction of an autonomous system does not remove the question of responsibility but relocates it, away from direct causation and toward the prior decisions, conditions, and relations through which outcomes emerge. The significance of this argument is not in attributing blame to any single actor, but in the recognition that responsibility precedes the outcome, distributed across the relations and decisions that constitute the conditions of production. It does not diminish in the presence of autonomous systems, but becomes more diffuse, relational, and difficult to locate at any single point. Responsibility must therefore be understood in relation to the networks and decisions through which outcomes are produced, rather than the outcomes themselves.

Translated to architectural production, this argument relocates responsibility before the outcome. In a practice where autonomous systems participate in assembly, responding to environmental and social inputs rather than executing a predetermined form, the link between a decision and the state that results from it runs through interactions no single actor directs. What the attribution model searches for at the outcome, a cause and its bearer, is found instead in the decisions made earlier: in the parameters such a system is given, in what it is designed to recognise as a site of intervention, what it treats as a successful outcome, and what inputs it is built to respond to. These judgements carry obligations that extend beyond any single state the system produces. Responsibility of this kind is prospective rather than reactive in its engagement; it is not discharged when a system is deployed, but persists through every configuration the system generates and the consequences those configurations set in motion.

3.4 The Modal Ground and Three Axes of Implication

The argument developed across this chapter points toward a reconception of responsibility that cannot be captured by existing frameworks of attribution. What emerges instead is responsibility as implicated, understood through the mode of practice, through the decisions, parameters, and logics by which architecture is produced, rather than through the substance of any single outcome. This modal ground is where the account begins, and the responsibility it describes can be traced along three axes. These axes are not separate kinds of responsibility but distinct dimensions of a single condition, each describing how that responsibility operates across the network through which architecture is produced. The first is distributed: responsibility spreads across the plural, multi-agent network of human and non-human actors at once, operating at the scale of the system rather than flowing in a line from author to outcome. The second is relational: responsibility emerges through the relationships between actors within the network, and through each actor's relationship to the network itself, rather than residing in any single participant. The third is temporal: responsibility does not end when a project is complete, but reaches both into the decisions taken before anything is produced and into the consequences that follow once it has. This temporal reach is latent in the concept itself, since implication derives from the Latin implicāre, to fold or entangle.

These three axes do not operate independently but are mutually constitutive, each shaping and being shaped by the others across the network through which architectural outcomes are produced. Together they describe a form of responsibility that is collective, forward-looking, and irreducible to any single point of origin.

It is also here that the account extends Rothberg's own. His implicated subject is bound to conditions already in place, inherited or sustained; the distributed and automated character of contemporary practice draws implication forward instead, toward the consequences a system will continue to produce. With this extension in place, the hypothesis of this thesis can be stated in full.

Drawing on Michael Rothberg's work on implication, this thesis proposes that responsibility no longer lies in the singular agent but emerges as a collective and forward-looking condition, understood through the mode of practice and traced across the distributed, relational, and temporal axes of the network through which architecture is produced.[24]

An architecture conceived, produced, and understood under these conditions is what this thesis terms implicated architecture. Where implicated responsibility names the form responsibility takes, implicated architecture names a practice that operates under it, and it is this practice the following chapter examines.

4. Implicated Architecture: TetraGora

4.1 The Project: Architectural Systems for Robotic Assembly

The following chapter examines the theoretical framework developed across the preceding chapters through the lens of an original design research project, developed within The Living Architecture Lab, RC3. TetraGora proposes a system of autonomous robotic assembly for the production of reconfigurable housing. Rather than proposing a fixed typology or predetermined architectural outcome, the project operates through a logic of emergence, in which robotic systems navigate unstructured environments, establish the conditions for assembly, and adapt their outputs in response to environmental and social inputs. The architecture that results is not designed in the conventional sense but generated through the interactions between the system's parameters, the conditions of the site, and the inputs the system receives over time.

These interactions are structured by the system's underlying spatial logic. The plot is voxelised, divided into a three-dimensional grid through which both the robots and the architectural components are located and tracked. The components are modular geometries, and a spatial planning algorithm determines the qualities of the housing the system produces, from the area allotted to each room to the adjacencies between them. Because both the grid and the geometries are modular, the architecture they form is reconfigurable. Assembly is

24 Rothberg, *The Implicated Subject*.

carried out by quadruped robots equipped with onboard computing, which allows them to identify and position the geometries and to make independent decisions within the parameters the system establishes. This modularity is what allows a dwelling to change over time; an occupant might acquire a smaller unit at first and expand it as their needs grow, or reduce it when circumstances change.

The project is conceived primarily for deployment within dense urban environments, where the demand for housing is most acute. The underlying logic of the system, its capacity to assess, respond, and reconfigure in relation to shifting conditions, remains consistent regardless of the specific site or programme to which it is applied; housing is the project's focus, not the system's limit.

TetraGora is a design research project, investigating whether robotic systems can place and reconfigure modular geometries in the way the design requires, and its current work establishes this through simulation and prototyping. The architect's role is not to determine what the system produces but to establish the parameters, logics, and values through which it operates, so that design is mediated by the system throughout. It is this distinction, between designing an object and designing the conditions of its emergence, that makes the project a productive case through which to examine the hypothesis developed in Chapter 3.

4.2 Self-Assembly and the Absence of a Final State

What distinguishes the project is the extent of that mediation. Where AI shapes a design process or robotics an assembly and the building still arrives at a settled state, the mediation withdraws once construction is done, but here it continues for as long as the system operates, assessing, responding, and reconfiguring without a terminus. Reconfigurability is a permanent condition of the system, and the architecture it produces is never fixed. Once assembled, its geometry is disassembled and reassembled continuously in response to a changing set of environmental and social inputs, residents' patterns of occupation, weather conditions, seasonal change, or the evolving infrastructure of the surrounding context, among many others. Each response produces a different architectural state, and no single state is understood as definitive (fig. 4-1). The system does not move toward a final form but operates in continuous relation to the conditions it inhabits.

This has direct consequences for how the project engages with conventional frameworks of architectural accountability. As established in Chapter 1, accountability operates at the level of the project, attached to specific outcomes and evaluated against defined criteria. Here, no such criteria can be fully defined in advance, and no fixed outcome exists against which the system's performance can be measured. The architecture is not a discrete object but a continuous process, and the conditions of its evaluation shift as the architecture itself continuously transforms.

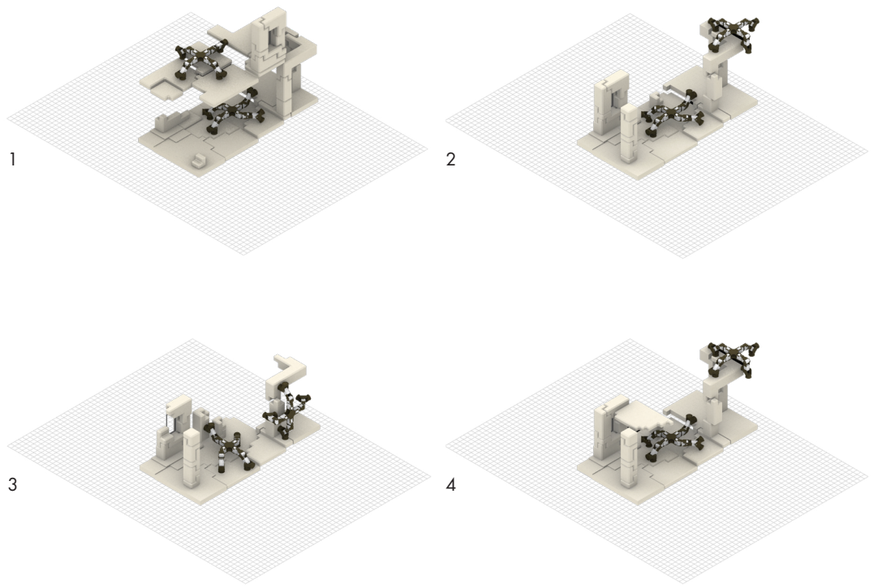


Figure 4-1: The System Reassembling in Response to Changing Conditions, TetraGora, 2026

What persists is not the form but the logic through which form is generated, and it is within that logic that the obligations of the project reside. The final state, where a building is conventionally completed and signed off, is where accountability ends; it is also where responsibility only appears to end, since the consequences of what has been built continue regardless. In removing the final state, the system forecloses the first genuinely and dispels the second. The absence of a final state is not incidental but inherent to the system itself. It is the condition through which the limits of the object-centred model, critiqued throughout this thesis, become most visible.

What mediation of this extent discloses is that the project's defining condition is modal. In designing a system whose outcomes are by definition open, provisional, and continuously transforming, the architect's implication is not in any single configuration the system produces but in the parameters, values, and logics embedded within it before it ever touches a site. Responsibility is carried by the mode of practice, the decisions through which the system is given its logic, rather than by the substance of any outcome that logic generates. It is along this modal ground that the character of implicated responsibility can be traced, across the project, through the three axes set out in Chapter 3.

4.3 Responsibility Distributed: A Network Without a Single Bearer

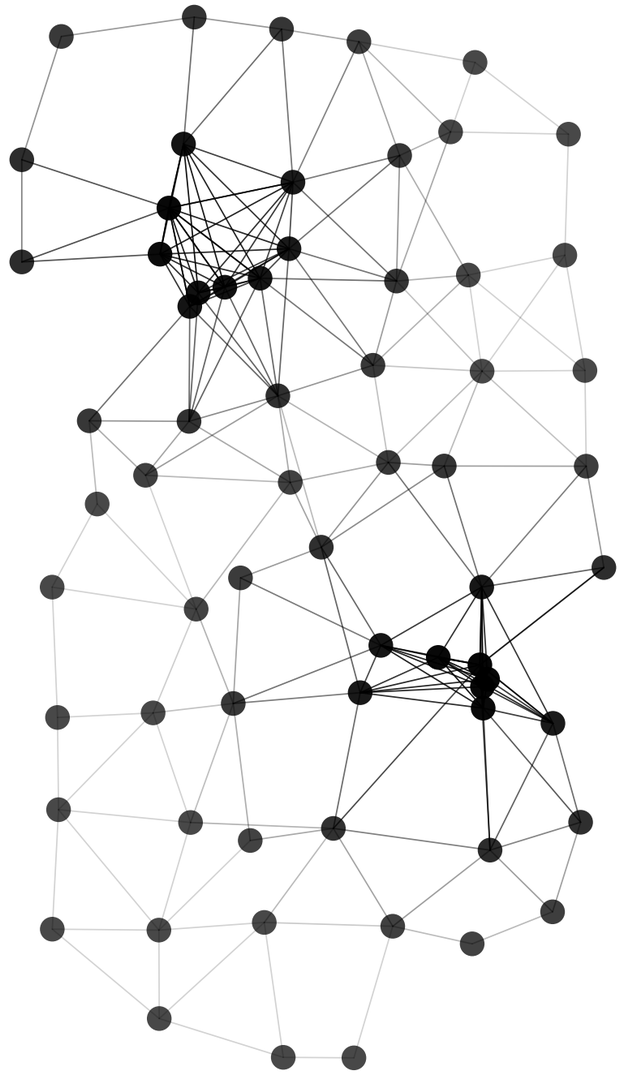
Implicated architecture holds that responsibility spreads across the network of participants through which architecture is produced. Traditional practice already distributes accountability, though it does so through more limited positions: the architect answers for the design, the construction company for the build, the consulting engineer for the structure, each holding a defined portion. The distribution is narrow, and it operates beneath the lone genius myth traced in Chapter 1, so that even this divided accountability tends to be placed centrally.

By contrast, the design process conducted with AI, algorithms, and robots places consequential decisions across more positions than a traditional practice recognises. In TetraGora, the spatial algorithm determines room sizes and adjacencies. The quadruped robots decide placement within the parameters the system establishes, engineers shape and maintain the processes through which both operate, and the occupants direct the system through their requests to expand or reduce their dwellings. A process of this kind is collaborative in its nature, and more actors inherently hold accountability for what emerges, carrying in turn a share of responsibility, where traditional practice folds both under the guiding vision of a few. The absence of a settled final state further underscores this, since no finished object exists to trace the contributions back to a single figure.

Yet accountability, as Chapter 1 established, requires identifiable actors to hold it, and the mediated network adds actors without adding the clarity needed to distinguish between them. Each additional participant becomes another node through which decisions pass, and what each holds becomes harder to trace. Where the algorithm's placement decision ends and the engineer's parameter begins is a genuinely open question, as is whether the robots and algorithms bear any share of the responsibility their decisions produce. Responsibility becomes more demanding to locate and to reference, for the practising architect above all, whose position within a network of this intricacy no longer describes itself. What the network complicates, and does not resolve, is how responsibility comes to be placed at all.

4.4 Responsibility Weighted: Relation and Degree

The second axis that implicated architecture names is relational: responsibility arises through each participant's relation to the network rather than residing in any single one of them. This relation is not unique to mediated practice. In a traditional project, the architect's relation is closer and more consequential than that of most other participants, and a greater share of responsibility follows from that closeness. TetraGora shows the same on the mediated side, where the parameters, values, and judgements set into the system before it reaches a site remain the most concentrated expression of implication within the network. Relation alone, however, describes the structure of these connections without describing their degree. The axis is better understood as weighted, with responsibility gathering unevenly according to how consequentially each position shapes what the system produces (fig. 4-2).



Weighted (D)

Figure 4-2: Weighted Distributed Network Model (after Baran, 1964), the author, 2026

A mediated practice brings the rest of this weighting into view. Traditional practice already works collaboratively, as large firms subcontract engineering, surveying, and other specialist tasks, but the subcontracted positions answer to the commissioning firm rather than to the project, and their weight is absorbed into the firm's attribution, sustaining the gap between plural production and singular authorship that Chapters 1 and 2 developed. A design process conducted with AI, algorithms, and robots resists that absorption. The decisions of the algorithm, the robots, and the occupants are consequential in their own right, held individually rather than subcontracted upward, and the weight they carry has no larger figure to gather into. The collaboration this discloses is a permanent condition of architectural production, one the mediated process brings to light rather than brings into being.

Baran's distributed model (fig. 2-2, C) shows uniform nodes, none holding the centre, and read as a picture of responsibility it suggests an even spread. Implicated responsibility is uneven (fig. 4-2). The distribution remains, but the positions do not carry equal weight, gathering most heavily where decisions shape the system most consequentially.

The weighting becomes hardest to settle at the inputs that act on the system after the design work is done. The occupants stand foremost among these, a position traditional practice rarely weighs at all, alongside the weather and the surrounding context, each exerting a direct effect on what the system does long after its parameters are set. The absence of a settled final state illustrates the difficulty rather than causing it. Because the system never stops responding, these influences never stop arriving, and their effects resist prediction in advance. The occupant is implicated through patterns of occupation and through explicit requests to expand or reduce a dwelling, and both act on the system as consequentially as any decision made before deployment. A responsibility attributed by weight has to account for positions whose weight accumulates only after deployment, so that when responsibility would need to be assigned, the scale has nothing yet to register.

4.5 Responsibility in Time: Reach Without Closure

Temporal is the third axis implicated architecture names, and responsibility under it runs before and after the work of design, past the point where accountability alone would end. Where the first two axes ask who holds responsibility and how much, this axis asks when it can be said to apply at all. Traditionally, accountability concludes when a project is completed, whether or not the practice is mediated. Because accountability is visible in a way responsibility is not, responsibility appears to conclude with it. Fully mediated practices that implement a self-assembling system, like the one in TetraGora, never reach a final state, and with no formal conclusion to the project, responsibility is no longer hidden behind accountability's end.

This axis reaches backward as well as forward. A design process conducted through algorithms, for example, draws on data that precedes it. In TetraGora, the spatial algorithm determines its arrangements from patterns learned from existing datasets, so the decisions the

system makes carry judgements formed before the project began. In cases like this, responsibility for the data is difficult to place, since the practice inherits the data without having gathered it or shaped the judgements behind it. Where a system is trained in real time instead of drawing on a fixed dataset, this difficulty compounds further. A fixed dataset can be checked for outliers and unreliable inputs before design begins, but a system training as it goes must filter this material during development, and rogue input may shape the system's behaviour before it is flagged. The mediated process is shaped by what it inherits, so the question of what responsibility looks like when design is informed by inherited material is one that traditional practice has not had to ask in the same way.

The forward reach carries the sharper difficulty. In fully mediated, self-assembling systems such as TetraGora, the work of the designers, the engineers, and the coders effectively comes to an end, while the work of the system is conceivably never done. Responsibility and accountability can therefore only ever be placed for a portion of the system, the portion whose work has finished, and the operating remainder continues without either. This compounds what the previous sections identified, since a responsibility that is already demanding to locate and to weigh must now also be timed, assigned to some phase of a process that does not conclude. If the automated part of the process is never fully complete, can it be held concretely accountable or responsible at all, and if so, at what point?

4.6 The Modal Ground Reconsidered

The three axes were traced separately, but they describe a single condition. Distribution, weight, and timing are not properties responsibility possesses; they are what the mode of practice looks like when it is asked who, how much, and when. Each question leads to the others because each is asking about the same thing, how the system is designed to operate. To distribute responsibility across the network is to have already raised the question of weight, and to weigh it is to have raised the question of timing. The modal ground is not a frame the axes sit beneath but the object all three describe.

What TetraGora makes visible reaches past its case. Wherever mediation extends into a system's operation, responsibility is distributed across the network, weighted unevenly, and carried past the work of design. TetraGora makes the condition legible because all three hold at once, but the condition belongs to the mode of practice rather than the project. What remains is how a practice answers for a responsibility distributed, weighted, and temporal together.

5. Conclusion: Responsibility Without an Object

5.1 The Cultural Presupposition Revisited

The conditions that shape architectural practice do not begin with the architect. The profession operates within a plurality of pre-existing technological, cultural, and economic conditions. Within them, the terms of a project, what it can be, how it will be judged, what obligations

it carries, are largely settled before any individual decision is made, yet these conditions themselves are seldom examined as closely as the outcomes they produce. This thesis has treated them as its object of study rather than as the backdrop against which practice operates. The singular architect, the visible bearer of accountability, and the object-centred frameworks of evaluation were shown to be cultural constructions rather than inherent conditions of practice, and as automation redistributes the work of design across networks of human and non-human actors, the ground beneath those constructions is shifting.

The thesis asks how responsibility should be understood within architectural design processes conducted through mediated networks, and in response it proposes the framework of implicated responsibility. Responsibility is understood through the mode of practice, how a system is designed to operate rather than what it produces, and is traced along three axes. The first is distributed, with responsibility spreading across every position through which the work passes rather than concentrating in any one of them. The second is weighted, with responsibility gathering unevenly according to how consequentially each position shapes what emerges. The third is temporal, with responsibility reaching beyond the work in both directions, back into what the practice received and forward into what it continues to produce. This is the practice the thesis has termed implicated architecture, and TetraGora is where its condition was examined.

5.2 From Object to System: Reframing Architectural Responsibility

The shift from object to system changes more than how architecture is produced. When architecture is understood as a fixed object, responsibility can be located in its production, in the decisions made, the brief delivered, and the building evaluated against defined criteria. When architecture is understood as a system, one that generates outcomes continuously in response to changing conditions and across a mediated network, responsibility is no longer located in any single output. It is a condition of the network itself, distributed across the relations and decisions through which outcomes are produced and continuously transformed.

This reframing has implications that extend beyond the immediate conditions of any single project. Architecture is collectively implicated in shaping material, social, and environmental outcomes, and the obligations that arise from that implication do not end when a building is complete or when a system is deployed. As Rothberg notes, "we remain captive to a communal responsibility by virtue of our participation in a collective way of life".[25] To practice architecture is to participate in the conditions through which the built environment is produced, and that participation carries obligations that are ongoing, relational, and distributed across the full network of actors involved. This is what Kuma gestures toward when he observes that "architecture is always situated in and connected to the world. More precisely, architecture is a device mediating between the subject and the world".[26] Architecture does not exist apart from

25 Rothberg, *The Implicated Subject*, 47.
26 Kuma, *Anti-Object*, 42.

the conditions that produce it or the communities it shapes. It is always already embedded in a network of relations, and it is within those relations that responsibility circulates, extending beyond individual architects to the broader systems and actors contributing to the collective experience of architecture.

5.3 The Distance Accountability Leaves

Accountability is bounded, assigned to identifiable actors, and settled through evaluation against defined criteria. Practice has long treated it as the limit of professional obligation, when obligation extends well past it. The responsibility this thesis describes, distributed, weighted, and temporal, is not what the existing frameworks are built to register, and the distance between the two is where its questions begin.

This distance raises a question about the framework of accountability itself, a bounded condition that answers for the visible aspects of a project and leaves the rest to responsibility. What would a framework look like that registered a responsibility distributed across many positions rather than concentrated in one, weighted unevenly across them, and reaching beyond the work of design in both directions?

5.4 What Remains Open

Beyond the framework of accountability, the axes raise questions of their own. Whether the non-human participants of a mediated network, the algorithms and robots whose decisions shape what is built, bear any share of the responsibility those decisions produce remains open. So does the question of inherited material, of how responsibility is placed on data a practice draws from rather than gathers, and of what changes when a system trains on inputs faster than they can be examined. Past these sits the question the axes converge on. Locating responsibility is not yet answering for it, and a responsibility that is distributed, weighted, and temporal together offers no single position, measure, or moment through which a practice might answer.

These questions reach beyond the project that raised them, and some reach beyond architecture. The condition belongs to the mode of practice rather than to any single case of it, and wherever systems participate in producing outcomes rather than executing them, the same questions of who, how much, and when will arise. TetraGora is one modality of mediated practice, and other modalities may press the axes further, or disclose conditions these three do not name. What this thesis offers is a ground from which those questions can be asked.

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7. List of Figures:

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