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Governing Without Guarantees: Complexity, Digital Infrastructure, and Institutional Responsibility

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Abstract

Contemporary policy theory recognises that governance operates under uncertainty, yet still organises institutional action as if outcomes can be stabilised through design, incentives, and constraint. Complexity theory and interpretive critiques have unsettled the promise of control, but have paid less attention to a related shift: the erosion of responsibility within systems that cannot be fully predicted yet remain normatively accountable. This article develops the concept of Governance Without Guarantees (GWG) to describe environments in which institutional action unfolds without stable causal expectations while continuing to generate consequences that demand accountability over time. The central challenge in such settings is not uncertainty itself, but whether institutions can remain answerable as action becomes mediated through rules, metrics, and digital infrastructures. The article introduces Responsibility Retention Capacity (RRC) as a diagnostic framework for assessing whether governance arrangements keep responsibility traceable, contestable, and revisable. Drawing on digital public infrastructure cases, like identity systems and automated welfare platforms in India and the United States, it shows how embedded technical systems redistribute accountability and obscure harm. The article contributes to policy theory by reframing governance under uncertainty through GWG, offering RRC as an analytical lens, and demonstrating how digital infrastructures intensify the displacement of responsibility.

Keywords: Institutional Responsibility; Public Choice Theory; Complexity Theory; Interpretive Policy Analysis; Institutional Ethics; State Capacity; Citizenship and Digital Identity

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1. Introduction

Public policy today is made in environments where consequences endure longer than the certainty that produced them. Yet much of policy theory continues to operate as if outcomes can be stabilised through design, incentives, and institutional constraint. From welfare reform to regulatory governance, from behavioural nudges to digital automation, the dominant aspiration remains the same: to engineer compliance, align incentives, and secure predictable results (Hood 1991; Power 1997; Margetts and Dunleavy 2013; Lindblom 1959; Fischer 2003; Stone 2012). This aspiration has shaped not only policy tools but also how responsibility, success, and failure are understood.

This article begins from the recognition that contemporary governance unfolds within systems that do not behave as if they can be mastered. Climate policy, public health systems, financial regulation, welfare delivery, and digital infrastructures operate through feedback loops, institutional entanglements, and historical layering that routinely defeat linear planning (Pierson 2004; Morçöl 2012; Geyer and Rihani 2010). Policies do not merely intervene in stable systems; they restructure the systems themselves. They alter administrative routines, redistribute authority, reshape expectations, and generate consequences that outlive the decisions that produced them. In such environments, the promise of control does not simply fail; it misdescribes the world in which governance now operates.

My position is not that policy should abandon ambition, nor that institutions should retreat into caution. It is that policy theory must become more honest about the conditions under which governing actually occurs. We do not govern from a position of certainty; we govern from within uncertainty that is structural, not temporary (Cilliers 2005; Room 2011). We do not act upon systems whose behaviour can be fully anticipated; we act within systems whose responses are emergent, recursive, and often irreversible (Byrne 1998; Duit and Galaz 2008). And we do not merely choose among options; we create the terrain on which future choices become possible or foreclosed.

This article argues that these conditions require a fundamental reorientation in how policy action is understood. Rather than treating policymaking as a problem of optimisation or institutional design for compliance, I propose that it be understood as a form of judgment under conditions of persistent uncertainty. Judgment, as I develop it here, is neither discretionary improvisation nor technocratic expertise. It is the burden of acting without guarantees, while remaining answerable for consequences that unfold beyond the moment of decision (Flyvbjerg 1998; Ansell and Geyer 2017). It is the obligation to act in conditions where knowledge is incomplete, effects are unevenly distributed, and failure carries durable social cost.

This article advances a theoretical and normative argument, grounded in interpretive policy analysis and informed by comparative empirical cases. It reframes policymaking not as optimisation under known constraints, but as institutional responsibility over time.

This reorientation is not merely conceptual. It is institutional and moral. When policy is framed as control, accountability is located in procedures, metrics, and compliance. When policy is framed as judgment, accountability is located in responsibility over time—responsibility for how decisions

reshape institutions, redistribute risk, and structure vulnerability (Bevir and Rhodes 2006; Stone 2012). This distinction matters because the systems most affected by contemporary policy—welfare delivery platforms, digital identity infrastructures, algorithmic governance tools—do not simply administer benefits or enforce rules. They reorganise the conditions of citizenship itself: who is seen by the state, who is believed, who is eligible, who waits, and who is excluded (Eubanks 2018; Masiero and Das 2019).

I come to this argument from a critical engagement with Public Choice Theory, complexity theory, and interpretive policy analysis, but also from a deeper dissatisfaction with how policy failure is usually narrated. Too often, failure is framed as miscalculation, poor implementation, or institutional deviation from design. Rarely is it framed as the predictable consequence of governing within systems that generate effects no one actor controls, yet for which someone must remain responsible (Pierson 1993; Bovens 2007). This article insists that responsibility cannot be dissolved into systems, procedures, or technical artefacts. It must remain anchored in institutions, practices, and political judgment.

The article unfolds as follows. Section 1 revisits Public Choice Theory to examine how its enduring influence has normalised an architecture of governance oriented toward constraint, predictability, and behavioural discipline. Section 2 introduces complexity theory as a sensibility that exposes the limits of linear causality, stable baselines, and prescriptive policy design. Section 3 turns to digital public infrastructure as a critical site where these tensions become institutionally embedded, tracing how technical design choices generate long-term path dependencies that reshape administrative practice and reconstitute citizenship. Section 4 develops the normative and pedagogical implications of reframing policy as judgment, addressing accountability, institutional design, and the formation of policy practitioners capable of governing without guarantees.

This article does not offer a new formula for better policy. It offers a reorientation in how policy itself is understood. It invites the reader to move away from the pursuit of certainty and toward the practice of seriousness: the capacity to act without full knowledge, to remain open to revision, and to take responsibility for consequences as they emerge. In complex societies, this is not simply a concession to uncertainty. It is an attempt to keep responsibility visible even when outcomes cannot be fully secured in advance.

2. Governance Without Guarantees and the Problem of Responsibility

This article makes a conceptual contribution to policy theory by shifting the analytical focus from uncertainty as a condition of governance to the fate of responsibility within it. While a substantial body of scholarship has established that contemporary policy environments are characterised by complexity, non-linearity, and limited predictability, less attention has been paid to how institutions remain accountable when action unfolds under such conditions. Existing approaches have been effective in demonstrating the limits of control, but they have been less precise in explaining how

responsibility is sustained, displaced, or obscured as governance becomes increasingly mediated through rules, metrics, and technical systems.

To address this gap, the article develops the concept of Governance Without Guarantees (GWG) to describe policy environments in which institutional action proceeds without the possibility of stabilising outcomes in advance, yet continues to generate consequences that demand accountability over time. GWG does not merely denote the presence of uncertainty. It identifies a structural condition in which the aspiration to govern through control persists despite the absence of stable causal expectations. Under such conditions, institutions continue to rely on design, incentives, and procedural constraint, as if outcomes can be rendered predictable, even as the systems within which they operate remain open, adaptive, and historically contingent.

The central claim advanced here is that this mismatch between control-oriented design and complex policy environments produces a systematic erosion of responsibility. When governance is organised around the anticipation of predictable effects, responsibility is typically located in ex ante design or ex post enforcement. However, in environments where consequences emerge over time and through interaction effects, responsibility cannot be exhausted at the point of decision. It must instead be sustained as an ongoing institutional practice. The problem, therefore, is not only that outcomes cannot be guaranteed, but that prevailing governance arrangements are poorly equipped to remain answerable under such conditions.

To render this problem analytically tractable, the article introduces the concept of Responsibility Retention Capacity (RRC). RRC is defined as the capacity of governance systems to keep responsibility traceable, contestable, and revisable over time, even when action is mediated through formal rules, organisational routines, or technical infrastructures. It is not a scalar measure, but rather a diagnostic framework that enables the analysis of how responsibility is organised, distributed, and potentially displaced within institutional arrangements.

RRC draws attention to several dimensions of governance that are often treated as secondary in conventional policy analysis.

- First, it foregrounds the traceability of decision-making, asking whether outcomes can be meaningfully linked to identifiable actors or whether they are attributed to impersonal systems.
- Second, it emphasises contestability, examining whether affected individuals and groups can challenge decisions in substantive terms rather than through procedural formality alone.
- Third, it highlights revisability, focusing on the extent to which institutional arrangements remain open to modification in light of emerging consequences.
- Fourth, it considers the visibility of harm, recognising that responsibility is difficult to sustain where errors are fragmented, individualised, or rendered administratively invisible.

- Finally, it directs attention to the allocation of risk, particularly the extent to which uncertainty is absorbed by institutions or displaced onto others (often those with the least capacity to bear it).

By articulating these dimensions, RRC enables a more systematic diagnosis of a phenomenon that is otherwise described in diffused terms: the displacement of responsibility within complex governance systems. This displacement occurs when decisions are embedded in durable arrangements (legal, organisational, or technical) that mediate action while simultaneously obscuring the locus of accountability. In such contexts, responsibility shifts from identifiable actors to architectures, from political judgment to procedural compliance, and from contestable decisions to system outputs. The result is not an absence of governance, but a form of governance in which responsibility becomes increasingly difficult to locate, attribute, and revise.

The analytical value of RRC lies in its ability to connect and extend existing strands of policy scholarship. Public Choice Theory offers a powerful account of incentive structures and institutional constraint, yet it largely treats responsibility as secured through rule design and compliance. Complexity theory, in turn, demonstrates the limits of prediction and control, but it does not fully account for how institutions remain answerable when outcomes are emergent and unevenly distributed. Interpretive approaches foreground meaning, discourse, and situated practice, but they have paid less attention to how responsibility becomes embedded and stabilised within infrastructural arrangements over time. By focusing explicitly on responsibility retention, this article integrates these insights while identifying a dimension that remains under-theorised across them.

This argument builds on, but also departs from, Bovens's (2007) influential multi-forum accountability framework. Bovens demonstrates that accountability in contemporary governance is exercised across multiple institutional forums, including legal, administrative, political, and social arenas, and that accountability relationships are often fragmented rather than singular. RRC accepts this multiplicity, but shifts the analytical focus from the existence of accountability forums to the capacity of governance systems to preserve responsibility over time under conditions of infrastructural complexity and uncertainty.

In other words, Bovens explains where accountability is exercised and through which institutional relationships, whereas RRC asks whether responsibility itself remains traceable, contestable, and revisable once decisions become embedded within durable technical and organisational systems. This distinction becomes particularly important in digitally-mediated governance, where accountability forums may formally persist even as responsibility becomes practically displaced through automation, interoperability, and infrastructural lock-in.

The relevance of this framework becomes particularly clear in the context of digital public infrastructure. As policy decisions are increasingly translated into data architectures, algorithmic processes, and automated systems, the conditions under which responsibility is exercised are transformed. Early design choices become embedded in durable technical forms, generating path dependencies that structure future action while rendering the origins of those decisions less visible

and less contestable. In such settings, the question is no longer simply whether policies are effective or efficient, but whether institutions retain the capacity to remain responsible for the consequences of systems they no longer fully control.

This raises a normative question: do the values that underpin governance remain stable as they travel across institutional contexts? The analysis here suggests that not all values exhibit the same degree of stability. Certain procedural values -- such as traceability, minimal contestability, and basic forms of accountability -- tend to persist across institutional boundaries, because they are embedded in administrative and legal norms. However, substantive values such as equity, inclusion, and fairness are far more context-dependent, shaped by institutional mandates, political priorities, and infrastructural constraints.

Where multiple institutions are simultaneously implicated, as is often the case with digital infrastructures that span welfare, finance, and identification systems, the question of whose judgment prevails becomes unavoidable. In practice, authority tends to be exercised by those institutions that control infrastructural standards and data architectures, rather than those most directly accountable to affected populations. This creates an asymmetry in which technical or coordinating bodies acquire de facto normative authority without corresponding mechanisms of democratic accountability.

Responsibility Retention Capacity provides a way of diagnosing this problem. Where RRC is high, institutions retain the ability to contest and renegotiate value conflicts across domains. Where it is low, value hierarchies become embedded in infrastructure and insulated from revision. The question is therefore not simply which values are stable, but whether institutions retain the capacity to deliberate over them as they interact.

By conceptualising governance as operating without guarantees, and by introducing responsibility retention capacity as a diagnostic lens, this article contributes to a reorientation of policy analysis. It shifts attention away from the search for optimal design under assumed conditions of stability and toward the institutional conditions under which responsibility can be sustained in environments where outcomes cannot be secured in advance. This reorientation does not abandon the tools of policy analysis. It places them within a more demanding normative and analytical frame—one that treats responsibility not as a residual category, but as a central concern of governance in complex societies.

3. Public Choice Theory and the Architecture of Control

Public Choice Theory emerged in the mid-twentieth century as a sustained challenge to both welfare economics and idealised accounts of democratic governance. Rejecting the assumption that political actors are motivated primarily by public interest or civic virtue, it recast political life through the lens of rational choice, modelling politicians, bureaucrats, and voters as self-interested agents operating under incentive constraints (Downs 1957; Buchanan and Tullock 1962). This analytic

move proved enormously generative. It exposed the dynamics of rent-seeking, bureaucratic expansion, regulatory capture, and collective action problems with a clarity that earlier normative frameworks had obscured (Olson 1965; Niskanen 1971; Mueller 2003). It also reoriented policy analysis toward institutional design, shifting attention from intentions to incentives, from moral aspiration to structural constraint.

The enduring influence of Public Choice Theory lies not only in its empirical insights, but in the governing imagination it normalised. At its core, Public Choice advanced a vision of governance in which political life is rendered legible through calculable preferences, strategic behaviour, and institutional rules that discipline self-interest. Institutions, in this view, are not sites of ethical judgment or political learning, but mechanisms for aligning private incentives with socially acceptable outcomes. The task of governance becomes one of constraint: limiting discretion, designing rules, and constructing architectures that render behaviour predictable and outcomes steerable (Brennan and Buchanan 1985; Weingast 1995).

Read through the lens of Governance Without Guarantees, this architecture of control has an under-examined consequence. By locating responsibility primarily in rule design and incentive alignment, it presumes that accountability can be secured ex ante, at the moment institutions are constructed. Yet where policy outcomes unfold through complex and evolving interactions, such a presumption proves fragile. Responsibility does not remain anchored in design; it must be sustained as consequences emerge over time.

From this perspective, Public Choice Theory can be seen as privileging a particular configuration of responsibility—one in which accountability is front-loaded into institutional rules while remaining comparatively under-specified in relation to downstream effects. The result is not an absence of responsibility, but a tendency towards proceduralisation. Responsibility becomes equated with compliance, even where compliance produces outcomes that are neither anticipated nor easily attributable.

This is precisely where the notion of Responsibility Retention Capacity becomes analytically useful. Governance arrangements shaped by strong control logics may perform effectively in aligning incentives, yet exhibit low capacity to retain responsibility when outcomes deviate from expectation. The issue, therefore, is not that Public Choice fails to explain behaviour. It is that it offers limited resources for understanding how responsibility is maintained when behaviour unfolds within systems that cannot be stabilised in advance.

This article does not reject Public Choice Theory; it re-situates its insights within a governance environment that now questions its governing assumptions. The orientation toward constraint, predictability, and behavioural discipline has outlived the institutional conditions under which it was first formulated.

This orientation has profoundly shaped contemporary policy practice. Regulatory regimes, performance management systems, audit cultures, and market-based governance instruments all bear the imprint of this architecture of control (Hood 1991; Power 1997; Pollitt and Bouckaert 2017).

Even reforms framed in the language of flexibility or decentralisation often reproduce the same logic, reintroducing constraint through performance metrics, contractual obligations, and algorithmic oversight systems (Behn 2001; Moynihan 2008). Discretion is permitted, but only within tightly-bounded parameters; learning is encouraged, but only insofar as it feeds back into optimisation; responsibility is assigned, but primarily through compliance with pre-specified rules rather than responsiveness to evolving consequences.

The appeal of this architecture is not difficult to understand. It promises protection against arbitrariness, insulation from corruption, and defense against the moral hazards of discretionary power. In a political world marked by distrust of authority, institutional design offers a way to replace personal judgment with procedural reliability (Rothstein 2011). Yet this promise rests on a deeper assumption: that political systems can be sufficiently stabilised to render control a plausible governing aspiration. It presumes that institutional design can anticipate behavioural responses with reasonable accuracy, that policy environments are sufficiently bounded to permit ex ante specification of outcomes, and that deviations from design reflect error rather than systemic transformation.

This assumption becomes increasingly fragile in contemporary governance contexts. First, the behavioural foundations of rational choice have been systematically challenged by behavioural economics, cognitive psychology, and sociological research, which demonstrate that actors routinely depart from utility-maximising rationality in patterned and context-dependent ways (Simon 1957; Kahneman 2011; Jones 2003). Preferences are shaped by institutions, identities, and histories; they are not merely revealed through choice. Incentives do not operate in isolation; they interact with norms, narratives, and organisational cultures in ways that cannot be fully specified in advance (March and Olsen 1989; DiMaggio and Powell 1991).

Second, and more fundamentally, the institutional environments within which policies operate are rarely stable or closed. They are embedded in dense networks of actors, technologies, legal frameworks, and historical trajectories that shape behaviour in ways that exceed incentive alignment alone. Policies do not simply act upon these environments; they reorganise them. They generate feedback effects, create new actors and interests, and reshape the political and administrative landscape in ways that transform the conditions under which future policies are made (Pierson 1993; Baumgartner and Jones 1993; Mettler and SoRelle 2014). What begins as an intervention within a system becomes, over time, a reconfiguration of the system itself.

Public Choice Theory, however, remains anchored in a relatively static relationship between institutional design and behavioural response. It presumes that rules can be specified in advance, that incentives will operate in reasonably predictable ways, and that deviations from intended outcomes represent failures of compliance or implementation rather than transformations of the institutional field (Brennan and Buchanan 1985; Weingast 1995). Even where uncertainty is acknowledged, it is treated primarily as an informational deficit to be reduced through better design, refined incentives, or improved monitoring (Laffont and Tirole 1991). Uncertainty, in this account, is a problem to be managed, not a condition to be inhabited.

This framing has significant consequences for how responsibility is understood. When governance is organised around control, responsibility becomes procedural: it attaches to rule-following, compliance, performance metrics, and audit trails (Power 1997; Hood 1991; Bovens 2007; Moynihan, Herd, and Harvey 2015). Rarely is failure understood as a systemic outcome generated by the interaction of policies with complex institutional environments over time (Bovens 2007; Hood 2011). Responsibility thus becomes diffused, displaced onto systems, procedures, and technical artefacts, rather than anchored in institutional practices and political judgment.

Yet in contemporary policy environments, this diffusion of responsibility is precisely what makes institutional harms difficult to identify, contest, and correct over time. When policies restructure administrative routines, redistribute authority, and embed normative assumptions into technical systems, the consequences do not remain local or reversible. They become institutionalised. They shape how frontline workers interpret rules, how citizens encounter the state, and how political accountability is exercised or evaded (Lipsky 1980; Brodkin 2011; Soss, Fording, and Schram 2011). In such contexts, the promise of control does not merely fail; it obscures the moral and political dimensions of governing within systems that generate effects no one actor fully commands, yet for which someone must remain answerable.

This is not to suggest that Public Choice Theory is obsolete or analytically barren. Its insights into incentive structures, collective action problems, and institutional constraint remain indispensable (Mueller 2003; Ostrom 2005). But its governing imagination—its orientation toward constraint, predictability, and behavioural discipline—has outlived the conditions under which it was first formulated. What is required is not the abandonment of institutional design, but a more honest recognition of its limits. Design cannot substitute for judgment. Rules cannot exhaust responsibility. Incentives cannot contain emergence.

This section has argued that the enduring influence of Public Choice Theory reflects not only its analytic power, but its normative appeal: it offers a vision of governance that promises discipline without discretion, predictability without politics, and order without moral burden. Complexity theory challenges this vision not by rejecting institutions, but by exposing the fragility of control as a governing aspiration. It is to this challenge that the next section turns, not to replace one framework with another, but to unsettle the very expectation that governance can be reduced to design.

4. Complexity Theory and the Limits of Prescription

Complexity theory emerged from the natural sciences as an attempt to understand systems composed of many interacting elements whose collective behaviour cannot be reduced to the properties of individual components (Waldrop 1992). Over time, its insights have been extended to social, organisational, and political systems, where non-linearity, emergence, feedback effects, and historical path dependence are pervasive (Byrne 1998; Cilliers 1998; Morçöl 2012; Room 2011). What

distinguishes complex systems is the production of system-level patterns that arise from interaction rather than design, and that resist linear prediction or centralised control.

Applied to public policy, complexity theory unsettles several foundational assumptions of conventional governance.

- First, it challenges the expectation that policy interventions will produce proportionate and predictable outcomes. In complex systems, small interventions can generate large and durable effects, while large interventions may dissipate without trace (Duit and Galaz 2008; Geyer and Rihani 2010).
- Second, it destabilises the distinction between policy design and policy implementation. Implementation is not the execution of a fixed plan, but an ongoing process of interpretation, adaptation, and institutional learning in which policy is continually reconstituted through practice (Lipsky 1980; Rhodes et al. 2011; Hill and Hupe 2009).
- Third, it calls into question evaluation frameworks that rely on stable baselines, fixed objectives, and linear causal attribution, revealing these as artefacts of administrative convenience rather than accurate representations of institutional dynamics (Patton 2011; Pawson 2013).

These challenges strike at the foundations of how policy knowledge is produced and authorised. Complexity theory reframes uncertainty not as a residual category to be eliminated through better information, but as a constitutive condition of social systems (Cilliers 2005; Stirling 2010). Knowledge about such systems is therefore necessarily partial, provisional, and situated. No actor or institution can possess a complete representation of the system, and no model can exhaust its dynamics (Hayek 1945; Sanderson 2009).

This insight resonates with interpretive and post-positivist traditions in policy analysis, which have long emphasised the constructed, contested, and context-dependent nature of policy problems (Fischer 2003; Bacchi 2009; Stone 2012; Bevir and Rhodes 2006). These traditions reject the idea that policy problems exist as objective facts waiting to be solved, instead locating them within discursive, institutional, and historical contexts that shape how issues are framed, which solutions become thinkable, and whose interests are rendered visible or invisible. Complexity theory extends this insight by showing that even when problems are well-defined, their institutional trajectories remain open, contingent, and shaped by interaction effects beyond the control of any single actor.

At this point, the contrast with control-oriented governance becomes stark. Where Public Choice Theory seeks to discipline uncertainty through institutional design, complexity theory insists on the irreducibility of uncertainty itself. This implies that the ambitions of policy theory must be recalibrated. The task is no longer to identify optimal solutions under assumed conditions of stability, but to design institutions capable of learning, adaptation, and responsibility under conditions of change, surprise, and uneven consequence (Ansell and Geyer 2017; Duit et al. 2010).

What complexity theory ultimately displaces is not policy action, but the expectation of mastery. However, it leaves open a critical institutional question: how responsibility is to be organised under such conditions. If outcomes cannot be predicted and causal pathways remain indeterminate, the locus of accountability cannot be confined to either design or implementation. Yet complexity-informed approaches often emphasise adaptation, learning, and resilience without fully specifying how institutions remain answerable for the consequences of actions taken under uncertainty.

It is at this point that Governance Without Guarantees extends the implications of complexity theory. Rather than treating uncertainty as the primary analytical challenge, it shifts attention to the institutional capacity to retain responsibility in its presence. Responsibility Retention Capacity provides a way of articulating this problem more precisely. It directs analysis toward whether governance arrangements enable ongoing attribution, contestation, and revision, or whether they allow responsibility to dissipate as outcomes emerge through distributed interactions.

In this sense, the contribution of GWG is not to replace complexity theory, but to render its normative implications more explicit. If uncertainty cannot be eliminated, then the central question of governance becomes whether institutions remain capable of recognising and responding to the consequences they help produce. Without such capacity, adaptation risks becoming a technical response to systemic effects, for which responsibility is no longer clearly held.

It undermines the idea that governance can be reduced to the selection of optimal instruments or the engineering of predictable outcomes. Instead, it foregrounds the limits of prescription. Policy interventions do not operate upon stable systems; they enter into evolving institutional fields, generating feedback effects that reshape incentives, norms, and power relations (Pierson 2004; Mettler and SoRelle 2014). The effects of policy are therefore not merely outputs to be measured, but transformations to be interpreted.

This shift carries profound implications for accountability. When outcomes cannot be fully predicted and effects unfold over extended temporal horizons, responsibility cannot be confined to either ex ante design or ex post compliance. Accountability must instead be understood as an ongoing institutional practice: the capacity to attend to emerging consequences, to revise decisions in light of new information, and to remain answerable for harms that were not intended but were nonetheless produced (Bovens 2007; Room 2011; Ansell and Geyer 2017). This form of accountability is not procedural alone. It is ethical and political, because it concerns who bears the cost of uncertainty and how that burden is distributed (Tronto 1993; Flyvbjerg 1998).

Policymaking must be understood as a form of judgment under conditions of persistent uncertainty. This judgment is not discretionary whim, nor is it reducible to expertise. It is the obligation to act in conditions where knowledge is incomplete, consequences are unevenly distributed, and responsibility cannot be deferred to systems, rules, or models.

The implications of this reorientation bear directly on how institutions are designed, how policies are evaluated, how failures are interpreted, and how practitioners are trained. Rather than prioritising optimisation, closure, and compliance, a complexity-informed approach demands institutional

arrangements that remain open to revision, attentive to feedback, and capable of bearing responsibility over time (Sanderson 2009; Stirling 2010; Ansell and Geyer 2017). It requires governance structures that can absorb surprise without collapsing into either paralysis or overreach.

This section has argued that complexity theory does not offer a new master framework for policy design. It offers, instead, a different disposition toward policy action, one marked by caution about claims of mastery and attentiveness to institutional limits. By exposing the limits of prediction and control, it reclaims judgment as an irreducible element of governance. It is to the institutional consequences of this insight, particularly in the domain of digital public infrastructure, that the next section turns.

5. Digital Public Infrastructure and the Reconstitution of Citizenship

Digital public infrastructure provides a critical empirical site for examining Governance Without Guarantees because it embeds policy decisions into durable systems that reshape how responsibility is organised and exercised.

Digital identity systems, welfare delivery platforms, population registries, data-sharing architectures, and algorithmic decision-making tools increasingly mediate access to rights, services, and state recognition (Margetts and Dunleavy 2013; Janssen and van den Hoven 2015; OECD 2024). These systems are often justified in the language of efficiency, inclusion, and scalability, reflecting the enduring influence of control-oriented governance logics. Yet their institutional effects extend far beyond administrative optimisation. They restructure how the state sees its citizens, how citizens encounter the state, and how political accountability is organised over time.

From a complexity perspective, digital infrastructures exhibit precisely the characteristics that render control fragile: non-linearity, emergence, feedback effects, and path dependence (Pierson 2000; Helbing 2015; Sandhu et al. 2023). Their effects are not proportional to their design intentions, nor do they unfold in predictable sequences. Minor technical decisions, institutional compromises, or political contingencies at the point of implementation can cascade into large-scale and durable governance transformations. Once operational, such systems become embedded in administrative routines, organisational cultures, and everyday practices, reshaping how frontline workers interpret rules, how citizens navigate eligibility processes, and how policy objectives are translated into lived experience (Brodkin 2011; Soss, Fording, and Schram 2011; Bovens and Zouridis 2002). This institutional embedding generates powerful lock-in effects, making reversal, redesign, or democratic contestation politically costly and administratively disruptive; symbolically, these are then framed as inefficiency rather than reform (Pierson 2000; Sandhu et al. 2023).

These dynamics become especially consequential when digital infrastructures are used to mediate access to social protection, public services, and legal recognition. In such contexts, technical design choices become conditions of citizenship, echoing broader critiques of state simplification and legibility (Scott 1998). From the perspective of Responsibility Retention Capacity, these

transformations can be understood as instances of responsibility displacement through infrastructure. As decision-making becomes embedded within technical systems, the attribution of responsibility shifts from identifiable actors to the architectures through which decisions are executed. Outcomes are experienced by citizens as authoritative, yet the grounds on which they are produced become increasingly opaque.

This shift has two interrelated consequences. First, it weakens traceability, as decisions are attributed to system outputs rather than to accountable agents. Second, it narrows contestability, as avenues for appeal are structured through the same systems that produce the outcomes in question. Revisability, in turn, becomes constrained by the infrastructural rigidity of the system, particularly where design choices generate path dependencies that are costly to reverse.

Responsibility becomes distributed across layers of design, implementation, and operation, while becoming simultaneously more difficult to locate and contest. In such settings, governance does not operate without responsibility, but increasingly without clear sites at which responsibility can be exercised. Citizenship, under such arrangements, is no longer mediated primarily through political membership, social rights, or relational presence, but through data architectures, authentication protocols, and procedural compliance (Isin and Ruppert 2015; Hintz, Dencik, and Wahl-Jorgensen 2019). The citizen becomes, increasingly, a data subject, and the encounter with the state becomes an encounter with systems.

Empirical evidence from digital welfare systems illustrates these dynamics with particular clarity. In India, the Aadhaar biometric identity system was introduced to improve targeting, reduce fraud, and enhance efficiency in welfare delivery. While it has enabled new forms of service integration, data interoperability, and administrative coordination, it has also generated significant exclusion errors, authentication failures, and new forms of vulnerability. These effects have disproportionately burdened elderly persons, manual labourers, rural residents, persons with disabilities, and populations with unstable biometric markers or limited digital access (Drèze, Khera, and Mungikar 2017; Masiero and Das 2019; Khera 2019).

These outcomes were not the product of isolated design flaws. They emerged through complex interactions among technological architectures, administrative incentives, infrastructural unevenness, street-level discretion, and social hierarchies (Bhatia and Bhabha 2017; Masiero 2019). What began as a technical reform thus evolved into a reconfiguration of entitlement verification, state presence, and everyday citizenship.

Similarly, in the United States, the automation of welfare eligibility determination and the deployment of algorithmic risk assessment tools in child protection, criminal justice, and healthcare systems have been justified on grounds of efficiency, consistency, and objectivity. Yet empirical studies demonstrate that these systems often reproduce or amplify existing inequalities, particularly along lines of race, class, and geography (Eubanks 2018; Benjamin 2019; Obermeyer et al. 2019). They embed opaque decision rules into administrative processes, rendering outcomes difficult to contest while redistributing accountability away from human decision-makers and toward technical artefacts

and institutional procedures (Zouridis, Bovens, and Trappenburg 2020; Yeung 2018). Frontline workers become constrained by algorithmic outputs, managers defer responsibility to system logic, and citizens encounter decisions that appear authoritative yet inscrutable. In this way, digital systems reorganise the moral economy of welfare, the structure of administrative discretion, and the terms on which state power is exercised and contested.

These cases reveal a broader pattern. Digital public infrastructure does not merely implement policy decisions; it transforms the institutional environment within which future policy decisions are made. Early design choices regarding data architecture, eligibility rules, error thresholds, interoperability standards, and system governance generate long-term distributive and political consequences that cannot be easily undone (Pierson 2000; Janssen and van den Hoven 2015; Sandhu et al. 2023). These systems thus function as what Latour (1992) describes as immutable mobiles: stabilised arrangements that carry particular normative assumptions across time and space, shaping behaviour long after their original rationale has faded.

From a governance perspective, this transformation raises fundamental questions about accountability and responsibility. When decisions are embedded in systems rather than enacted by identifiable officials, responsibility becomes diffuse (Bovens 2007; Bovens and Zouridis 2002). Harm is experienced by citizens, but agency is attributed to architectures, protocols, or algorithms. Appeals are routed through technical procedures rather than political judgment. In such contexts, the language of error replaces the language of responsibility, and institutional failure is reframed as system malfunction rather than governance failure (Yeung 2018; Zouridis et al. 2020). This shift has profound implications for democratic citizenship, as it weakens the capacity of citizens to contest decisions, demand justification, and seek redress.

A judgment-oriented approach resists this displacement of responsibility. It insists that technical systems do not absolve institutions of accountability. Rather, they intensify the need for institutional responsibility over time. If digital infrastructures embed early decisions into durable institutional forms, then policymakers cannot rely on ex ante optimisation or technical assurances alone. They must remain answerable to the evolving consequences of those decisions, particularly where harms are unevenly distributed and borne by those with limited capacity to absorb failure.

This reorientation has direct implications for institutional design. Rather than prioritising scalability, closure, and standardisation, digital public infrastructure should be designed with modularity, reversibility, contestability, and participatory oversight in mind (Ansell and Geyer 2017; Janssen and van den Hoven 2015; OECD 2024). Phased implementation, institutional redundancy, and robust mechanisms for grievance redress are not inefficiencies to be eliminated, but safeguards against systemic harm in complex environments (Bovens and Zouridis 2002; Yeung 2018). These design principles express a normative commitment to keeping accountability alive, and governance responsive to lived experience.

This section has argued that digital public infrastructure constitutes not merely a new administrative tool, but a transformation in the conditions of citizenship and governance. By

embedding normative assumptions into technical systems, it reshapes how rights are accessed, how power is exercised, and how responsibility is distributed. In such environments, governing well requires stronger institutional capacities for interpretation, learning, and judgment over time. It is to the normative and pedagogical implications of this transformation that the next section turns.

A question that arises, and one that is often left implicit in discussions of digital public infrastructure, is why such systems so consistently privilege efficiency over equity. This is a structural feature of how large-scale infrastructures are conceived, financed, and governed. At scale, infrastructures must stabilise decision-rules in order to operate; they require standardisation, codification, and reduction of discretion. Efficiency, in this context, is not simply a goal but also a precondition of operability. Equity, by contrast, often requires contextual judgment, flexibility, and responsiveness to variation—qualities that sit uneasily with infrastructural logics of uniformity.

From the perspective of Responsibility Retention Capacity, this creates a systematic tension. Systems designed for throughput and consistency tend to externalise the costs of ambiguity onto users, particularly those whose lives do not conform to the categories embedded in the system. In Aadhaar-linked welfare systems, for instance, authentication failures are not treated as systemic design limitations but as individual exceptions, thereby displacing responsibility downward (Drèze, Khera, and Mungikar 2017; Khera 2019). Similarly, in automated welfare systems in the United States, efficiency gains are achieved through eligibility simplification and automation, often at the cost of increased exclusion errors (Eubanks 2018).

6. Responsibility, Accountability, and the Formation of Policy Judgment

A related issue concerns the temporal stability of normative commitments. Not all values remain fixed as systems mature. Early stages of system design often privilege efficiency, standardisation, and scalability, reflecting the need to stabilise operations and demonstrate performance. Over time, however, as unintended consequences accumulate and user experiences become visible, pressures emerge to reintroduce values such as equity, flexibility, and responsiveness.

This temporal dynamic is critical for understanding governance without guarantees. Values are not simply chosen; they are sequenced, layered, and sometimes displaced over time. What matters, therefore, is not whether institutions select the "correct" values at the outset, but whether they retain the capacity to revise value commitments in light of evolving consequences. Responsibility Retention Capacity is, in this sense, a temporal concept: it asks whether institutions remain open to normative recalibration or whether early design choices become locked in.

The risk, particularly in digital infrastructures, is that values embedded at the point of design become normalised as technical necessities, foreclosing later contestation. A judgment-oriented

approach resists this closure by insisting that no value configuration is final, and that institutional responsibility includes the obligation to revisit foundational assumptions as systems evolve.

It is important to recognise that the limits of control identified here do not render optimisation-based approaches irrelevant in all domains. In policy settings characterised by relatively stable causal relationships and bounded uncertainty—such as certain areas of taxation, infrastructure maintenance, or routine service delivery—design-oriented approaches may continue to perform effectively. In such contexts, the alignment of incentives and the specification of rules can produce outcomes that are both predictable and administratively tractable.

The argument advanced in this article is, therefore, not that control-oriented governance is universally misplaced, but that its underlying assumptions are increasingly generalised beyond the conditions under which they hold. Where policy environments exhibit high degrees of interaction, temporal extension, and institutional entanglement, the reliance on design as a substitute for ongoing responsibility becomes problematic.

It is in these domains that Governance Without Guarantees provides a more appropriate analytical and normative orientation. If contemporary governance unfolds within systems that cannot be stabilised and whose effects cannot be fully anticipated, then the most consequential question becomes not how to optimise policy design, but how to remain responsible under conditions of uncertainty. This section develops the normative and pedagogical implications of reframing policy action as judgment, focusing on accountability, ethics, and the formation of policy practitioners capable of governing without guarantees.

6.1 Accountability Beyond Compliance

Dominant accountability frameworks in public administration and policy analysis remain deeply procedural. They locate responsibility in rule-following, compliance, performance metrics, and audit trails (Power 1997; Hood 1991; Bovens 2007). These mechanisms serve important functions: they protect against arbitrariness, enable oversight, and create traceability. Yet in complex governance environments, procedural accountability proves insufficient. Decisions may be procedurally sound and yet generate harmful effects over time; conversely, decisions that initially appear unsuccessful may enable institutional learning or social adaptation.

A judgment-oriented framework reframes accountability as an ongoing institutional practice rather than a terminal assessment. Responsibility, in this account, is not exhausted at the point of decision or compliance, but extends across time, attaching to how institutions attend to emerging consequences, revise commitments, and respond to harm (Room 2011; Ansell and Geyer 2017; Bovens, Schillemans, and Goodin 2014).

Accountability becomes less about whether a rule was followed and more about whether institutions remain responsive to the effects they generate. Framed in terms of Responsibility Retention Capacity, this shift can be understood as a movement from accountability as compliance to accountability as sustained answerability. The question is no longer simply whether procedures

were followed, but whether institutions remain capable of recognising, attributing, and responding to the consequences of their actions over time.

This distinction becomes particularly salient in governance settings where responsibility is mediated through complex organisational arrangements or technical systems. Where RRC is low, accountability risks becoming performative: procedures are followed, records are maintained, and metrics are satisfied, yet the capacity to engage substantively with harm remains limited. Where RRC is higher, institutions retain the ability to revisit decisions, acknowledge unintended effects, and adjust practices in response to lived experience.

The normative implication is not that uncertainty can be resolved, but that responsibility must be organised in ways that do not allow it to dissipate in the face of uncertainty. Accountability, in this sense, is not a mechanism external to governance. It is an ongoing institutional accomplishment.

This shift is especially consequential in the context of digital public infrastructure. When decisions are embedded in systems rather than enacted by identifiable officials, accountability is easily displaced onto architectures, protocols, and algorithms (Bovens and Zouridis 2002; Yeung 2018). Harm is experienced by citizens, but agency is attributed to systems. In practice, this often means that a citizen denied welfare encounters not a decision-maker but a chain of interfaces, each formally accountable yet substantively evasive. Appeals become technical procedures rather than political claims. A judgment-oriented approach resists this displacement. It insists that institutional responsibility cannot be delegated to systems, however sophisticated. The more governance is mediated by technical infrastructures, the greater the obligation to sustain human responsibility over time.

6.2 Ethics under Uncertainty

Reframing policy as judgment also foregrounds the ethical dimensions of governing under uncertainty. Where control-oriented frameworks treat uncertainty as a problem to be minimised through better information or refined incentives, a complexity-informed perspective recognises uncertainty as an enduring condition of collective life (Stirling 2010; Sanderson 2009). Acting under such conditions requires not only analytical competence but moral orientation, raising questions of responsibility that cannot be reduced to procedural compliance alone (Arendt 2003).

Policy decisions rarely distribute risk evenly. They often concentrate uncertainty on those with the least capacity to absorb failure: the poor, the marginalised, the digitally excluded, the administratively invisible (Tronto 1993; Eubanks 2018; Masiero and Das 2019). A judgment-oriented ethic therefore demands attentiveness to how risk is allocated, who bears the cost of error, and whose lives are most affected by institutional experimentation. This ethic resonates with traditions of care, pragmatism, and critical policy analysis that emphasise responsibility for unintended effects and the moral weight of institutional design (Flyvbjerg 1998; Fischer 2003; Stone 2012).

In the context of digital governance, this ethical burden becomes particularly acute. When access to rights, services, and recognition is mediated through technical systems, errors do not merely inconvenience; they exclude. They do not merely delay; they deny (Khera 2019; Benjamin 2019).

Under such conditions, the ethical question is not whether systems are efficient, but whether institutions remain capable of recognising harm, admitting error, and revising practices in response to lived experience.

6.3 Policy Education and the Formation of Judgment

The implications of this reorientation extend beyond institutional design and accountability to the formation of policy practitioners themselves. Contemporary policy education remains heavily oriented toward optimisation techniques, cost-benefit analysis, performance management, and institutional design for compliance (Weimer and Vining 2017; Bardach and Patashnik 2019). These skills remain valuable. Yet they are insufficient for preparing practitioners to operate within complex adaptive systems where outcomes cannot be guaranteed and responsibility cannot be deferred.

A pedagogy of judgment would place greater emphasis on historical reasoning, comparative learning, ethical reflection, and the interpretation of feedback over time (Fischer 2003; Stone 2012; Bevir and Rhodes 2006). Students would be trained not only to design policies, but to read institutions: to recognise when stability masks fragility, when failure generates learning, and when intervention risks entrenching harm (Ansell and Geyer 2017; Sanderson 2009). They would be encouraged to cultivate prudence, revisability, and attentiveness to consequence, rather than decisiveness alone.

Such a pedagogy also requires rethinking how success is narrated. Instead of rewarding closure, certainty, and immediate performance gains, it would value responsiveness, institutional learning, and the capacity to remain answerable over time (Room 2011; Bovens et al. 2014). This orientation aligns closely with pragmatist and interpretive traditions, which reject universal solutions in favour of situated problem-solving and continuous critique. Policy judgment, in this sense, is less a technical competence to be mastered than a disposition to be cultivated.

6.4 Reclaiming Responsibility in Complex Governance

Taken together, these traditions have established that uncertainty is not an exception to governance, but one of its defining conditions, a point long anticipated in incrementalist accounts of policymaking (Lindblom 1959). By exposing the limits of prediction and control, it reclaims responsibility as a central, irreducible element of public action. Responsibility, here, is not procedural compliance, but institutional seriousness: the willingness to act without full knowledge, to remain open to revision, and to take responsibility for consequences that unfold over time.

This is not a call for institutional paralysis or moral caution at the expense of action. It is a call for governance that acknowledges its own limits without abdicating responsibility. In complex societies, uncertainty does not reduce the ethical burden of governing. If anything, it sharpens it, because consequences continue long after certainty disappears. The more uncertain the terrain, the greater the obligation to remain attentive, responsive, and accountable.

This section has argued that reframing policy as judgment carries far-reaching implications for accountability, ethics, and policy education. It is to the synthesis of these arguments, and to the broader implications for contemporary governance, that the conclusion now turns.

7. Conclusion: Governing Without Guarantees

This article has argued that the enduring appeal of control in policy theory rests on a misrecognition of the systems within which contemporary governance now operates. Public Choice Theory, for all its analytic strengths, remains anchored in a vision of politics that privileges constraint, predictability, and incentive alignment. Complexity theory exposes the limits of this vision, not by offering a superior set of prescriptions, but by questioning the coherence of prescription itself under conditions of emergence, feedback, and institutional transformation.

Reframing policy as judgment does not imply relativism, abdication, or institutional retreat. It demands greater seriousness about power, knowledge, and responsibility. Judgment recognises that decisions must be made even when outcomes cannot be fully known, and that accountability extends beyond initial intent to encompass evolving effects. It also recognises that learning is not automatic. It must be institutionally cultivated, politically protected, and ethically anchored (Room 2011; Ansell and Geyer 2017).

The analysis of digital public infrastructure demonstrates that these issues are not abstract. When technical systems mediate access to rights, recognition, and state presence, early design choices become durable political settlements. Accountability is redistributed, discretion is reorganised, and citizenship itself is reshaped (Isin and Ruppert 2015; Eubanks 2018; Benjamin 2019). In such contexts, the temptation to promise certainty is understandable. But it is precisely under such conditions that the discipline of judgment becomes indispensable.

For policy education, this implies a shift away from training students to optimise within models and toward preparing them to reason across contexts, attend to unintended consequences, and remain alert to the limits of their own frameworks (Fischer 2003; Stone 2012; Sanderson 2009). For institutional design, it implies constructing governance arrangements capable of absorbing surprise without collapsing into either paralysis or overreach (Ansell and Geyer 2017; Stirling 2010). These are not technical adjustments. They are normative commitments.

What is at stake, therefore, is not simply how well policies perform under uncertain conditions, but whether institutions remain capable of recognising and owning consequences that continue to evolve beyond their original design assumptions.

This article does not offer a new master framework for policy design. Instead, it proposes a reorientation away from the pursuit of certainty and toward a more sustained practice of institutional seriousness. In complex societies, governing well is less about choosing correctly once and more about

remaining answerable over time. That is not a concession to uncertainty. It is the only honest way to govern within it.

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