Panarchy and Planning: Aligning South Africa's Spatial Governance With The Cyclical Nature Of Urban Development In South Africa

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SUMMARY

Cities do not develop in linear trajectories. Across history, urban systems have repeatedly expanded, consolidated, broken down, and renewed themselves. Panarchy theory explains these dynamics through an adaptive cycle comprising growth (r), conservation (K), collapse (Ω), and renewal (α). Resilience thinking further clarifies how systems reorganise following disruption without losing their essential identity.

South Africa's spatial planning system, however, continues to operate predominantly according to administrative time. Five-year Integrated Development Plans (IDPs) and Spatial Development Frameworks (SDFs), Medium-Term Expenditure Frameworks (MTEFs), and electoral cycles structure decision-making, budgeting, and accountability. Developmental processes and demographic change, land-use transitions, infrastructure stress, and ecological feedback unfold on different temporal rhythms. This misalignment produces delayed responses, regulatory rigidity, and repeated planning failure.

This paper advances a national planning approach that governs according to developmental time while remaining accountable to administrative cycles. Three contributions are made. First, Panarchy is translated into a phase-specific planning brief that defines appropriate institutional actions in each adaptive phase. Second, a feedback architecture anchored in the National Spatial Data Observatory (NSDO) is proposed to provide continuous, evidence-based phase diagnostics through integrated spatial, fiscal, and environmental indicators. Third, an institutional elasticity scorecard is introduced to measure adaptive capacity across planning and budgeting systems.

The paper concludes that aligning spatial governance with the temporal logic of urban systems offers a disciplined way to translate theory into routine practice, improve alignment between planning and budgeting, and track outcomes through reproducible indicators.

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1. INTRODUCTION

Cities do not develop along smooth or linear trajectories. Across history, urban systems have expanded, stabilised, declined, and renewed, often repeatedly and unevenly over long-time horizons. Some cities, such as Babylon and Angkor, collapsed and were never reconstituted, while others, including Rome and Kyoto, endured cycles of decline and renewal. These patterns indicate that urban change is fundamentally cyclical rather than progressive. Understanding these cycles is essential for effective spatial governance.

Panarchy theory provides a structured framework for interpreting cyclical urban dynamics. It conceptualises cities as adaptive systems that move through recurring phases of growth (r), conservation (K), collapse (Ω), and reorganisation (α) (Gunderson and Holling 2002). Resilience thinking complements this perspective by explaining how systems absorb disturbance, reorganise, and retain core function across these transitions ((Walker and Salt 2006). Together, these approaches shift attention from static planning outcomes toward the timing, sequencing, and adaptability of governance interventions.

South Africa's spatial planning system, however, remains largely organised around administrative timeframes. Integrated Development Plans, Spatial Development Frameworks, fiscal cycles, and electoral terms operate on fixed schedules that assume institutional stability and predictable progression. Developmental time, by contrast, unfolds through demographic change, economic restructuring, infrastructure decay, and ecological feedback. The resulting misalignment constrains responsiveness, as planning interventions are frequently implemented after system conditions have already shifted (Wüst 2022).

This temporal disconnect is not merely procedural. It contributes directly to spatial inefficiency, institutional rigidity, and repeated cycles of crisis management. Adaptive governance literature emphasises that when institutions fail to adjust to changing system conditions, rigidity accumulates and vulnerability increases (Folke et al. 2005; Pahl-Wostl 2009). In the South African context, this is evident in delayed planning responses, inflexible regulatory systems, and fragmented coordination across spheres of government.

This paper addresses this governance failure by advancing a national planning approach that governs to developmental time while remaining accountable to administrative cycles. It reframes Panarchy as an operational governance framework and demonstrates how phase-sensitive

planning, continuous feedback, and institutional elasticity can be embedded within South Africa's spatial governance system. In doing so, the paper responds directly to the question:

What is your urban area's time, and how should planning respond to it?

2. PANARCHY AS A FRAMEWORK FOR SPATIAL GOVERNANCE

Panarchy provides a governance-relevant framework for understanding how spatial systems evolve over time and how institutions should respond to that evolution. Rather than assuming stability or linear progression, Panarchy conceptualises cities and regions as adaptive systems that move through recurring cycles of growth (r), conservation (K), collapse (Ω), and reorganisation (α) (Gunderson and Holling, 2002). Its value for spatial governance lies in its diagnostic capacity: it enables planners to interpret system conditions and select interventions that are appropriate to timing and phase.

A central insight of Panarchy is that urban systems are nested across scales. Neighbourhoods, municipalities, provinces, and national systems may occupy different phases of the adaptive cycle simultaneously. A rapidly expanding informal settlement may exist within a fiscally distressed municipality, while that municipality is embedded in a relatively stable national framework. This nesting challenges the assumption that uniform planning instruments can be applied coherently across space and scale and helps explain why standardised governance responses frequently underperform.

Conventional spatial planning systems tend to privilege conservation-phase logic. Zoning schemes, development controls, infrastructure standards, and budgeting frameworks are designed to optimise efficiency, predictability, and control. While these instruments are effective under stable conditions, Panarchy shows that prolonged conservation generates rigidity and erodes adaptive capacity, increasing vulnerability to disruption (Allen et al., 2014). In spatial governance, this rigidity manifests as procedural inertia, resistance to land-use change, and delayed institutional response.

Panarchy reframes this condition by emphasising that no phase is inherently desirable or undesirable. Growth phases encourage innovation but may strain infrastructure and governance capacity. Conservation phases provide stability but risk lock-in. Collapse phases release accumulated stress but disrupt service delivery. Reorganisation phases enable innovation but involve uncertainty. Effective spatial governance, therefore, depends on recognising which phase a system is in and applying instruments suited to that phase, rather than attempting to enforce permanent stability.

This reframing shifts the core planning question from *what* should be planned to *when and how* planning should intervene. In Ω-phase conditions, such as municipal financial distress or infrastructure failure, long-term statutory plans and rigid compliance mechanisms are often ineffective. Conversely, deploying emergency or provisional measures in stable r- or K-phase

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contexts can undermine long-term spatial coherence. Panarchy, therefore, legitimises differentiated governance responses across time while maintaining overall system integrity.

Panarchy also provides a non-normative explanation for governance failure. Institutional breakdown does not necessarily indicate incompetence; it may reflect a mismatch between institutional design and system phase. Adaptive governance literature highlights that such mismatches accumulate when rules, procedures, and decision-making structures fail to adjust to changing conditions (Folke et al., 2005). Panarchy clarifies when these mismatches are most likely to emerge, particularly during phase transitions.

From a spatial governance perspective, Panarchy supports differentiated institutional roles. During r-phase expansion, governance should prioritise coordination, flexibility, and phased infrastructure provision. During K-phase consolidation, attention should shift toward regulatory review and institutional recalibration to prevent rigidity. In Ω-phase contexts, planning becomes provisional and stabilising, focused on protecting essential services and enabling transition. During α-phase reorganisation, governance must protect experimentation and enable learning, allowing promising innovations to mature without being suppressed by unreformed regulatory systems.

Finally, Panarchy underscores the importance of continuous feedback. Phase transitions are rarely abrupt or uniform, and without iterative learning, institutions tend to respond too late or with inappropriate instruments. Adaptive governance and multi-level learning frameworks emphasise that responsiveness depends on detecting early signals of change and revising decisions accordingly (Pahl-Wostl, 2009). Panarchy provides the temporal logic that makes such learning actionable within spatial planning practice.

In this way, Panarchy does not replace statutory planning systems but reframes their use. Integrated Development Plans and Spatial Development Frameworks remain necessary tools of coordination and accountability. Their effectiveness, however, depends on their capacity to operate as phase-sensitive instruments supported by feedback and institutional learning. This conceptual grounding establishes the basis for the operational frameworks developed in the following section.

3. SUPPORTING FRAMEWORKS FOR OPERATIONALISING PANARCHY

This paper does not advance multiple competing theoretical frameworks. Complex Adaptive Systems theory and resilience thinking constitute the primary explanatory foundations of the analysis. Panarchy is employed as the temporal structuring device through which these foundations are translated into spatial governance logic. The additional frameworks referenced in this section are applied selectively as diagnostic, normative, or operational instruments where they directly support phase identification, institutional adjustment, innovation management, or decision-making under uncertainty. Their purpose is not to expand the theoretical scope of the paper, but to enable the practical application of Panarchy within planning and governance systems.

3.1 Complex Adaptive Systems and the Adaptive Cycle (Primary Foundation)

Panarchy is grounded in Complex Adaptive Systems (CAS) theory, which explains why urban and spatial systems cannot be governed through linear, command-and-control planning approaches. Cities comprise interacting agents—households, firms, institutions, and infrastructures—whose cumulative behaviours generate emergent spatial patterns that are not directly predictable or centrally controllable (Holland, 1995; Levin, 1999). Governance outcomes therefore arise from interaction, feedback, and adaptation rather than administrative design.

The Adaptive Cycle provides the temporal structure through which these dynamics can be interpreted. Systems move through phases of growth (r), conservation (K), collapse (Ω), and reorganisation (α), each characterised by distinct configurations of resources, institutional rigidity, and adaptive capacity (Holling, 2001). In spatial planning contexts, these phases are observable through patterns such as rapid land conversion during growth phases, procedural rigidity and lock-in during conservation, infrastructure or service failure during collapse, and policy experimentation during reorganisation.

Together, CAS and Adaptive Cycle theory establish the central premise of this paper: planning systems must be governed according to their systemic phase rather than institutional calendars or administrative cycles (Holling, 2001). Phase identification is therefore the analytical starting point for adaptive spatial governance.

3.2 Resilience Thinking and Transformative Adaptation (Primary Decision Logic)

Resilience thinking provides the strategic decision logic that follows phase recognition. It clarifies whether governance responses should aim to stabilise existing systems, adapt them incrementally, or pursue deliberate transformation. Walker et al. (2004) distinguish between adaptability, defined as adjustment within existing structures, and transformability, which becomes necessary when those structures are no longer viable. This distinction is further elaborated by Walker and Salt (2006) in the context of social–ecological governance.

Within a Panarchial framework, this distinction is critical. Attempts to restore conservation-phase stability during Ω-phase collapse often entrench failure rather than resolve it (Walker et al., 2004). Conversely, premature transformation during growth or conservation phases can destabilise otherwise functional systems.

Transformative adaptation is therefore treated not as a separate theory, but as an extension of resilience thinking that provides criteria for recognising when incremental reform is insufficient. Ziervogel (2019) and the IPCC Sixth Assessment Report (IPCC, 2022) demonstrate that compounding risk, inequality, and ecological stress may require fundamental institutional and spatial reconfiguration. Within Panarchy-informed governance, collapse is reframed as a potential opening for structural realignment once critical thresholds have been crossed.

3.3 Institutional Fit as a Resilience Property (SES and IAD as Diagnostic Tools)

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While CAS and resilience explain system behaviour and response strategy, governance effectiveness depends on institutional fit. The Social–Ecological Systems (SES) framework is used diagnostically to examine whether institutional rules, authority, and scale align with system dynamics (Ostrom, 2009). Misalignment reinforces rigidity during conservation phases and accelerates failure during collapse.

The Institutional Analysis and Development (IAD) framework complements this diagnosis by providing structured methods for examining how institutional rules persist beyond their functional relevance and how decision arenas may be recalibrated (Ostrom, 2009). Within this paper, SES and IAD are not treated as independent theoretical positions, but as analytical instruments that support resilience-oriented institutional adjustment.

Rather than advocating wholesale institutional redesign, this combined approach supports targeted recalibration—adjusting rules, procedures, and governance arrangements to restore adaptability while preserving necessary stability.

3.4 Innovation, Scaling, and Uncertainty Management (Operational Extensions)

Innovation and learning are central to α-phase reorganisation, yet are frequently suppressed by dominant conservation-phase regimes. Strategic Niche Management (SNM) is applied as an operational tool to explain how protected spaces—such as pilot projects, temporary regulatory exemptions, and experimental planning instruments—allow innovation to emerge without being prematurely overridden (Rip and Kemp, 1998).

The Multi-Level Perspective (MLP) complements this by explaining how niche innovations may scale into dominant regimes through interactions between niches, regimes, and broader landscape pressures (Geels and Schot, 2007). Within Panarchy, MLP clarifies how α-phase experimentation transitions into renewed growth once rigidity is disrupted.

Decision-making during Ω- and α-phase conditions is inherently uncertain. Scenario planning is therefore applied as a governance support tool that enables institutions to explore multiple plausible futures rather than rely on predictive certainty (Ilbury and Sunter, 2001; UNEP, 2019). This strengthens preparedness and adaptive capacity during periods of instability.

3.5 Normative Constraints on Adaptation

Doughnut Economics is applied as a normative constraint rather than a governing theory. Raworth (2017) defines a social foundation below which human needs are unmet and an ecological ceiling beyond which environmental limits are breached. Within a Panarchial framework, these boundaries inform decisions about when growth should be moderated, when conservation should be reconsidered, and when reorganisation must explicitly prioritise equity and ecological integrity.

3.6 Integrated Synthesis

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Section 3 establishes a disciplined theoretical hierarchy. Complex Adaptive Systems theory and resilience thinking provide the primary explanatory foundations. Panarchy supplies the temporal logic through which these foundations are operationalised for spatial governance. SES, IAD, SNM, MLP, scenario planning, and Doughnut Economics function as supporting instruments that enable diagnosis, adjustment, innovation, and accountability across adaptive phases.

4. APPLICATION TO THE SOUTH AFRICAN SPATIAL ENVIRONMENT

Panarchy enables South Africa's spatial environment to be interpreted in terms of system phases rather than administrative status. Different parts of the spatial system occupy different positions within the adaptive cycle simultaneously. Rapid peri-urban expansion, consolidated metropolitan cores, municipal collapse, and localised innovation coexist across the country. A phase-aware planning approach is therefore essential if governance responses are to be timely, proportionate, and effective.

South Africa's spatial challenges are shaped by structural inequality, uneven infrastructure investment, institutional fragmentation, and exposure to economic and environmental shocks. These dynamics do not unfold uniformly. Applying Panarchy allows planning to respond to these differentiated conditions without relying on a single, static planning logic.

4.1 r-Phase: Accumulation and Expansion

The r-phase is characterised by rapid growth, innovation, and resource mobilisation. In South Africa, r-phase dynamics are most evident in peri-urban expansion zones, informal settlement growth areas, and development corridors linked to infrastructure investment. These areas experience accelerated land conversion and population inflows, often ahead of formal planning and service provision.

In r-phase contexts, the primary planning role is enabling rather than controlling. Overly prescriptive regulation at this stage frequently exacerbates informality and constrains adaptive capacity (Gunderson & Holling, 2002; Nel and Denoon-Stevens 2023). Planning instruments should therefore prioritise flexibility, coordination, and phased development.

Phase-appropriate planning actions include flexible land-use management, incremental formalisation, phased infrastructure provision, and early cross-sector coordination. Premature consolidation through rigid zoning or long-term infrastructure commitments risks locking in suboptimal spatial forms that are difficult to adapt later.

4.2 K-Phase: Conservation and Rigidity

The K-phase reflects consolidation, stability, and increasing rigidity. In South Africa, this phase is most visible in established metropolitan cores, legacy zoning regimes, and entrenched institutional

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procedures. Planning systems in these contexts prioritise efficiency, predictability, and control through detailed regulation and standardised processes.

While conservation-phase stability supports orderly development, prolonged rigidity reduces adaptive capacity and increases vulnerability to disruption (Gunderson and Holling, 2002). This rigidity is evident in slow development approvals, resistance to land-use change, and inflexible service standards that no longer reflect socio-economic realities (Glaeser 2017). The appropriate planning role during the K-phase is institutional recalibration. Regulatory review, procedural reform, and the introduction of adaptive clauses within planning instruments are necessary to prevent lock-in and reduce the likelihood of abrupt collapse.

4.3 Ω-Phase: Release and Collapse

The Ω-phase represents system breakdown and the release of accumulated stress. In South Africa, this phase is evident in municipalities experiencing financial distress, infrastructure failure, and service delivery collapse. Under such conditions, conventional long-term planning instruments are often ineffective or counterproductive.

Panarchy reframes collapse as a system condition rather than an anomaly. The governance task during Ω-phase is stabilisation and transition management, not the restoration of previous system configurations at all costs. Planning becomes provisional, time-bound, and focused on protecting essential services.

Phase-appropriate actions include scenario planning to manage uncertainty (UNEP, 2019), temporary regulatory flexibility, prioritisation of critical infrastructure, and coordination across spheres of government. Resilience thinking is essential in determining whether stabilisation or deeper transformation is required (Walker et al., 2004).

4.4 A-Phase: Reorganisation and Innovation

The α-phase is characterised by experimentation, learning, and institutional reconfiguration. In South Africa, this phase is visible in pilot projects, community-led initiatives, informal settlement upgrading, and experimental governance arrangements.

These innovations are fragile and often suppressed by unreformed conservation-phase regulatory systems. The planning role during α-phase is therefore enabling and protective. Strategic Niche Management provides mechanisms for shielding innovation while learning outcomes are assessed (Rip and Kemp, 1998).

Phase-appropriate actions include temporary regulatory overlays, adaptive permitting, structured monitoring, and explicit learning objectives linked to scaling decisions. The Multi-Level Perspective explains how successful niche innovations can transition into mainstream practice once system conditions allow (Geels and Schot, 2007).

4.5 Synthesis

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Applying Panarchy to the South African spatial environment demonstrates that planning effectiveness depends on alignment between governance instruments and system phases. r-phase contexts require enabling coordination, K-phase systems demand recalibration, Ω-phase conditions call for stabilisation and transition, and α-phase environments depend on protected experimentation.

These phases coexist across space and scale. A phase-blind planning system cannot respond effectively to such complexity. Panarchy, therefore, provides a coherent logic for differentiated spatial governance that remains accountable while responsive to developmental time. This phase-specific application completes the first core contribution of the paper and prepares the ground for the institutional mechanisms and feedback systems outlined in the following section.

5. INSTITUTIONAL MECHANISMS, FEEDBACK ARCHITECTURE, AND MEASUREMENT

Sections 1 to 4 established that effective spatial governance depends on aligning planning instruments with the developmental phase of urban systems. To move from phase awareness to routine practice, Panarchy must be embedded within institutional mechanisms that enable continuous feedback, learning, and adjustment. This section operationalises that requirement by specifying a feedback architecture anchored in the National Spatial Data Observatory (NSDO) and introducing an institutional elasticity scorecard to measure adaptive performance across cycles.

5.1 Continuous Feedback in Phase-Sensitive Governance

Panarchy is inherently dynamic. Systems do not remain fixed within a single phase, nor do transitions occur predictably. Adaptive governance, therefore, depends on iterative feedback and the capacity to revise decisions as conditions change (Folke et al. 2005). Planning instruments that are phase-aware only at the point of adoption quickly lose relevance if not supported by ongoing monitoring and learning (Pahl-Wostl, 2009).

In In South Africa, feedback across spatial, fiscal, and service-delivery systems remains fragmented and, in some cases, effectively absent. Where feedback does exist, it is frequently displaced by political contestation rather than system learning, with decision-making shaped by competing institutional interests instead of empirical signals. Formal accountability mechanisms, such as audit outcomes and performance reports, are often delivered long after underlying conditions have shifted, delaying the detection of early phase-transition signals including accelerating informalisation, infrastructure stress, and fiscal exposure. As a result, institutional responses tend to be reactive, retrospective, and poorly aligned with the temporal dynamics of urban systems.

5.2 NSDO-Anchored Feedback Architecture

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The NSDO provides an institutional platform capable of integrating spatial, environmental, and administrative data into a coherent feedback system. Anchoring Panarchy-based feedback within the NSDO establishes a shared evidentiary baseline across planning and budgeting functions and enables temporal analysis of change rather than reliance on static indicators.

Operationally, the feedback architecture centres on **monthly phase-signal dashboards** that complement statutory reporting cycles. These dashboards integrate:

– Land-use and settlement change
– Infrastructure and service stress indicators
– Climate and environmental anomalies
– Fiscal exposure and expenditure patterns

Together, these data streams support timely diagnosis of consolidation, destabilisation, or reorganisation and inform adjustments to spatial plans and programme pipelines.

5.3 Embedding Feedback in Planning and Budgeting

For feedback to influence governance outcomes, it must be institutionally embedded. NSDO-derived phase diagnostics are designed to inform Integrated Development Plan and Spatial Development Framework reviews, allowing differentiated emphasis rather than uniform compliance. At the national level, such diagnostics can support limited mid-cycle fiscal adjustments that are consistent with adaptive governance principles (Meadowcroft, 2011).

Quarterly interdepartmental adaptive-learning sessions consolidate evidence, reflect on phase transitions, and translate lessons into coordinated action. Structured learning processes of this kind are central to building institutional resilience over time (Olsson, Folke, and Berkes 2004).

5.4 Measuring Institutional Elasticity

Adaptive governance also requires the capacity to act on new information. The **institutional elasticity scorecard** provides a compact means of assessing whether planning and budgeting systems can adjust across Panarchy phases. Drawing on resilience thinking (Walker et al., 2006), elasticity is understood as an institutional property rather than an ad hoc response.

The scorecard comprises four indicators:

1. Integrated Development Plan Amendment Lag – measuring responsiveness to detected system change.
2. Fiscal Elasticity Ratio – capturing the extent of within-cycle budget reallocation (Meadowcroft, 2011).
3. Service Continuity Resilience Score – assessing the ability to maintain essential services during stress (Walker et al., 2004).
4. Spatial Reinvestment Rate – derived from NSDO data to indicate successful post-collapse renewal.

Published annually, these indicators embed adaptive accountability without creating new reporting burdens.

5.5 Closing the Learning Loop

To prevent learning from remaining episodic, the framework incorporates an annual learning audit that consolidates NSDO feedback, elasticity metrics, and institutional reflection. Rather than assessing performance against static targets, the audit evaluates whether governance responses were appropriate to the relevant system phase and whether alignment improved over time. Feeding these insights into subsequent planning and budgeting cycles ensures that governance evolves through reflection rather than reaction (Olsson et al., 2006).

5.6 Synthesis

The NSDO-anchored feedback architecture and institutional elasticity scorecard complete the Panarchy-informed planning approach outlined in the abstract. Phase-sensitive planning identifies appropriate responses, feedback reveals when conditions change, and elasticity measures indicate whether institutions can respond effectively. Together, these mechanisms enable spatial governance that remains accountable while operating in alignment with developmental time.

6. CONCLUSION

This paper set out to address a persistent failure in spatial governance: the misalignment between how cities change and how institutions plan. Urban systems evolve through cycles of expansion, consolidation, breakdown, and renewal. Yet planning and budgeting frameworks in South Africa remain largely structured around administrative time, five-year plans, fiscal calendars, and electoral terms, rather than the developmental time of cities themselves. The consequence is a planning system that is frequently out of phase with the conditions it seeks to govern.

By reframing Panarchy as a governance framework rather than a descriptive ecological metaphor, the paper demonstrates how spatial planning can be aligned with the cyclical nature of urban development. Panarchy's adaptive cycle, growth (r), conservation (K), collapse (Ω), and reorganisation (α), offers a disciplined way to diagnose system state, anticipate transition, and select phase-appropriate planning responses (Gunderson and Holling, 2002). When reinforced by resilience thinking, the framework clarifies whether governance should prioritise stabilisation, adaptation, or transformation in the face of disturbance (Walker et al., 2004; Walker and Salt 2006).

The paper makes three substantive contributions. First, it translates Panarchy into a phase-specific planning brief for the South African spatial environment. This brief demonstrates that effective planning is not achieved through uniform instruments, but through differentiated governance postures aligned to system phase: enabling coordination during r-phase expansion, institutional recalibration during K-phase rigidity, stabilisation and transition management during Ω-phase

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collapse, and protection of innovation during α-phase reorganisation. Recognising that these phases coexist across space and scale is essential for managing the complexity of South Africa's spatial landscape.

Second, the paper proposes a feedback architecture anchored in the National Spatial Data Observatory to support continuous phase diagnosis and timely adjustment. By integrating spatial change, infrastructure stress, climate signals, and fiscal exposure, the NSDO provides an evidentiary backbone for adaptive governance. Monthly phase-signal dashboards, embedded within existing planning and budgeting processes, will enable institutions to detect emerging transitions rather than respond only after failure has occurred. This approach will operationalise the adaptive governance principles emphasised by Folke et al. (2005) and Pahl-Wostl (2009) while remaining compatible with statutory accountability requirements.

Third, the paper introduces an institutional elasticity scorecard to measure adaptive capacity across cycles. The four indicators, IDP Amendment Lag, Fiscal Elasticity Ratio, Service Continuity Resilience Score, and Spatial Reinvestment Rate, provide a compact and reproducible means of assessing whether institutions can act on new information without losing core functions. By embedding these measures within annual reporting and learning audits, adaptability will become an explicit object of governance rather than an implicit aspiration.

Taken together, these contributions demonstrate that governing to developmental time does not require abandoning administrative cycles. Instead, it requires recalibrating how planning and budgeting instruments are interpreted and used. Phase awareness, continuous feedback, and institutional elasticity allow existing systems to function more intelligently within conditions of uncertainty and change. In this sense, resilience becomes a property of the governance system itself rather than a rhetorical policy goal.

The implications for South Africa's spatial governance are significant. Panarchy-informed planning provides a coherent framework for managing growth pressures, preventing institutional lock-in, navigating periods of collapse, and enabling renewal without defaulting to crisis-driven improvisation. It offers a way to align national vision, provincial coordination, and local action with the lived temporal realities of cities and regions.

Ultimately, cities move in their system's rhythm. Governance endures only when it learns to move with that rhythm rather than against it. By institutionalising phase-sensitive planning, evidence-based feedback, and adaptive accountability, Panarchy provides a disciplined pathway for translating theory into routine practice and for aligning spatial governance with the real dynamics of urban change. Because Panarchy includes the stability of spatially larger systems and accepts the more rapid change in smaller systems, using it as a governance framework will also enable the entire system to be better managed.

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8. BIOGRAPHICAL NOTES

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