National Spatial Governance for the National Spatial Development Framework (NSDF) and National Spatial Data Observatory (NSDO): Sector Analytics for Security, Climate, and Social Outcomes in South Africa (Post-2025)

Mr. Rajesh MAKAN and Mr. Clinton HEIMANN – South Africa

KEYWORDS
National Spatial Development Framework (NSDF); National Spatial Data Observatory (NSDO); Spatial governance; Authoritative spatial data; Planning–budget alignment; Spatial analytics;
Public sector performance

SUMMARY
This paper proposes a national spatial governance operating model that integrates the National Spatial Development Framework (NSDF) and the National Spatial Data Observatory (NSDO) into a single policy–data–performance system for South Africa from 2025. It argues that spatial transformation will remain fragmented unless the NSDF functions as an operative, strategic national spatial reference and the NSDO is positioned as the authoritative spatial intelligence capability embedded within routine planning, budgeting, and performance cycles of government.
The model is explicitly practical and measurable. The NSDF provides a consistent national spatial logic for spatial targeting, while the NSDO supplies a certified catalogue of authoritative spatial layers, sector analytics, and a compact spatial performance scorecard that reports outcomes to the executive on defined annual and budget-cycle reporting schedules. The proposed governance architecture comprises four components: policy alignment through consistent application of NSDF spatial logic across sectors and spheres; data custodianship via an NSDO-managed catalogue of authoritative layers with defined standards, custodians, and update cycles; planning–budget linkage through spatial screening at defined decision gates within annual planning, the Medium-Term Development Plan (MTDP), and the Medium-Term Expenditure Framework (MTEF); and results management through spatially explicit performance reporting.
The paper elevates sector analytics as the delivery engine of spatial governance and demonstrates how security and public safety, climate and environmental resilience, and social and human development outcomes can be systematically embedded within national decision-making rather than treated as thematic overlays. A minimum viable analytics stack, defined deliverables, and clear institutional accountability arrangements are specified to establish baseline alignment, strengthen auditability, and link public expenditure to measurable spatial outcomes within existing fiscal and administrative control systems.

National Spatial Governance for the National Spatial Development Framework (NSDF) and National Spatial Data Observatory (NSDO): Sector Analytics for Security, Climate, and Social Outcomes in South Africa (Post-2025)

Mr. Rajesh MAKAN and Mr. Clinton HEIMANN – South Africa

1. INTRODUCTION

South Africa's spatial transformation agenda has, since 1994, been marked by progressive policy intent alongside persistent implementation fragmentation. The adoption of the National Spatial Development Framework (NSDF) in 2022 establishes a national spatial policy with a long-term horizon, a theory of change, and explicit national spatial outcomes, sub-frames, and National Spatial Action Areas (NSAAs) that concentrate attention on strategic spaces (DLRRD, 2022). Despite the development of various instruments, the practical challenge remains that spatial planning often operates as a reference document rather than an operative system that routinely shapes infrastructure programming, budget prioritisation, and performance reporting. In parallel, the governance of spatial data remains uneven across custodians, systems, and standards, limiting auditability and the capacity to measure progress consistently.

The Concept Note on the National Spatial Data Observatory (NSDO) makes this problem explicit: policy incoherence and siloed planning continue to undermine developmental outcomes, while disjointed data systems impede monitoring, evaluation, and coherent spatial targeting, despite sustained public expenditure (DLRRD, 2025a). The NSDO is accordingly envisaged as a national capability to enable integrated spatial planning, evidence-based decision-making, and improved coordination across spheres of government, aligned to national priorities and fiscal frameworks (DLRRD, 2025a). The central argument advanced in this paper is that the NSDF and NSDO should be operationalised as a single ***policy–data–performance*** system post-2025, where one national spatial reference guides priorities, one catalogue of authoritative layers supports decisions, and one results scorecard reports outcomes within fixed cycles.

In practical terms, this fragmentation results in capital investments by the state that are spatially misaligned, sector programmes that operate in parallel rather than in combination, and performance reporting that cannot be audited spatially across planning and budget cycles. The absence of a single national spatial reference and an authoritative spatial data system weakens executive oversight, limits the ability to assess value-for-money, and constrains the state's capacity to demonstrate progress toward spatial justice, resilience, and equitable service delivery. The formalisation of the NSDO therefore represents a narrow but decisive post-2025 institutional window to address this systemic failure.

2. NATIONAL SPATIAL GOVERNANCE AS AN OPERATING LOGIC: FROM FRAMEWORKS TO DELIVERY

The following section shows how this operating logic is institutionalised. National spatial governance is not framed in this paper as an additional planning layer but as an operating logic

that binds spatial policy intent, spatial evidence, and institutional decision-cycles into a coherent system. The NSDF already provides the normative content required for such a system; including national spatial outcomes, national spatial development levers, and sub-frames that give investment guidance for connectivity, nodes and corridors, movement infrastructure, ecological infrastructure, and resource economy regions, with NSAAs as focal action spaces (DLRRD, 2022). What is missing is a consistently executed governance mechanism that translates the NSDF's spatial logic into auditable decisions within the annual planning and budgeting machinery of the state.

The European Union's INSPIRE Directive illustrates that spatial coherence at scale requires more than datasets; it requires a legally grounded infrastructure of spatial information with interoperability rules, shared services, and a defined scope of thematic data priorities across member states (European Commission, 2007; INSPIRE Knowledge Base, n.d.). INSPIRE's emphasis on interoperability and the ability to combine datasets and services across jurisdictions reinforces a core principle for the South African context: without authoritative layers, common standards, and repeatable services, "alignment" is largely rhetorical. Similarly, the United Nations Integrated Geospatial Information Framework (UN-IGIF) positions geospatial information management as a national governance capability, aimed at integrating, strengthening, and maximising geospatial information for public decision-making and implementation (UN-GGIM, n.d.). In this framing, the NSDO is not simply a repository, but a delivery capability that must be embedded into institutional pathways and business processes.

In this sense, national spatial governance functions not only as a mechanism for aligning policy, data, and institutional decision-cycles, but also as the means through which national development priorities are translated into territorially grounded and executable action.

3. INTEGRATING THE NSDF AND NSDO: ONE SYSTEM, NOT TWO INSTRUMENTS

Although the NSDF and NSDO are frequently described as complementary, the core proposition of this paper is that they should be treated as functionally inseparable. The NSDF defines the national spatial logic and the spatial prioritisation architecture (DLRRD, 2022). The NSDO concept note positions the observatory as the state's national spatial intelligence function, including the spatialisation of NSDF priorities, project mapping and tracking, integration of live datasets (demographic updates, land-use changes, and climate-related data), and scenario planning using advanced methods such as digital twins (DLRRD, 2025a; DLRRD, 2025b).

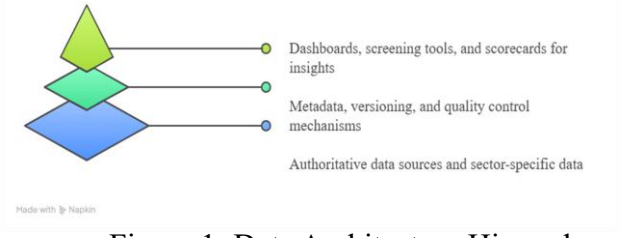

Figure 1: Data Architecture Hierarchy

In practical terms, this means the NSDO becomes the mechanism through which NSDF intent is executed, tested, and updated over time. This approach aligns with the United States FGDC articulation of the National Spatial Data Infrastructure (NSDI) "Framework", which emphasises that an NSDI is not only data, but also the procedures, technology, and institutional relationships that reduce duplication, improve decision-making, and facilitate consistent use of geographic information (FGDC, n.d.-a).

The FGDC's further emphasis on authoritative national geospatial data assets as complete, accurate, current, and standards-compliant, which directly reinforces the NSDO's proposed authoritative layers and quality gates (FGDC, n.d.-b; DLRRD, 2025a). The point is simple; without custodianship, standards, and updates, comparisons across cycles are contestable, and performance narratives remain politically malleable.

4. THE NATIONAL SPATIAL GOVERNANCE ARCHITECTURE: FOUR COMPONENTS THAT MAKE THE SYSTEM EXECUTABLE

Building on the premise that the NSDF and NSDO operate as a single policy–data–performance system, this section specifies the governance components required to make that system executable within state decision-making. The focus is not on restating the rationale for integration, but on defining the institutional mechanisms through which spatial intent becomes auditable action.

First, policy alignment is treated as a national spatial reference system rather than a periodic planning event. The NSDF provides a coherent national spatial logic, including settlement typologies, connectivity priorities, ecological infrastructure, and a targeted approach through NSAAs (DLRRD, 2022). In this model, sector plans and municipal SDFs do not merely "note" the NSDF; they apply it as the reference for spatial screening and programme placement.

Second, data custodianship is structured through the NSDO as a catalogue of authoritative layers with named custodians, quality thresholds, lineage, versioning, and update cadences (DLRRD, 2025a). This component is the precondition for auditable comparisons across time and across institutions. The NSDO's stated principles of leveraging existing initiatives, collaboration, open access, coherence, capacity building, accountability, innovation, and inclusive engagement are not presented as aspirations, but as governing rules for how spatial data becomes trusted evidence in the national system (DLRRD, 2025a).

Third, the planning–budget linkage is operationalised through spatial screening rules. The NSDF logic is embedded into annual performance planning and the MTDP / MTEF such that capital bids and programme frameworks are tested for spatial fit before allocation. This emphasis resonates strongly with OECD infrastructure governance guidance, which argues that robust governance frameworks align infrastructure planning, decision-making and implementation with policy objectives and value-for-money, and that strategic infrastructure planning should be linked to explicit funding envelopes to ensure implementation discipline (OECD, 2023a; OECD, 2023b). In the South African context, this component is crucial because spatial plans without budget alignment remain advisory, while budgets without spatial screening reproduce fragmentation.

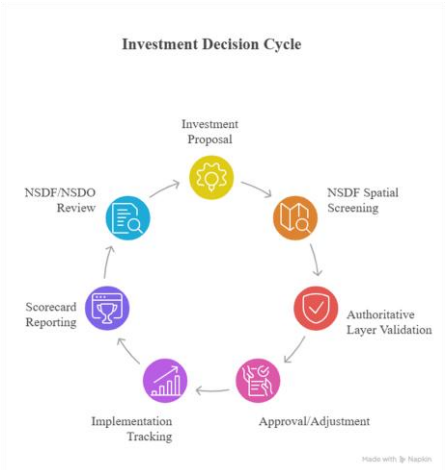

Figure 2: Investment Decision Cycle Governance Operating System

Fourth, results management is strengthened through a spatial scorecard designed for executive oversight. The scorecard tracks NSDF application coverage by sector, data currency and completeness, decision-cycle turnaround times, and the share of expenditure mapped to NSDF priorities. This is consistent with the NSDO's stated role of tracking progress and enabling evidence-based decisions across government (DLRRD, 2025a), and it reflects international evidence that digital government transformation is strengthened when SDIs are positioned as enabling infrastructure for cross-sector public administration, rather than as stand-alone technical platforms (Barbero et al., 2019).

4.1 Embedding the NSDF-NSDO System in Statutory Planning and Budget Decision Gates

For the proposed NSDF–NSDO framework to function as an operational system rather than a conceptual model, it must be embedded at defined decision points within existing government planning, budgeting, and implementation processes. The spatial operating system is therefore designed to intervene at a limited number of high-leverage decision gates where spatial alignment materially affects outcomes, rather than creating parallel approval structures.

The minimum set of decision gates through which the NSDF–NSDO system is operationalised is as follows:

First, capital project initiation and concept approval: At project inception, proposed capital and major programme initiatives are spatially screened against NSDF spatial logic using NSDO-certified authoritative layers. This screening confirms alignment with national spatial priorities, settlement typologies, connectivity frameworks, ecological infrastructure, and National Spatial Action Areas before projects advance into formal planning and costing.

Second, Medium-Term Expenditure Framework (MTEF) technical evaluation: During MTEF bid assessment, NSDO analytics are applied to evaluate spatial need, infrastructure exposure, climate risk, service access deficits, and overlap with existing public investment. These analytics inform the technical scoring of bids prior to fiscal recommendation, strengthening value-for-money assessment and reducing spatial duplication.

Third, Annual Performance Plan (APP) formulation: Programme outputs and targets are spatially validated using NSDO indicators to ensure that planned delivery corresponds to

identified spatial priorities, service backlogs, and development pressures. This step anchors spatial intent within routine departmental performance planning.

Fourth, Integrated Development Plan (IDP) and Spatial Development Framework (SDF) review cycles: Municipal planning instruments draw on NSDO-derived spatial diagnostics to adjust priorities in response to observed spatial change, rather than relying solely on static five-year planning assumptions. This enables adaptive spatial governance across spheres.

Fifth, mid-year performance assessment: NSDO dashboards provide early warning signals on spatial misalignment, service stress, or emerging environmental and infrastructure risks, enabling corrective action within the financial year rather than retrospective adjustment.

Sixth, adjustment budget processes: Spatial exposure and performance evidence produced by the NSDO informs reallocation decisions during adjustment budgets, ensuring that fiscal corrections respond to spatially verified conditions rather than anecdotal or sector-specific pressures.

Seventh, procurement pipeline sequencing: Infrastructure and service delivery procurement is sequenced using NSDO analytics to prioritise interventions where spatial demand, risk, or opportunity is most acute, improving delivery efficiency and risk management.

By anchoring the spatial operating system at these decision gates, spatial alignment is enforced through existing statutory planning, fiscal, and accountability mechanisms. This ensures that the NSDF–NSDO system strengthens routine governance processes rather than operating as a discretionary or advisory overlay.

4.2 National Spatial Performance Scorecard for Executive Oversight and Fiscal Accountability

To translate spatial alignment from policy intent into measurable performance, the NSDF–NSDO operating system is supported by a compact national spatial performance scorecard. The scorecard is not intended to be exhaustive. Its purpose is to provide a small set of authoritative, repeatable indicators that enable executive oversight and allow decision-makers to assess whether planning, budgeting, and implementation are spatially aligned over time.

Indicators included in the scorecard are required to meet four criteria: they must be spatially explicit, derived from authoritative datasets, capable of regular update, and directly linked to policy and investment decisions. Together, they provide a system-level view of spatial performance rather than a project-by-project compliance assessment.

Table 1: Proposed NSDF–NSDO Spatial Performance Scorecard (Minimum Set)

Indicator	*Definition*	*Method / Measure*	*Custodian*	*Update Cycle*	*Reporting Scale*
***Spatial** Investment Alignment Index*	Degree to which public capital investment aligns with NSDF spatial priority areas	Ratio of capital expenditure inside NSDF priority zones to total capital expenditure	National Treasury / DLRRD	Annual	National, Provincial
Infrastructure Exposure Risk Score	Level of infrastructure exposure to climate, environmental, and settlement pressure	Overlay of infrastructure networks with hazard, settlement growth, and climate anomaly layers	DLRRD (NSDO)	Quarterly	National, District
Service Access Deficit Index	Spatial concentration of households lacking	Composite index of service access	DLRRD / Sector custodians	Annual	District, Municipal

Indicator	*Definition*	*Method / Measure*	*Custodian*	*Update Cycle*	*Reporting Scale*
	access to basic services	indicators mapped spatially			
Spatial Development Pressure Index	Rate and intensity of land-use and settlement change	Change detection analysis of land-use and settlement layers	DLRRD (NSDO)	Quarterly	District, Municipal
Spatial Reinvestment Ratio	Level of reinvestment in previously underperforming or distressed areas	Public investment trends in areas previously identified as high-risk or low-performance	National Treasury / DLRRD	Annual	District

The spatial performance scorecard is reviewed on a fixed annual cycle and referenced explicitly at key decision gates, including MTEF evaluation, adjustment budget processes, and IDP and SDF reviews. Its role is not to replace existing performance frameworks, but to introduce a consistent spatial evidence layer that informs prioritisation, sequencing, and corrective action.

5. SECTOR ANALYTICS AS THE DELIVERY ENGINE OF NATIONAL SPATIAL GOVERNANCE

5.1 Sector Analytics and Implementation Coherence

The paper elevates sector analytics on the premise that implementation coherence is ultimately secured through repeated, sector-specific decisions rather than through spatial plans alone. The NSDO documentation already foregrounds the importance of integrating real-time and thematic datasets and tracking projects within National Spatial Action Areas (NSAAs) (DLRRD, 2025a; DLRRD, 2025b). This paper extends that logic by demonstrating how three governance domain, namely security and public safety, climate and environmental resilience, and social and human development can be structurally embedded within national spatial governance systems, rather than treated as peripheral or thematic overlays.

By positioning sector analytics as a routine governance function, the NSDF–NSDO operating system enables spatial intelligence to shape day-to-day planning, budgeting, and investment decisions across government. In this framing, analytics are not an adjunct to planning, but the primary mechanism through which spatial intent is translated into delivery.

5.2 Security and Public Safety as a Spatial Governance Domain

In the security and public safety domain, the operational emphasis is on rendering safety measurable in spatial terms. This includes the spatial analysis of crime and disorder hotspots, built-form risk factors, and police and emergency response-time isochrones; the identification of safety buffers around social infrastructure such as schools and clinics; and the assessment of the resilience of critical facilities as part of spatial risk management. The objective is not to securitise spatial planning, but to enable evidence-driven service design, informing station location planning, patrol zoning, and the prioritisation of safety-related capital investments.

Such analytics depend on authoritative spatial layers and consistent update routines, conditions that the NSDO is explicitly designed to provide (DLRRD, 2025a). Internationally, the interoperability principle embedded in the INSPIRE Directive reinforces the necessity of standardised, combinable datasets: where safety analytics cannot be integrated with transport networks, settlement patterns, and social facility locations, response-time optimisation and risk

mitigation logic become institutionally siloed and difficult to govern (European Commission, 2007; INSPIRE Knowledge Base, n.d.).

5.3 Climate and Environmental Resilience as a Spatial Intelligence Function

In the climate and environmental resilience domain, the NSDF already positions ecological infrastructure and climate considerations as central determinants of national spatial development, particularly in relation to environmental limits and systemic vulnerability (DLRRD, 2022). The NSDO operationalises this intent through the integration of climate-related spatial datasets and scenario-planning capabilities (DLRRD, 2025a).

In governance terms, this enables coastal and riverine hazard exposure mapping, heat-stress surfaces, wildfire interfaces, and ecosystem condition and connectivity indicators to be incorporated into settlement controls, infrastructure risk pipelines, restoration targeting, and climate-budget tagging. The United Nations Integrated Geospatial Information Framework (UN-IGIF) provides a directly aligned international reference point, framing geospatial information management as a strategic foundation for integrating spatial intelligence across sectors in support of policy formulation, decision-making, and sustainable development outcomes (UN-GGIM, n.d.). The implication is that climate governance does not operate as a parallel system, but as a spatial intelligence function embedded within the same executive reporting, planning, and budget screening cycles.

5.4 Social and Human Development: Access, Equity, and Spatial Justice

In the social and human development domain, the governance focus is on access, equity, and spatial justice. The NSDF incorporates a national spatial social service provisioning model and explicitly foregrounds equitable access to social services as a core element of spatial transformation (DLRRD, 2022). A post-2025 NSDF–NSDO system operationalises this objective through the generation of access surfaces to clinics, schools, early childhood development centres, social grant service points, and public transport nodes, alongside the spatial tracking of inequalities by income, gender, and location.

Critically, these analytics become decision-relevant only when they are directly linked to programme placement logic and budgetary allocation processes, thereby reinforcing the integration between the NSDO's analytical pillars and the spatial screening mechanisms proposed in this paper (DLRRD, 2025b; OECD, 2023a).

5.5 Transferability of the Sector Analytics Governance Model

Taken together, these three domains illustrate how national spatial governance is enacted through repeated, sector-specific decisions rather than through spatial plans in isolation. Security, climate resilience, and social development are used illustratively to demonstrate how authoritative spatial analytics can systematically shape service design, investment prioritisation, and risk management.

The same governance logic is readily transferable to other sectors, including transport, energy, water, and economic development, underscoring the broader applicability and scalability of the NSDF–NSDO operating model across the state's planning, budgeting, and performance systems.

6. MINIMUM VIABLE ANALYTICS STACK AND A DISCIPLINED DELIVERABLE

6.1 Minimum Authoritative Spatial Datasets for Sector Analytics

Sector-based spatial analytics are central to the NSDF–NSDO operating system. To ensure consistency, auditability, and interoperability across governance domains, the framework

distinguishes between aspirational analytics and a minimum authoritative dataset baseline required for routine decision-making.
The datasets listed below represent the minimum spatial information required to enable repeatable sector analytics across government. They are not exhaustive, nor do they preclude additional datasets where available. Their purpose is to establish a common baseline against which sector analytics can be executed consistently across cycles and spheres.

Table 2: Minimum Authoritative Spatial Datasets by Sector Domain

Sector Domain	***Minimum Authoritative Spatial Datasets***	***Primary Decision Use***
Spatial planning and land use	National land-use classification; cadastral parcels; settlement footprint; NSDF spatial typologies	Spatial alignment of plans, zoning review, settlement growth management
Infrastructure and services	Infrastructure network layers (water, electricity, transport); service coverage areas; condition indicators	Infrastructure prioritisation, risk exposure assessment, service sequencing
Climate and environmental risk	Flood risk zones; climate anomaly indicators; environmental sensitivity layers; disaster risk areas	Climate resilience planning, infrastructure protection, disaster preparedness
Human settlements and social services	Population distribution; informal settlement locations; service access indicators; deprivation indices	Targeting of service delivery, upgrading programmes, social investment
Economic development	Employment nodes; industrial areas; logistics corridors; market accessibility indicators	Investment prioritisation, economic clustering, corridor development
Safety and security	Police precinct boundaries; incident density; mobility patterns; critical infrastructure locations	Spatial targeting of interventions, emergency response, risk prevention
Fiscal and investment oversight	Capital project locations; expenditure geocoding; asset registers	Spatial screening of investment, alignment monitoring, performance auditing

6.2 Authoritative Data Governance and Minimum Viable Analytics Outputs

Each dataset is required to be certified as authoritative, version-controlled, spatially interoperable, and linked to a defined decision-use case within the NSDF–NSDO system.
The governance model is deliberately pragmatic, a minimum viable analytics stack is proposed because institutional credibility is built through visible outputs within short cycles. These deliverables are intentionally scoped to leverage existing datasets, statutory mandates, and established planning and budget cycles, minimising new system build requirements while maximising early institutional credibility.
The first requirement is a published authoritative layers list with service-level targets, named custodians, and update cadences, ensuring that data used for decision-making is traceable and auditable (DLRRD, 2025a). The second requirement is an indicator and performance dictionary defining each metric used in alignment screening and scorecard reporting, with transparent definitions and reproducible methods. The third requirement is automated NSDF-alignment checking for projects and programmes, not as a punitive gate but as a routine governance practice that detects misalignment early. The fourth requirement is reproducible dashboards for

provinces and metros that draw from the same authoritative catalogues and show spend, outputs, and outcomes spatially.

These deliverables align strongly with international SDI practice, where the value of SDIs is frequently framed as reducing duplication, enabling data discovery and integration, and improving decision-making through standardised access and interoperability (FGDC, n.d.-a; Barbero et al., 2019). They also align with the OECD's emphasis that strategic infrastructure plans and governance systems must link objectives to practical funding and implementation tools to avoid decoupling of policy and delivery (OECD, 2023b). The expected output is a credible baseline of NSDF alignment by sector, a first authoritative layers catalogue with update cadences, and an executive dashboard that links spend, outputs, and spatial outcomes on a single map interface, reinforcing the NSDO's stated role in enabling evidence-based decisions and progress tracking (DLRRD, 2025a; DLRRD, 2025b).

7. GOVERNANCE ARRANGEMENTS AND THE INSTITUTIONAL SHAPE OF ACCOUNTABILITY

7.1 Institutional Roles and Accountability within the NSDF–NSDO Architecture

For the NSDF–NSDO framework to function as a governance operating system, institutional roles must be explicit. Spatial alignment cannot rely on voluntary coordination alone; it requires clear authority for data certification, analytical standards, decision support, and enforcement through existing accountability structures.

The proposed architecture does not create new institutions. Instead, it assigns responsibility, accountability, and coordination roles across existing mandates to ensure that spatial intelligence informs planning and budgeting decisions consistently.

Table 3: Institutional Accountability for the NSDF–NSDO Spatial Operating System

Architecture Component	***Responsible (R)***	***Accountable (A)***	***Consulted (C)***	***Informed (I)***
NSDF spatial logic and policy alignment	DLRRD	Minister responsible for Land Reform and Rural Development	COGTA, SALGA, Provinces	Municipalities
Certification of authoritative spatial data layers	DLRRD (NSDO)	Director-General: DLRRD	Sector data custodians	All departments
Spatial analytics and scorecard production	DLRRD (NSDO)	Director-General: DLRRD	National Treasury, COGTA	Cabinet clusters
Integration with IDPs and SDFs	Municipalities	Municipal Accounting Officers	COGTA, Provinces	Councils
Integration with budgeting and MTEF	National Treasury	Director-General: National Treasury	DLRRD, Sector departments	Cabinet
Enforcement of spatial screening in capital bids	National Treasury	Minister of Finance	DLRRD, DPME	Accounting Officers
Publication of spatial performance results	DLRRD (NSDO)	Director-General: DLRRD	Auditor-General, DPME	Public

7.2 Embedding Spatial Governance within Existing Fiscal and Administrative Controls

This accountability structure embeds spatial governance within recognised fiscal and administrative control points, strengthening decision quality, auditability, and executive oversight without introducing parallel systems.

The NSDO's governance arrangements, including inter-ministerial oversight, technical advisory capability, data and technology working groups, user engagement mechanisms, legal compliance functions, and project management office, are explicitly designed to support cross-sector adoption and sustainability (DLRRD, 2025b). In this model, governance is not only about coordination; it is about making responsibilities visible through custodianship, standards, update cycles, and reporting obligations. This logic is consistent with UN-IGIF's emphasis on building national geospatial information management capabilities through strategic pathways and implementation guidance (UN-GGIM, n.d.). It also reinforces a key point for the South African system that spatial governance fails when data and policy are treated as "support functions" and succeeds when they are positioned as core public administration infrastructure linked to executive accountability and budget discipline.

8. CONCLUSION

This paper has argued that South Africa's post-2025 opportunity lies not in the proliferation of additional spatial frameworks, but in the disciplined integration of the National Spatial Development Framework and the National Spatial Data Observatory into a single national spatial governance operating system. The NSDF provides the national spatial logic, while the NSDO supplies the authoritative data governance, analytical capability, and monitoring apparatus required to make that logic executable, enforceable, and auditable over time (DLRRD, 2022; DLRRD, 2025a).

By explicitly embedding spatial intelligence at defined decision gates within capital initiation, the Medium-Term Expenditure Framework, annual performance planning, adjustment budgets, municipal planning cycles, and procurement sequencing, the NSDF–NSDO system shifts spatial governance from narrative alignment to routine administrative practice. The introduction of a minimum viable spatial performance scorecard further anchors spatial outcomes within executive oversight and fiscal accountability, enabling consistent assessment of alignment, exposure, and reinvestment across planning and budget cycles.

The specification of minimum authoritative spatial datasets and clear institutional accountability arrangements ensures that sector analytics for security, climate resilience, and social development are reproducible, comparable, and scalable across spheres of government. In doing so, the framework aligns spatial planning, budgeting, and implementation within existing statutory mandates and control systems, strengthening value-for-money assessment, auditability, and decision quality.

Taken together, the NSDF–NSDO operating system demonstrates how spatial transformation and institutional accountability can be achieved through the integration of policy intent, authoritative data, and routine decision-making processes. Rather than functioning as an additional planning layer, national spatial governance is positioned as core public administration infrastructure, capable of translating spatial intent into measurable, territorially grounded delivery.

REFERENCES

Barbero, M., Lopez Potes, M., Vancauwenberghe, G. and Vandenbroucke, D. (2019) *The role of Spatial Data Infrastructures in the Digital Government Transformation of Public Administrations*. Luxembourg: Publications Office of the European Union (European Commission Joint Research Centre). (JRC Publications)

Department of Land Reform and Rural Development (DLRRD) (2022) *National Spatial Development Framework*. Pretoria: Government of South Africa.

Department of Land Reform and Rural Development (DLRRD) (2025a) *Concept Note: National Spatial Data Observatory (For Internal Discussion), 30 June 2025*. Pretoria: Government of South Africa.

Department of Land Reform and Rural Development (DLRRD) (2025b) *National Spatial Data Observatory Concept Consultation Presentation*. Pretoria: Government of South Africa.

European Commission (2007) *Directive 2007/2/EC establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)*. Brussels: European Union. (INSPIRE Knowledge Base)

Federal Geographic Data Committee (FGDC) (n.d.-a) *Information about the NSDI Framework*. Washington, DC: FGDC. (Federal Geographic Data Committee)

Federal Geographic Data Committee (FGDC) (n.d.-b) *NSDI Federal Guiding Principles: Authoritative Data*. Washington, DC: FGDC. (Federal Geographic Data Committee)

INSPIRE Knowledge Base (n.d.) *INSPIRE Directive: Legislation and scope*. European Commission. (INSPIRE Knowledge Base)
OECD (2023a) *OECD Infrastructure Governance Indicators*. Paris: OECD Publishing. (OECD)
OECD (2023b) *Developing Strategic Approaches to Infrastructure Planning*. Paris: OECD Publishing. (OECD)
United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) (n.d.) *United Nations Integrated Geospatial Information Framework (UN-IGIF)*. New York: United Nations. (UN-GGIM)

SPEAKER BIOGRAPHICAL NOTES

Mr Rajesh Makan: Acting Deputy Director-General at the Department of Land Reform and Rural Development in the Branch Spatial Planning and Land Use Management, Republic of South Africa, and a PhD candidate in Town and Regional Planning at the University of Pretoria. His work at the Department includes working on the implementation of the Spatial Planning and Land Use Management Act. This included leading work in the development of various guidelines and tools in the support of its implementation. He has also overseen the development of the countries first National Spatial development framework and is involved in various other projects ranging from the development of policy to the development of Guidelines. He was also a member of the South African Council for Planners as a representative of the Department and served on both the 2nd Council and 3rd Council.

Mr Clinton Heimann: Acting Director-General at the Department of Land Reform and Rural Development, Republic of South Africa, and a PhD candidate in Urban and Regional Planning at the University of the Free State. His work focuses on spatial governance, land administration reform, national spatial planning frameworks, and the integration of geospatial intelligence into public-sector decision-making. He represents South Africa and Africa in international geospatial governance forums, including being the Co-Chair of the UN-GGIM, and has led national initiatives on the National Spatial Development Framework and the National Spatial Data Observatory and the IMC on Spatial Governance

CONTACTS

Mr Rajesh Makan
Department of Land Reform and Rural Development
South Africa
+2782 379 4482
rajesh.makan@dlrrd.gov.za

Mr Clinton Heimann
Department of Land Reform and Rural Development
South Africa
+2782 928 4123
clinton.heimann@dlrrd.gov.za