

Social System Diagnostics

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Abstract

Constraint Analysis provides a method for identifying the constraints and constraint components responsible for system behaviour. However, before detailed causal investigation can begin, it is often necessary to determine whether a problem exists and where analysis should be focused. This paper introduces Systemic Diagnostics as a complementary methodology for assessing system condition and identifying areas requiring further investigation.

The paper argues that diagnosis and explanation represent distinct but complementary stages in the process of understanding social systems. Diagnosis seeks to identify symptoms and areas of concern, while Constraint Analysis seeks to explain the underlying causes responsible for observed conditions. Systemic Diagnostics is presented as a top-down process of diagnostic expansion, whereby general concerns regarding system viability are progressively disaggregated into increasingly specific dimensions and indicators capable of directing further investigation.

To support this process, the paper introduces a diagnostic hierarchy based upon system viability. Because viability cannot be directly observed, it is disaggregated into four diagnostic dimensions: Potential, Flow, Capability, and Flexibility. These dimensions reflect the functional differentiation of social systems, in which different subsystems contribute distinct functions to overall viability. Dysfunctions often manifest through reductions in the effectiveness of particular functions, providing diagnostic clues that help identify areas requiring further investigation. The resulting hierarchy provides a structured framework for assessing system condition and identifying potential regions of constraint misalignment.

The relationship between diagnostics and explanation is explored through organisational, national, and public-service examples. The paper further examines the implications of Systemic Diagnostics for governance, monitoring, collective learning, and adaptive decision-making.

It concludes that Systemic Diagnostics and Constraint Analysis are complementary components of a unified methodology for understanding and improving social systems. Diagnostics identifies where investigation should begin, Constraint Analysis explains why observed conditions have arisen, and intervention modifies the significant constraint components responsible for system behaviour.

1. Introduction

Constraint Analysis provides a method for identifying the constraints and constraint components responsible for system behaviour. By examining the causal networks that enable, inhibit, and regulate system activity, it becomes possible to explain why systems behave as they do and to identify potential opportunities for intervention. However, before detailed analysis can begin, it is often necessary to determine whether a problem exists and where investigation should be focused.

This challenge is encountered throughout medicine, engineering, management, governance, and everyday life (Checkland, 1999; Simon, 1996). Complex systems are rarely analysed in their entirety at the outset. Instead, people typically begin by assessing a small number of observable indicators that provide clues regarding the condition of the system. Doctors monitor symptoms and vital signs before investigating underlying physiological mechanisms. Engineers monitor performance indicators before examining individual components. Governments track economic, social, educational, infrastructural, and environmental indicators before attempting to identify the causes of societal problems.

These activities are forms of diagnosis.

Diagnosis differs from explanation (Simon, 1996). It seeks to identify areas of concern and assess the condition of a system. Explanation seeks to identify the causal mechanisms responsible for the observed condition. Diagnostic indicators can reveal that a problem exists, but they cannot by themselves determine its cause. Similar symptoms may arise from many different underlying mechanisms, and interventions based solely upon symptoms may therefore prove ineffective or even counterproductive.

Social systems present the same challenge. The complexity of modern societies makes comprehensive causal analysis impractical as a starting point for investigation. Consequently, there is a need for a diagnostic approach that helps identify potential regions of concern before more detailed analysis is undertaken. Such an approach can help direct attention, prioritise investigation, and provide an initial assessment of system condition.

The possibility of diagnosis arises because social systems are functionally differentiated (Parsons, 1951; Luhmann, 1995). Different subsystems perform different functions that contribute to overall system viability, and dysfunctions often become visible through reductions in the effectiveness of those functions. Consequently, observations regarding system condition can provide clues regarding the subsystems and processes requiring further investigation. However, because social systems are highly interconnected, the causes of dysfunction are not necessarily located within the subsystem in which symptoms are observed. Diagnosis therefore provides a means of

identifying areas of concern, while further investigation is required to determine their underlying causes.

This paper introduces the concept of Systemic Diagnostics as a complement to Constraint Analysis. Systemic Diagnostics provides a top-down approach to assessing social systems through the use of diagnostic indicators intended to identify potential regions of constraint misalignment requiring further investigation. Constraint Analysis then provides the explanatory framework needed to understand the underlying causes of the observed condition and to identify appropriate intervention opportunities.

The relationship between the two approaches can be summarised as:

Diagnose → Explain → Intervene → Reassess

Diagnostic indicators identify potential problems. Constraint Analysis identifies the constraints and constraint components responsible for those problems. Interventions modify significant constraint components in an attempt to improve system behaviour, while reassessment determines whether the condition of the system has improved.

The purpose of this paper is therefore not to replace Constraint Analysis, but to introduce a complementary diagnostic framework that helps identify where detailed investigation should begin. Constraint Analysis provides a practical methodology for understanding, managing, and improving complex social systems.

2. Diagnosis as Progressive Expansion

2.1 Human Responses to Complexity

When individuals encounter problems in complex systems, they rarely begin by analysing the complete network of causes responsible for the observed behaviour. Such analysis is often impractical because the causal structures involved are extensive, interconnected, and only partially observable (Simon, 1996).

Instead, diagnosis typically begins with a general perception that something is wrong. A system may appear to be underperforming, unstable, ineffective, or unable to adapt to changing circumstances. At this stage, the nature and causes of the problem are often unclear. The task of diagnosis is therefore to move from a vague concern toward a more detailed understanding of where investigation should be focused.

This process is common throughout medicine, engineering, management, governance, and everyday life. A patient may report feeling unwell without knowing the cause. An engineer may observe declining performance without knowing which component has failed. A government may recognise that societal conditions are deteriorating without understanding the underlying mechanisms responsible.

Diagnosis therefore functions as a process of progressive expansion. Beginning with a broad concern, attention is gradually directed toward increasingly specific aspects of system behaviour until the areas requiring detailed investigation become clear.

Systemic Diagnostics applies the same principle to social systems. Rather than attempting to analyse all possible causes immediately, it progressively disaggregates concerns regarding system viability into more specific dimensions and indicators that help guide subsequent investigation.

2.2 Functional Differentiation and Diagnosis

Diagnosis is possible because social systems are functionally differentiated (Parsons, 1951; Luhmann, 1995). Different subsystems perform different functions that contribute to the viability of the system as a whole. Educational systems develop capabilities, infrastructure systems support flows, governance systems coordinate collective action, and economic systems support the production and distribution of resources.

When difficulties arise, they are often manifested through reductions in the effectiveness of particular functions. Observed dysfunction therefore provides an initial indication of which subsystems may require further investigation. Problems relating to innovation may direct attention toward educational, research, or economic systems, while problems relating to coordination may direct attention toward governance, communication, or infrastructure systems.

However, the causes of dysfunction are not necessarily located within the subsystem in which symptoms are observed. Because social systems are highly interconnected, the performance of any subsystem is influenced by constraints arising elsewhere in the wider system. Consequently, diagnosis can identify where problems appear to be occurring, but further investigation is required to determine why they have arisen.

This distinction highlights the complementary roles of Systemic Diagnostics and Constraint Analysis. Diagnosis identifies the functional areas in which difficulties are observed. Constraint Analysis identifies the wider constraint configurations responsible for generating those difficulties.

3. Viability and its Disaggregation

3.1 System Viability

The concept of viability occupies a central position within systems theory. A viable system is one that is capable of maintaining itself and adapting successfully over time despite changes in its environment (Ashby, 1956; Beer, 1979). Viability therefore reflects the combined effects of a system's structures, processes, resources, capabilities, and interactions with its environment.

Viability is not an all-or-nothing property. Systems may exhibit varying degrees of viability depending upon their ability to sustain essential functions, respond to disturbances, and generate adaptive responses to changing conditions. Highly viable systems are capable of maintaining stability while remaining sufficiently adaptable to accommodate change. Poorly viable systems often exhibit declining performance, increasing instability, reduced adaptive capacity, and heightened vulnerability to disruption.

Because viability depends upon the interaction of many factors, it is not directly observable. Instead, it must be inferred from observable characteristics of system behaviour and performance.

3.2 Why Viability Requires Disaggregation

Although viability is the ultimate concern, viability itself cannot be directly observed. It must therefore be disaggregated into a smaller number of observable dimensions that collectively provide an indication of system condition.

The purpose of these dimensions is diagnostic rather than explanatory. They help identify potential areas of concern and direct subsequent investigation. However, they do not, by themselves, explain the causes of observed problems.

Constraint Analysis performs this explanatory role. Diagnostic indicators identify possible regions of concern, while Constraint Analysis investigates the constraints, significant constraint components, and patterns of alignment or misalignment responsible for those conditions.

The relationship between the two approaches can therefore be summarised as:

Diagnosis → Constraint Analysis → Intervention → Reassessment

The viability dimensions introduced in the following section represent a disaggregation of viability intended to support this diagnostic process.

4. The Diagnostic Hierarchy

The diagnostic hierarchy provides a structured framework for assessing system viability. It disaggregates viability into a set of diagnostic dimensions and indicators that help identify areas requiring further investigation.

The hierarchy proceeds from an overall assessment of system viability, through a set of broad viability dimensions, to increasingly specific indicators that provide evidence regarding system condition.

4.1 Level 1 – Overall Viability

The highest level of diagnosis concerns the overall viability of the system. At this level, diagnosis focuses upon broad questions regarding system condition rather than specific causes or mechanisms.

Questions may include:

- Is the system performing effectively?
- Is it becoming unstable?
- Is it failing to adapt?
- Is its long-term viability threatened?
- Is the system capable of maintaining itself and adapting successfully over time?

At this stage, concerns may be recognised, but their nature and causes remain unclear. Further diagnosis therefore requires the disaggregation of viability into more specific dimensions.

4.2 Level 2 – Viability Dimensions

Viability is a complex and multifaceted property that cannot be directly observed. Consequently, it is useful to disaggregate viability into a smaller number of broad diagnostic dimensions that collectively provide insight into system condition. The four dimensions proposed here are Potential, Flow, Capability, and Flexibility.

Collectively, these dimensions address four fundamental questions regarding system viability:

- **Potential** – Is the system creating future opportunities and capabilities?
- **Flow** – Are information, resources, authority, and other necessary transfers moving effectively through the system?
- **Capability** – Can the system achieve its intended outcomes?
- **Flexibility** – Can the system learn, adapt, and respond to changing circumstances?

Together, these dimensions provide complementary perspectives on system viability. A system may perform well in one dimension while experiencing difficulties in another. Diagnostic assessment therefore requires consideration of all four dimensions rather than reliance upon any single measure.

These dimensions do not explain behaviour directly. Rather, they provide a structured way of assessing different aspects of viability and identifying potential areas of concern.

Potential

Potential refers to a system's capacity to generate future opportunities and developmental possibilities. It reflects the extent to which a system is creating the conditions necessary for future growth, adaptation, and improvement. Potential is therefore concerned not only with present resources and capabilities but also with the ability to develop new ones over time. Systems may appear successful in the present while gradually undermining their future prospects through underinvestment, declining innovation, or inadequate capability development.

In social systems, potential may be reflected in the development of human capabilities, the generation of new knowledge, investment in infrastructure, innovation, entrepreneurship, and the cultivation of future opportunities. A society with high potential continually expands the range of options available to it, while a society with low potential may become increasingly constrained by stagnation, declining skills, underinvestment, or limited opportunities for future development.

Because potential concerns future possibilities rather than immediate performance, deterioration may not always be immediately apparent. However, persistent declines in education, innovation, investment, or capability development often indicate a gradual erosion of long-term viability.

Flow

Flow refers to the capacity of a system to coordinate and exchange matter, energy, information, resources, authority, and other transfers necessary for effective functioning. Every system depends upon flows between its components, and disruptions to these flows can significantly reduce overall performance. Many systems fail not because resources are absent, but because those resources are unable to move effectively between the components that require them.

In social systems, flow may be reflected in communication, transportation, institutional processes, supply chains, financial transactions, and the movement of information and resources. High-flow systems tend to exhibit efficient coordination, low friction, and effective communication, while low-flow systems often suffer from delays, bottlenecks, mistrust, bureaucracy, or fragmented decision-making.

Flow is closely related to the ability of a system to maintain coherence and coordinate collective action. Persistent impediments to flow may therefore provide an early indication of emerging constraint misalignments.

Capability

Capability refers to the capacity of a system to achieve intended outcomes. It reflects the extent to which a system can mobilise resources, coordinate activities, and produce desired effects within its environment. Systems may possess ambitious goals and

strong motivations while lacking the resources, skills, knowledge, organisation, or coordination necessary to achieve them.

In social systems, capability may be reflected in productive capacity, organisational effectiveness, technological competence, leadership, and collective action. High capability allows a system to translate intentions into outcomes, whereas low capability may result in unmet objectives, declining performance, and increasing dependence upon external support.

Capability should not be confused with power in the conventional political sense. The concept is used here to describe the effectiveness of the system as a whole rather than the influence of particular individuals or groups. A highly capable system possesses the means necessary to achieve its goals and respond effectively to challenges.

Flexibility

Flexibility refers to the capacity of a system to adapt to changing circumstances (Ashby, 1956). Since environments continually change, viability depends not only upon current performance but also upon the ability to modify behaviour, structures, and processes when existing arrangements become ineffective.

Flexibility should not be confused with instability or continual change. Highly flexible systems often possess strong core structures and purposes while remaining capable of modifying specific behaviours and processes in response to changing circumstances.

In social systems, flexibility may be reflected in learning, experimentation, innovation, institutional responsiveness, diversity, and the availability of alternative courses of action (Senge, 2006). Flexible systems are able to accommodate change while maintaining coherence and functionality. Inflexible systems may become locked into patterns of behaviour that were once effective but are no longer suited to current conditions.

Because adaptation is central to long-term viability, persistent reductions in flexibility often precede more visible forms of system decline.

Viability Dimension	Diagnostic Question
Potential	Is the system creating future opportunities and capabilities?
Flow	Are resources, information, authority, and decisions moving effectively?
Capability	Can the system achieve intended outcomes?
Flexibility	Can the system learn, adapt, and respond to changing circumstances?

The four dimensions are complementary rather than independent. Potential concerns the creation of future opportunities and capabilities. Flow concerns the effective movement and coordination of resources. Capability concerns the achievement of desired outcomes. Flexibility concerns adaptation to changing circumstances. Together they provide a structured means of assessing both the present and future viability of a system.

4.3 Level 3 – Detailed Indicators

Each viability dimension can be explored through more specific indicators. These indicators provide observable evidence regarding the functioning of the subsystems and processes that contribute to overall viability.

Because social systems are functionally differentiated, difficulties often become visible through reductions in the effectiveness of particular functions. Indicators therefore provide clues regarding which aspects of a system may require further investigation.

However, they do not by themselves reveal the causes of observed problems, since dysfunction may arise from constraints located elsewhere in the wider system. Rather, they provide an intermediate level of diagnosis between broad viability concerns and detailed causal analysis. They help identify where difficulties are manifesting, while Constraint Analysis investigates the underlying constraint configurations responsible.

The indicators presented here are illustrative examples only and will vary according to the nature of the system being examined.

Potential Indicators

- education
- skills
- innovation
- entrepreneurship
- investment
- research activity
- capability development
- social mobility

Flow Indicators

- trust
- communication quality

- infrastructure performance
- transaction costs
- institutional responsiveness
- information transfer effectiveness
- coordination efficiency

Capability Indicators

- productive capacity
- resource availability
- organisational effectiveness
- technological capability
- leadership effectiveness
- collective action capacity

Flexibility Indicators

- learning capacity
- adaptability
- redundancy
- diversity
- experimentation
- governance responsiveness
- problem-solving capability

Together, these indicators provide a progressively more detailed picture of system condition and help direct attention toward areas requiring further investigation. The next stage of analysis is to move beyond symptoms and indicators and investigate the constraints and constraint components responsible for the observed patterns.

5. From Diagnosis to Constraint Analysis

5.1 Identifying Areas of Concern

The purpose of diagnosis is not to explain system behaviour directly. Rather, it is to identify and progressively refine areas of concern until they can be investigated in greater detail.

By the end of the diagnostic process, attention has been narrowed from a general concern regarding system condition to a more specific set of viability dimensions and indicators requiring explanation. At this point, diagnosis has fulfilled its purpose.

For example, declining educational performance may indicate difficulties affecting the development of future capabilities. Communication failures or infrastructure bottlenecks may indicate problems affecting the coordination of activities and flows. Deteriorating service performance may suggest limitations affecting the system's ability to achieve desired outcomes. Institutional rigidity may indicate a reduced capacity to adapt to changing circumstances.

These observations provide clues regarding the functions through which difficulties are manifesting and help identify areas requiring further investigation. However, they do not by themselves explain why these conditions have arisen, since the underlying causes may lie elsewhere within the wider constraint network.

The role of diagnosis is therefore to answer the question: *Where should we investigate?*

The role of Constraint Analysis is to answer the question: *What is causing the observed condition?*

5.2 Symptoms and Causes

A central limitation of diagnostic indicators is that they reveal symptoms rather than causes (Simon, 1996).

In many cases, the same symptom may arise from multiple underlying mechanisms. A decline in organisational performance, for example, may result from inadequate resources, ineffective leadership, poor communication, conflicting objectives, institutional rigidity, cultural fragmentation, or some combination of these factors. Similarly, declining economic productivity may result from educational deficiencies, infrastructure limitations, regulatory constraints, technological stagnation, demographic change, or broader systemic misalignments.

The existence of a symptom therefore does not uniquely identify its cause (Simon, 1996).

This distinction is well recognised in medicine. A fever may indicate infection, inflammation, immune response, heat exposure, or a range of other conditions. The symptom provides evidence that a problem exists, but further investigation is required to determine its cause. The same principle applies to social systems.

Diagnostic indicators are therefore best understood as signals that further investigation may be required rather than explanations of behaviour in their own right.

5.3 Constraint Analysis as Explanation

Once areas of concern have been identified, investigation proceeds through Constraint Analysis.

Constraint Analysis seeks to identify the constraints responsible for observed behaviour and the ways in which those constraints interact. Rather than focusing upon symptoms, it focuses upon the causal structures that enable, inhibit, and regulate system activity.

This involves identifying:

- relevant constraints;
- constraint components;
- significant constraint components;
- patterns of alignment and misalignment;
- leverage opportunities;
- potential intervention targets.

Where diagnosis asks whether a system appears healthy or unhealthy, Constraint Analysis seeks to explain why.

The transition from diagnosis to explanation therefore represents a shift from observing system condition to investigating the causal networks responsible for that condition.

5.4 Misdiagnosis and Intervention Failure

The distinction between diagnosis and explanation is important because interventions based solely upon symptoms may fail to address the underlying causes of a problem (Meadows, 2008).

For example, declining organisational performance may be addressed through additional funding, restructuring, recruitment, or new procedures. However, if the underlying problem arises from poor communication, conflicting objectives, or ineffective governance, such interventions may produce little improvement. Similarly, attempts to increase economic growth may prove ineffective if they fail to address the constraints responsible for reduced productivity or innovation.

Misdiagnosis therefore creates a risk of ineffective intervention. Resources may be directed toward visible symptoms while the underlying constraint configuration remains unchanged.

Effective intervention requires a transition from diagnosis to explanation before action is undertaken.

5.5 From Symptoms to Intervention Targets

Constraint Analysis provides the bridge between diagnosis and intervention.

Diagnostic indicators identify potential regions of concern. Constraint Analysis then investigates the underlying constraints responsible for those concerns and identifies significant constraint components that influence system behaviour. Some of these components may represent leverage opportunities capable of producing substantial changes in system performance when modified.

The process therefore moves from:

Symptoms

↓

Viability Dimensions

↓

Detailed Indicators

↓

Constraint Analysis

↓

Significant Constraint Components

↓

Intervention Targets

This progression transforms broad concerns regarding system condition into specific opportunities for action.

5.6 Summary

Diagnosis and Constraint Analysis are complementary rather than competing processes.

Diagnosis provides a top-down assessment of system condition. It identifies areas of concern and directs attention toward aspects of the system requiring further investigation. Constraint Analysis provides a bottom-up explanation of the causal structures responsible for those conditions and identifies potential intervention targets.

The relationship between the two approaches can therefore be summarised as:

General Concern

↓

Viability Dimensions

↓

Detailed Indicators

↓

Constraint Analysis

↓

Intervention Targets

Diagnosis identifies where to look. Constraint Analysis identifies what is causing the problem. Intervention Design identifies what may be changed.

6. Examples

6.1 An Organisation

Consider a membership organisation whose purpose is to support the development of a particular professional or scientific field. Over a period of several years, membership has gradually declined, participation in activities has reduced, and the organisation appears increasingly unable to pursue its stated objectives. Internal disagreements have become more common, communication between members has deteriorated, and attempts to introduce improvements have achieved only limited success.

At this stage, observers may conclude that the organisation is experiencing difficulties, but the nature and causes of those difficulties remain unclear. The organisation may be described as "underperforming", "stagnating", or "in decline", but such descriptions provide little guidance regarding the underlying causes or potential remedies.

The diagnostic process therefore begins with an assessment of viability.

Potential

Potential concerns the organisation's capacity to generate future opportunities and developmental possibilities.

Possible indicators may include:

- membership recruitment;
- development of future leaders;
- innovation in activities and services;
- engagement of younger members;
- ability to attract new expertise and resources.

In this example, membership is declining, recruitment is weak, and relatively few new initiatives are emerging. These indicators suggest that the organisation's future developmental capacity may be deteriorating. Diagnostic assessment therefore suggests reduced Potential.

Flow

Flow concerns the movement of information, resources, authority, and coordination throughout the organisation.

Possible indicators may include:

- communication quality;
- cooperation between groups;
- responsiveness of decision-making processes;
- effectiveness of information sharing;
- participation in organisational activities.

In this example, communication has become increasingly fragmented and disagreements frequently remain unresolved. Information does not always reach those who need it, and coordination between different parts of the organisation appears limited. These indicators suggest impaired Flow.

Capability

Capability concerns the organisation's ability to achieve its intended objectives.

Possible indicators may include:

- delivery of services;
- achievement of strategic goals;
- effectiveness of projects and activities;
- maintenance of organisational functions;
- ability to mobilise resources.

Although the organisation continues to function, many activities require substantial effort to maintain and some objectives remain unfulfilled. Organisational effectiveness appears to be declining. Diagnostic assessment therefore suggests reduced Capability.

Flexibility

Flexibility concerns the organisation's capacity to adapt to changing circumstances.

Possible indicators may include:

- responsiveness to feedback;
- willingness to experiment;
- adaptation to environmental change;
- ability to resolve emerging problems;
- capacity for organisational learning.

In this example, problems have persisted for several years despite repeated recognition that change is required. Existing practices remain largely unchanged, and attempts at reform frequently encounter resistance or become stalled. These indicators suggest reduced Flexibility.

Diagnostic Assessment

The resulting diagnostic profile may be summarised as follows:

Viability Dimension	Assessment
Potential	Low
Flow	Low
Capability	Moderate to Low
Flexibility	Low

This assessment provides a useful description of the organisation's condition. It suggests that the organisation is experiencing difficulties across multiple dimensions of viability and that intervention may eventually be required.

However, the diagnostic profile does not explain why these conditions have arisen.

For example, poor Flow may result from communication failures, governance problems, conflicting objectives, cultural divisions, resource limitations, or combinations of these factors. Similarly, reduced Capability may arise from declining resources, ineffective organisational structures, inadequate leadership, loss of expertise, or other causes.

Diagnosis therefore identifies areas of concern but does not yet reveal the underlying mechanisms responsible.

Transition to Constraint Analysis

At this point, the investigation moves beyond diagnosis and into Constraint Analysis.

In this example, difficulties are evident across all four viability dimensions. Rather than pointing towards a single subsystem or functional domain, the findings suggest the possibility of broader systemic dysfunction affecting multiple aspects of organisational performance.

The diagnosis therefore indicates that investigation should focus upon the organisation as a whole rather than any single subsystem. Constraint Analysis is required to identify the constraints, significant constraint components, and patterns of alignment or misalignment responsible for the observed condition.

This example illustrates an important limitation of diagnosis. While diagnostic indicators can identify areas in which dysfunction is manifesting, they do not always narrow investigation to a specific subsystem. In cases of widespread dysfunction, diagnosis may instead indicate the need for a broader system-wide analysis.

6.2 A Nation State

Consider a nation that has experienced several decades of economic and social success but is now showing signs of increasing difficulty. Economic growth has slowed, productivity has stagnated, public trust in institutions has declined, infrastructure is ageing, and political divisions have become increasingly visible. Citizens express growing dissatisfaction, while governments find it increasingly difficult to achieve long-term objectives.

As with the organisational example, observers may recognise that problems exist without necessarily understanding their causes. Public debate may focus upon symptoms such as economic stagnation, declining public services, political dissatisfaction, or social fragmentation. These observations indicate that a problem may exist but provide only limited insight into the underlying mechanisms responsible.

The diagnostic process therefore begins with an assessment of viability.

Potential

Potential concerns the nation's capacity to generate future opportunities and developmental possibilities.

Possible indicators may include:

- educational attainment;
- skills development;
- research and innovation;
- business formation;
- infrastructure investment;
- social mobility.

Suppose that investment in infrastructure has declined, educational performance has stagnated, and innovation rates have slowed. These indicators suggest that the nation's ability to generate future opportunities may be weakening. Diagnostic assessment therefore indicates reduced Potential.

Flow

Flow concerns the movement of information, resources, goods, services, authority, and decisions throughout society.

Possible indicators may include:

- transport performance;
- institutional efficiency;
- trust;
- communication effectiveness;
- transaction costs;
- responsiveness of public services.

Suppose that infrastructure bottlenecks are increasing, planning processes are becoming slower, public trust is declining, and coordination between institutions appears increasingly difficult. These indicators suggest impaired Flow.

Capability

Capability concerns the nation's capacity to achieve desired outcomes.

Possible indicators may include:

- economic productivity;
- industrial capability;
- public service performance;
- resource mobilisation;
- technological competence;
- state effectiveness.

Suppose that productivity growth has slowed, major projects frequently exceed budgets or schedules, and governments struggle to implement long-term policies successfully. These indicators suggest declining Capability.

Flexibility

Flexibility concerns the nation's capacity to adapt to changing circumstances.

Possible indicators may include:

- institutional adaptability;

- policy responsiveness;
- workforce adaptability;
- innovation;
- organisational learning;
- resilience to shocks.

Suppose that institutions appear increasingly unable to respond effectively to new challenges and that political systems struggle to build consensus around necessary reforms. These indicators suggest reduced Flexibility.

Diagnostic Assessment

The resulting diagnostic profile may be summarised as follows:

Viability Dimension	Assessment
Potential	Moderate to Low
Flow	Low
Capability	Moderate
Flexibility	Low

This profile suggests that the nation may be experiencing a reduction in overall viability. The assessment identifies several areas that warrant further investigation and may help direct the attention of policymakers, analysts, and researchers.

However, the diagnostic profile does not explain why these conditions have arisen.

For example, declining productivity may result from educational constraints, technological constraints, infrastructure limitations, demographic changes, governance failures, cultural factors, or combinations of these influences. Similarly, declining trust may arise from institutional performance, communication failures, political polarisation, economic insecurity, or other causes.

The same diagnostic indicators may therefore emerge from very different underlying constraint configurations.

Transition to Constraint Analysis

At this point, the investigation moves beyond diagnosis and into Constraint Analysis.

Unlike the organisational example, the diagnostic profile does not suggest broad dysfunction across all dimensions of viability. Instead, the difficulties appear

concentrated within functions associated with future development (Potential), coordination (Flow), and adaptation (Flexibility).

The diagnosis therefore helps narrow investigation towards the subsystems responsible for these functions. This may include educational, innovation, infrastructure, governance, institutional, and policy-related subsystems. However, the diagnosis does not determine which of these subsystems is responsible for the observed condition, nor does it identify the constraints generating the dysfunction.

Constraint Analysis is therefore required to investigate the relevant constraints, significant constraint components, and patterns of alignment or misalignment responsible for the observed condition.

This example illustrates a second type of diagnostic outcome. While the organisational example suggested the need for a broad system-wide investigation, the nation-state example narrows attention towards particular functional domains and the subsystems responsible for them. Constraint Analysis is then required to determine which constraints within those domains are generating the observed dysfunction.

6.3 A Public Service

Consider a public service responsible for delivering an important function such as healthcare, education, social care, planning, or transportation. The service employs large numbers of skilled staff, receives substantial funding, and possesses considerable technical expertise. Despite these resources, service performance has gradually deteriorated. Waiting times are increasing, users report dissatisfaction, staff morale is declining, and pressures appear to be growing throughout the organisation.

Observers recognise that the service is struggling to meet expectations, but the reasons for this decline remain unclear. Public debate may focus upon visible symptoms such as delays, shortages, rising costs, or declining quality. These observations indicate that a problem exists, but they do not by themselves explain why performance has deteriorated.

The diagnostic process therefore begins with an assessment of viability.

Potential

Potential concerns the service's capacity to develop and improve over time.

Possible indicators may include:

- workforce development;
- staff training;
- investment in facilities and technology;

- innovation;
- recruitment and retention.

Suppose that investment in staff development continues and new technologies are being introduced. Recruitment remains challenging but broadly adequate. These indicators suggest that the service retains a moderate level of Potential.

Flow

Flow concerns the movement of information, resources, decisions, and work throughout the organisation.

Possible indicators may include:

- communication effectiveness;
- coordination between departments;
- administrative efficiency;
- information sharing;
- responsiveness of decision-making processes.

Suppose that information systems are fragmented, communication between departments is poor, and administrative processes are increasingly slow and complex. Staff spend significant amounts of time navigating procedures rather than delivering services. These indicators suggest impaired Flow.

Capability

Capability concerns the service's ability to achieve its intended objectives.

Possible indicators may include:

- professional expertise;
- availability of resources;
- service delivery capacity;
- technical competence;
- organisational effectiveness.

Suppose that the service retains highly qualified staff, significant resources, and substantial technical expertise. Despite operational difficulties, it remains capable of delivering many of its core functions. These indicators suggest that Capability remains relatively high.

Flexibility

Flexibility concerns the capacity of the service to adapt to changing circumstances.

Possible indicators may include:

- responsiveness to feedback;
- ability to implement reforms;
- organisational learning;
- innovation adoption;
- adaptability of procedures.

Suppose that repeated attempts at reform encounter resistance, decision-making processes are highly centralised, and organisational procedures are difficult to modify. Emerging problems are recognised but often persist for extended periods before effective action is taken. These indicators suggest reduced Flexibility.

Diagnostic Assessment

The resulting diagnostic profile may be summarised as follows:

Viability Dimension Assessment

Potential	Moderate
Flow	Low
Capability	High
Flexibility	Low

This profile suggests an important diagnostic pattern. The service possesses considerable capability and retains the resources necessary to perform its functions, yet difficulties in coordination, information transfer, and adaptation are limiting overall performance.

The assessment therefore indicates that the primary concerns may not lie in the availability of resources or expertise but in the way these resources are coordinated and adapted to changing circumstances.

However, the diagnostic profile does not explain why these conditions have arisen.

Poor Flow may result from organisational structure, governance arrangements, communication constraints, regulatory requirements, technological limitations, or cultural factors. Similarly, reduced Flexibility may arise from institutional inertia,

incentive structures, risk aversion, accountability mechanisms, or other constraint configurations.

Diagnosis therefore identifies the nature of the problem but does not yet reveal its causes.

Transition to Constraint Analysis

At this point, the investigation moves beyond diagnosis and into Constraint Analysis.

Unlike the previous examples, the diagnostic profile helps narrow attention towards particular functional domains and subsystems. The service appears to possess the resources, expertise, and technical capability necessary to perform its functions, suggesting that the primary difficulties do not lie in capability generation. Instead, the observed dysfunction appears concentrated within Flow and Flexibility.

This directs attention towards subsystems responsible for coordination, communication, decision-making, governance, and organisational adaptation.

Examples might include:

- information and communication systems;
- administrative and coordination processes;
- governance and decision-making structures;
- performance management systems;
- organisational learning and improvement mechanisms;
- regulatory and accountability arrangements.

Constraint Analysis would then investigate the constraints affecting these subsystems and the ways in which they interact. Particular attention might be given to communication bottlenecks, governance constraints, institutional rigidities, incentive structures, feedback mechanisms, and patterns of alignment or misalignment between organisational objectives and operational processes.

This example illustrates a more focused diagnostic outcome than the previous examples. Rather than indicating broad systemic dysfunction, the diagnostic profile helps identify particular functional domains and subsystems requiring further investigation. Constraint Analysis can then be concentrated upon those areas in order to identify the significant constraint components responsible for the observed condition.

The example also demonstrates that poor performance does not necessarily arise from inadequate resources or insufficient capability. A public service may possess substantial capability while still experiencing reduced viability because of limitations

affecting coordination, communication, governance, and adaptation. Diagnostics helps identify this pattern, while Constraint Analysis provides the explanatory framework needed to understand its causes and identify appropriate interventions.

6.4 Comparing Diagnostic Outcomes

The three examples presented above illustrate that Systemic Diagnostics can produce different types of diagnostic outcome depending upon the pattern of viability dimensions and indicators observed.

In the organisational example, difficulties were evident across all four viability dimensions. The resulting diagnostic profile suggested broad systemic dysfunction rather than problems confined to any particular subsystem. Consequently, diagnosis provided only limited guidance regarding where investigation should begin and indicated the need for a system-wide Constraint Analysis.

In contrast, the public service example exhibited a more distinctive pattern. Capability remained relatively high, while Flow and Flexibility were impaired. This diagnostic profile suggested that the service possessed the resources and expertise necessary to perform its functions but was experiencing difficulties relating to coordination, communication, governance, and adaptation. In this case, diagnosis helped direct attention towards particular functional domains and subsystems.

The nation-state example occupied an intermediate position. The diagnostic profile suggested difficulties associated primarily with the generation of future opportunities and capabilities. This directed attention towards subsystems associated with education, innovation, investment, and long-term development.

These examples illustrate an important characteristic of Systemic Diagnostics. Diagnostic indicators do not directly identify causes. Rather, they identify patterns of dysfunction that help determine the scope and focus of subsequent investigation.

Where diagnostic signatures are diffuse and affect multiple viability dimensions, diagnosis may indicate the need for broad system-wide analysis. Where diagnostic signatures are more distinctive, diagnosis may help focus investigation upon particular functions, subsystems, or domains of activity.

The relationship can be summarised as follows:

Diffuse Diagnostic Signature

→ Broad System-Wide Investigation

Distinctive Diagnostic Signature

→ Focused Subsystem Investigation

Constraint Analysis then proceeds by identifying the constraints, significant constraint components, and patterns of alignment or misalignment responsible for the observed condition.

Systemic Diagnostics therefore narrows the search space for explanation, but the degree to which it does so depends upon the nature of the diagnostic signature observed.

7. Governance Implications

7.1 Governance as Monitoring

Governance involves more than the exercise of authority or the implementation of policy. At its most fundamental level, governance is concerned with maintaining and improving the viability of a system over time (Beer, 1979). To achieve this, decision-makers must first develop an understanding of the condition of the system they are attempting to govern.

This requirement makes diagnosis an essential governance function.

Governments, organisations, and institutions routinely monitor a wide range of indicators intended to provide information regarding system condition. Examples include economic growth, productivity, educational attainment, public trust, infrastructure performance, organisational performance, service quality, and environmental indicators. Such measures help decision-makers assess whether the system appears healthy, stable, adaptable, and capable of achieving its objectives.

Although these indicators are often collected for practical reasons, they can also be interpreted as diagnostic indicators of system viability. They provide signals regarding Potential, Flow, Capability, and Flexibility and help identify areas that may require closer attention.

Governance therefore begins with observation and monitoring. Without diagnostic information, emerging problems may remain undetected until they become significantly more difficult to address.

7.2 Governance as Investigation

Monitoring alone is insufficient for effective governance.

Diagnostic indicators can reveal that a problem exists, but they cannot determine its causes. Similar patterns of declining performance may arise from many different underlying constraint configurations. Consequently, governance requires a transition from observation to investigation.

Constraint Analysis provides the explanatory framework necessary for this transition. Once areas of concern have been identified, the relevant constraints, significant

constraint components, and patterns of alignment or misalignment can be investigated. This process helps distinguish symptoms from causes and reduces the risk of interventions being directed toward superficial manifestations of deeper problems.

Many governance failures arise from inadequate investigation. Decision-makers may respond to visible symptoms while overlooking the constraints responsible for generating them. In such cases, interventions may produce limited improvements or even unintended consequences.

Effective governance therefore requires the integration of diagnostics and explanation. Diagnostic indicators identify where attention should be directed; Constraint Analysis helps determine what is causing the observed condition.

7.3 Governance as Learning

Social systems exist within changing environments. Economic conditions, technologies, cultures, demographics, resources, and external circumstances continually evolve. As a result, governance cannot be reduced to a one-time process of diagnosis and intervention. It must operate as an ongoing process of learning (Senge, 2006).

Diagnostic indicators play an important role in this process by providing feedback regarding system condition. Changes in Potential, Flow, Capability, and Flexibility may indicate that previous interventions have been successful, unsuccessful, or require modification. Monitoring these dimensions over time therefore helps decision-makers assess the consequences of their actions and identify emerging challenges.

Governance can consequently be viewed as a process of collective learning in which observations regarding system condition are continually compared against objectives, expectations, and environmental conditions (Senge, 2006). This learning process enables societies and organisations to update their understanding of the systems they govern and refine their responses accordingly.

From this perspective, diagnostics forms an essential component of societal reflexivity (Archer, 1995). It provides the information necessary for systems to observe themselves, evaluate their condition, and adjust their behaviour in response to changing circumstances.

7.4 Governance as Adaptation

The ultimate purpose of governance is not merely to observe or understand systems but to support their continued viability.

Diagnosis identifies potential concerns. Constraint Analysis identifies underlying causes. Intervention seeks to modify significant constraint components. Governance

provides the mechanisms through which these activities are coordinated and evaluated.

This process is inherently adaptive (Ashby, 1956). As conditions change, new diagnostic patterns emerge, new constraints become significant, and new interventions become necessary. Effective governance therefore depends upon the capacity to monitor, investigate, learn, and adapt continuously (Ashby, 1956; Beer, 1979).

The relationship between these activities can be summarised as:

Monitor

↓

Diagnose

↓

Investigate

↓

Intervene

↓

Evaluate

↓

Adapt

This cycle represents a practical expression of societal learning and adaptive governance. Diagnostic indicators provide the initial signals that direct attention, Constraint Analysis provides causal understanding, and intervention modifies the constraint configurations responsible for system behaviour.

In this sense, Systemic Diagnostics may be viewed as one of the foundational processes through which societies, organisations, and institutions maintain viability in the face of changing circumstances.

8. Conclusion

Complex social systems are difficult to understand and improve because their behaviour emerges from large numbers of interacting constraints and processes. Although Constraint Analysis provides a powerful method for explaining system behaviour, detailed causal investigation is rarely the starting point for practical decision-making. In most circumstances, individuals, organisations, and governments first seek to determine whether a problem exists and where attention should be directed.

This paper has argued that Systemic Diagnostics and Constraint Analysis represent complementary stages in the process of understanding social systems. Systemic Diagnostics provides a top-down assessment of system condition. Because viability cannot be directly observed, it is disaggregated into the diagnostic dimensions of Potential, Flow, Capability, and Flexibility. Together with more detailed indicators, these

dimensions provide a structured means of identifying areas requiring further investigation.

Diagnosis is possible because social systems are functionally differentiated. Different subsystems perform different functions that contribute to overall viability, and dysfunctions often become visible through reductions in the effectiveness of those functions. Diagnostic indicators therefore provide clues regarding where difficulties are manifesting, although they do not reveal the underlying causes responsible.

Constraint Analysis provides this explanatory function. By investigating constraints, significant constraint components, and patterns of alignment or misalignment, it identifies the causal mechanisms responsible for observed conditions and supports the design of effective interventions.

The relationship between these stages may be summarised as:

Diagnose

↓

Explain

↓

Intervene

↓

Reassess

The examples presented in this paper demonstrate that diagnostic outcomes may vary in specificity. Some diagnostic signatures indicate broad system-wide dysfunction requiring comprehensive investigation, while others help direct attention towards particular functional domains or subsystems. In all cases, diagnostics helps narrow the search space for explanation, while Constraint Analysis identifies the causes of the observed condition.

Systemic Diagnostics and Constraint Analysis should therefore be understood not as alternative approaches but as complementary components of a unified methodology for understanding and improving complex social systems. Subsequent papers in this series build upon this foundation by exploring intervention design, governance, and the maintenance of viability in complex social systems.

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Definitions

D3.24 – Systemic Diagnostics

Systemic Diagnostics is a top-down process for assessing system condition through the use of diagnostic indicators and viability dimensions in order to identify areas requiring further investigation.

D3.25 – Diagnostic Indicator

A **diagnostic indicator** is an observable characteristic of a system that provides information regarding its condition, viability, or performance and may indicate the need for further investigation.

D3.26 – Viability Dimension

A **viability dimension** is a broad analytical category used to assess a particular aspect of system viability. In this framework, Potential, Flow, Capability, and Flexibility constitute the primary viability dimensions.

D3.27 – Diagnostic Expansion

Diagnostic expansion is the process of progressively disaggregating a general concern regarding system condition into increasingly specific viability dimensions, indicators, and areas requiring investigation.

Propositions

P3.45 – Diagnostic Expansion Proposition

Effective diagnosis proceeds through the progressive disaggregation of concerns regarding system viability into increasingly specific dimensions and indicators capable of directing further investigation.

P3.46 – Diagnostic–Explanatory Complementarity Proposition

Systemic Diagnostics and Constraint Analysis are complementary processes. Diagnostics identifies areas requiring investigation, while Constraint Analysis identifies the constraints and constraint components responsible for observed conditions.

P3.47 – Viability Disaggregation Proposition

Because viability cannot be directly observed, assessment of system viability requires the use of diagnostic dimensions and indicators that provide indirect evidence regarding system condition.