Practical Utility of Complex System Governance

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OLD DOMINION UNIVERSITY
IDEA FUSION

Scholarship – Research – Relationships – Practice

EMSE
Engineering Management and Systems Engineering

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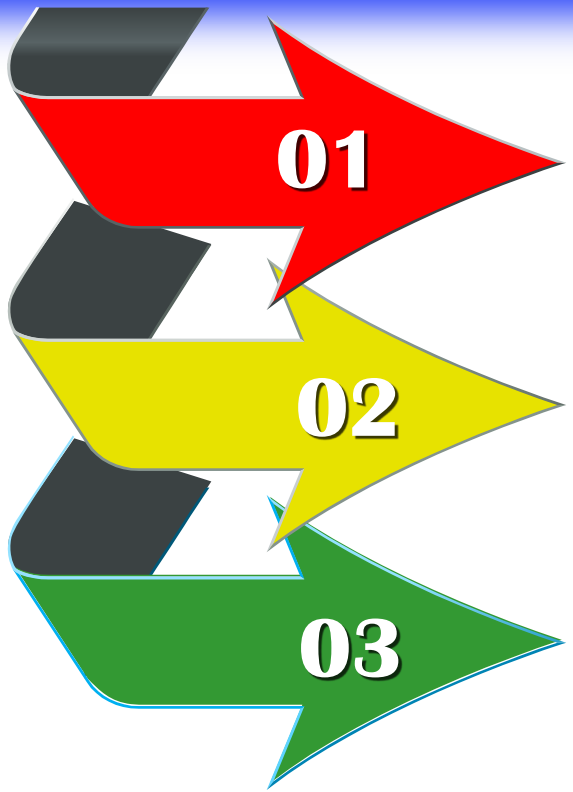
Purpose and Scenarios

PURPOSE: Explore 3 application scenarios to demonstrate practical utility of Complex System Governance as a response to increasingly complex systems and their problems

3 Scenarios



Workforce Capacity for dealing with complexity

System Failures resulting from flaws in governance functions

System Development investment of scarce resources

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10 REASONS
Why System Governance Can Fail
… AND WHAT YOU CAN DO TO FIX IT!

1) Information flow does not support consistent decision and action

Map information flows, mechanisms, and patterns related to support for analysis, decision, and evaluation

Assess information gaps and inconsistencies in appropriateness, accuracy, and accessibility

2) Lack of coordination among entities produces uncertainty and incongruence

Examine communication channels for their ability to dampen unnecessary oscillations with the system

Balance tensions between independence of system units and integration into the larger system

10

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Complex System Governance

CSG is the design, execution, and evolution [development] of the [nine] metasystem functions necessary to provide control, communication, coordination, and integration of a complex system

(Keating, et al. 2014)

Keating, C.B., Katina, P.F., & Bradley, J. M. (2014). Complex system governance: concept, challenges, and emerging research. *International Journal of System of Systems Engineering*, 5(3), 263-288.

Cost Overrun

Schedule Overrun

OBSERVED FAILURE(s)

Missed Performance Target

High Employee Turnover

1

2

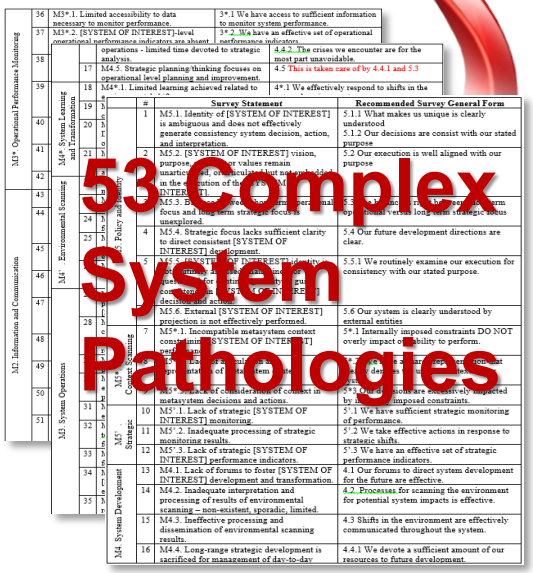
3

4

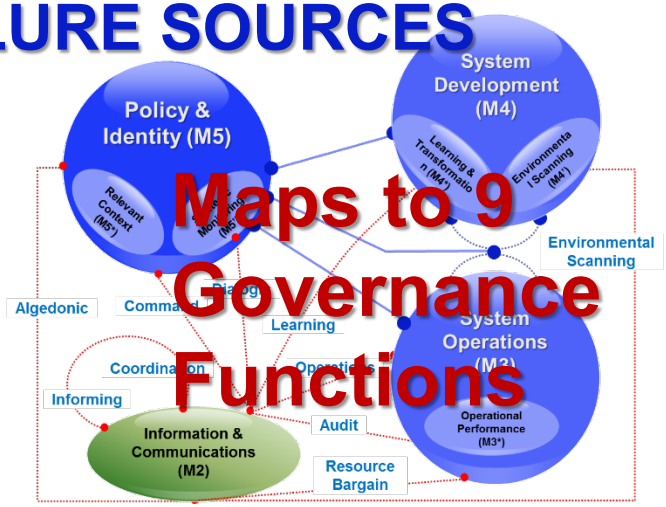
UNOBSERVED FAILURE SOURCES

Same underlying system pathology appears as 'different' surface issues

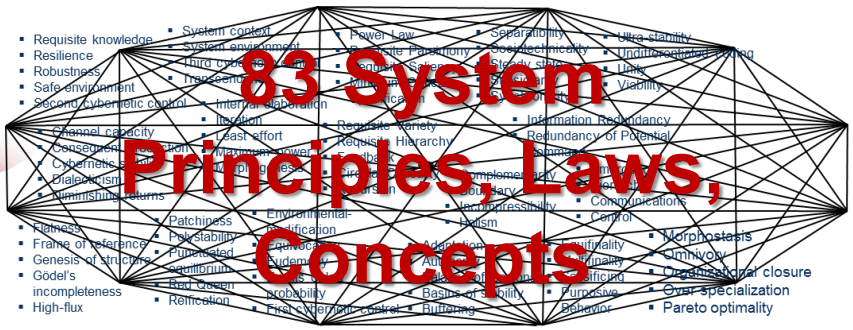
53 Complex System Pathologies



Maps to 9 Governance Functions



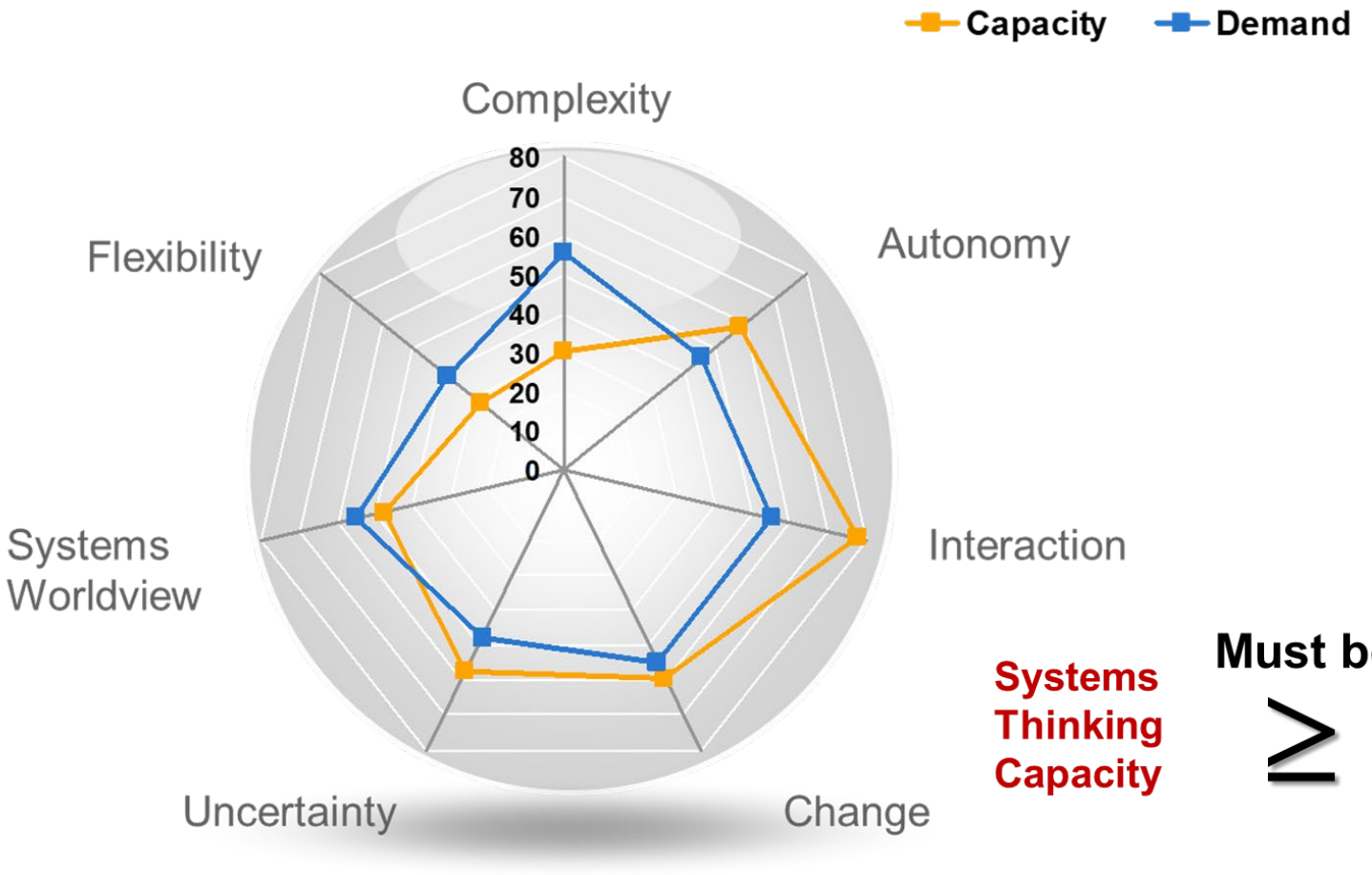
83 System Principles, Laws, Concepts



Complex System Governance: Practical Utility

Scenario 1: Workforce Capacity Sufficiency to Deal with Complexity

1 *Identification of gaps between workforce systems thinking capacity and complexity demanded by the environment*



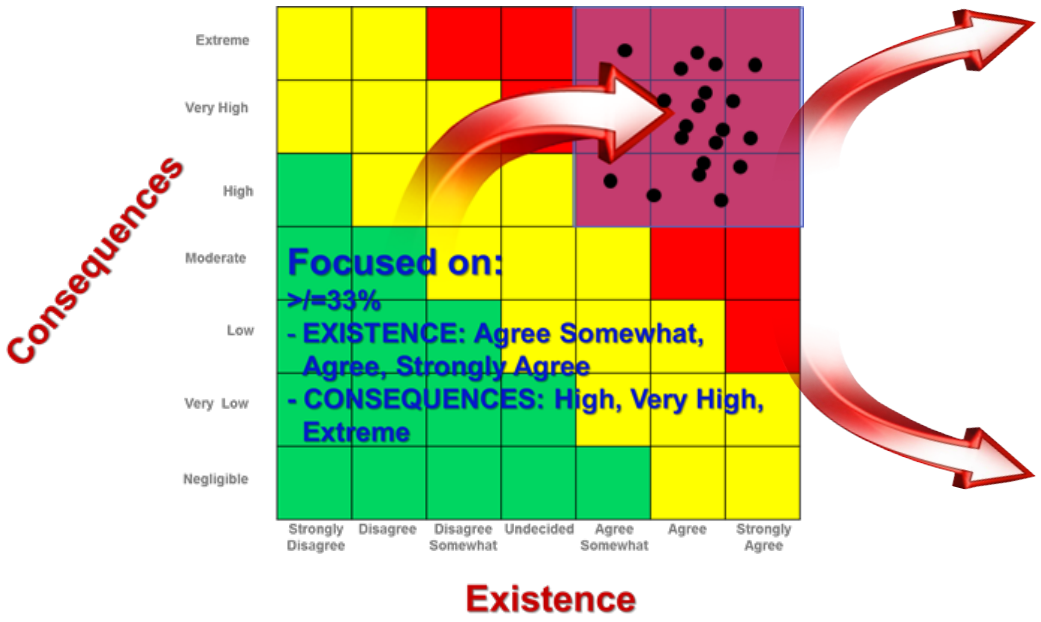
Systems Thinking Capacity **Must be** ≥ **Environment Complexity Demand**

Scenario 2: System Failures Resulting From Flaws in Governance Functions

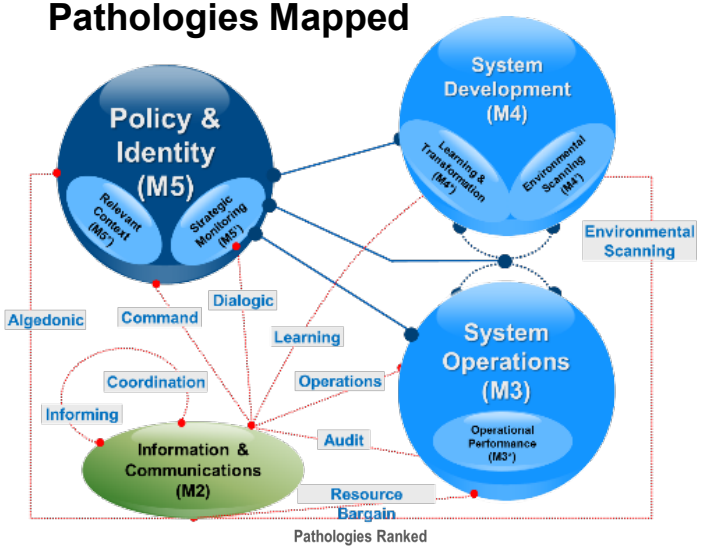
2

Identification, mapping, and prioritization of governance failure modes (pathologies)

Pathologies Identified

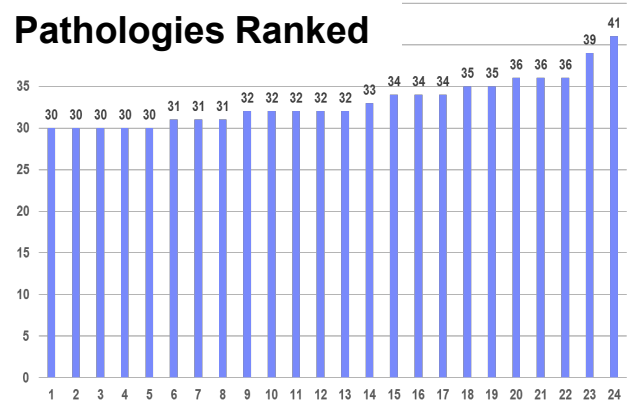


Pathologies Mapped



Pathologies Ranked

Pathologies Ranked

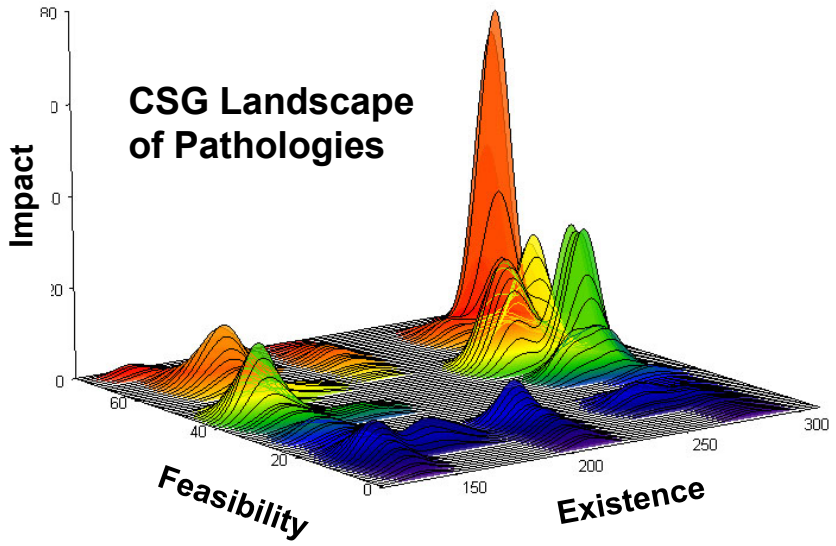


Scenario 3: System Development reallocation of scarce resources

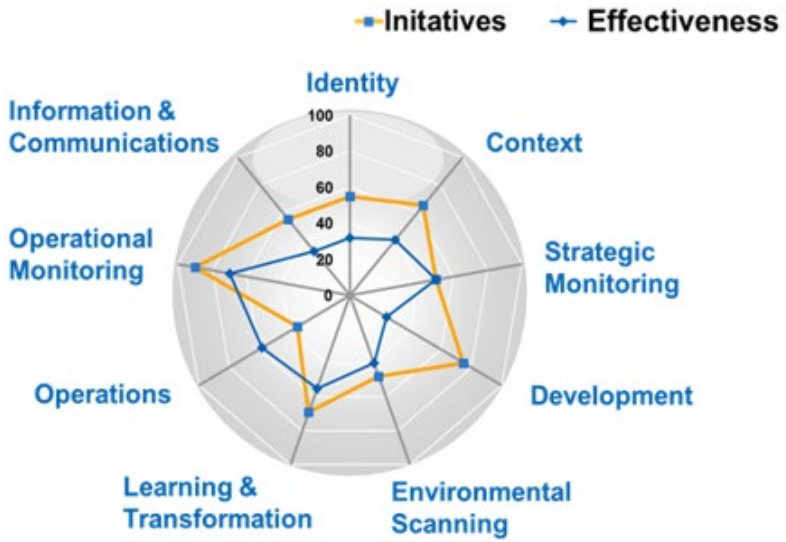
3

Definition of the CSG landscape of pathologies and mapping of initiatives against landscape

CSG Landscape Map to identify highest impact development areas.



Governance Check Aggregate Profile



16 Point Complex System Governance Check for Jefferson Lab

Jefferson Lab

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Open Discussion

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