

AFRICAN ASSOCIATION FOR
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Foundation



Anticipatory governance and systems thinking

Leveraging digital technology for public sector transformation

22nd September 2026
Kenya School of Government (KSG)
Mombasa, Kenya
Lead today – shape tomorrow

Kambidima Wotela, Ph.D (UCT)

- Some of the questions that we will reflect on
 - What is systems thinking versus systems methodology versus systems analysis?
 - How can systems approaches improve policy responses to complex challenges?
 - Who are the key actors in systems approaches on the continent?
 - How do we facilitate the interaction of these actors? interact?
 - Where are the gaps, bottlenecks, or opportunities for collaboration?

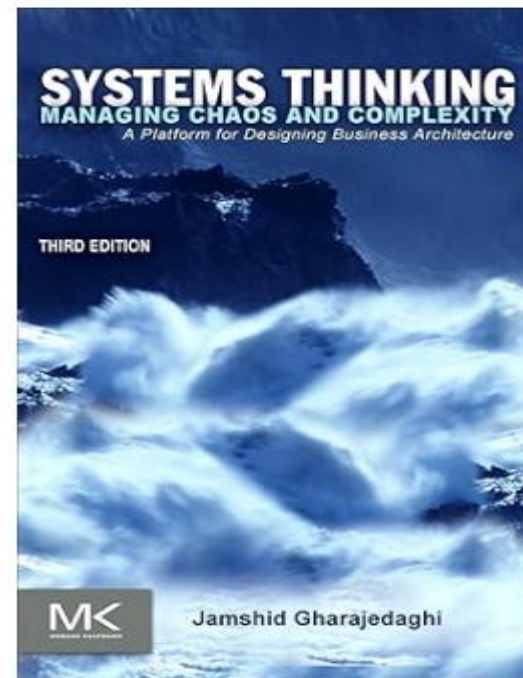
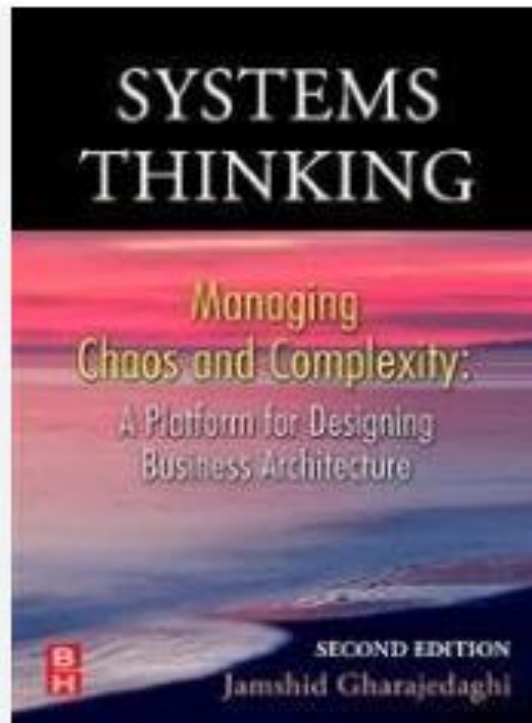
■ Outcomes

- About the presenter and initiation to systems thinking
- Introduction to systems thinking in policy contexts
- Some systems thinking tools and case-based learning
- Sub-Saharan Africa Regional Member Organization (SSARMO) of International Institute for Applied Systems Analysis (IIASA)

- **Systems thinker and doer ...**
 - Trained demographer (ethnological)
 - Facilitator at the WITS Graduate School of Governance
 - Systems thinking
 - Monitoring and evaluation
 - Research methods
 - Analytical and quantitative methods
 - Academic Director at the WITS School of Governance
 - A member of SSARMO



- Towards systems thinking ...
 - Monitoring and evaluation problem trees and logic models
 - An innocent Saturday visit to a friend
 - Introduced a module called, systems thinking for monitoring and evaluation



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SHAPE TOMORROW**

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- Understanding systems thinking in context
 - Complexity
 - Why is the second born not far better than the first
 - Why are we still grappling with poverty, unemployment, and other social ills

- Describing complexities (Patricia Rodger, 2008)
 - Simple
 - Linear
 - Single organisation
 - Single causal strand
 - Universal mechanism
 - Complicated
 - Multiple interdisciplinary and cross-jurisdictional agencies
 - Multiple simultaneous causal strands
 - Different causal mechanisms in different contexts
 - Complex
 - Recursive, with feedback loops
 - Emergent outcomes

- Describing complexities (public sector context)
 - Within the public sector understanding, what is complexity?

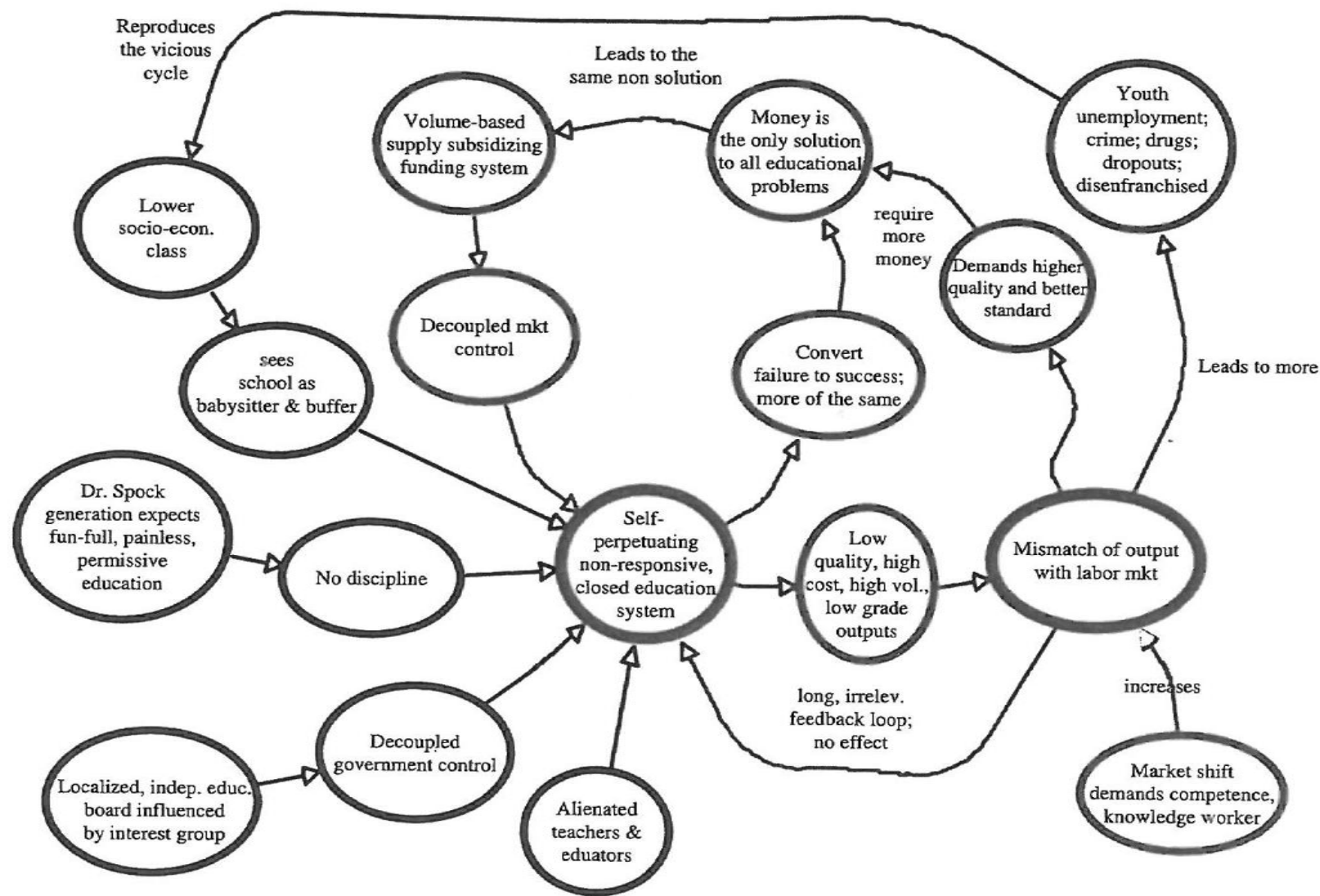
■ Describing complexities (public sector context)

- As the world faces increasingly complex environmental issues such as climate change, biodiversity loss, water scarcity and quality, and land degradation, the need for innovative and comprehensive solutions becomes paramount. Through the lens of systems thinking, policymakers and experts can uncover the root causes of these challenges and the interplay between climate change and human populations in various contexts to mitigate growing inequality and to develop sustainable strategies to address these challenges effectively. Africa is particularly vulnerable to such challenges due to the combination of specific geographical, socioeconomic, and environmental factors.

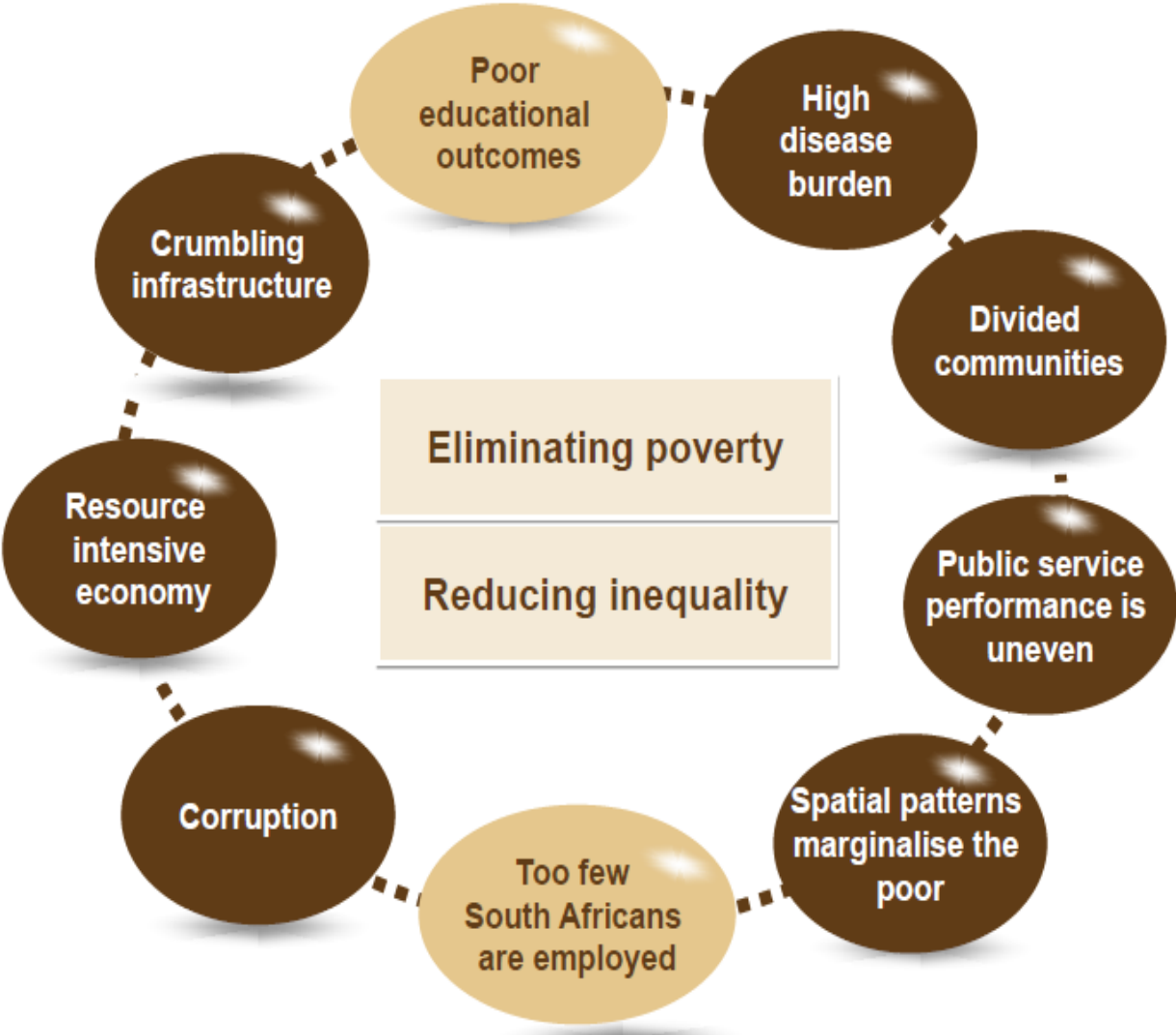
The International Institute for Applied Systems Analysis (IIASA) is dedicated to applying systems analysis to environmental development issues to provide evidence-based insights and solutions that empower policymakers, institutions, and experts to devise effective policies and strategies for a sustainable future. In collaboration with its National and Regional Member Organizations (NMOs/RMO), the institute conducts cutting-edge research across various environmental and development topics.

This special issue aims to showcase the latest advancements in systems analysis and its application to environmental and societal challenges in Africa. We invite submissions from researchers from across the institute as well as from collaborators in Africa.

■ Describing complexities (public sector context)



■ Describing complexities (public sector context)



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- Class discussion
 - What is systems thinking?
 - What is systems analysis?
 - What is systems methodology?

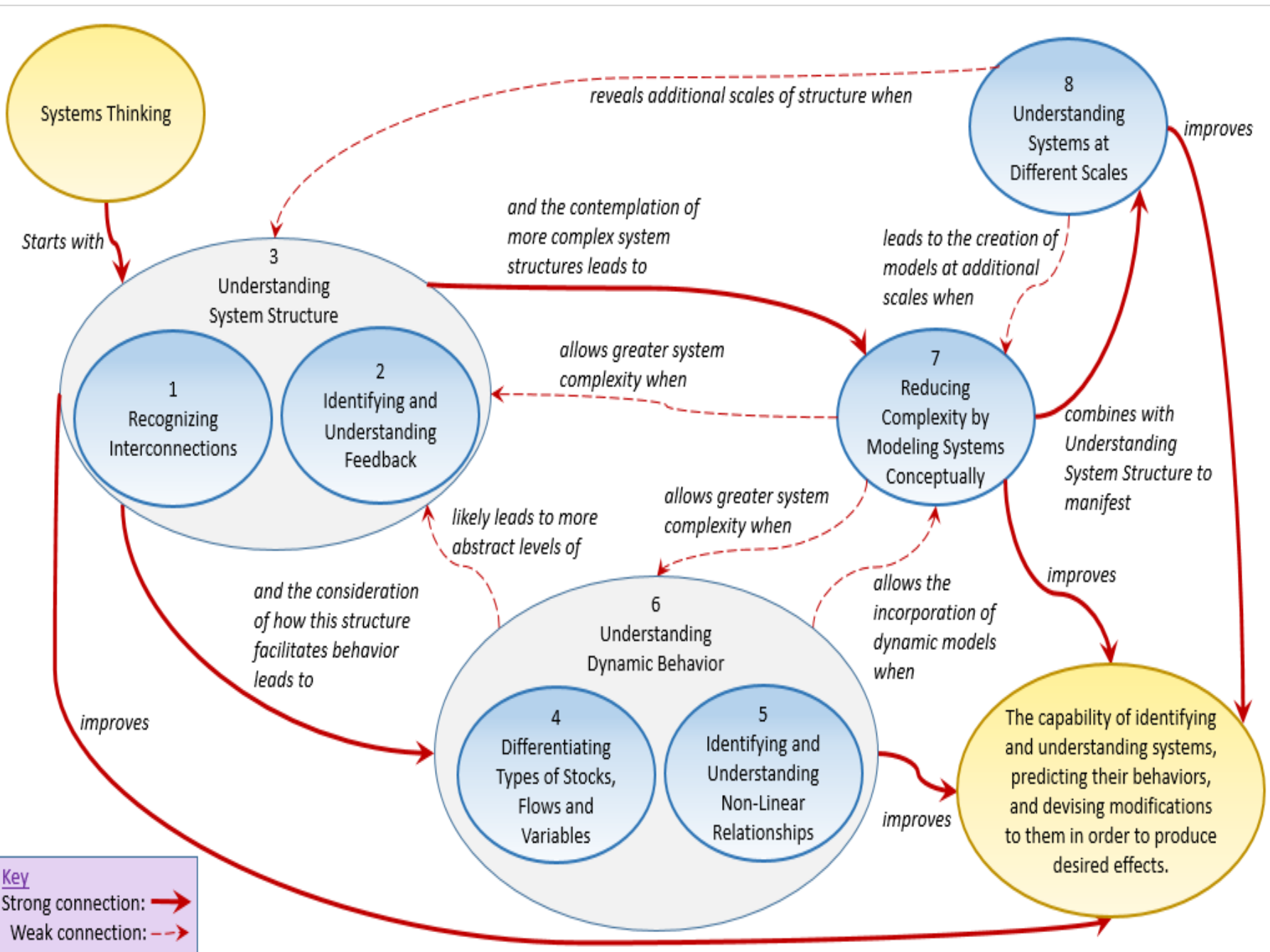
<<<Remember everything is connected>>>

<<<What underlies the symptoms that we are seeing>>>

- The various 'thinking' approaches
 - Linear thinking ... involves looking for [one] a link between a cause and an effect
 - Event-oriented thinking ... acknowledges complexities but views life as a series of events and not as a system
 - Lateral thinking ... involves creative thinking that does not rely upon traditional step-by-step, logical thinking
 - Does not have a clear objective and ending point
 - Lacks structure and defined goals
 - Critical thinking involves analysing facts objectively before judgment
 - Skepticism and questioning facts should be for a good reason and backed up facts

- There is no general agreement on what exactly system thinking, systems analysis, or systems methods/methodology is ...
 - ... a structured, iterative, step-by-step approach of looking at or decoding complexity that entails identifying the parts and determining relationships between (i.) parts, (ii.) each part and whole, (iii.) all the parts and whole

■ Iterative process of questioning/inquiry



The System Test

A requirement for a systems thinking definition

Purpose

Describes the purpose of systems thinking in a way that can be clearly understood.

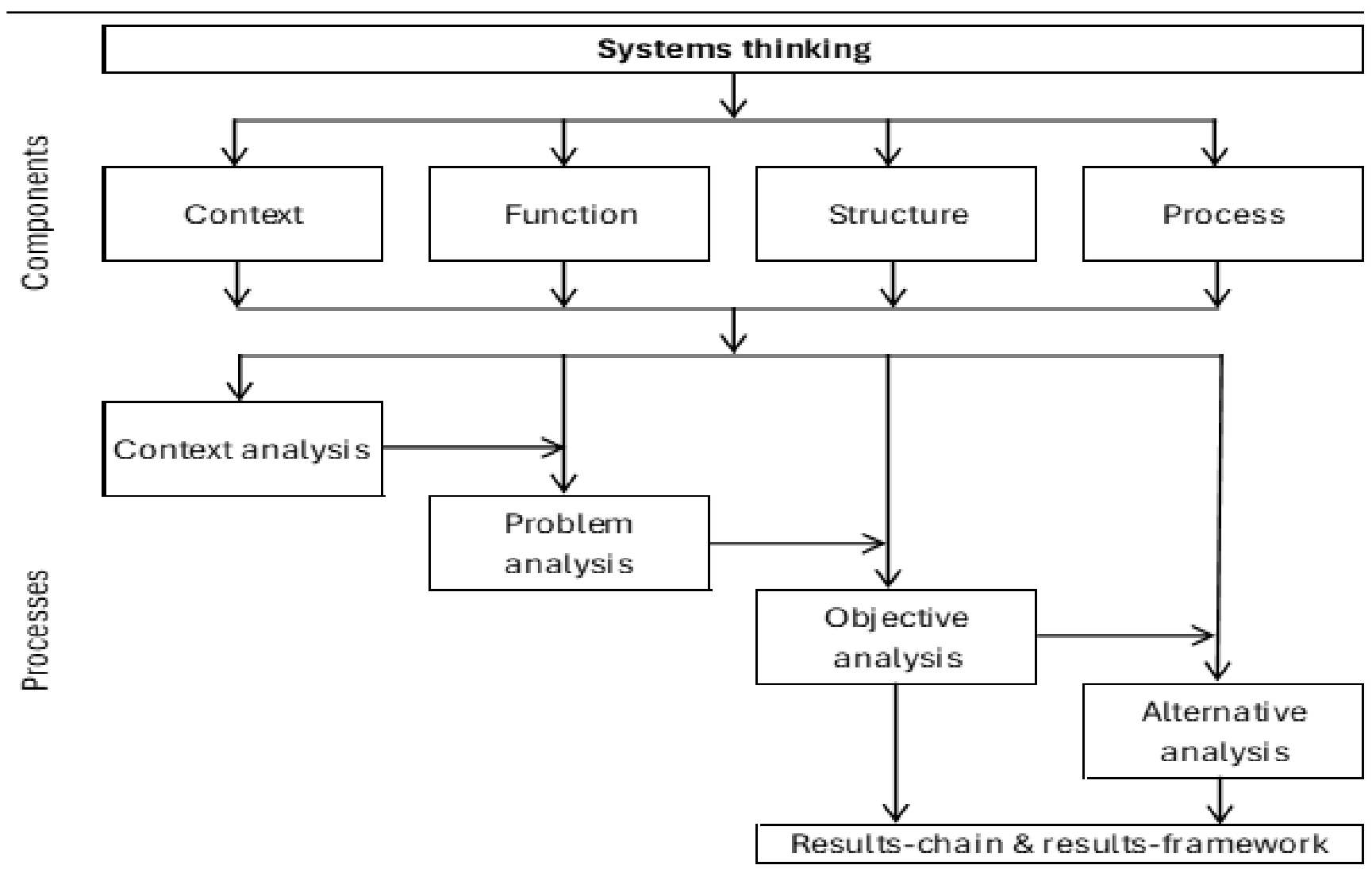
Elements

Describes the characteristics of systems thinking, such as the ability to do X.

Interconnections

Describes the ways the systems thinking elements feed into and relate to each other.

■ Adapted from Gharajedaghi, J. (2011) and Arnold, R. D., & Wade, J. P. (2015)



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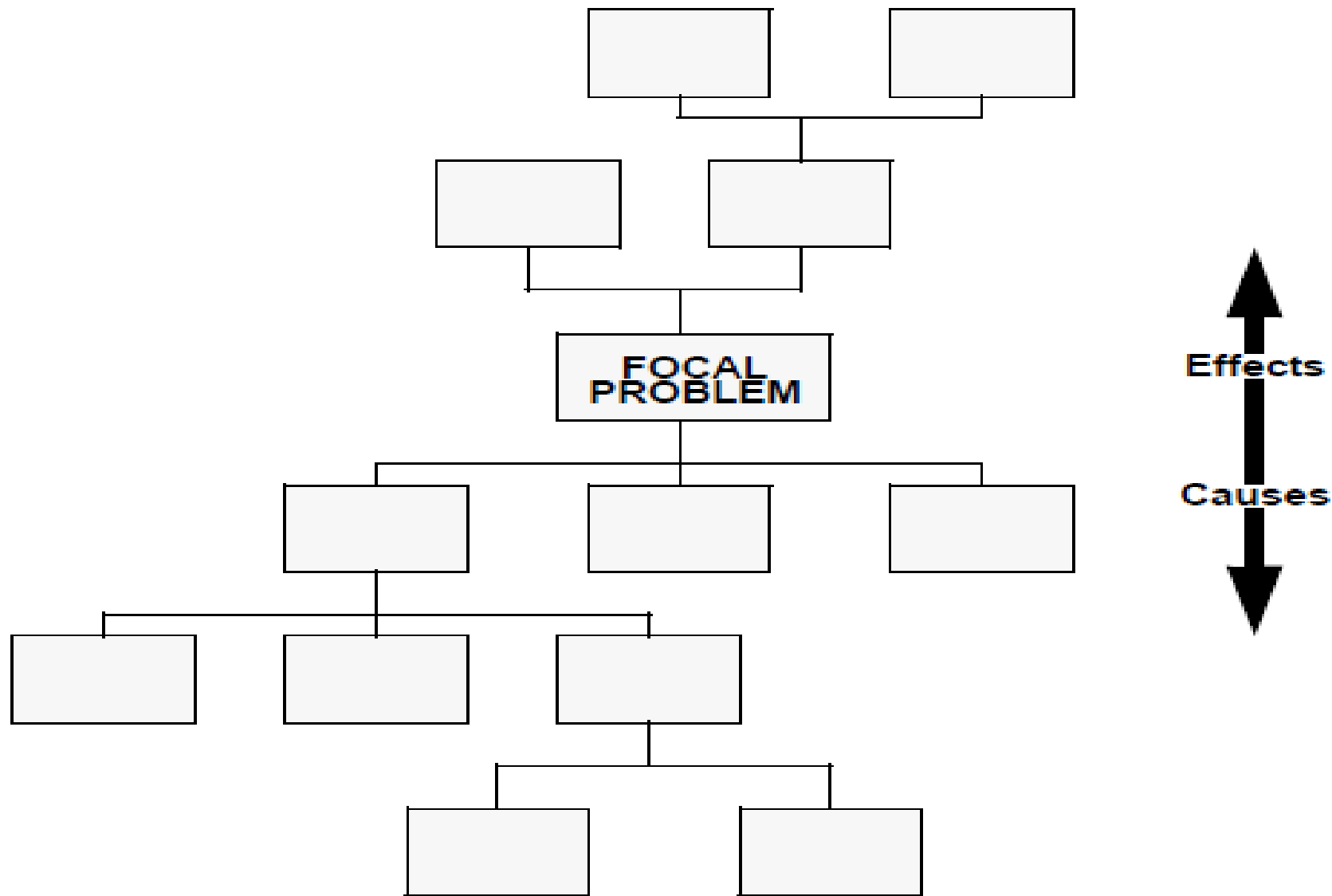


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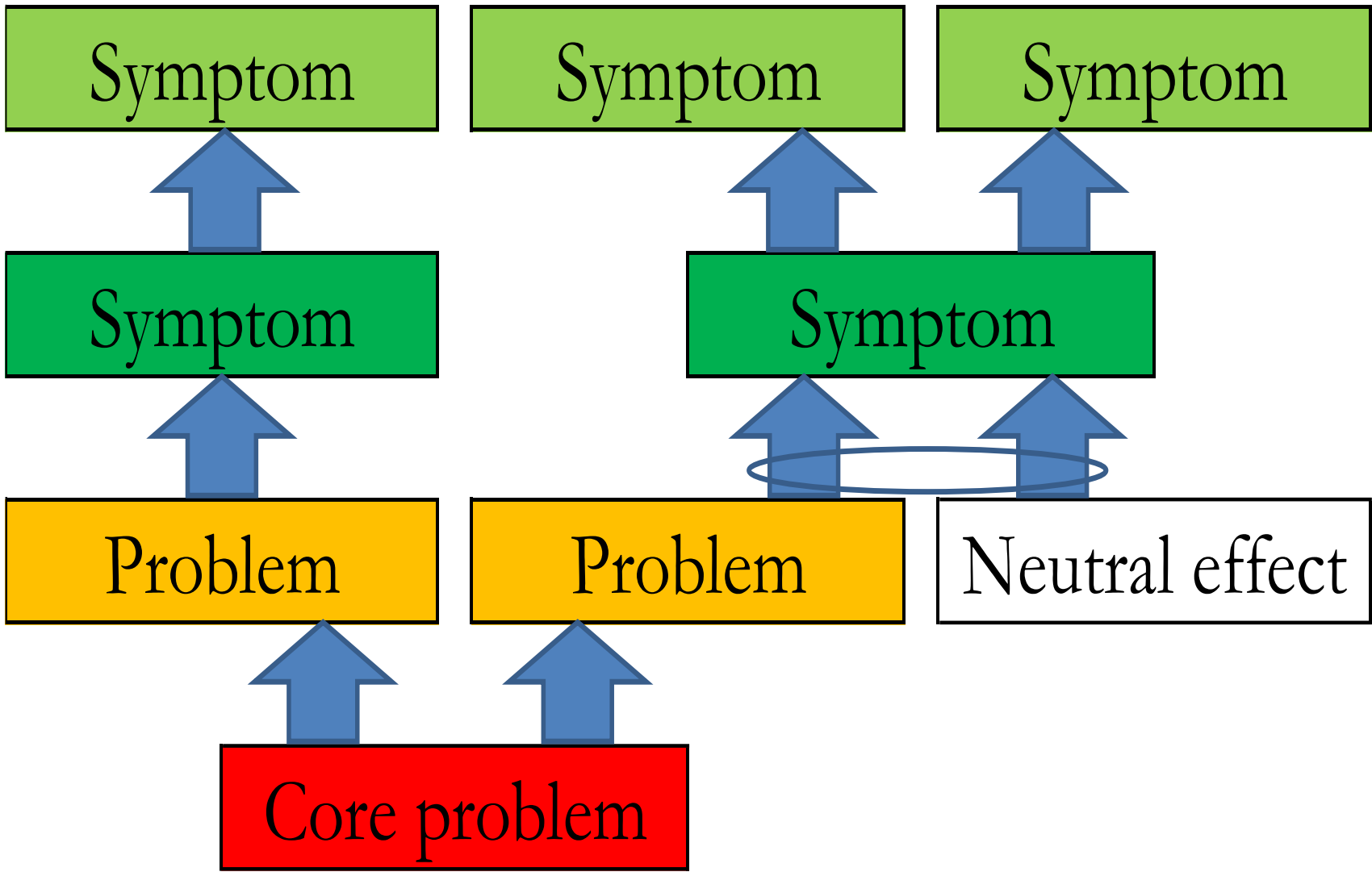
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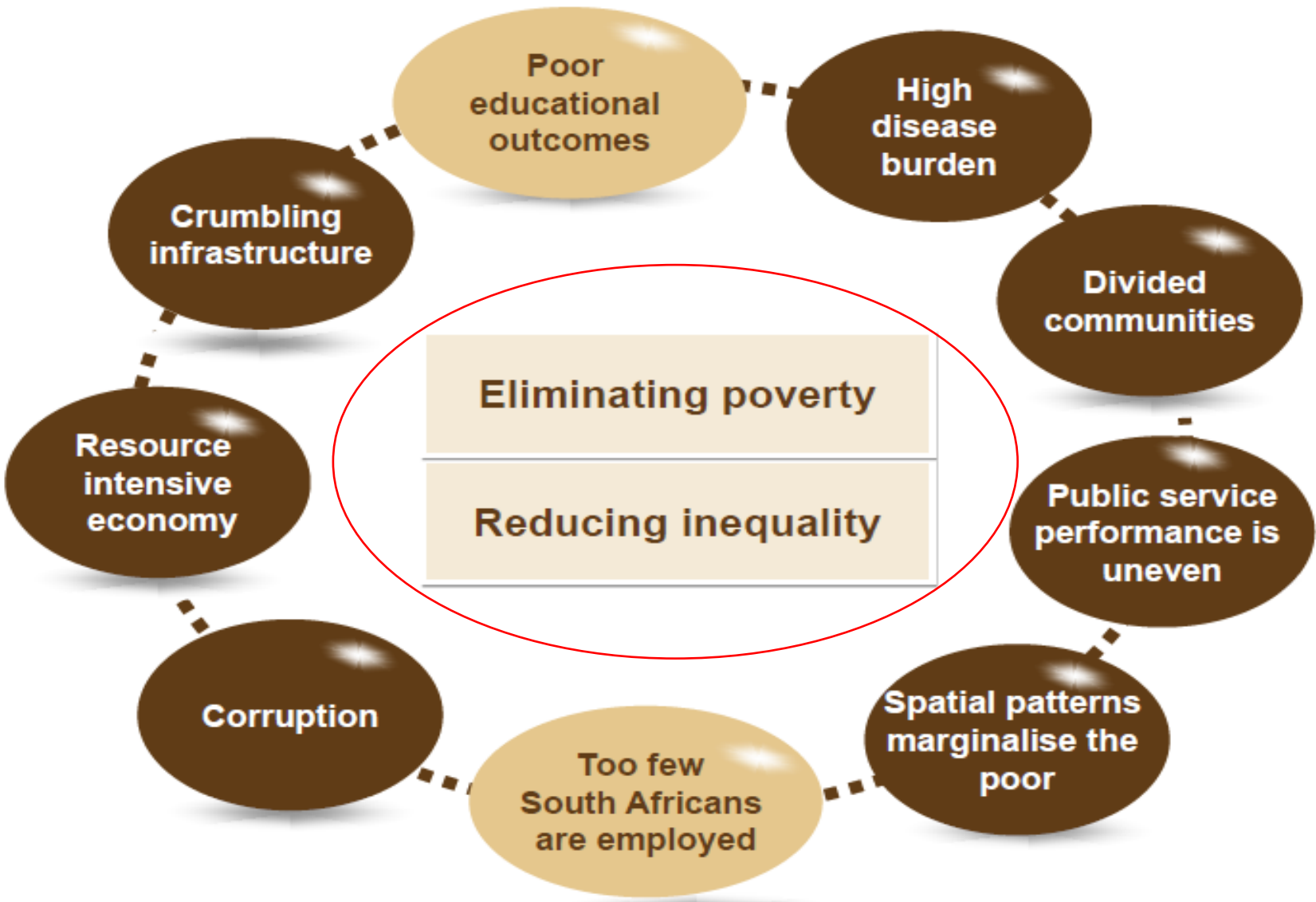
■ Problem mapping



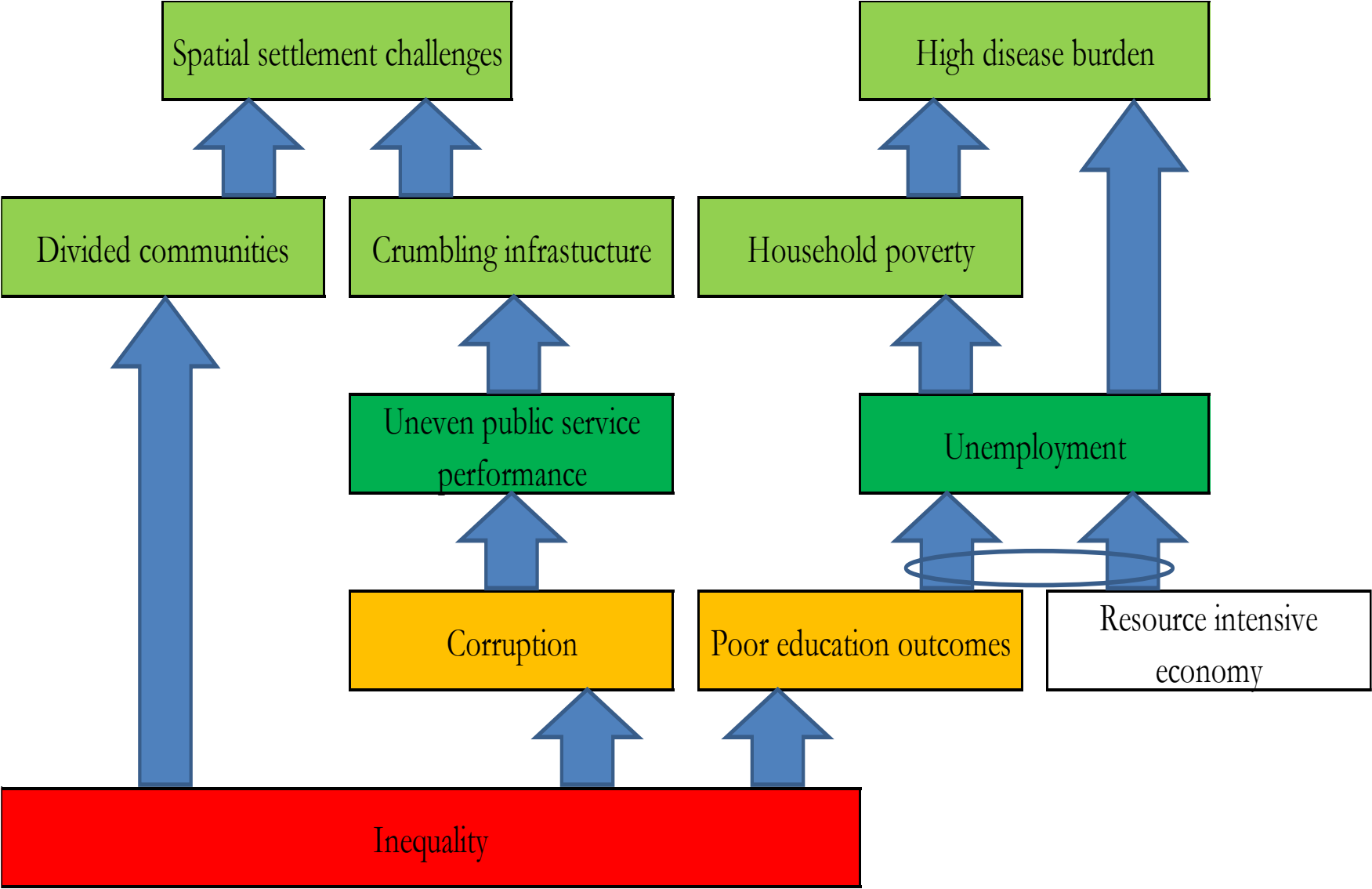
■ Youngman's (2009) theory of constraint



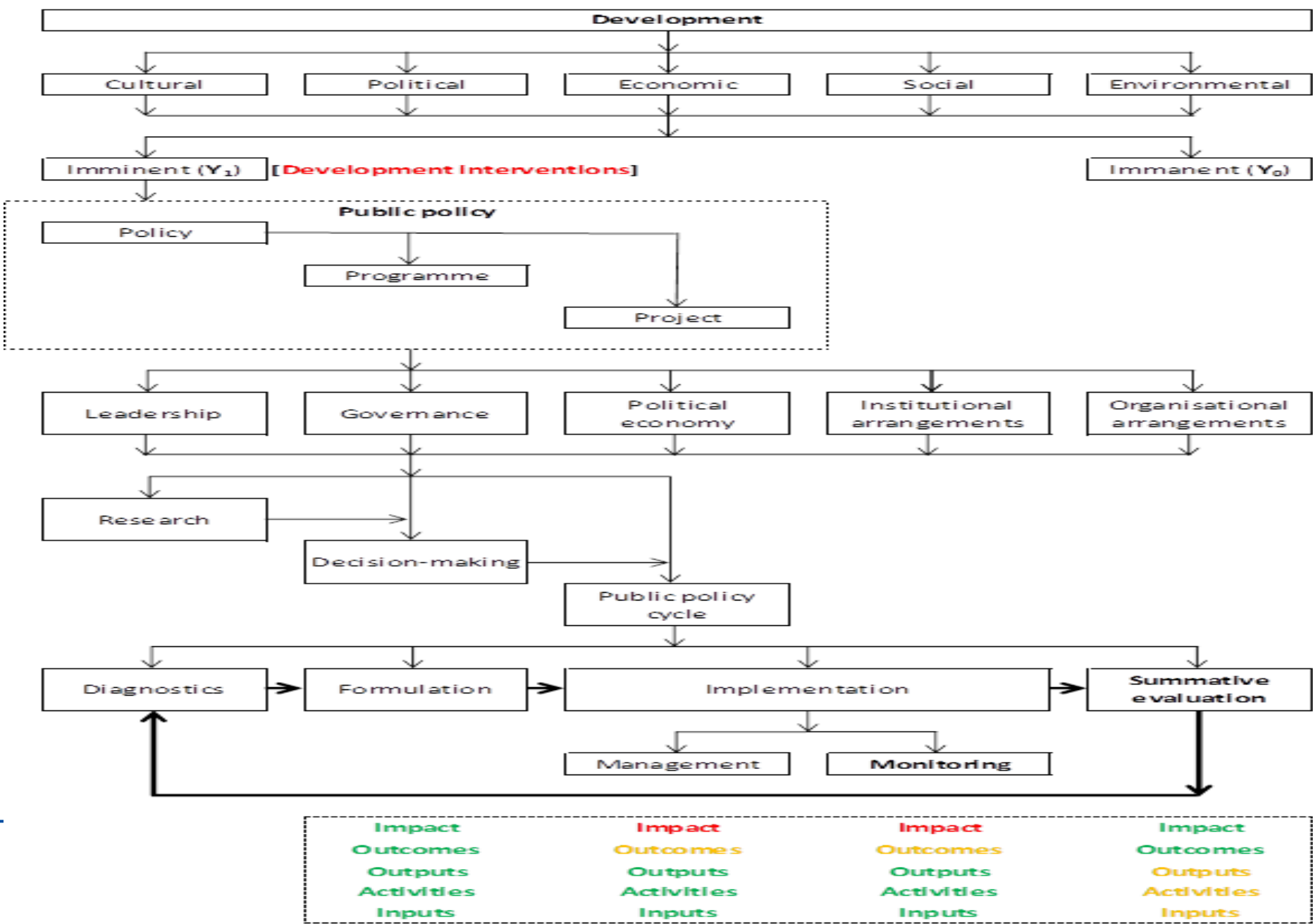
■ Recall the South African diagnostic attributes



■ Using a systems thinking approach ...



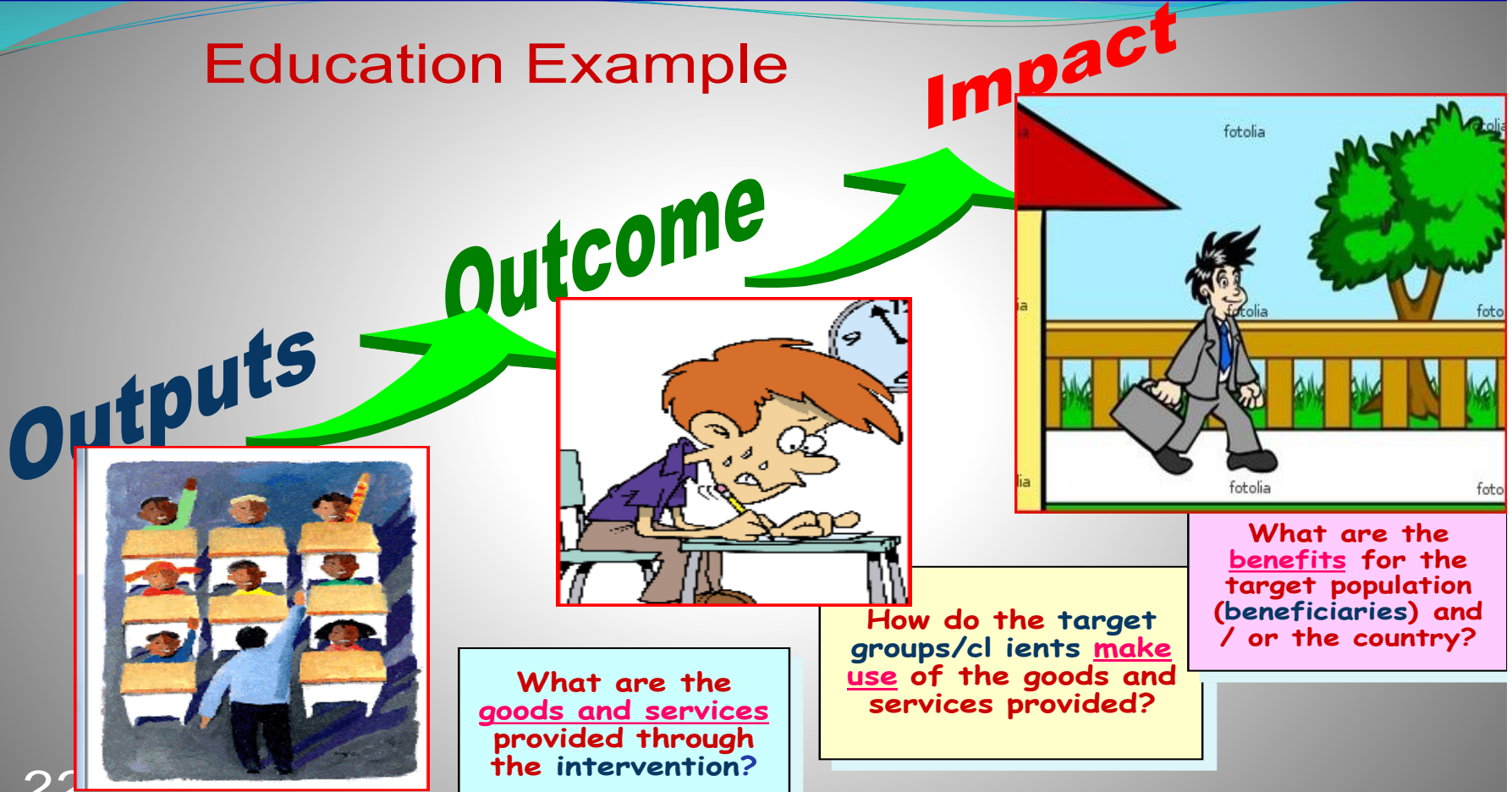
Public sector discourse



- A good problem analysis, in contexts, provides for effective and impactful solutions

Outputs, Outcomes, & Impacts

Education Example



How can systems approaches improve policy responses to complex challenges?



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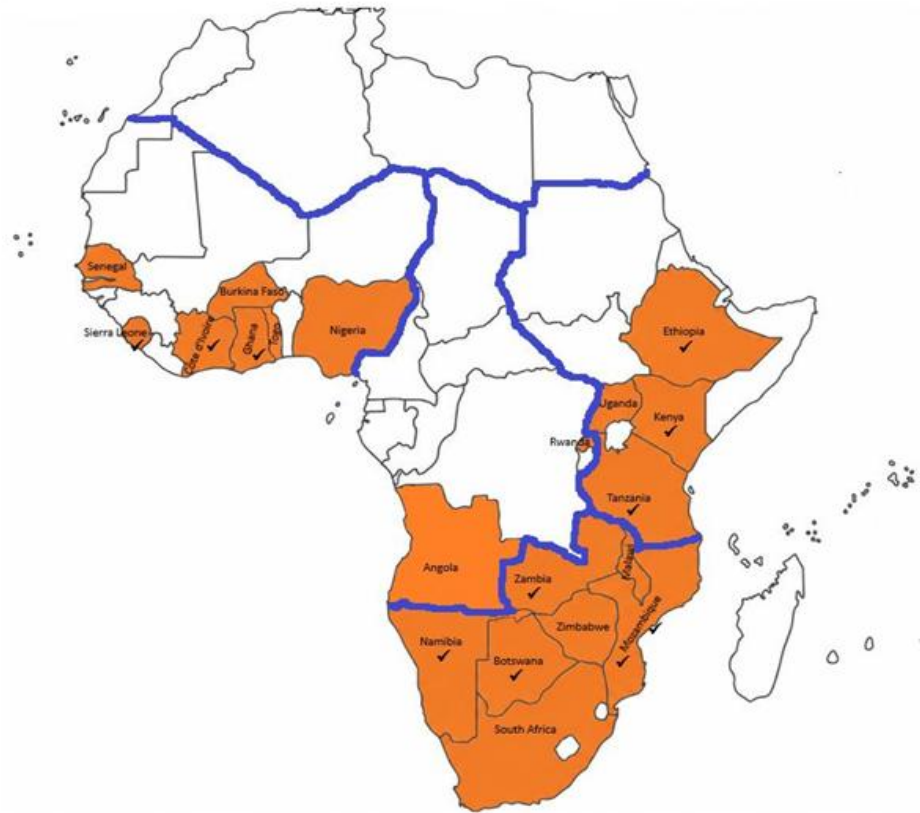
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- The nesting organisations of the sub-Saharan African Regional Member Organisation (SSARMO)
 - International Institute for Applied Systems Analysis (IIASA)
 - Independent international research institute with members in the Americas, Asia, and Europe
 - Conducts independent policy-oriented research on the interconnected global challenges
 - The Southern African Systems Analysis Centre (SASAC)
 - Collaborative initiative that aims to grow and develop systems analysis research capacity in Southern Africa
 - Facilitates a transdisciplinary approach to solving complex regional sustainability and policy problems

- The nesting organisations of the sub-Saharan African Regional Member Organisation (SSARMO)
 - The Science Granting Councils Initiative (SGCI)
 - Strengthening institutional capacities of Science Granting Councils in sub-Saharan Africa



- The nesting organisations of the sub-Saharan African Regional Member Organisation (SSARMO)
 - The sub-Saharan African Regional Member Organisation (SSARMO)
 - Through SASAC, to develop integrated systems solutions and policy insights to the current, emerging, and novel regional challenges and opportunities
 - The National Research Foundation (NRF) of South Africa is the secretariat hub for SSARMO and has a regional vote on the IIASA Council

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- Some successes towards the sub-Saharan African Regional Member Organisation (SSARMO)
 - Between 2016 and 2022
 - Three-year systems analysis bursary programme
 - Systems analysis capacity development programme
 - High-level capacity strengthening programme
 - Early postgraduate education Programme ... culminated in the development of an honour's-level systems analysis module

■ The new sub-Saharan African Regional Member Organisation (SSARMO) agenda

- Collaborative joint research projects (aligned with IIASA themes and beyond).

3



RESEARCH COLLABORATION

- Joint research projects and publications
- Collaborative proposal development
- Research networks around shared challenges
- Mechanisms for connecting African researchers with IIASA programmes
- Opportunities for researcher exchanges and placements

Building long-term, thematic and multidisciplinary collaboration around regional and global priorities.

1



STRENGTHENING THE DOCTORAL AND EARLY-CAREER PIPELINE

- Integration of systems thinking and applied systems analysis as core components of doctoral training
- Structured student-supervisor and mentor matchmaking with IIASA researchers
- Co-supervision and joint mentorship frameworks involving African institutions and IIASA
- Strengthening the SASAC-YSSP pipeline through structured pre-application support and proposal clinics
- Establishing clearer postdoctoral and early-career progression pathways, including potential IIASA placement models

PPHP provides national-scale support. SASAC enhances PPHP candidates through methodological depth, international integration and regional collaboration opportunities.

- Student scholarship and postdoctoral fellowship programme (co-supervision – linked to IIASA-Connect).

- Student and postdoctoral fellowship mobility and placement programme.

2



POSTDOCTORAL, MOBILITY AND EXCHANGE PATHWAYS

- A structured IIASA postdoctoral placement pathway for Sub-Saharan African researchers
- Short-term research exchanges (1–3 months) for PhD students, postdoctoral fellows, and early-career academics
- Joint research residencies linked to ongoing IIASA programmes
- Alignment with national and regional mobility initiatives
- Mechanisms to support long-term collaborative research teams and leadership development

Moving from ad hoc exchanges to a coordinated mobility and collaboration model that strengthens individual and institutional capacity.

Sub-Saharan Africa Regional Member Organization of International Institute for Applied Systems Analysis



■ The new sub-Saharan African Regional Member Organisation (SSARMO) agenda

- Capacity development programmes for policy makers (adapting the NAASAC model currently supported by IIASA).

5

SYSTEMS THINKING PROGRAMME FOR POLICYMAKERS



- Practical systems approaches for policy formulation
- Scenario development and long-term strategic planning
- Application of modelling tools to national and regional challenges

An existing curriculum developed by NAASAC will serve as a foundation, adapted to align with African governance structures and development priorities.

- **Affirming the new sub-Saharan African Regional Member Organisation (SSARMO) agenda**
 - Conduct a rapid needs assessment and gap analysis for systems thinking and analysis in Africa and its subregions
 - Compile an inventory of existing systems thinking and analysis initiatives and networks in Africa and its subregions

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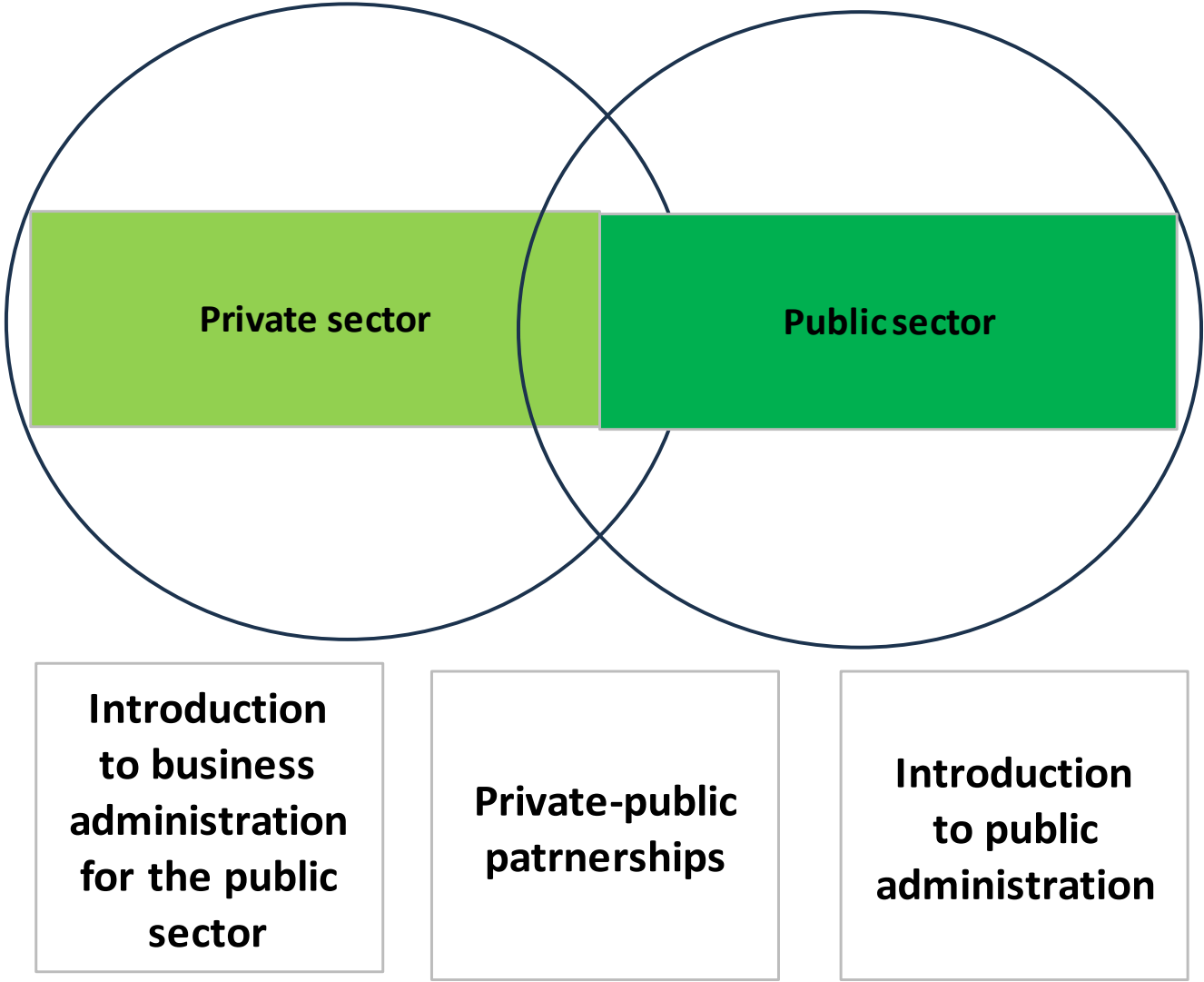
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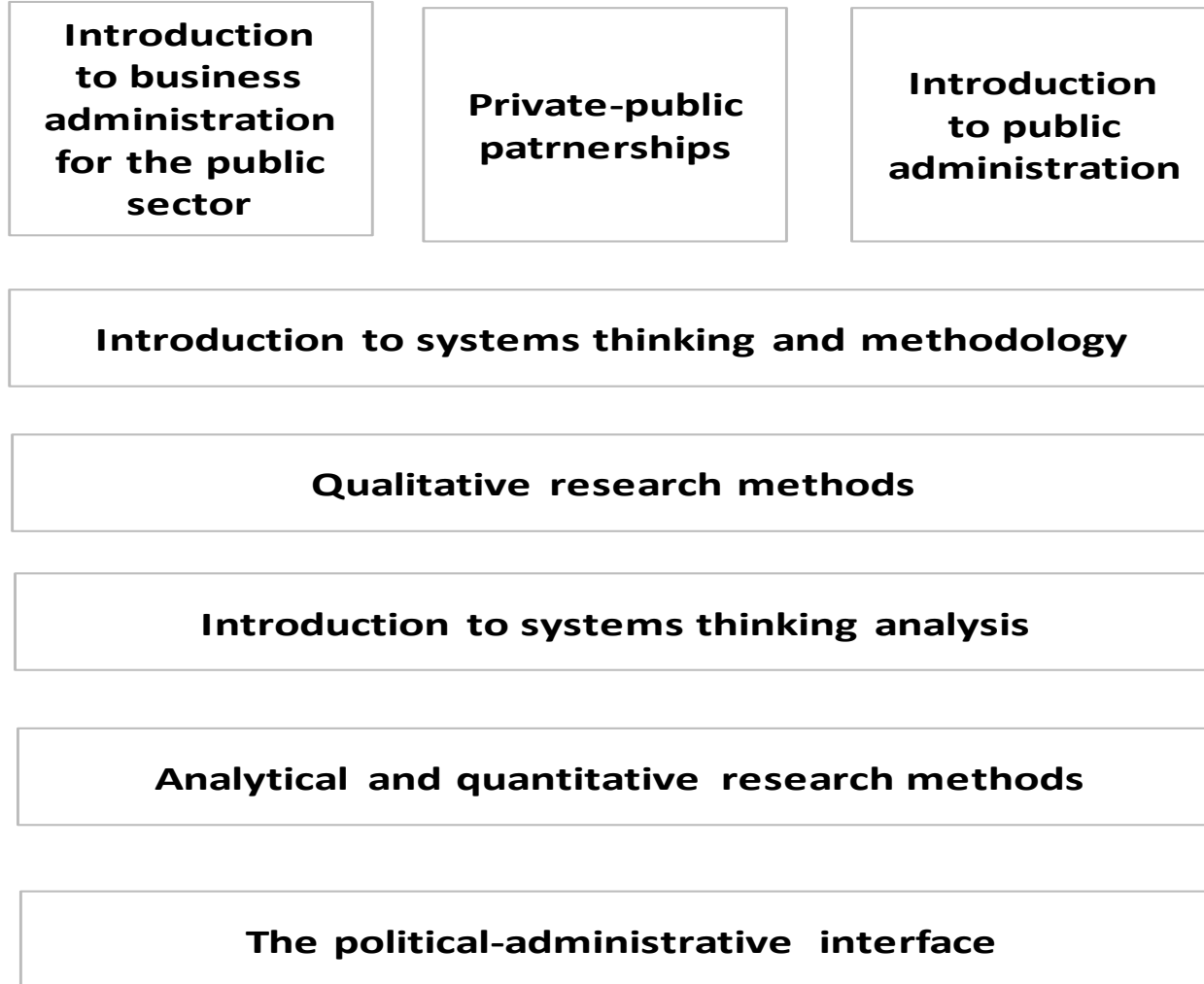
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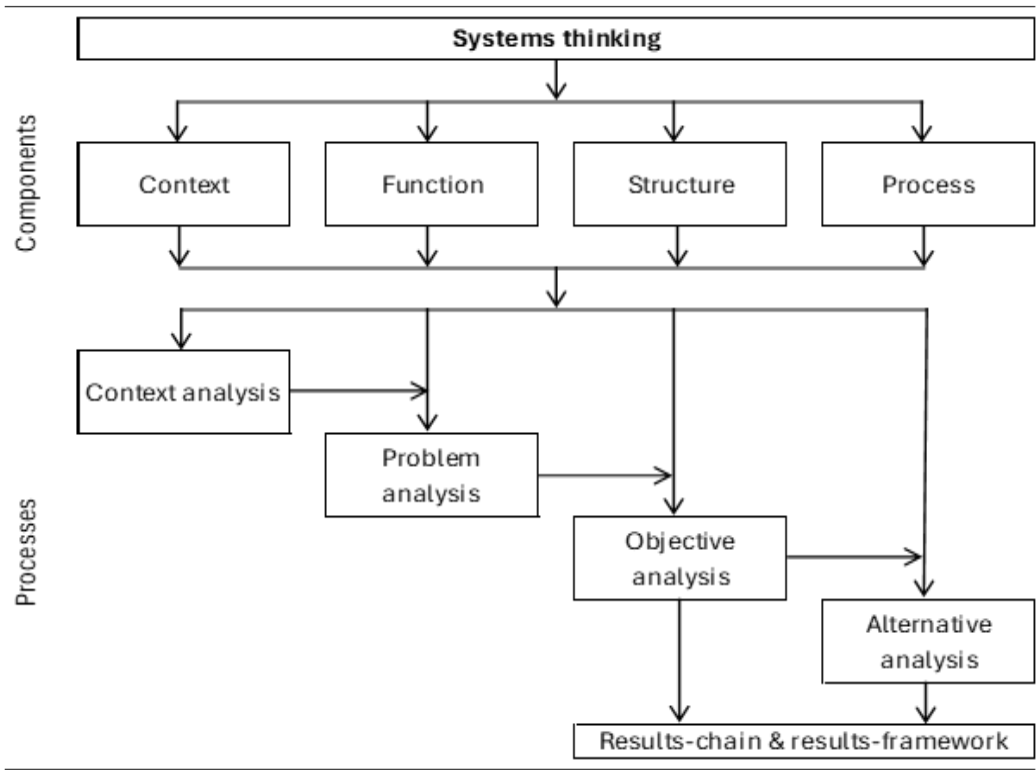
■ Our initial thinking on the systems thinking programme for policy makers



- **Our initial thinking on the systems thinking programme for policy makers**



■ Our initial thinking on the systems thinking programme for policy makers



Portfolio of evidence

Context analysis

Problem analysis

[Modelling] the proposed solution

Implementation arrangements



- Our initial thinking on the systems thinking programme for policy makers
 - Masterclasses
 - Certificate
 - Attendance
 - Completion/achievement
 - Competence
 - Postgraduate diploma
 - Masters by coursework and research

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System thinking to strengthen governance and policy responses to complex challenges





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