The role of a systems approach in innovation and industrialisation

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Overview

- Systems
- Innovation
- Industrialization
- A systems approach
- Gaps
- Findings

Systems

- Biology - nervous system, digestive system, immune system
- Ecology – ecosystem
- Astronomy – solar system
- Physiology – get it out of your system
- Transport – transport system, brake system
- Education – school system
- Society – heating system , metric system, public address system, sound system

Systems

*"A **group** or combination of **interrelated**, **interdependent**, or **interacting** elements or **components** forming a collective and **complex whole**, that share a **common purpose** and which work together in a certain way."*

Systems Theory

- Von Bertalanffy – General System Theory
- The whole is more than the sum of its parts
- Its about the whole and the parts and their relationships
- Open and Closed systems
- Supra- and sub-systems
- Management: learning, knowledge, environment, relationships, adaptation, complexity

Systems thinking

- Function is more important than structure
- Understanding vs knowledge
- Explain, rather than describe
- Looking out of instead of looking into
- Interdependent vs independent
- Solution seeking vs problem solving
- Cross-functional vs silos
- Strategy vs goals
- Multi-, inter- and intra-disciplinarity

Innovation

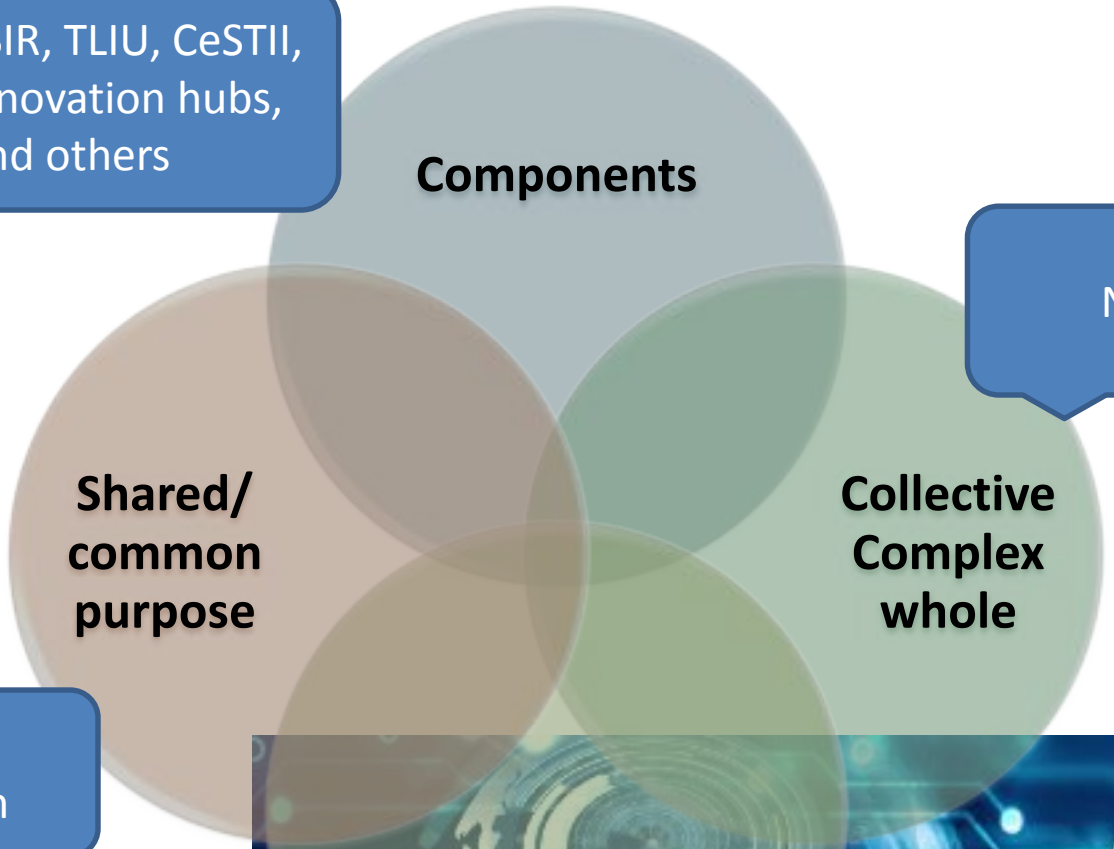
- *“innovation in this research is defined as the development and implementation of new to the market or company or significantly improved product or process that brings economic benefit to the company.”* – Resele (2015)
- *“an evolutionary, non-linear and interactive process between the firm and its environment”* - Kaufmann and Tödtling (1999)

NSI

“set of functioning institutions, organisations, and policies which interact constructively in the pursuit of a common set of social and economic goals and objectives” - 1996 Whitepaper

Innovation System

NACI, TIA, DST, dti, CSIR, TLIU, CeSTII, CIPC, universities, Innovation hubs, accelerators and others



NSI

Support Innovation

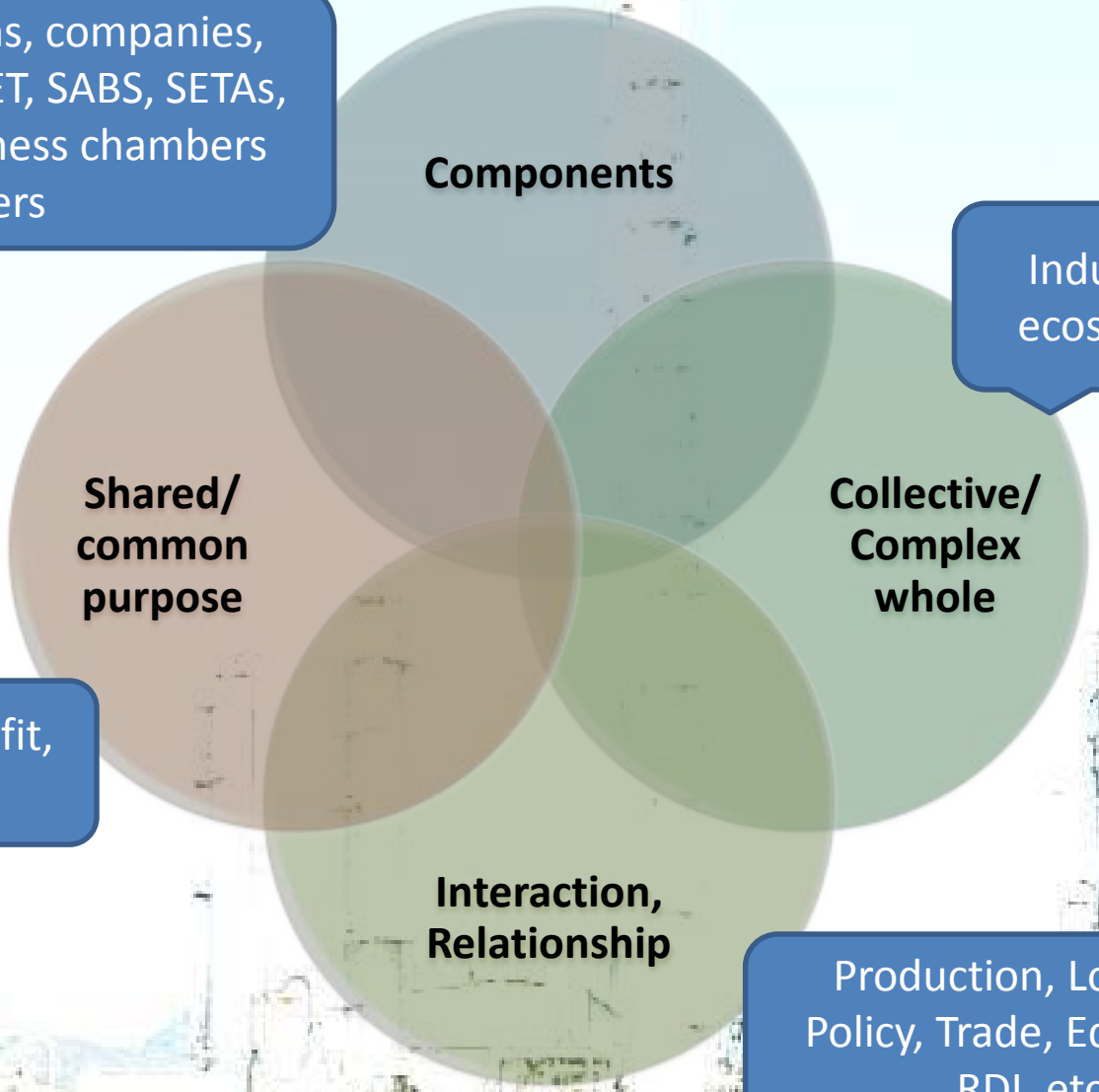
Funding, R&D, Projects, Policy, Innovation Bridge, Education, OpenIX, etc

Industrialization

- *"the act or process of industrializing: the widespread development of industries in a region, country, culture, etc."* – Merriam-Webster Dictionary
- *"the process of developing industries in a country"* – Cambridge Dictionary
- *"The long-term intensification of South Africa's industrialisation process, and movement towards a twenty-first century knowledge economy" & "Contributing to industrial development in Africa, with a strong emphasis on building regional productive capabilities "* - NIPF

Industrialization System

Industry associations, companies, unions, dti, DoE, DHET, SABS, SETAs, SANAS, banks, business chambers and others

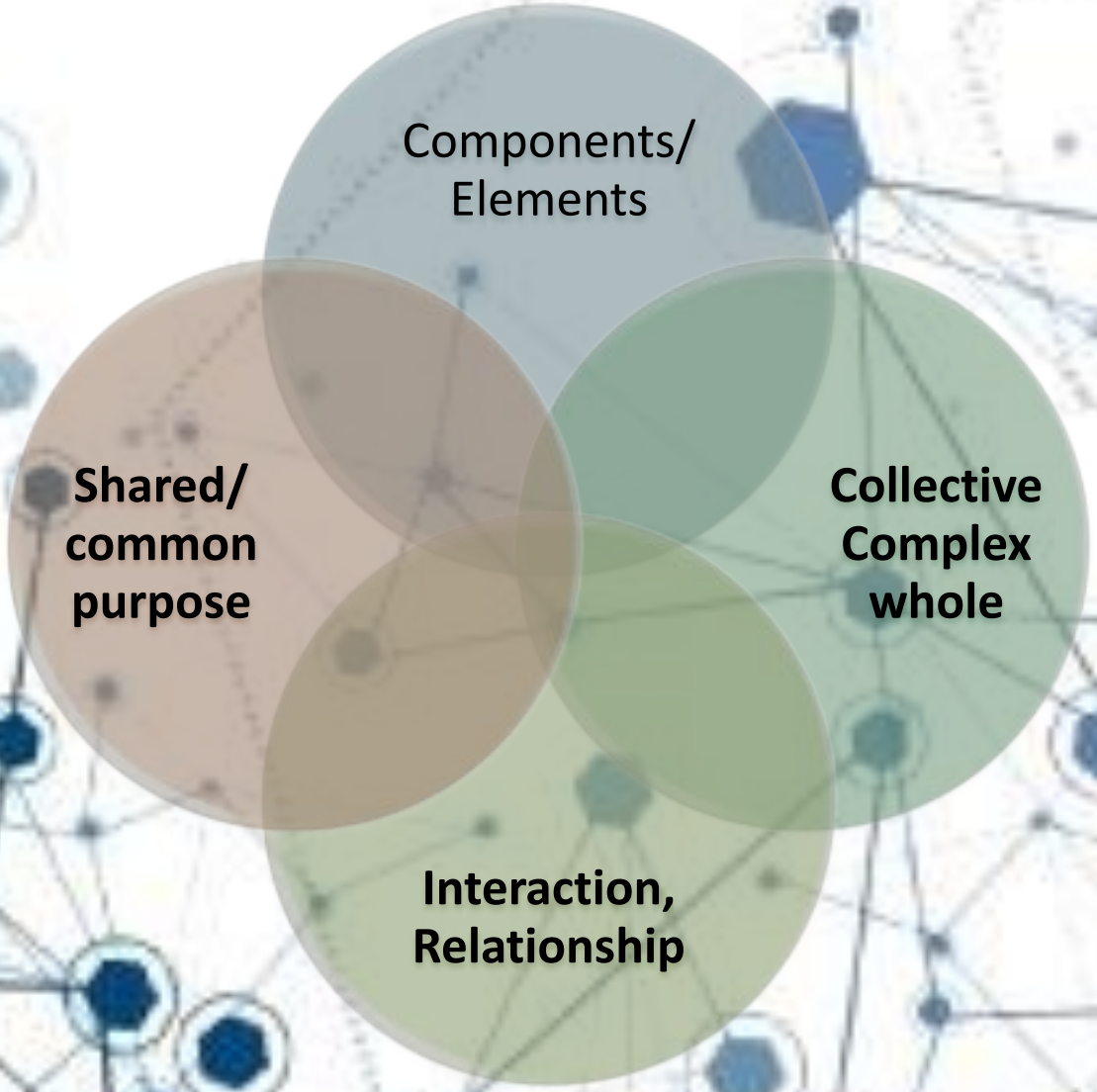


Industrial ecosystem

Economic growth, Profit, Trade, Employment

Production, Logistics, Policy, Trade, Education, RDI, etc.

A systems approach



Components

- Institutional frameworks
- Companies
- Government departments
- Associations and business chambers
- Academic and RDI institutions
- Unions
- NGO’s and CBO’s

Collective and Complex Whole

- Triple Helix approach (RDI, Industry, Government)
- Labour, community, others
- Tensions:
  - Big business vs SME's
  - National government vs provincial/ local
  - Government vs industry
  - Industry vs labour
  - Community vs government/ industry

Interaction & Relationships

- RDI
- Education and Training
- Funding/ Finance
- Policy & Regulation
- Production, Marketing and other functions
- Logistics, Procurement, Trade
- Management
- TQM and other processes
- others

Shared / Common Purpose

- No common purpose: Education, learning, knowledge, economic benefit, policy, political or other agenda, growth, development, employment, etc.

- “Is it not exactly why we were made for a time such as this, to break down silos and cross boundaries in order to address the complex challenges of our time?”

Multiple system levels

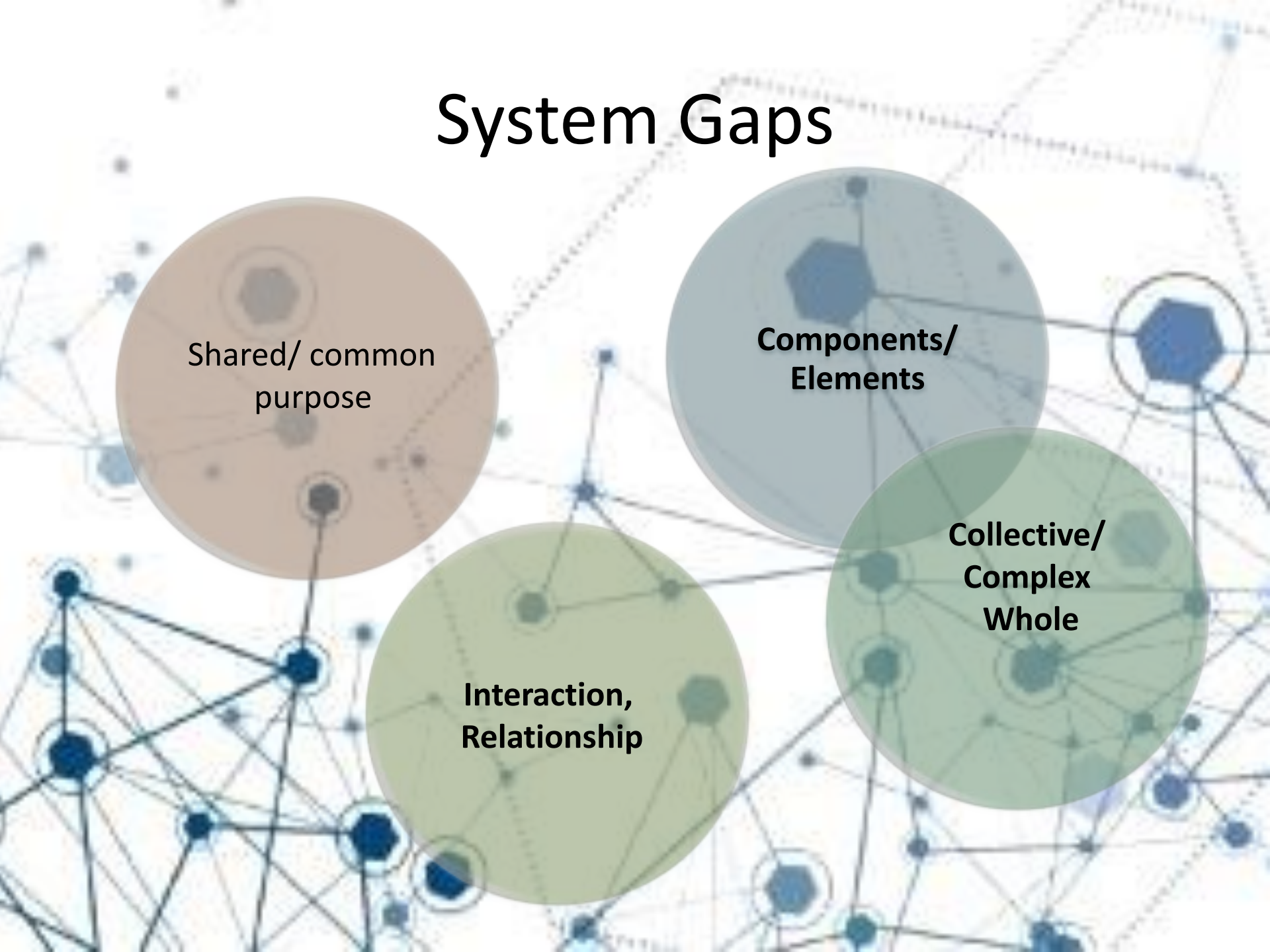
- Sectors, groups, associations, entities
- Departments, divisions, units
- Individuals

Knowledge/ Information

Technology and 4IR

Processes/ Methods

System Gaps


Shared/ common purpose
Components/ Elements
Collective/ Complex Whole
Interaction, Relationship

Coordination/ Collaboration

- “Economies that have industrialized have at their core—regardless of policies— institutions and processes to promote strategic collaboration between the private sector and the government”
- “Successful industrial policy require close government–private sector collaboration that ensures its relevance and effectiveness”
- “More successful countries understand, however, the need for systematic coordination and regularly co-opt the private sector and encourage super-ministerial collaboration” – UNECA (2014)

Some more quotes

- “Deeper systems change thinking across the ecosystem is essential” – African Innovation Paradigm Report by Matter Innovation, HYBR, Thomson Reuters, Audience Net
- “NSI is still not fully inclusive”; “lack of policy coherence and coordination, insufficient involvement of business and civil society”; “level of collaboration between all NSI actors needs to increase”; “Inclusivity and interactivity” – STI Whitepaper

What else?

Interconnectedness

Feedback loops

Emergence (Self-organization, non-linearity)

Synthesis (Whole AND parts)

Causality (Influence)

Systems Mapping and other tools

Findings

Infrastructure

Perceptions

Mentorship

Complexity

Strategy and Planning

New methods of support

Communication

Investment

Values

Partnerships and Collaboration

Intentions

Transparency (Clear goals, objectives, purpose)

Diversity

Knowledge and Information

Vision

Truth

“There is nothing in a caterpillar that tells you it will be a butterfly” — R. Buckminster Fuller

Thank you

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