

با نام خالق هستی

THE NEED FOR SYSTEM THINKING IN URBAN RESILIENCE

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URBAN RESILIENCE & SYSTEM APPROACH



Why is it matter?

- Multi-stakeholders approach
- Interconnected system design
- Interdependent on the nature
- Our body – Our city

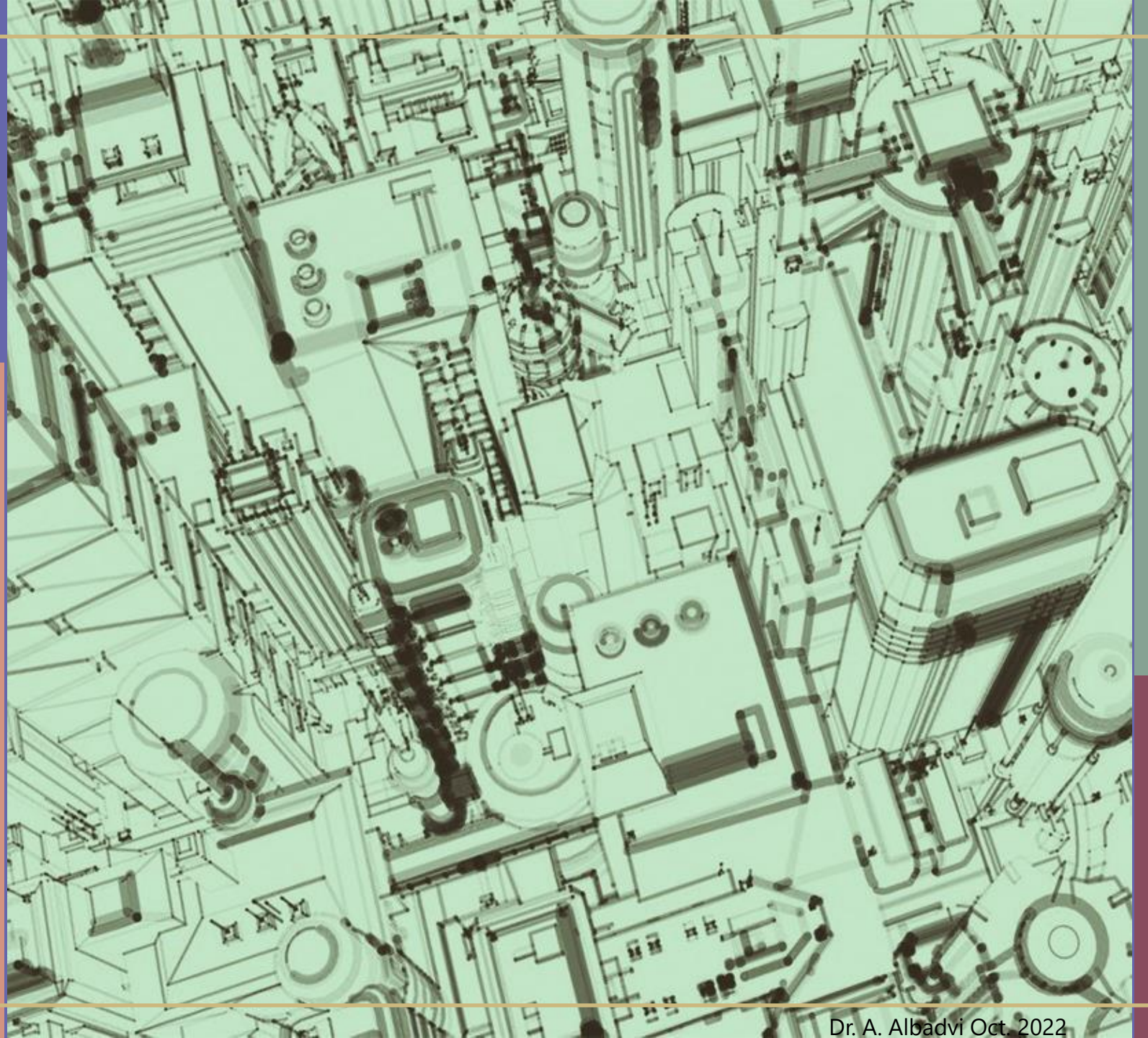


OUR BODY – OUR CITY

Urban System: highly Complex
Human-activity System

System Environment: highly complex
interconnected cities and rural areas

Urban Resiliency: a highly complex
adaptive system



NATURAL HAZARD

OUR BODY – OUR CITY

THE CONSUMPTION OF NATURAL SOIL

A System Approach is required to represent territorial exposure to multiple natural disasters in the different sub-urban areas within a vulnerable city.



INFRASTRUCTURE

OUR BODY – OUR CITY

More than 30,000 death per year and more than US\$250-300 Billion in economic losses of urban infrastructure between 1995 to 2015 (PNAS-The Proceedings of the National Academy of Sciences, Jan 2017, vol. 114, no.2)

A System Approach is required to represent the relationship between “hard” infrastructure and “socio-political” infrastructure which are influential in urban vulnerability dynamics.



WATER

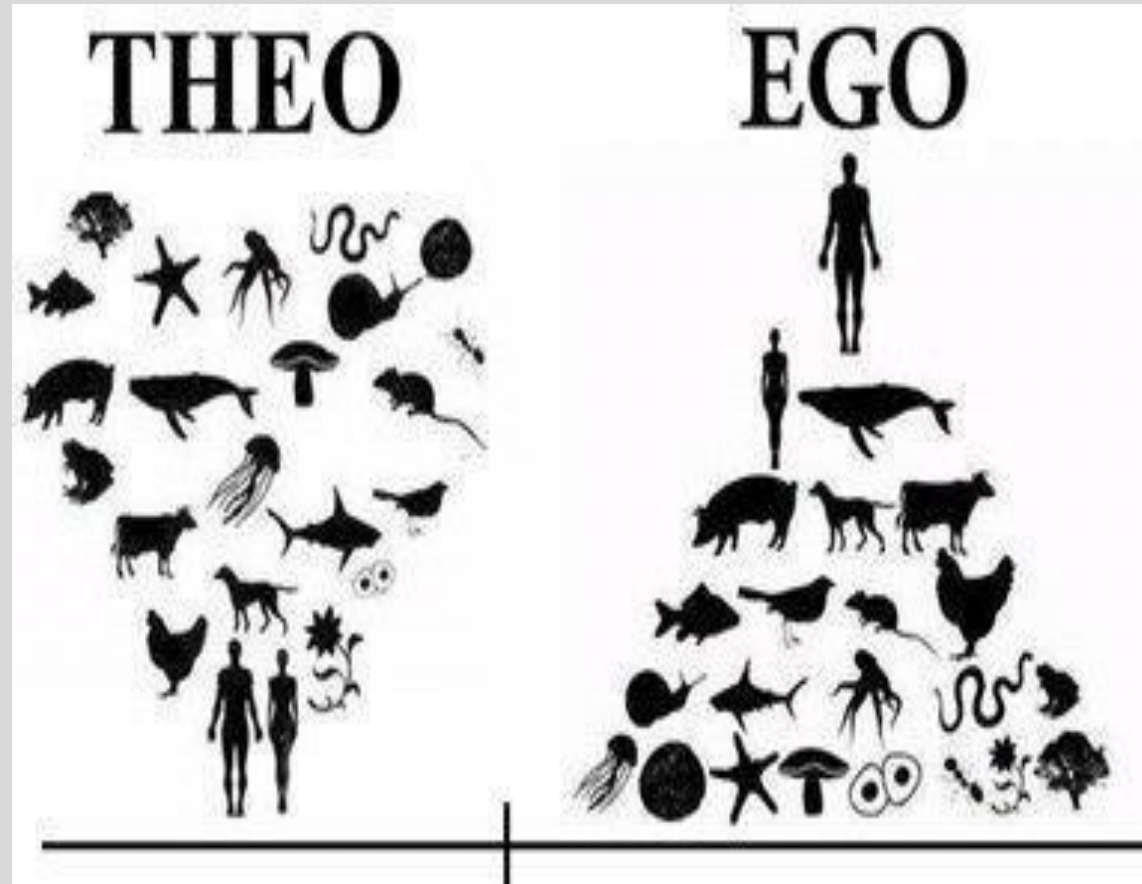
OUR BODY – OUR CITY

Urban areas house majority of the country's population –at least 74%- that function as nodes of resource consumption, especially water as a scarce resource (only 3% of the world's water is freshwater! And 1.1 billion people lack access to water).

A System Approach is required to represent how to adapt and to quickly transform systems that limit its adaptive capacity.



WHY WE ARE HERE? HOW DID WE GET HERE?



An Ego-system is structured to satisfy power-holders wants and to privatize decision-making, Financial capital is valued over human contribution, the social cost of policy decision-makers is not fully disclosed and social transactions lack transparency.

BALANCING ACT

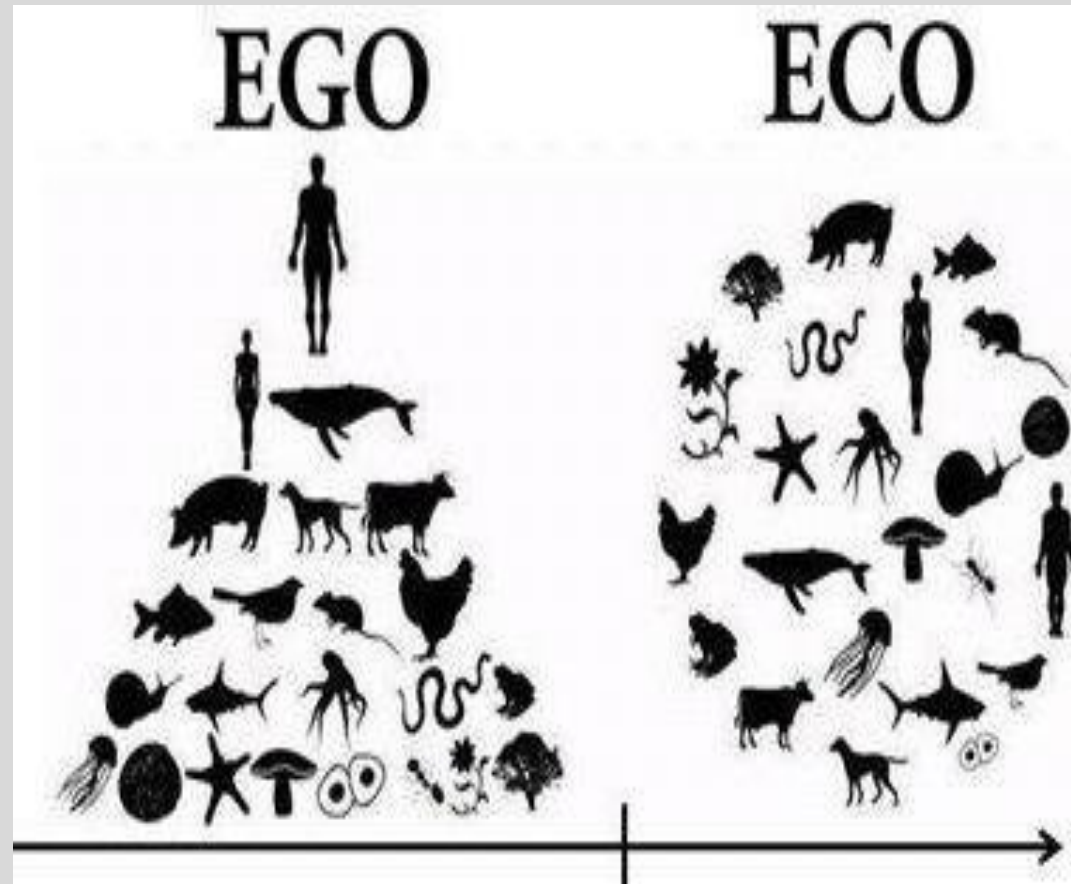
Human-Urban Balance Statement

Human needs ↔ **Urban means**

The Urban System is a highly complex and adaptive system that advocates the general adaptability of socio-technical networks rather than specific adaptedness. Urban Resilience in the system approach is framed as a balancing act among those who enact it empirically.



HOW WE CAN HEAL THE PROBLEM? FROM EGO-SYSTEM TO ECO-SYSTEM MINDSET



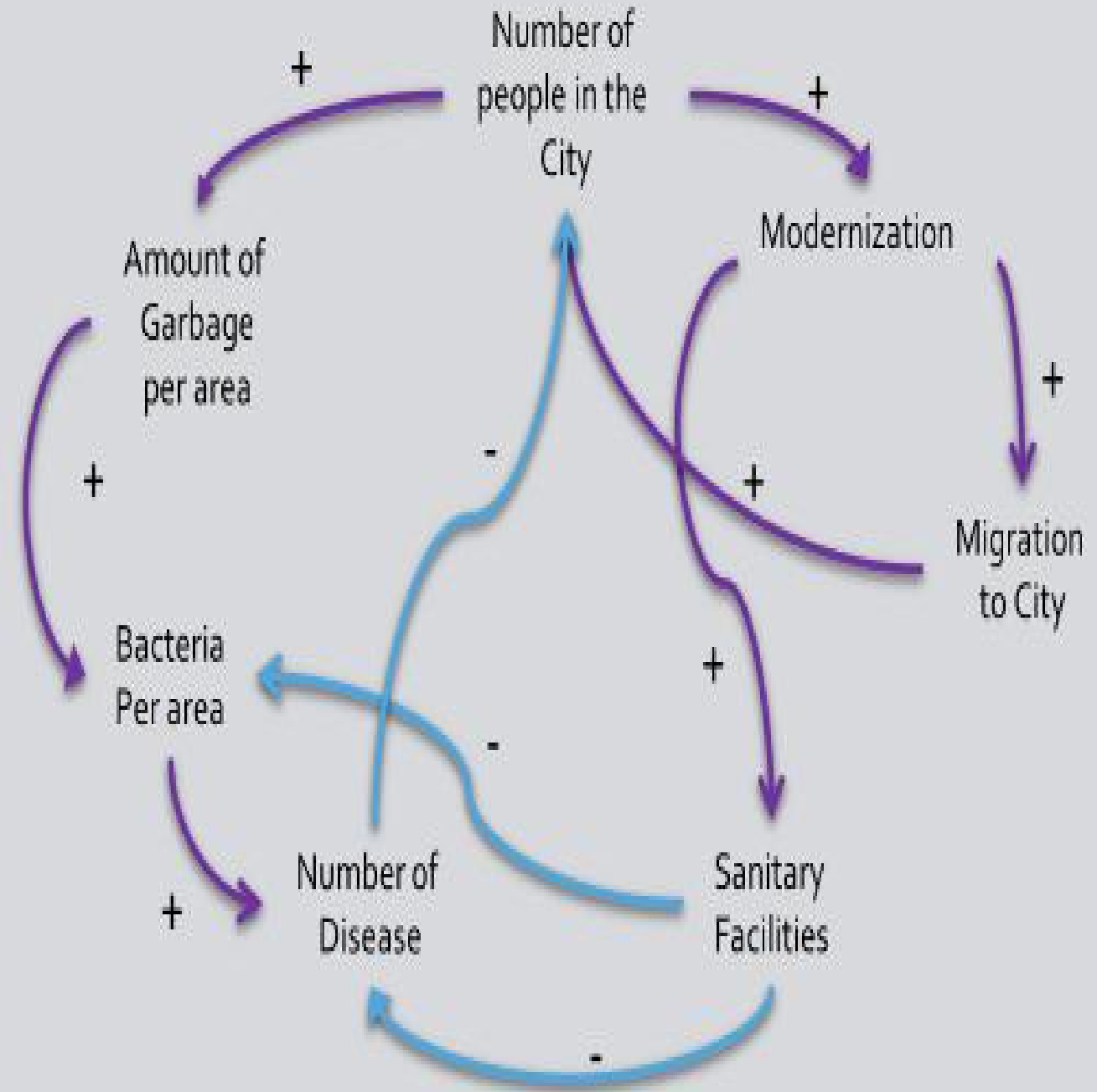
System Prosperity thinking: A methodological approach to analyze and design systems that fulfill all its beings' needs within the ecological means.

SYSTEM THINKING BASICS

Simple system modeling:

Positive loops: more for more, less for less. Enhance or amplify change that makes the system more unstable.

Negative loops: Balance around the equilibrium. Dampen or buffer change that makes to hold stability.



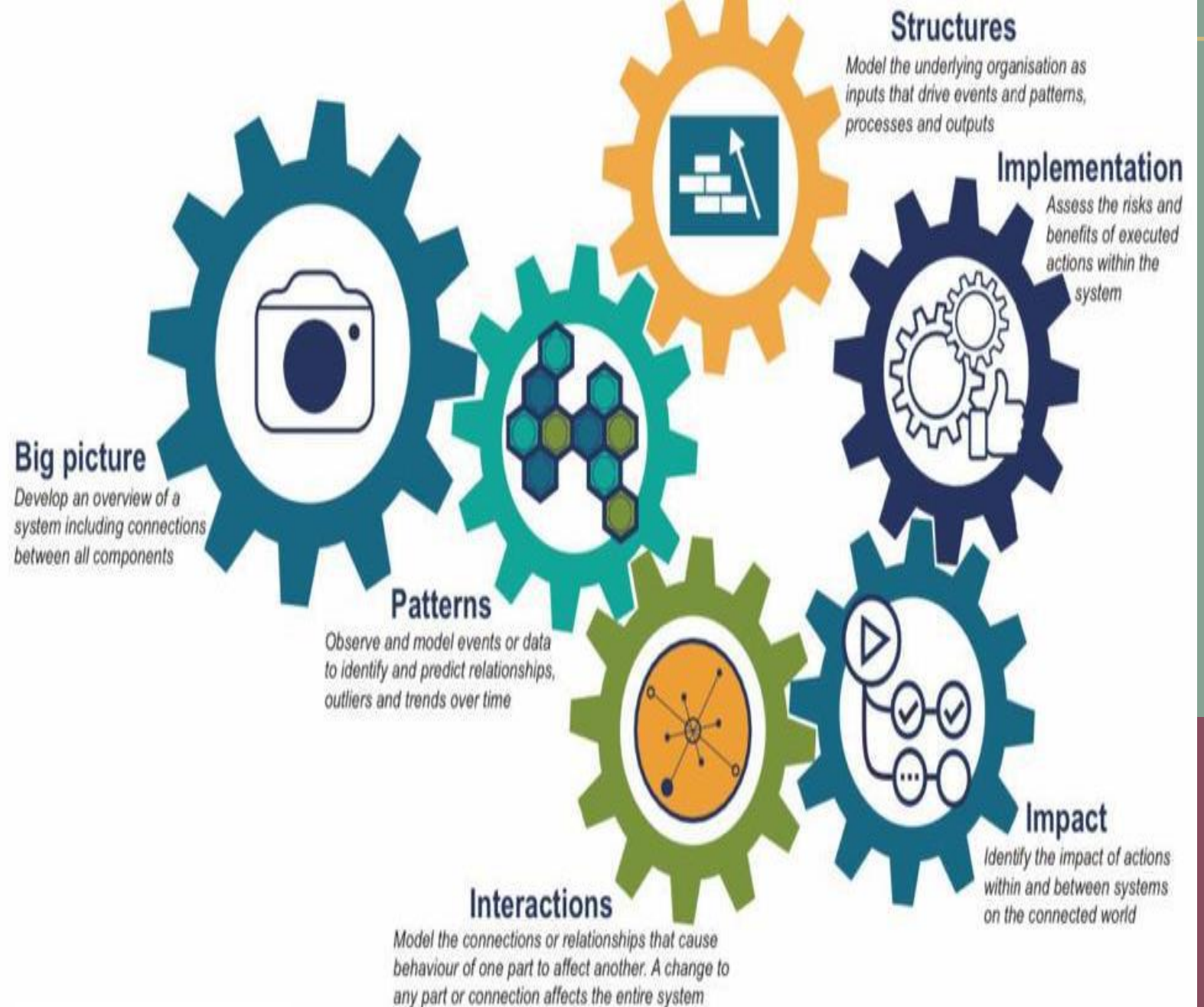
HOW CAN SYSTEM THINKING HELP?

Capability of identifying and understanding complex systems structure

Predicting by understanding the system's characteristics and its dynamic behavior

Reducing complexity by modeling techniques at different scales and system boundaries

Devising alignments with complex systems for higher holistic impacts





Resiliency

System thinking approach

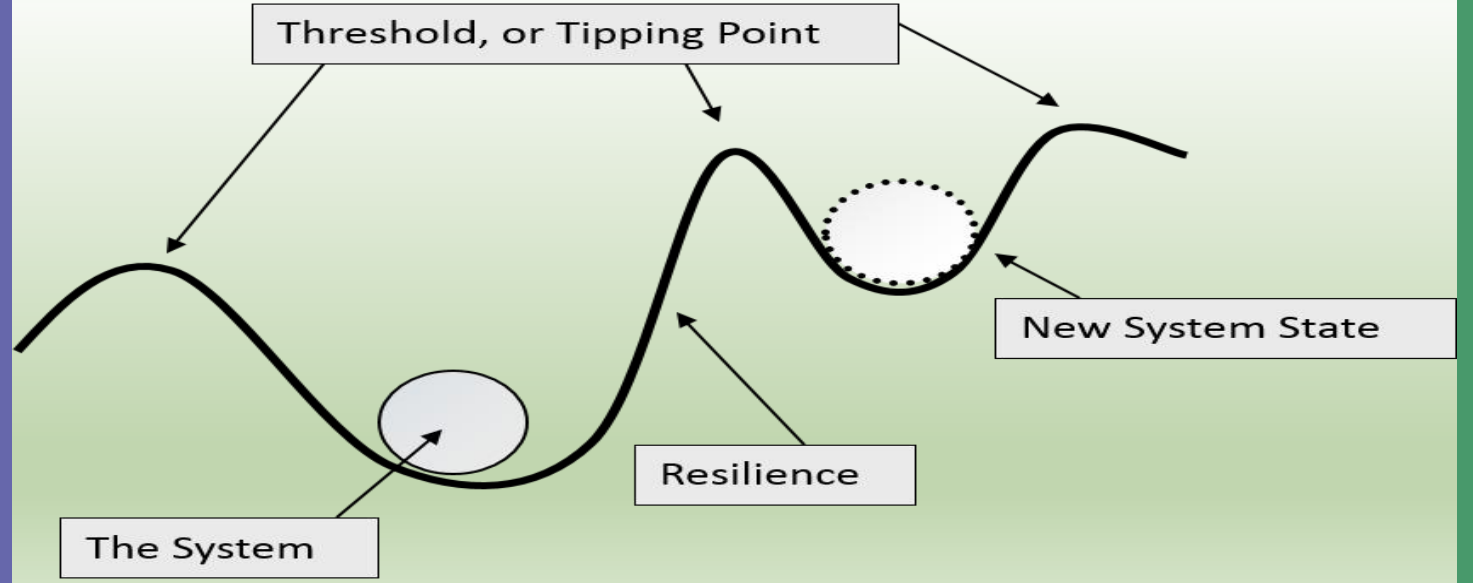
RESILIENCY

When you bend but don't break

The notion of Dynamic Stability in systems

Disturbance as opportunities: Learning from disturbances

Disturbances as an opportunity to break through system inertia, catalyzing significant adaptive change.



SYSTEMIC ACCOUNTABILITY: THE RELATIONSHIP BETWEEN RESILIENCE AND JUSTICE

Urban Resilience as an unjust “bouncing back” concept that leaves behind marginalized and vulnerable groups. Blindly accepting the unjust status quo!

A Systemic account forces us to elaborate on Urban Resilience as “bouncing forward” which allows us to address the question of how increasing resiliency can promote social justice.



SYSTEMIC ACCOUNTABILITY

Urban Development <-> Urban Resiliency

Urban Resiliency <-> Social Justice

**Higher inequality especially in post-
disaster city re-organization**



SYSTEM APPROACH FOR HIGHLY COMPLEX SYSTEMS

Fundamental assumptions in Urban Resiliency as
a highly complex system:

No **Fixing solution** for Complex Systems is
accessible.

Healing and Aligning is the line of thinking
System Approach for complex systems



METHODS & METHODOLOGIES:

“We cannot impose **our will** on a complex human-activity system. We can only **listen to** what the system and its highly interconnected sub-systems tell us and discover how system properties and our values can **work together** to bring forth something much better than could ever be produced by our **will alone**”. (D.H. Meadows, Thinking in Systems, 2008)

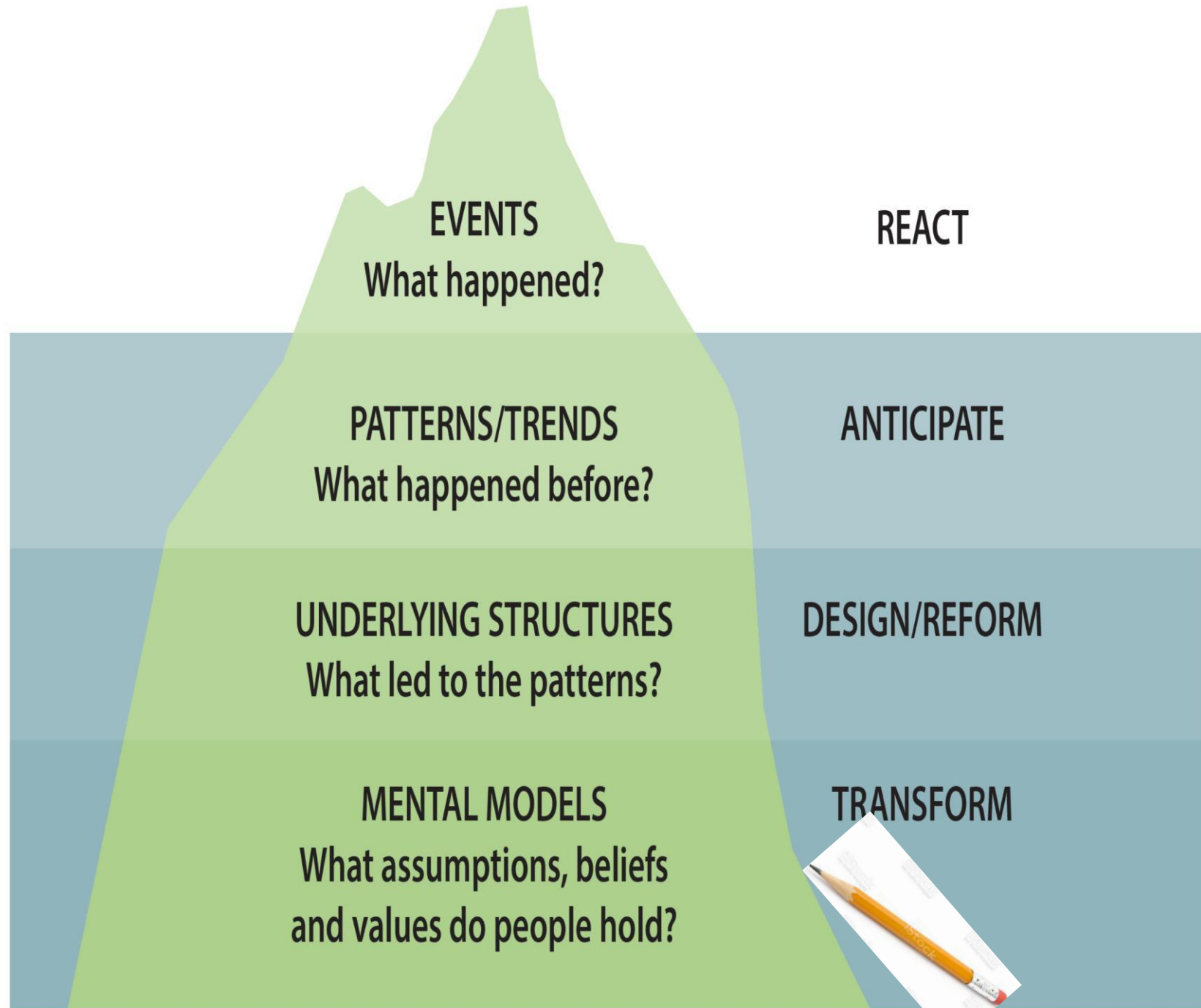


TO FIX OR
TO HEAL

1. ICEBERG SYSTEMS THINKING

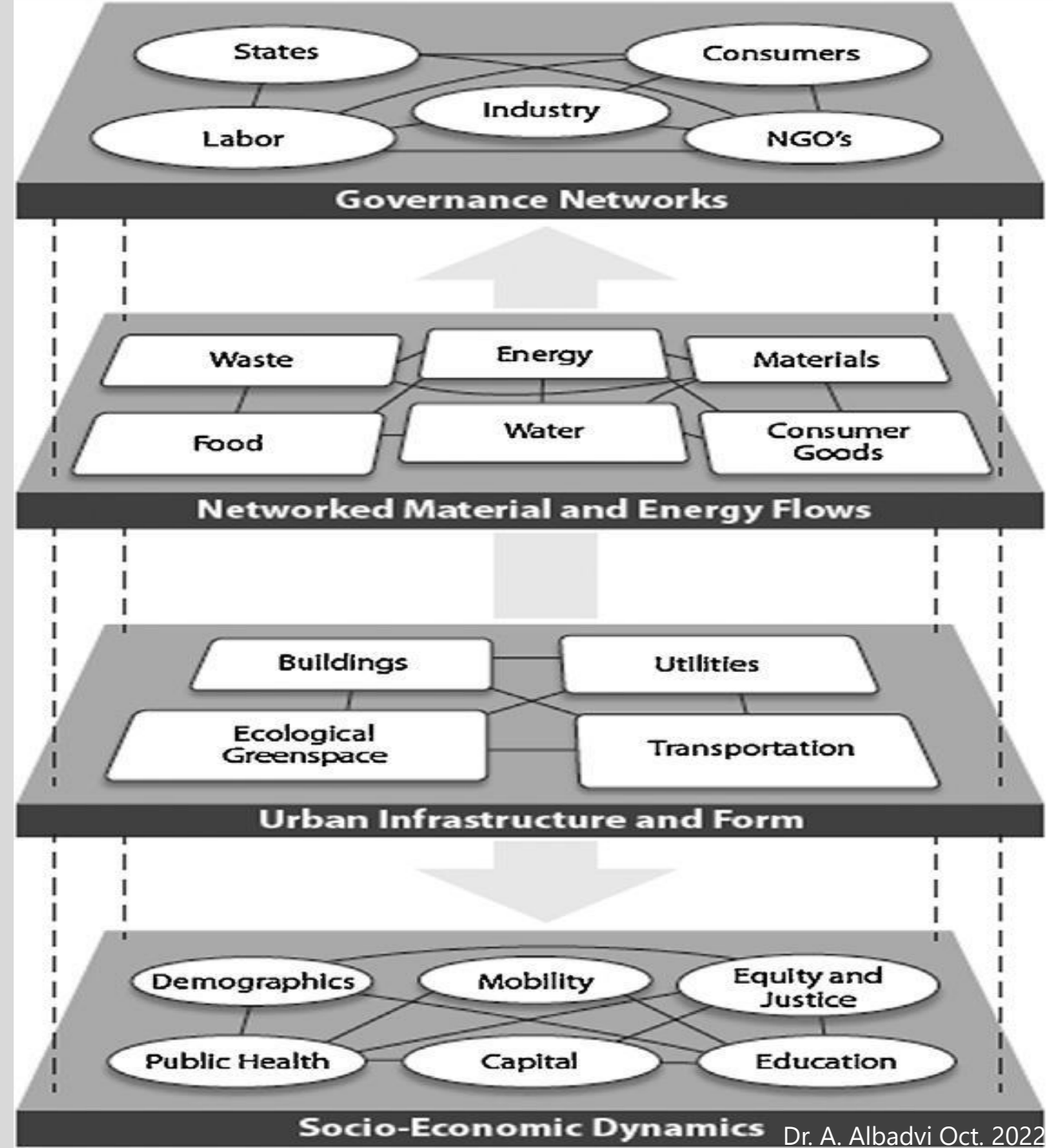
(GOODMAN, 2020)

"U" MODEL



2. MULTI-LAYER / MULTIPLEX NETWORK SYSTEM MAPPING

LAYERS REPRESENT SYSTEM ASPECTS CONSISTING OF NODES AND EDGES, BUT THE NODES EXIST IN SEPARATE LAYERS, REPRESENTING DIFFERENT FORMS OF INTERACTIONS.



Space-Time Dynamics

- Multi-scalar
- Complex and adaptive

3. LINK PREDICTION MAPPING:

PREDICTING THE EXISTENCE OR A
CHARACTERISTIC OF THE RELATIONSHIP
BETWEEN ENTITIES WITHIN A NETWORK.

GRAPH-BASED (AUTOIMMUNE) NEURAL
NETWORK MODEL



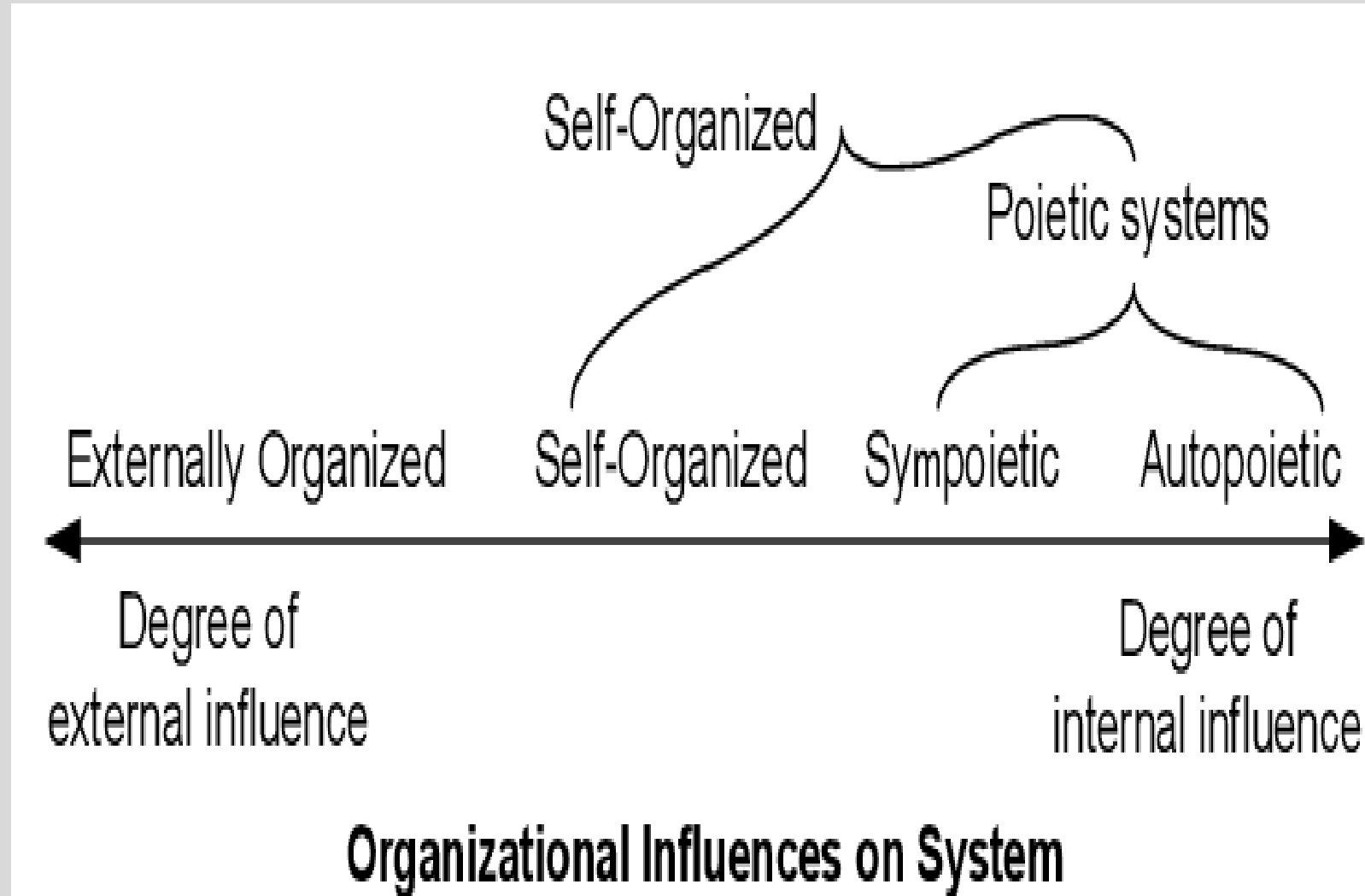
4. SELF-ORGANIZING SYSTEM MAPPING

AUTOPOIETIC SYSTEMS: A SYSTEM THAT RECURSIVELY REPRODUCES ITS ELEMENTS THROUGH ITS OWN ELEMENTS.

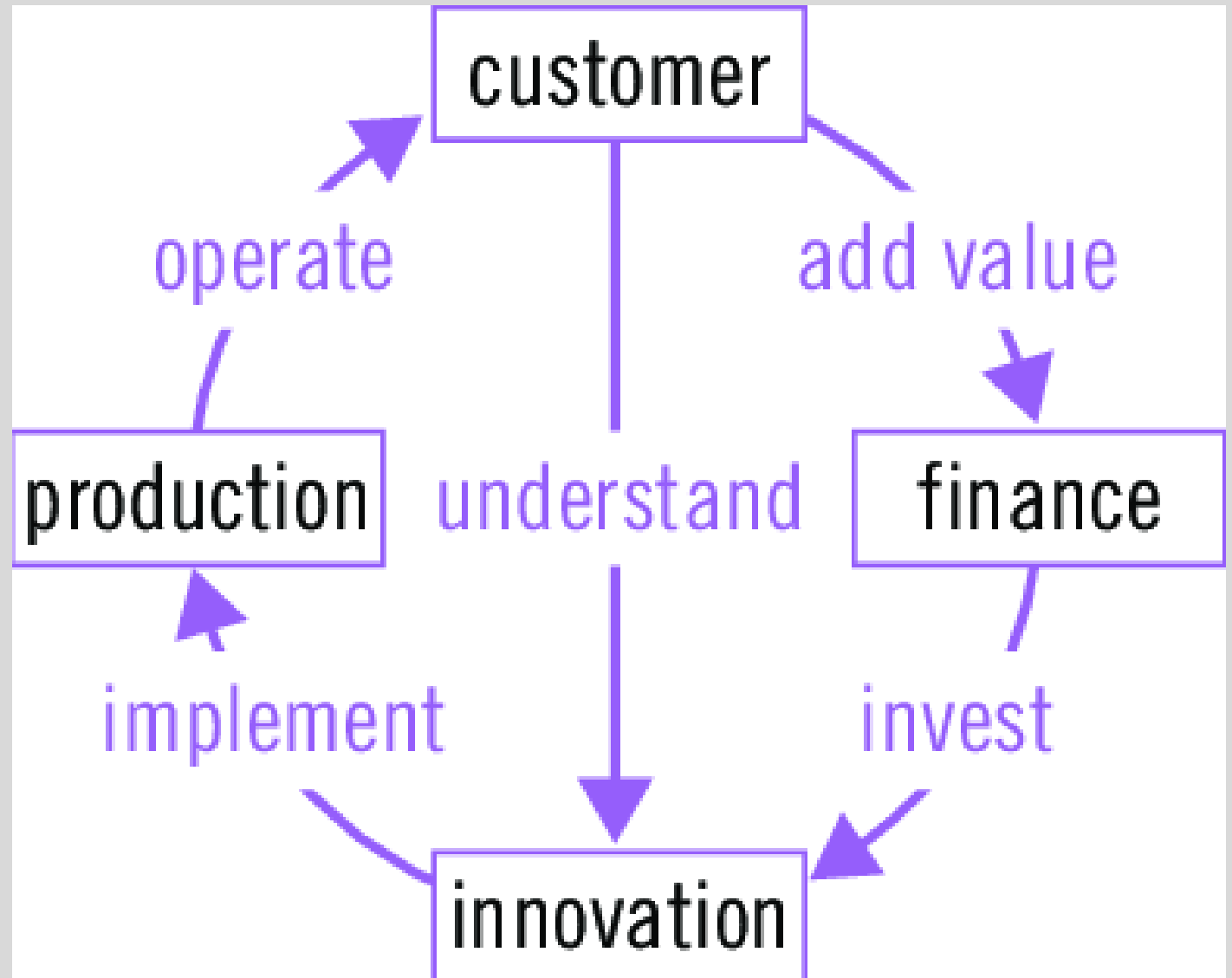
SYMPOIETIC SYSTEMS: COMPLEX, SELF-ORGANIZING BUT COLLECTIVELY PRODUCING, BOUNDARYLESS SYSTEMS.

BIOMIMICRY PRACTICE FOR LIVING COMPLEX SYSTEMS.

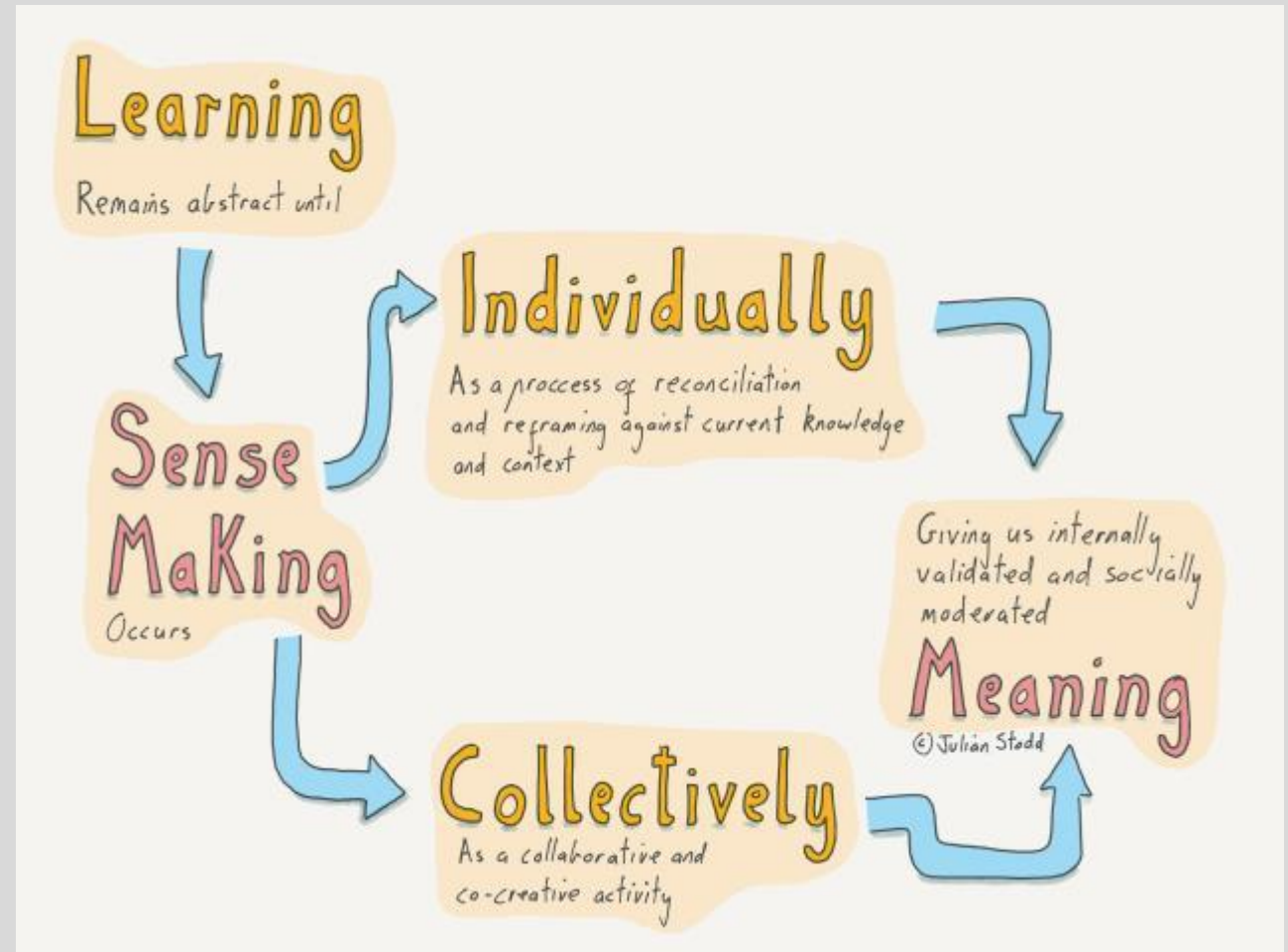
CONTINUUM OF SELF-ORGANIZING SYSTEMS



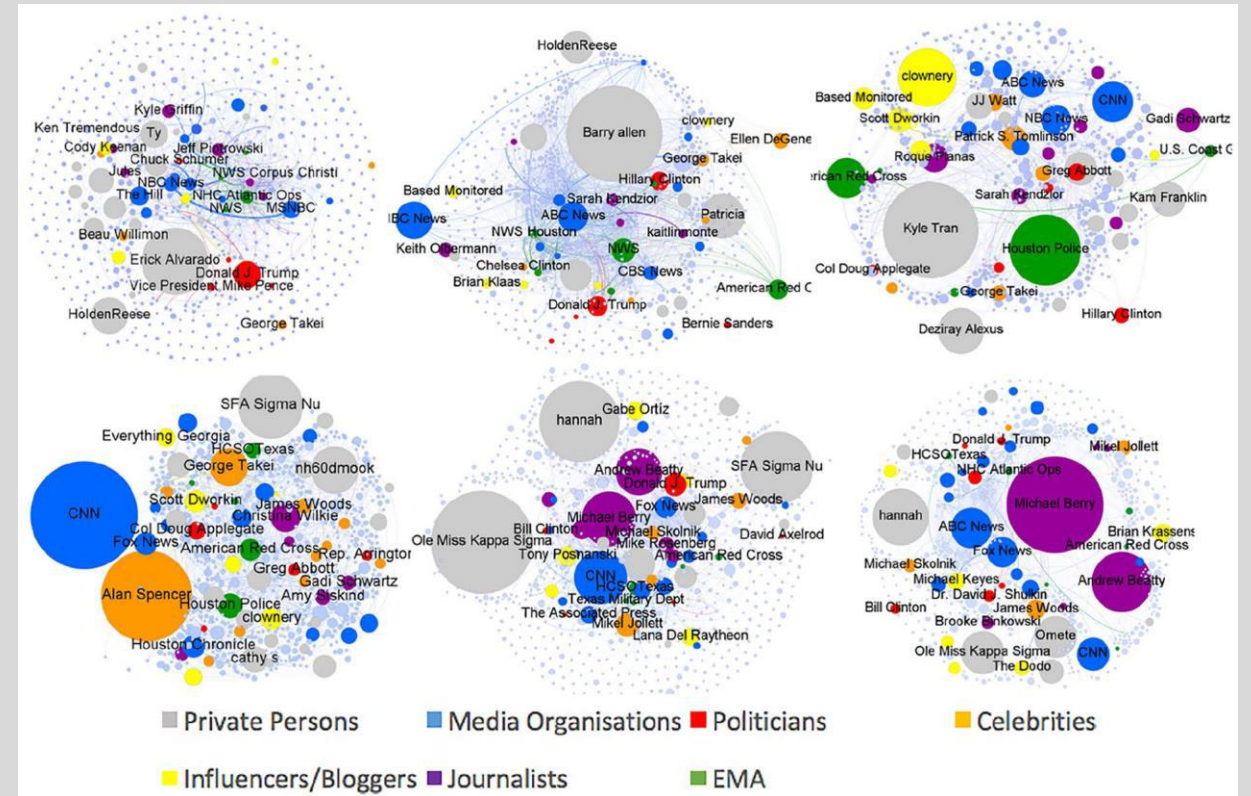
A SIMPLIFIED EXAMPLE OF A
SELF-ORGANIZING INNOVATION
ECO-SYSTEM



5. COLLECTIVE SENSE- MAKING MODELING FOR SYMPOIETIC SYSTEMS



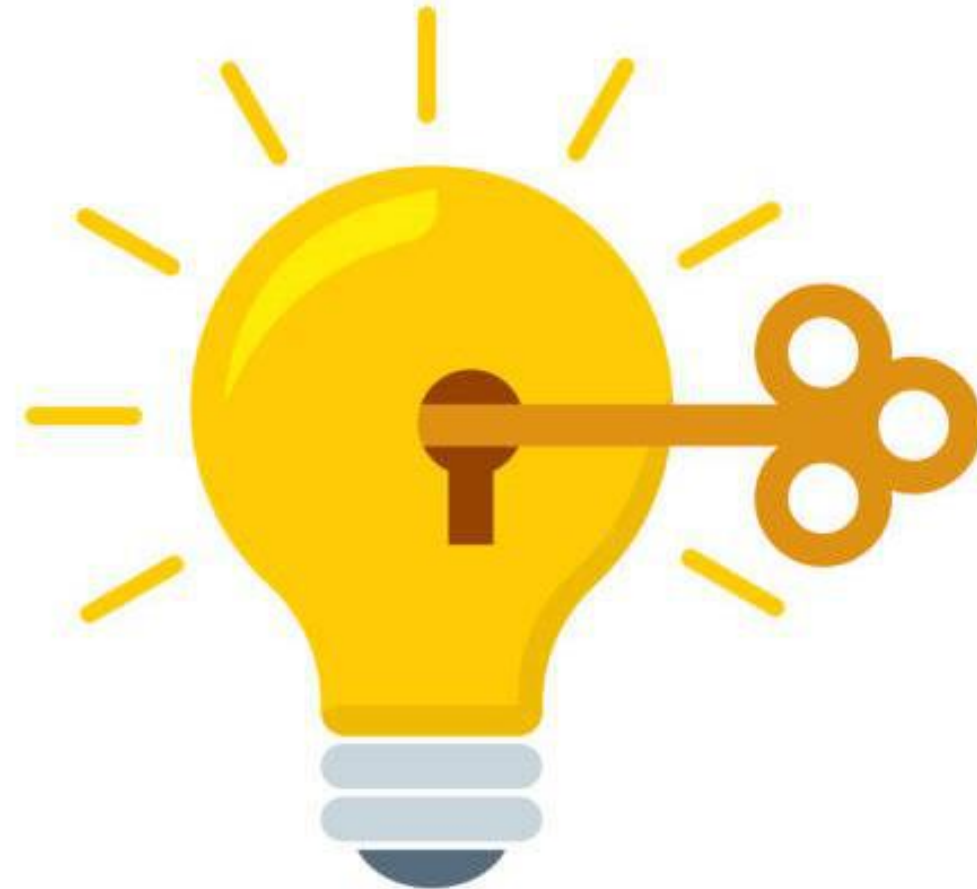
AN EXAMPLE OF COLLECTIVE SENSE-
MAKING MAPPING USING SOCIAL
NETWORK MODELING IN TIMES OF
CRISIS



Hurricane Harvey communication network Day 1–6
For over 12 million tweets
(<https://doi.org/10.1177/0268396220929258>)

KEY TAKEAWAYS:

1. System approach means “staying with the trouble”
2. Enrichment of Systemic lenses
3. Take futures thinking
4. Decenter the human perspective
5. Dance with the system
6. Listen to the wisdom of the system
7. Design systems with many



THANK YOU

