



31<sup>st</sup> Annual **INCOSE**  
international symposium  
virtual event

July 17 - 22, 2021

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# Systems Thinking: A Critical Skill for Systems Engineers

# Topics



01

**What is Systems Thinking?**

02

**What role can Systems Thinking play for Systems Engineers?**

03

**How can Systems Thinking be developed?**



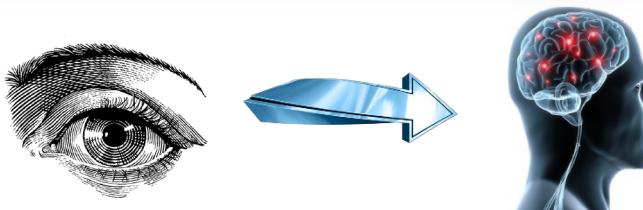
# Systems Thinking



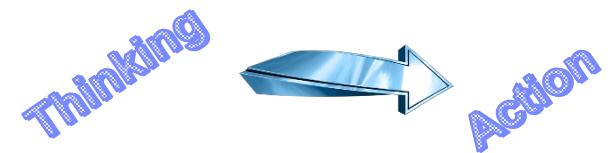
**“A new way to view and mentally frame what we see in the world; a worldview and way of thinking whereby we see the entity or unit first as a whole, with its fit and relationship to its environment as primary concerns; the parts secondary.”**

*\*Haines (1998, p. vi)*

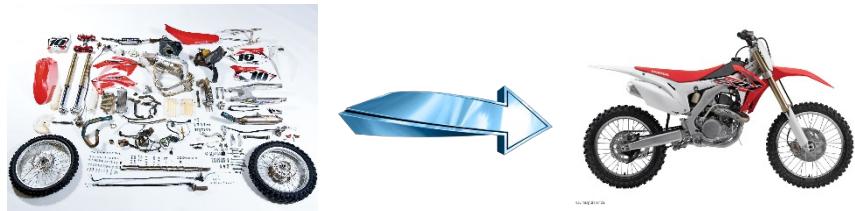
### 1. View and mentally frame



### 2. Worldview & way of thinking



### 3. Relationships primary; elements secondary



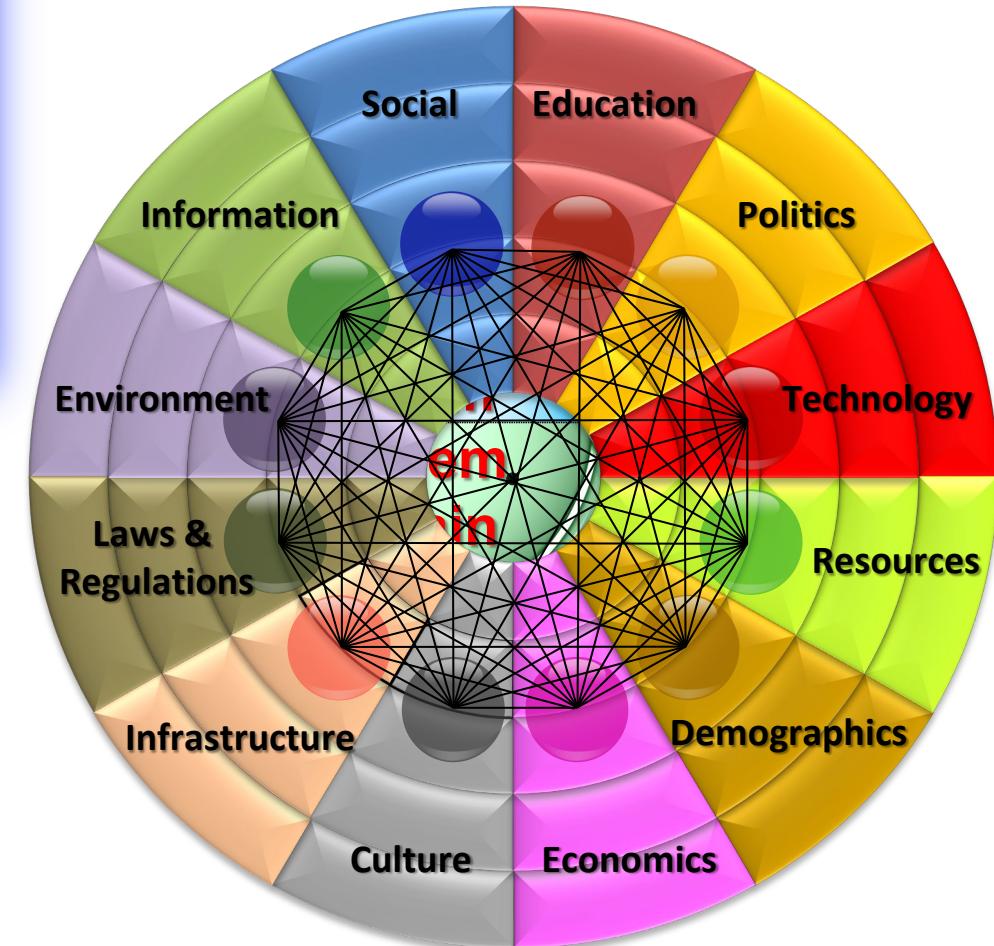
# The complex system problem domain



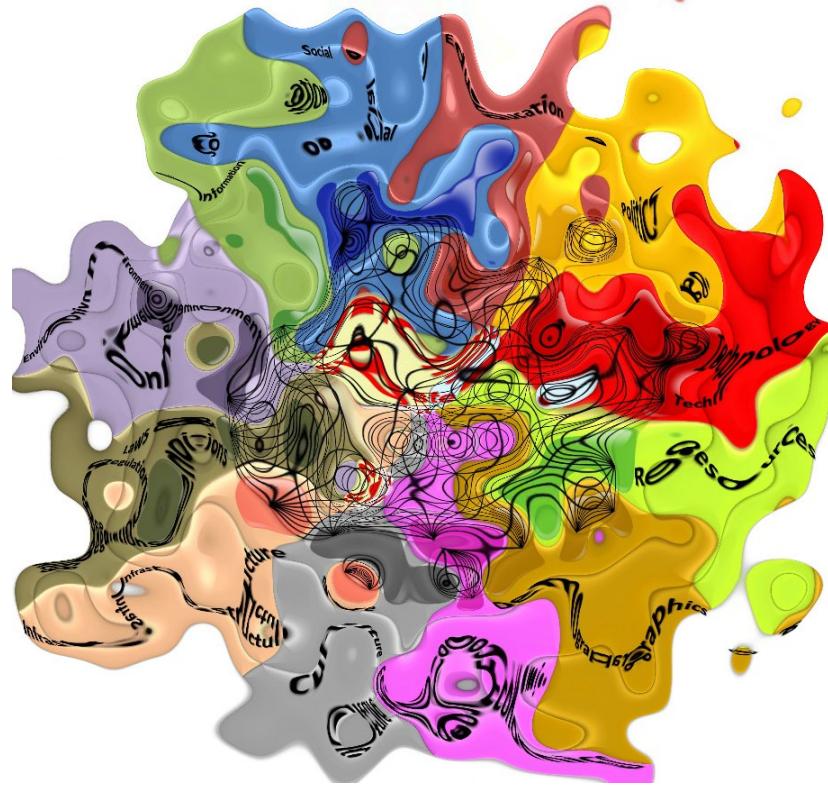
Crosses a holistic spectrum of dimensions



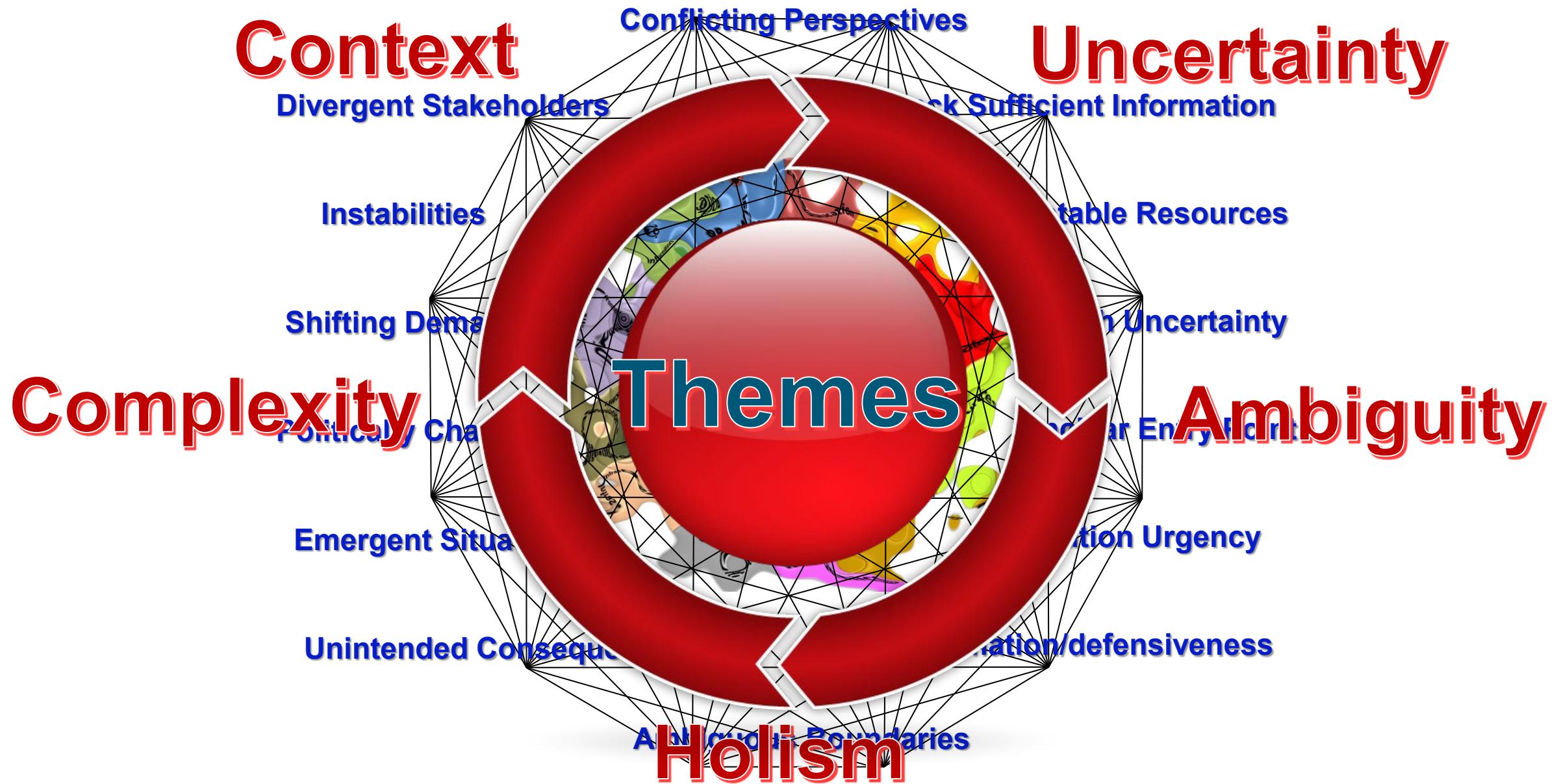
Is unique for each complex system



It's a little  
bit more  
complex  
than that



***This Problem Domain can produce several conditions***





# Role of Systems Thinking

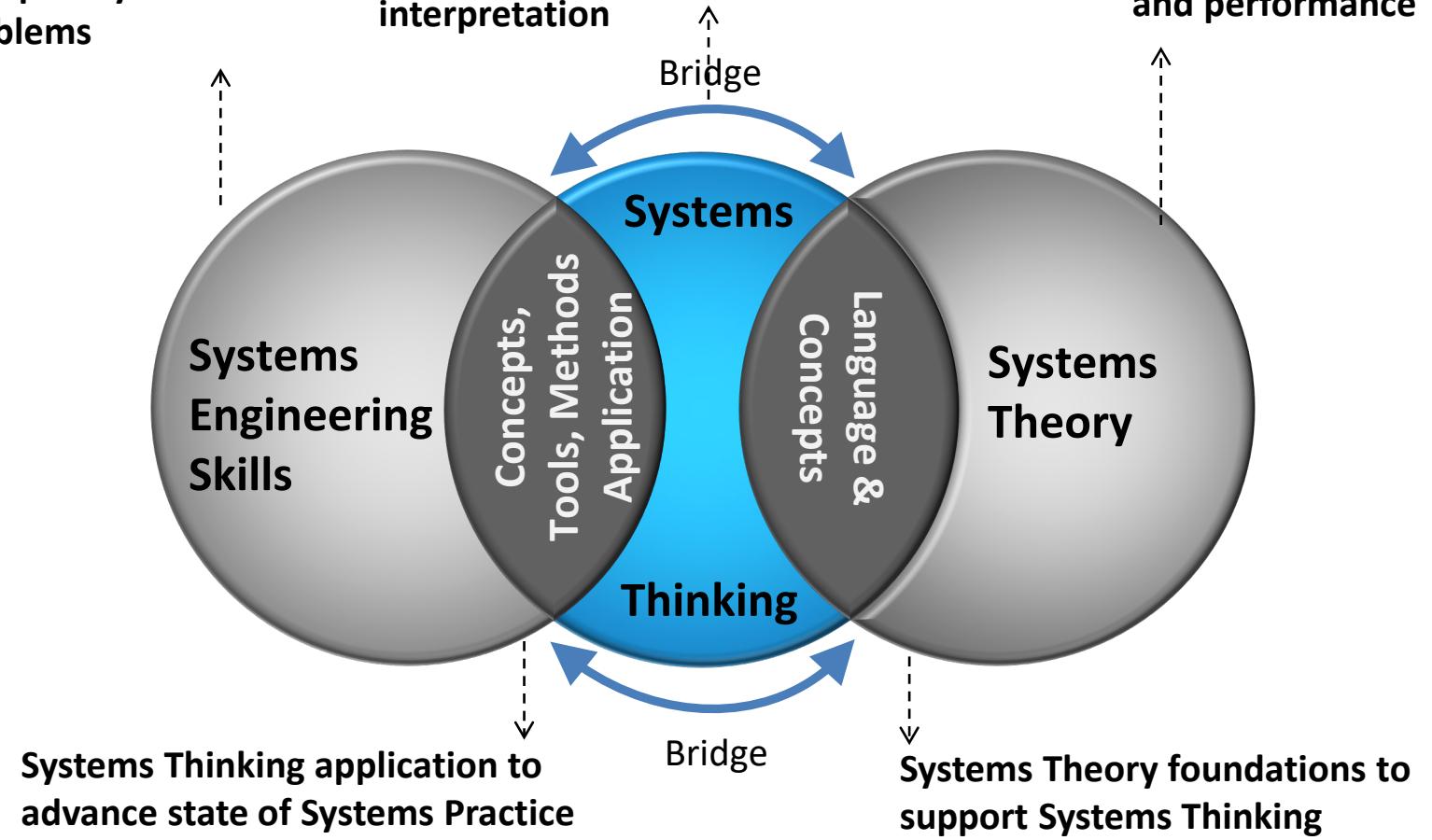
# Systems Thinking Relationships



Competencies to deal with complex systems and problems

Translation of Systems Theory to enable alternative decision, action, and interpretation

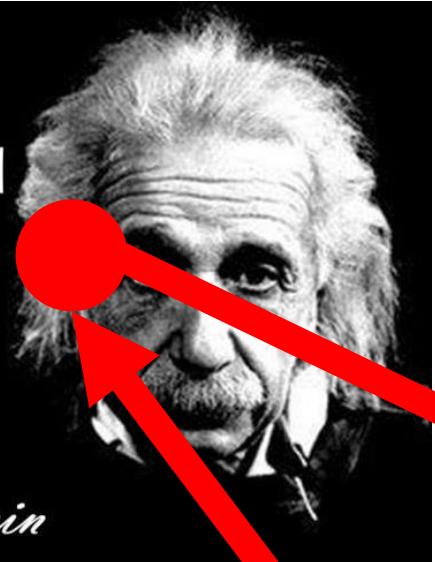
Set of principles, concepts, & laws explaining system structure, behavior, and performance





we cannot solve  
our problems with  
the same thinking  
we used when  
we created them

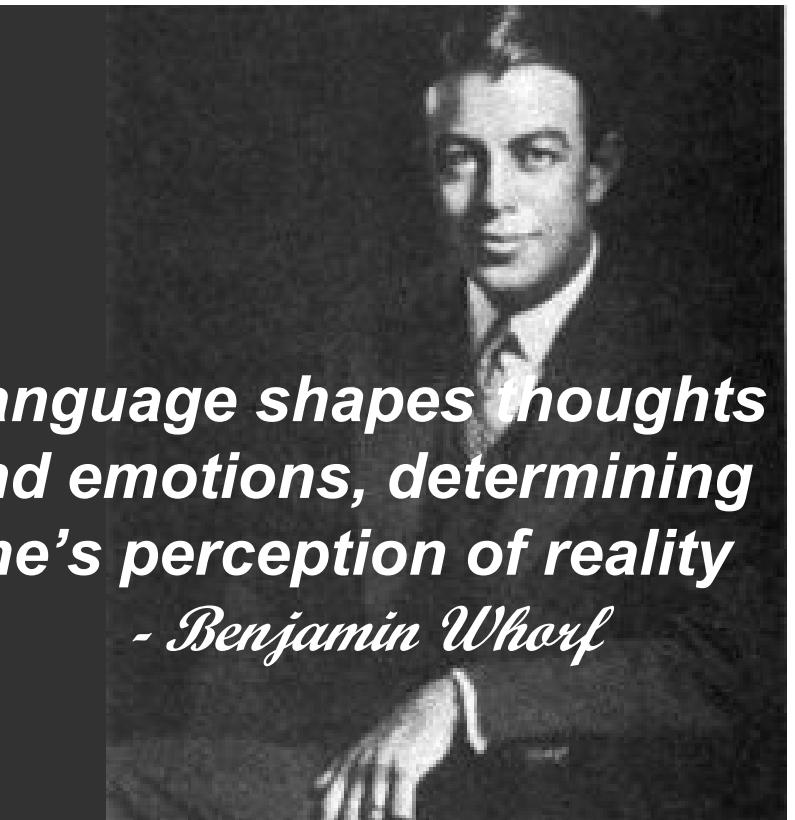
*~ Albert Einstein*



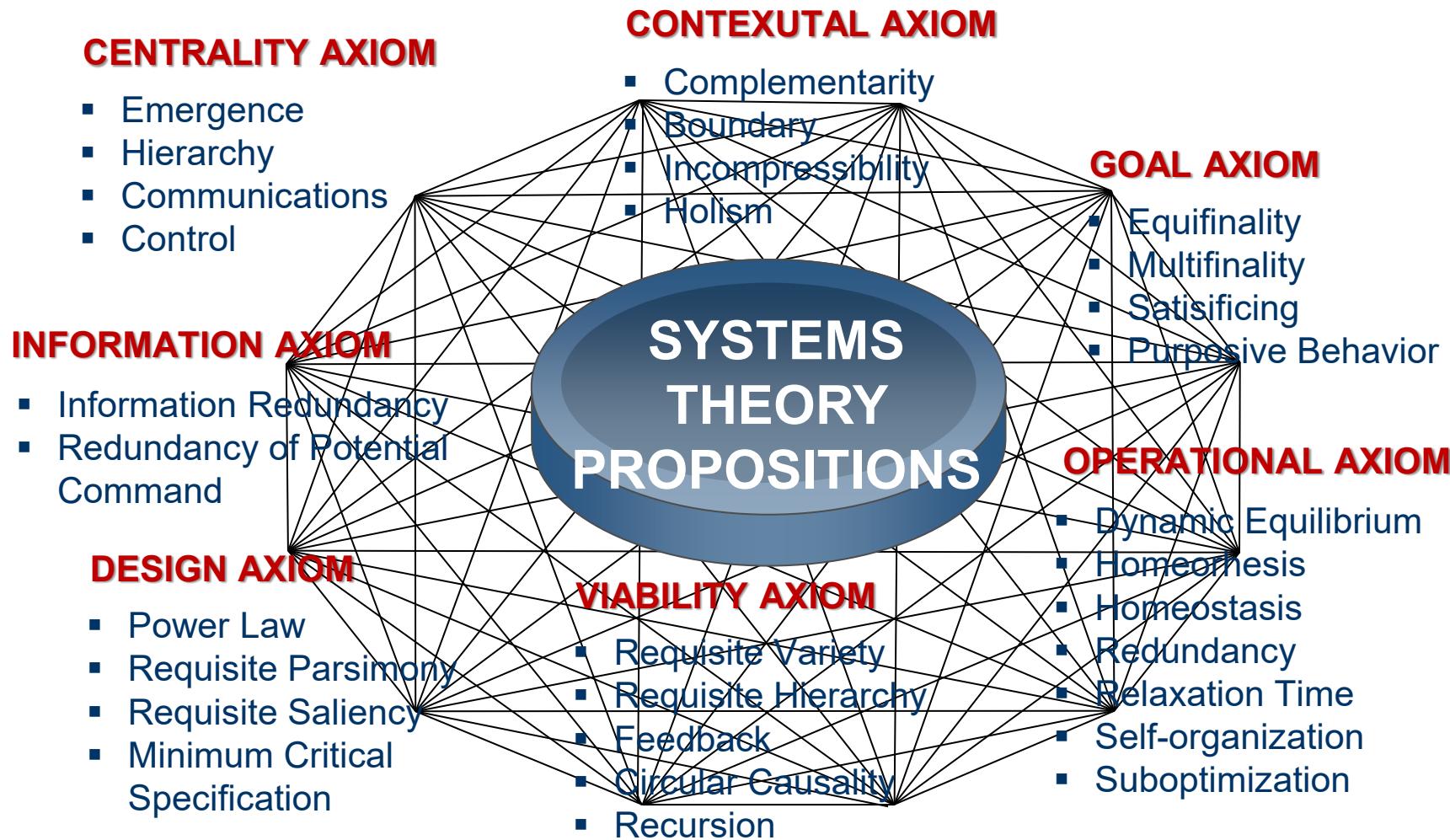
**Systems Theory**  
provides a language that  
can inform a different  
level of thinking to  
address complex  
problems

*Language shapes thoughts  
and emotions, determining  
one's perception of reality*

*- Benjamin Whorf*



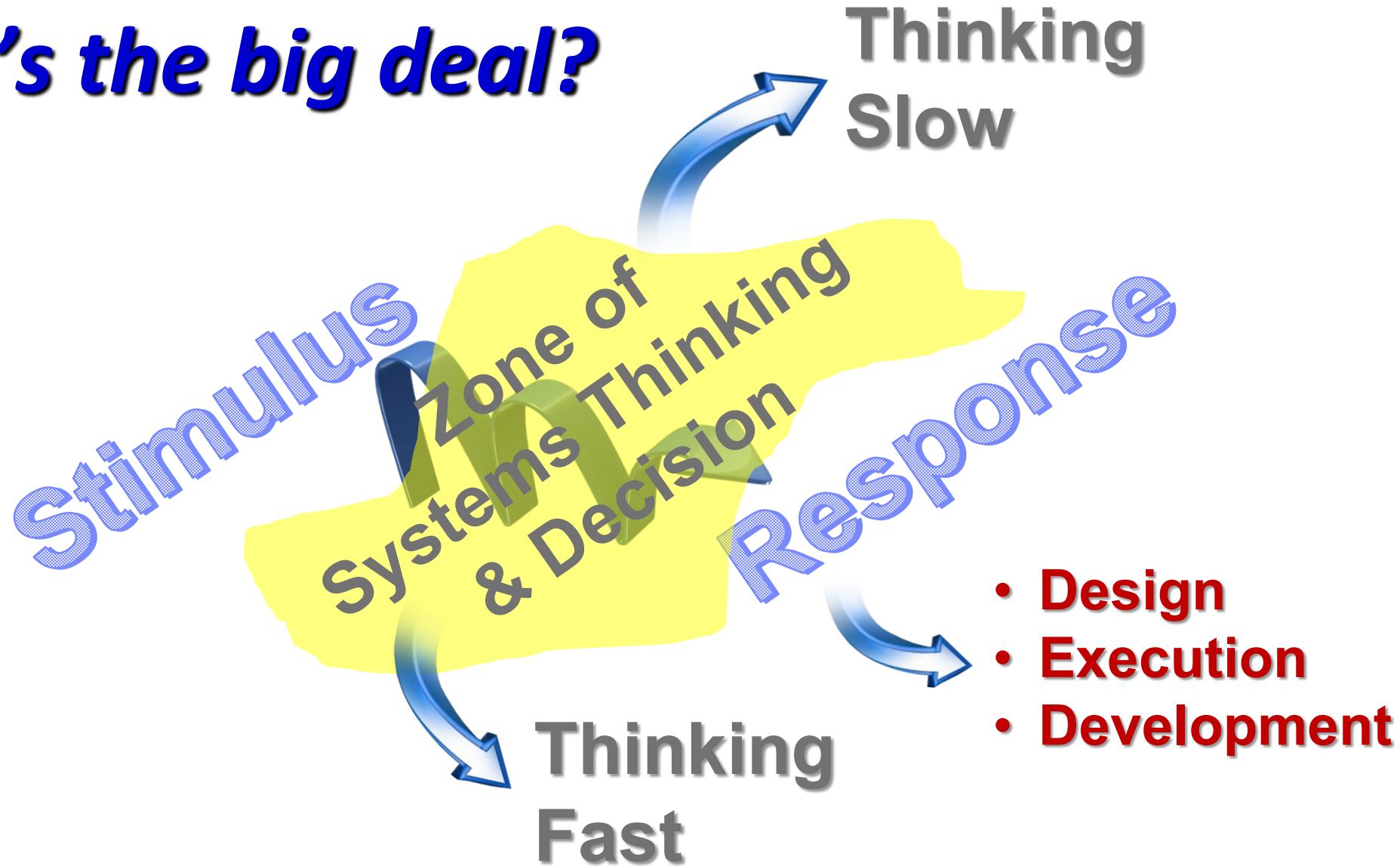
# **Systems Theory provides a language to drive different thinking, decision, action, and interpretation**



1. All systems are subject to the laws of systems
2. Always on
3. Applied without bias – equally
4. No allowances for ignorance
5. Violations - real consequences

# ***So What? Who cares?***

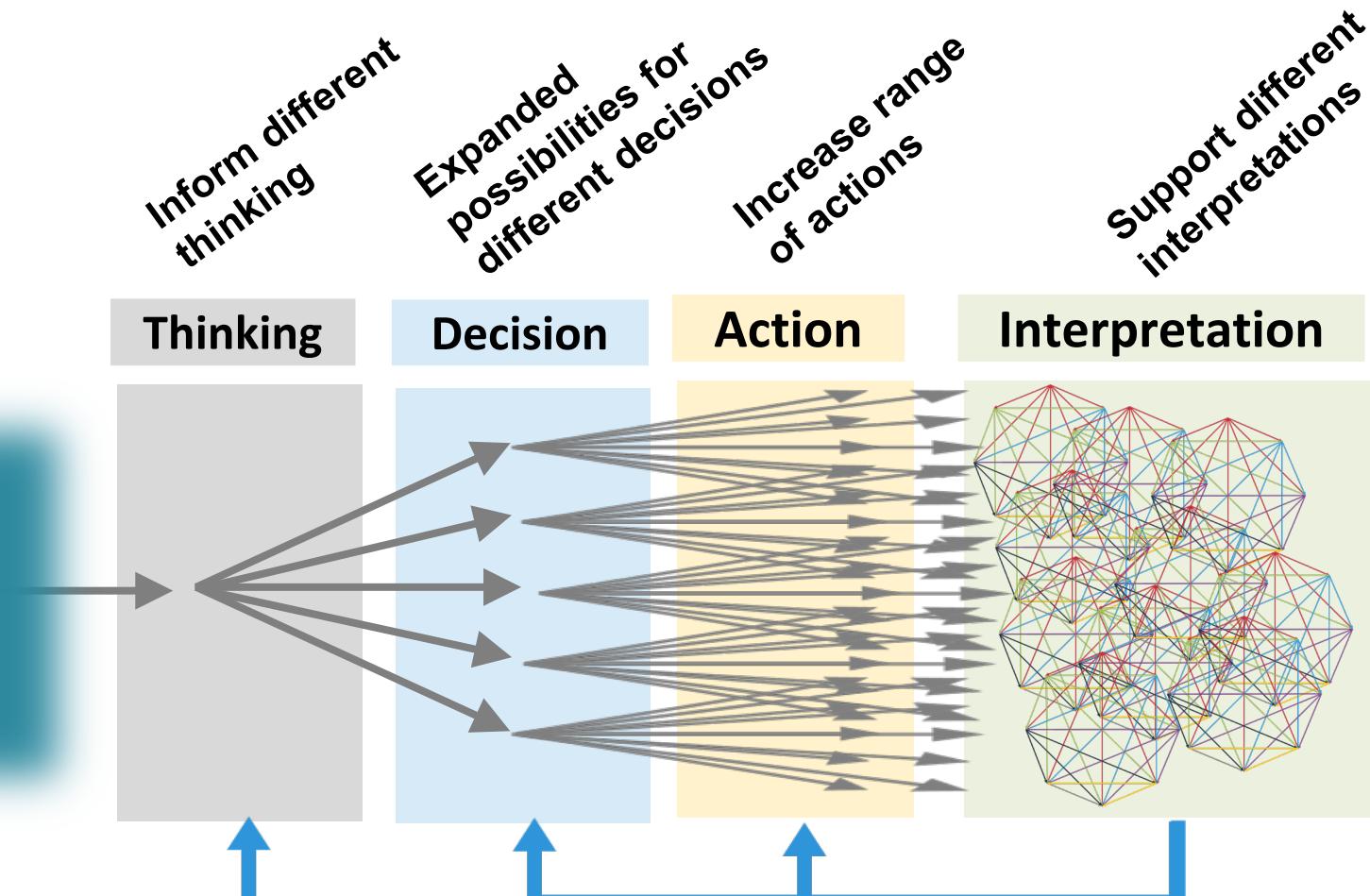
## ***What's the big deal?***



# Systems Thinking Offers



**Systems  
Thinking Skills  
Development**





## Systems View

Context/Environment

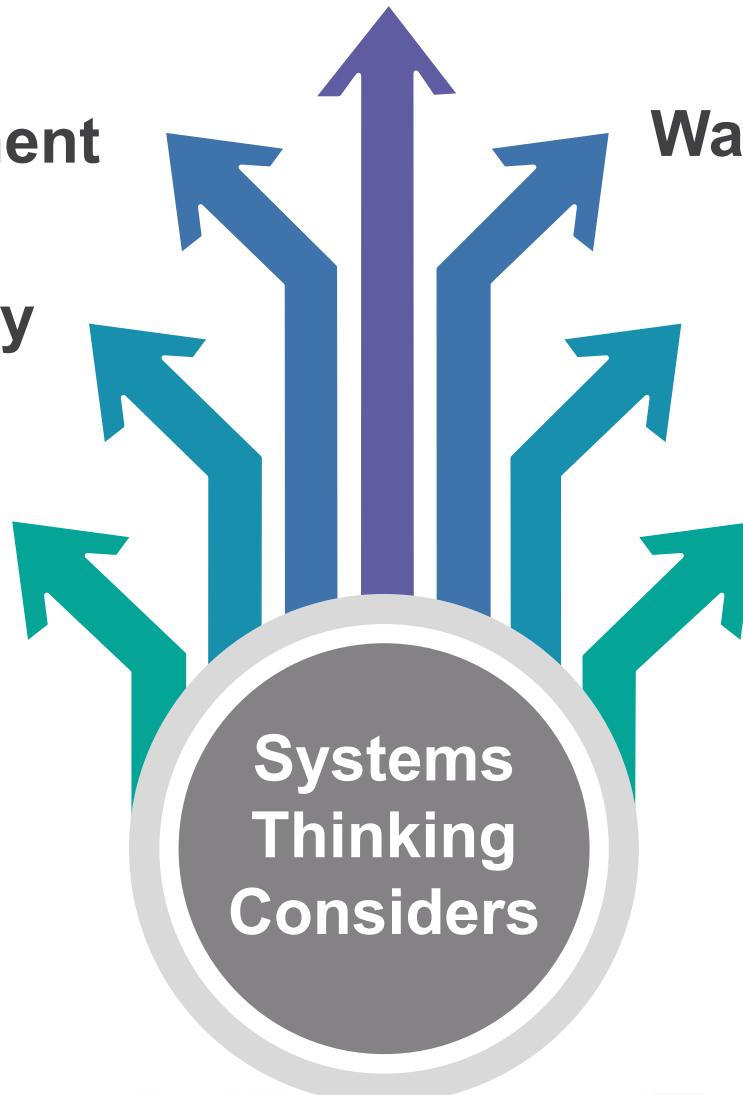
Multidisciplinary

Patterns

Way of Thinking

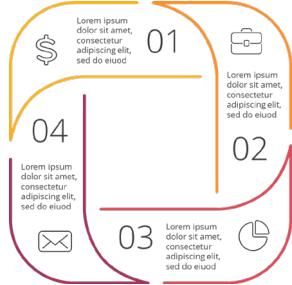
Holism

Interdependence





# How Can Systems Thinking Be Developed



## Deepening of Systems Maturity

Alternative Thinking,  
Decision, Action,  
Interpretation



## Projection to Circumstances

# Developing Systems Thinking



## Mastery of Systems Theory Language



Reframing the  
Familiar to New  
and Novel

## Immersion in Language





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