# THE STAMP PYRAMID:

Vertical Thinking for Leverage in a
Horizontally Focused World

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STAMP/STPA Workshop

William E. Young, Jr.
Colonel, USAF
PhD Student, Engineering Systems Division
Massachusetts Institute of Technology

MIT ESD
Massachusetts Institute of Technology
**Engineering Systems Division**

WYOUNG@MIT.EDU

# DISCLAIMER:

*The views expressed in this presentation are are those of the presenter and do not reflect the official policy or position of the United States Air Force, Department of Defense, or the U.S. Government*

# What Would You Do?



- ☐ You are investigating a safety incident
- ☐ Initially explaining STAMP can be a barrier to implementation
- ☐ A useful concept might
  - ■ Convey the "big picture" of STAMP
  - ■ Express its relationships with other methods

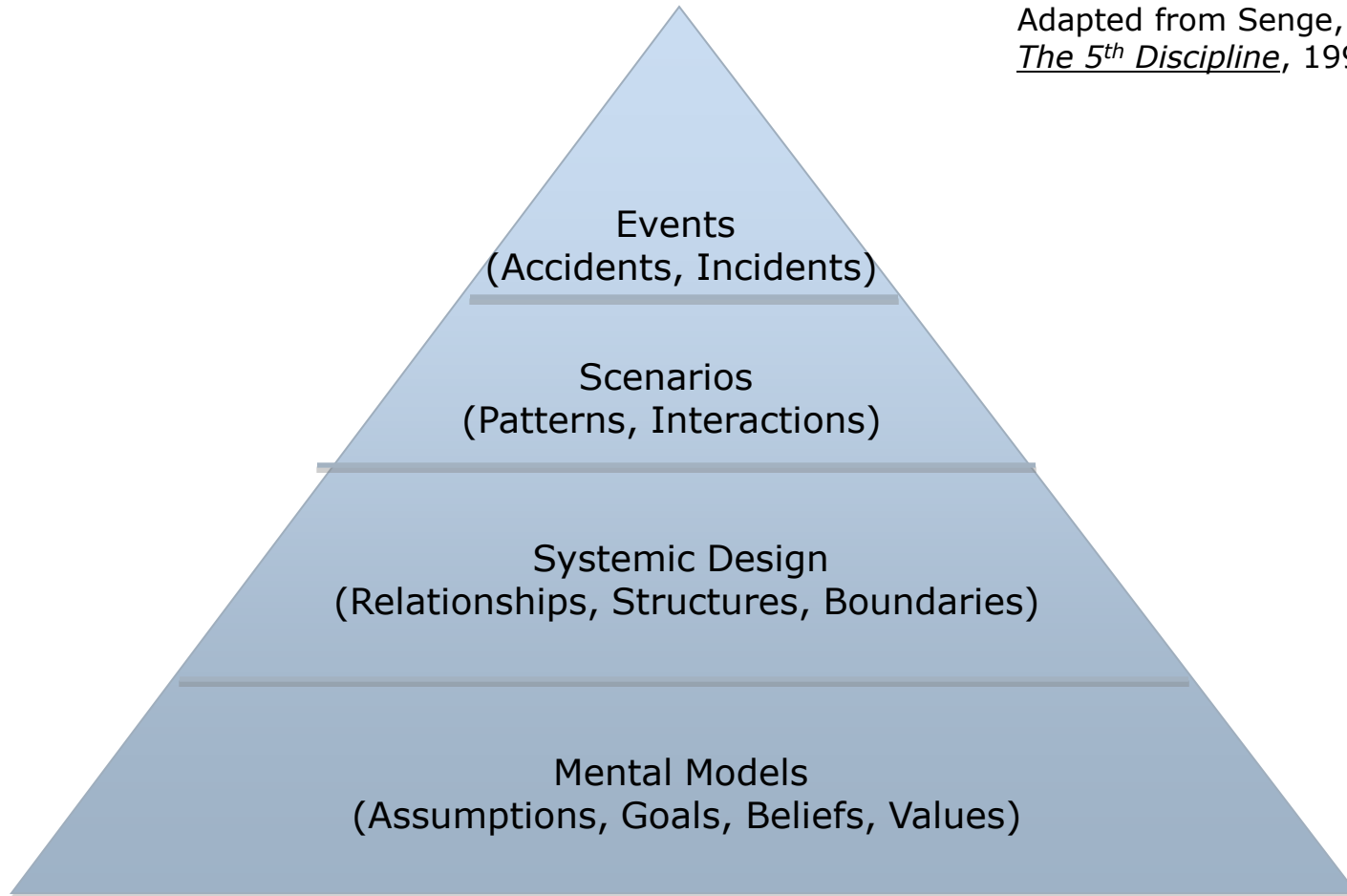Need a "back of the envelope" sketch to begin discussion

# The "STAMP Pyramid" Overview

☐ STAMP as a pyramid of systems ideas

☐ The top of the pyramid: event-based, horizontal thinking

☐ Getting below the surface: vertical thinking

- ■ Scenarios as patterns of interactions and disturbances

- ■ *Systemic\** design, relationships, structure, and boundaries

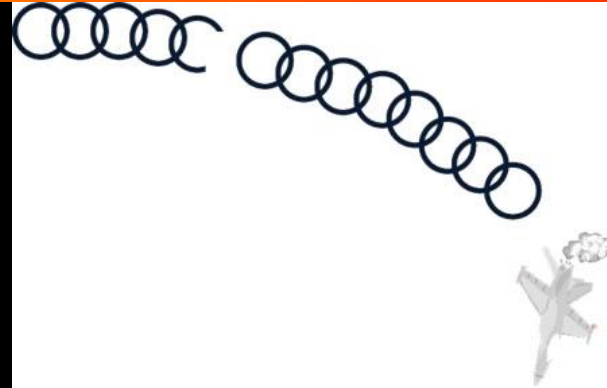- ■ Mental models encompassing assumptions, goals, belief & values (designers & operators)

> Visually depict STAMP as a pyramid of related systems concepts

# The STAMP Pyramid



Adapted from Senge,
*The 5th Discipline*, 1990 Doubleday

Events
(Accidents, Incidents)

Scenarios
(Patterns, Interactions)

Systemic Design
(Relationships, Structures, Boundaries)

Mental Models
(Assumptions, Goals, Beliefs, Values)

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# Event-based, Horizontal Thinking



- ☐ Most useful when cause & effect connections are clear
  - ■ Close temporal, spatial relationships
  - ■ Physical / material focus (not cognitive)
  - ■ Technical (as opposed to social)
- ☐ Fine for "tactical" thinking, but not for strategic thinking

Causality focus: What specific _events_ happened or didn't happen?

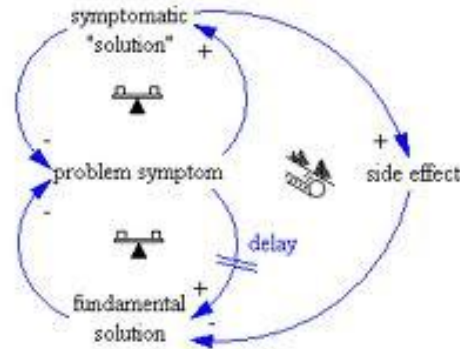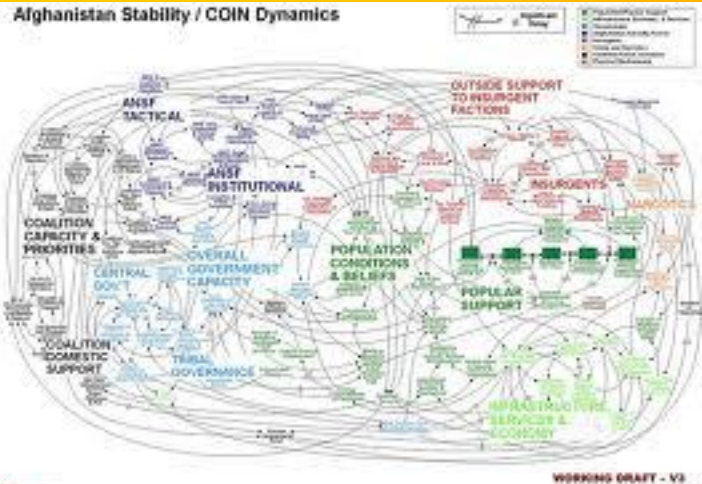# Scenarios as Patterns of Interactions & Disturbances
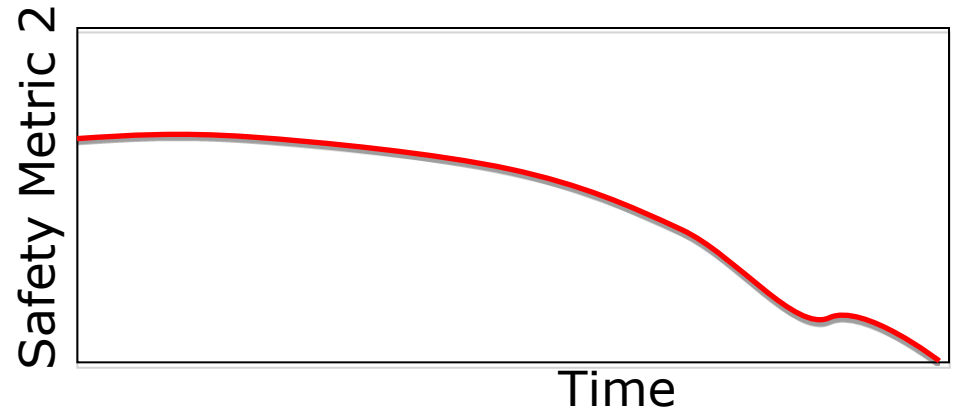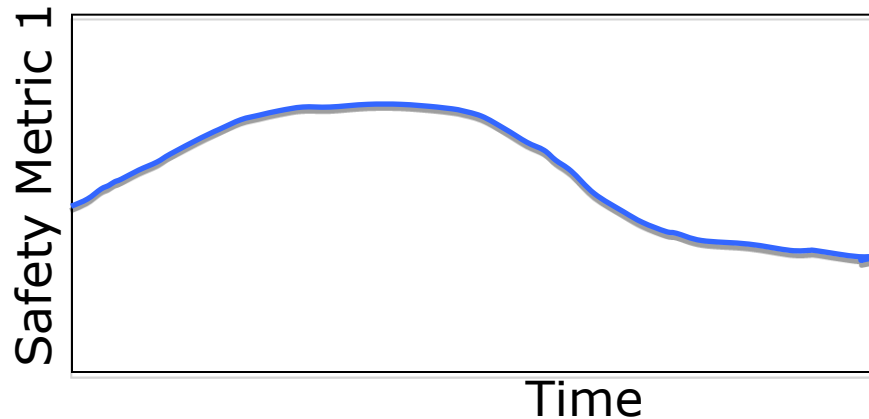


- ☐ Migration over time into states that the system should never be in

- ☐ Interactions include control and feedback signals (and their timing)

Thinking about avoiding drift into hazard regions, not just hazards

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- *Systemic* in terms of relating to the whole in a conceptual sense (bigger than just physical system)
- Nature of relationships determine (bound?) the interactions that are possible within the system
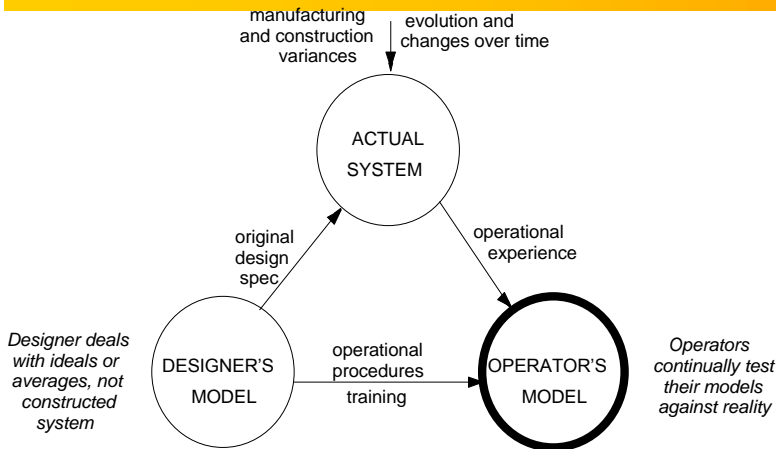
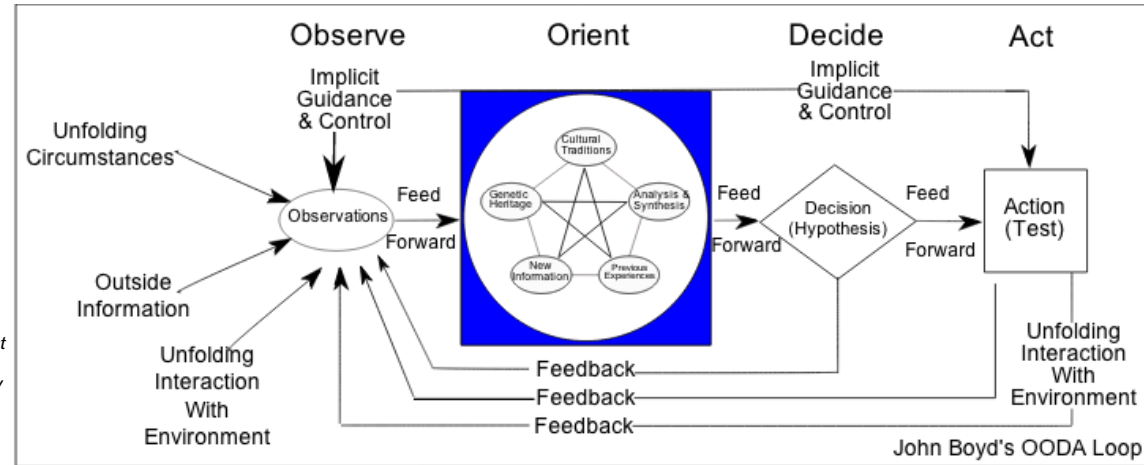System structure gives rise to behavior

# Mental Models



Figure 2.9 , pg 42
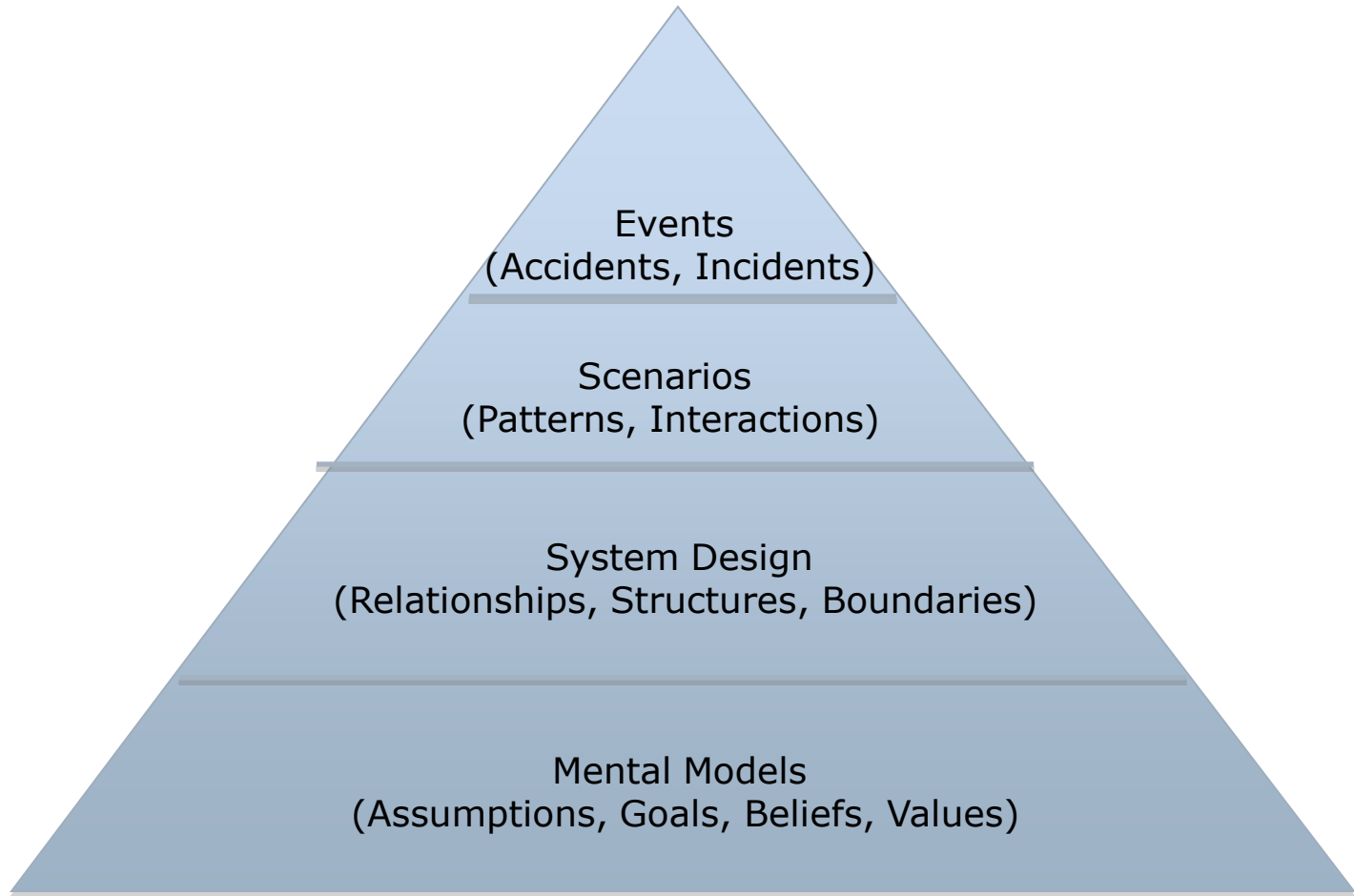Leveson, *Engineering a Safer World*
2011 MIT Press

John Boyd's OODA Sketch, *The Essence of Winning & Losing*,
Briefing Jan 1996

☐ System as an abstraction

☐ Both designer and operator mental models are important

Mental models drive how we think about, build and operate our systems
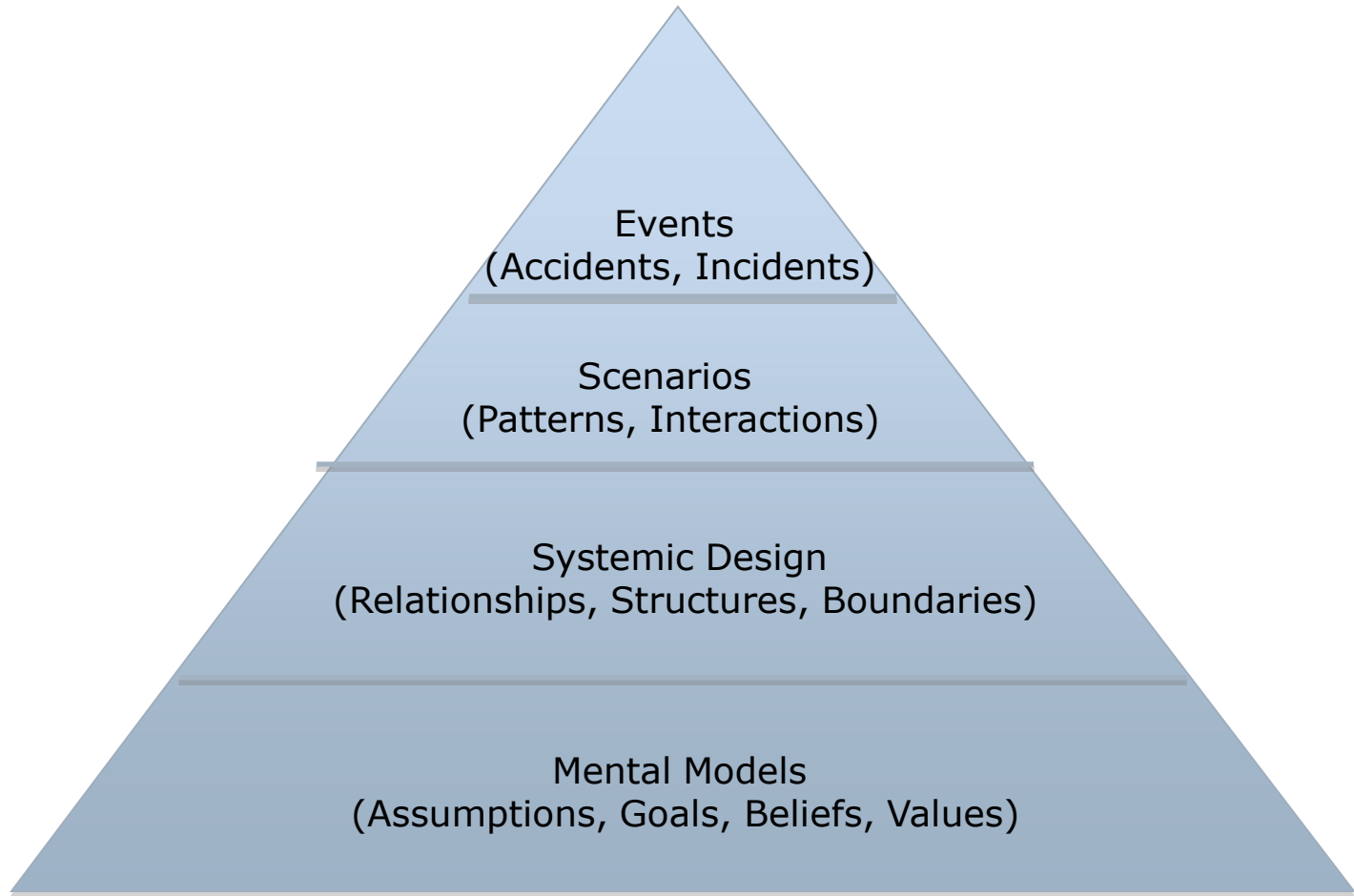
# Pyramid of System-Theoretic Ideas

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# Pyramid of System-Theoretic Ideas



Technical

Social

Events
(Accidents, Incidents)

Scenarios
(Patterns, Interactions)

Systemic Design
(Relationships, Structures, Boundaries)

Mental Models
(Assumptions, Goals, Beliefs, Values)

# Pyramid of System-Theoretic Ideas



Short-term

Long-term

Events
(Accidents, Incidents)

Scenarios
(Patterns, Interactions)

Systemic Design
(Relationships, Structures, Boundaries)

Mental Models
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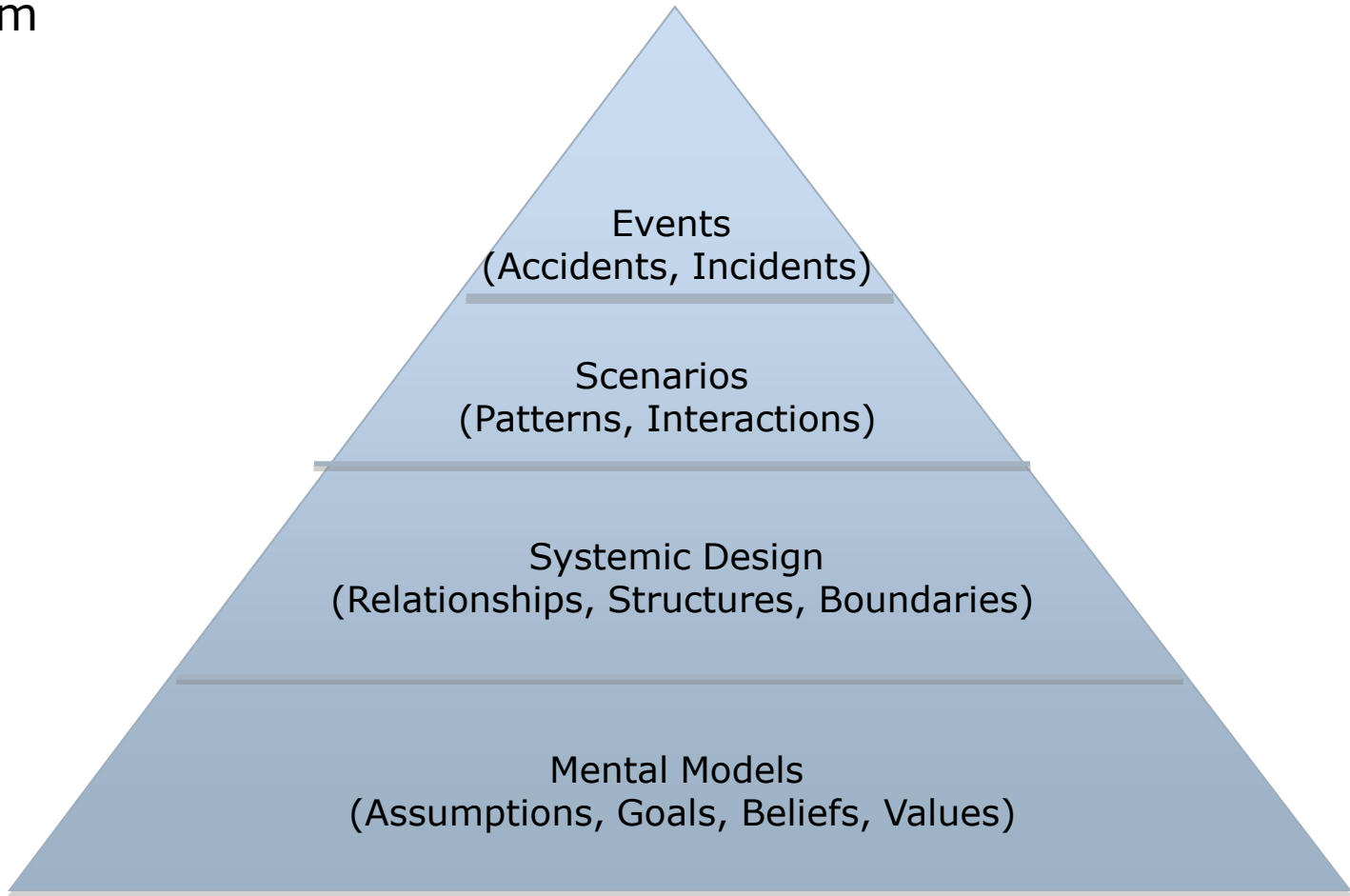
# Pyramid of System-Theoretic Ideas



Narrow focus

Broad focus

Events
(Accidents, Incidents)

Scenarios
(Patterns, Interactions)

Systemic Design
(Relationships, Structures, Boundaries)

Mental Models
(Assumptions, Goals, Beliefs, Values)
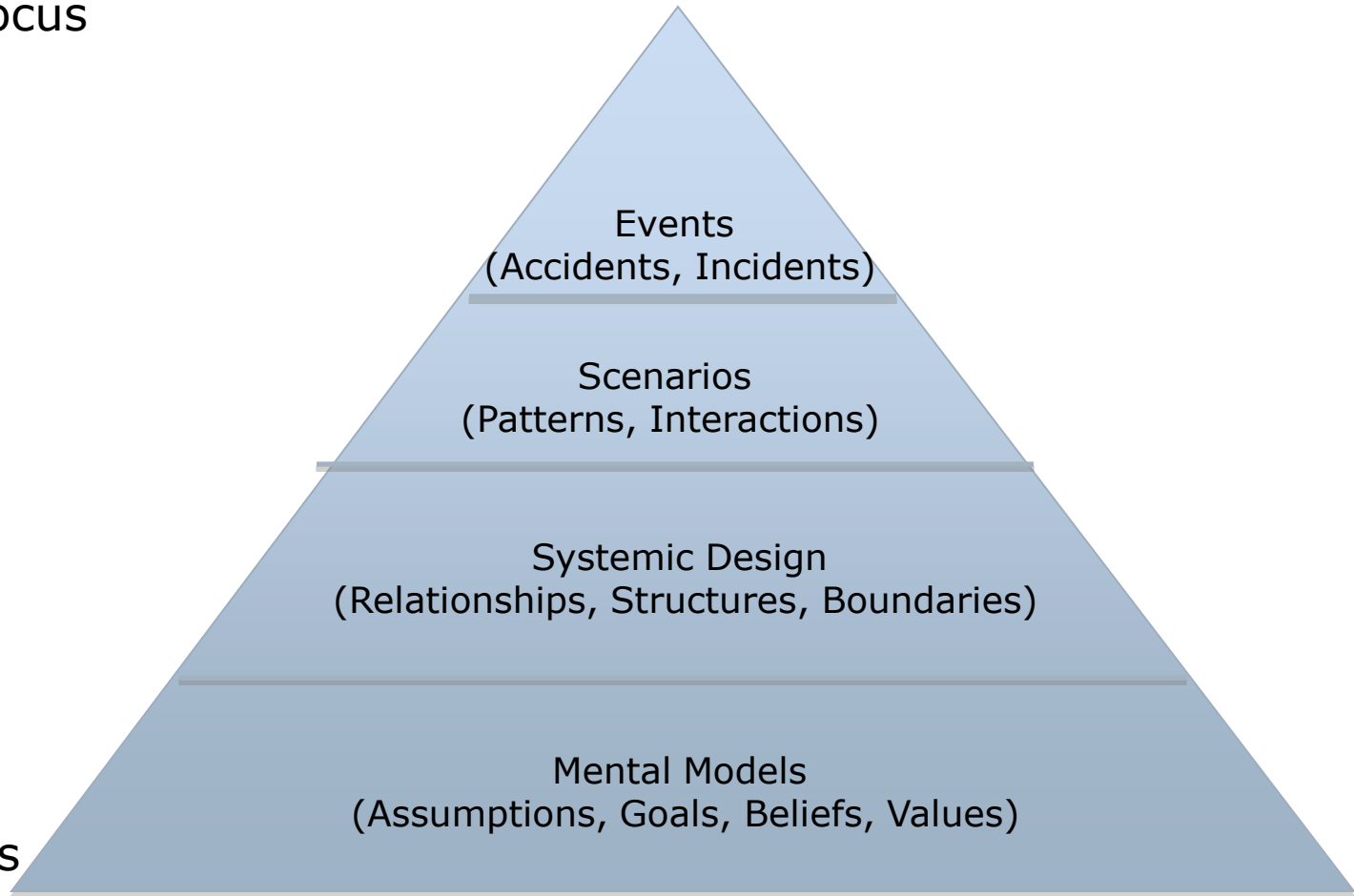
# Pyramid of System-Theoretic Ideas

Elements

"Wholes"



Events
(Accidents, Incidents)

Scenarios
(Patterns, Interactions)

Systemic Design
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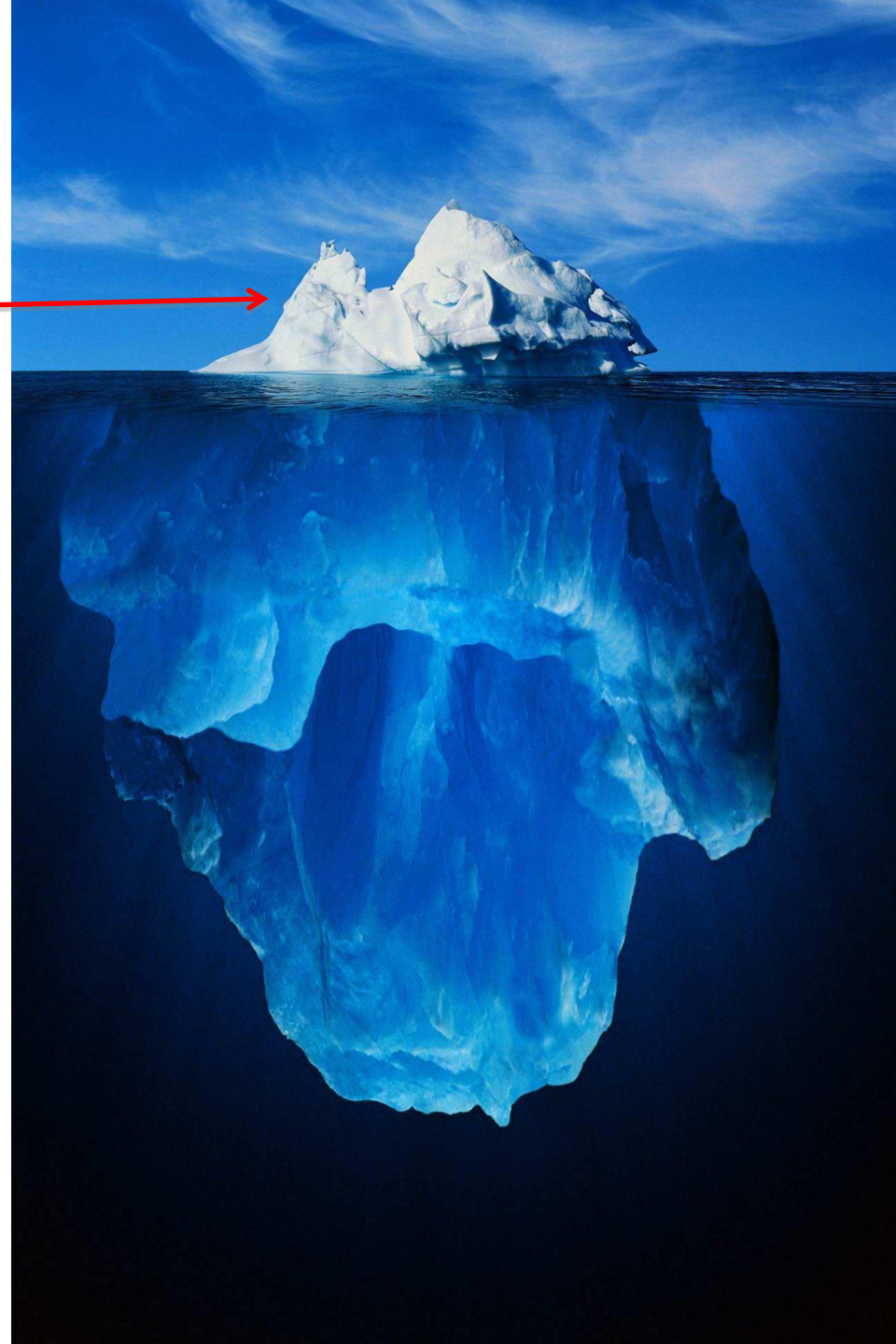
L E V E R A G E
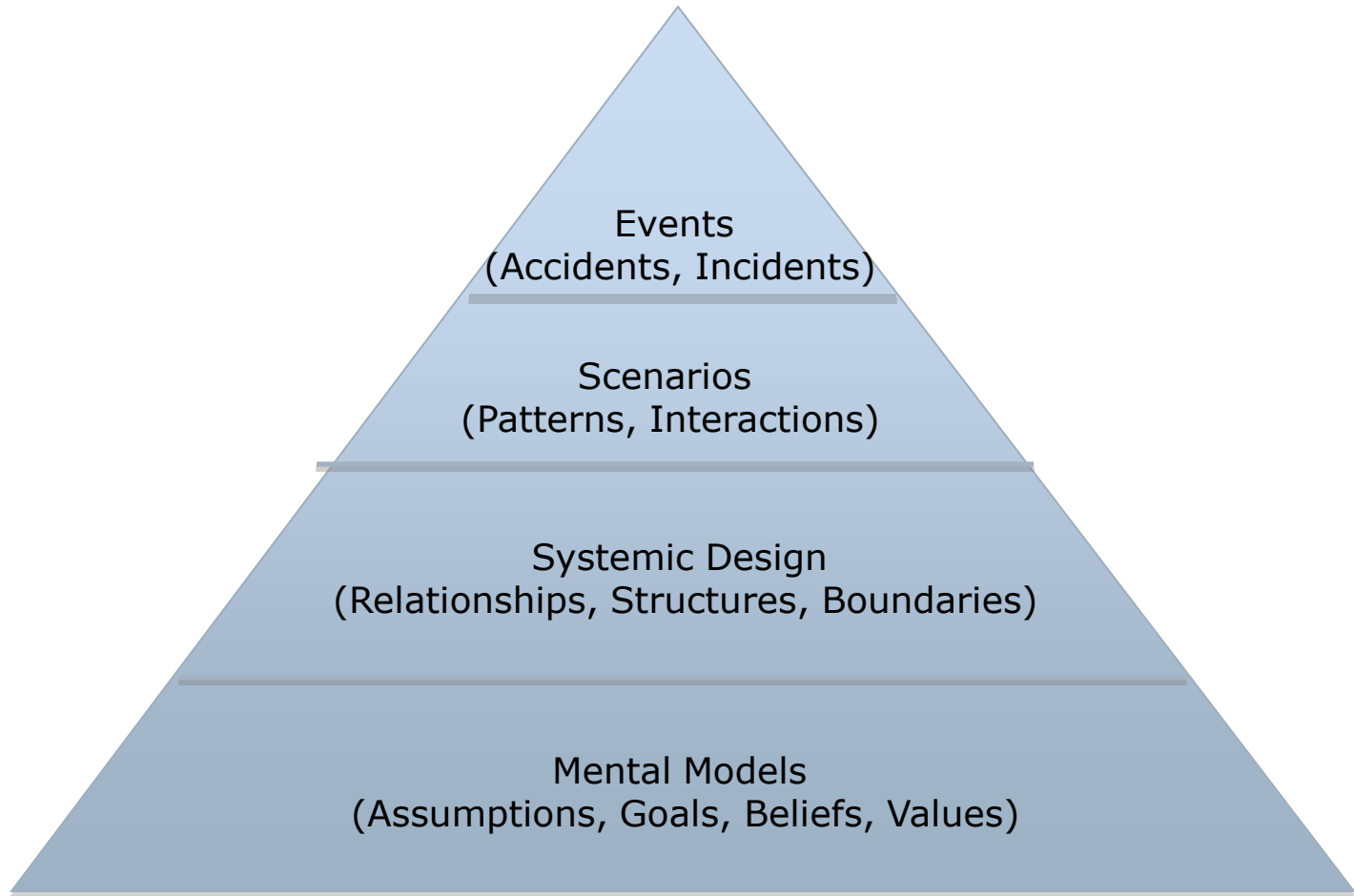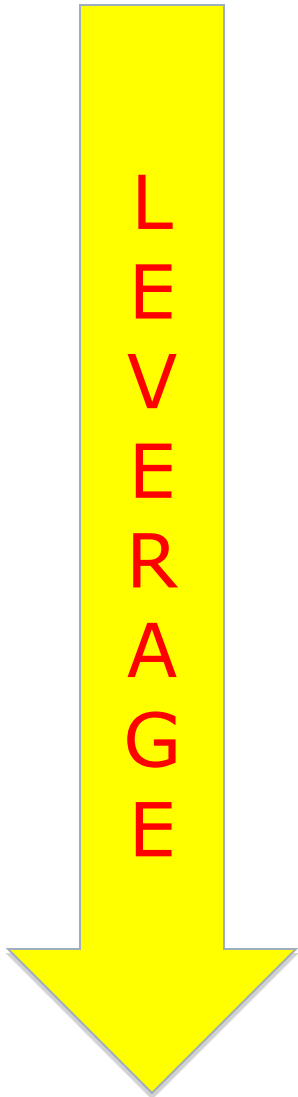
Event-based thinking

# Summary

- ☐ STAMP Pyramid captures some of the key insights and ideas behind STAMP

- ☐ Can be used as a quick way to begin framing the conversation about how STAMP:

  - ■ Differs from more traditional approaches
  - ■ Complements and extends analysis

STAMP Pyramid can help succinctly convey the essence of STAMP

# QUESTIONS/DISCUSSION

# My Contact Information

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