DISCLAIMER:

The views expressed in this presentation 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
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

- System as an abstraction
- Both designer and operator mental models are important

Mental models drive how we think about, build and operate our systems.

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
Pyramid of System-Theoretic Ideas

- Events (Accidents, Incidents)
- Scenarios (Patterns, Interactions)
- System Design (Relationships, Structures, Boundaries)
- Mental Models (Assumptions, Goals, Beliefs, Values)
Pyramid of System-Theoretic Ideas

- Mental Models (Assumptions, Goals, Beliefs, Values)
- Systemic Design (Relationships, Structures, Boundaries)
- Scenarios (Patterns, Interactions)
- Events (Accidents, Incidents)

Technical

Social
Pyramid of System-Theoretic Ideas

Short-term

Events (Accidents, Incidents)

Scenarios (Patterns, Interactions)

Systemic Design (Relationships, Structures, Boundaries)

Mental Models (Assumptions, Goals, Beliefs, Values)

Long-term
Pyramid of System-Theoretic Ideas

Narrow focus

- Events (Accidents, Incidents)
- Scenarios (Patterns, Interactions)
- Systemic Design (Relationships, Structures, Boundaries)
- Mental Models (Assumptions, Goals, Beliefs, Values)

Broad focus
Pyramid of System-Theoretic Ideas

- Elements
  - Events (Accidents, Incidents)
  - Scenarios (Patterns, Interactions)
  - Systemic Design (Relationships, Structures, Boundaries)
  - Mental Models (Assumptions, Goals, Beliefs, Values)

“Wholes”
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
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THE STAMP PYRAMID:

Vertical Thinking for Leverage in a Horizontally Focused World

April 19, 2012
STAMP/STPA Workshop

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