BOEING

Wicked Problems and Comprehensive Thinking in Irregular Warfare
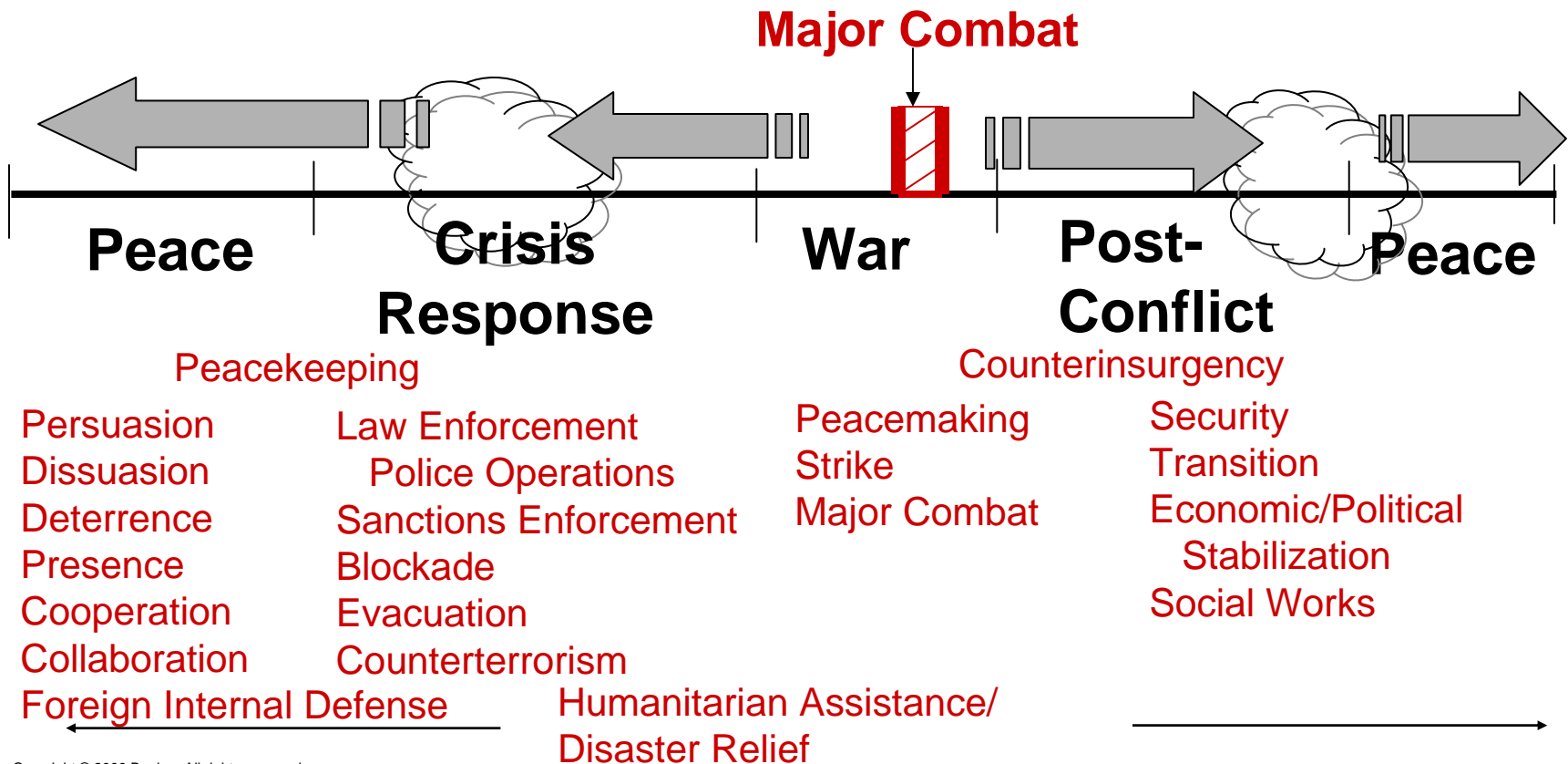
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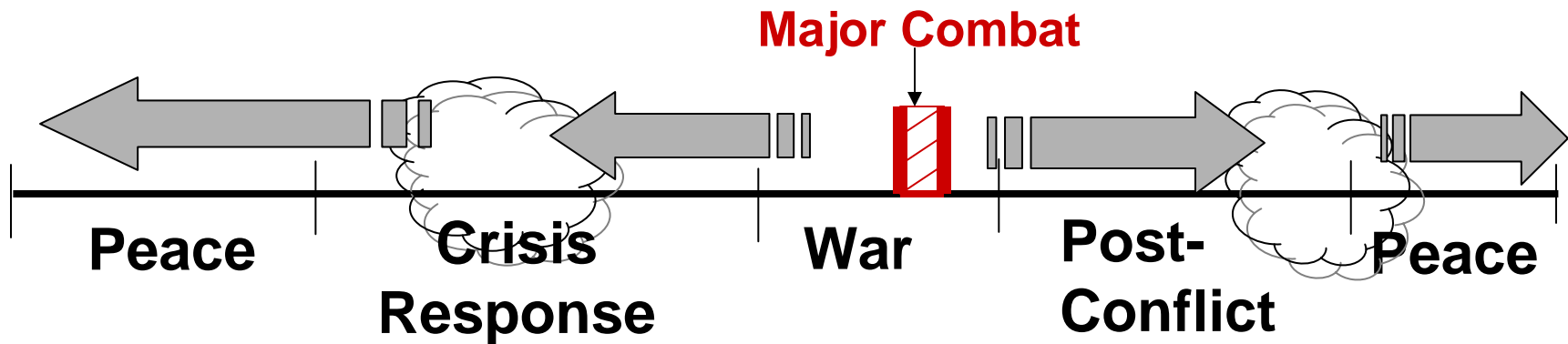
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Outline

1. **Wicked Problems: Globalization and Messy Social Challenges**

2. **Dealing with "Wickedness": Three Part Conceptual Framework**
   - **Complexity Theory**
   - **Living Systems Theory**
   - **Decision-making Theory**

3. **Bounding Complexity: Tools and PEOPLE**

4. **Conclusion: Comprehensive Thinking**

1. The Wicked Problem: Globalization and Messy Social Challenges

Major Combat

Peace   **Crisis Response**   **War**   **Post-Conflict**   **Peace**

Peacekeeping

Counterinsurgency

Persuasion
Dissuasion
Deterrence
Presence
Cooperation
Collaboration
Foreign Internal Defense

Law Enforcement
Police Operations
Sanctions Enforcement
Blockade
Evacuation
Counterterrorism

Peacemaking
Strike
Major Combat

Security
Transition
Economic/Political
Stabilization
Social Works

Humanitarian Assistance/
Disaster Relief

What does that mean?

Major Combat

Peace — Crisis Response — War — Post-Conflict — Peace

- Increasing human dimension
- Increasing complexity
- Cross spectrum
- Increasing need for a comprehensive approach

Irregular Warfare?

- **Not irregular, not necessarily warfare, not solely military**

- **Focus on the human dimension**
  - Man, his organizations, and his actions are the Problem … <u>and</u> Solution
  - "Suasion" Operations
    - Victory = Changing perceptions

- **Psychological vice Physical Attrition = new metrics**

- **Competition and conflict vice war and peace**
  - Ongoing, ever-changing never ending interaction
  - Not friends or foes but actors

The Wicked Problem

- **"Wicked"** (Rittel and Webber)
  - Each problem unique and part of web of problems
  - Enumerable potential solutions; No right or wrong answer
  - No end state

- **The "Social Mess"** (Horne)
  - Man and social context as source of the "wicked" "mess"
  - Human actions inherently messy

- **"Wicked"** ⟹ **Complex**
  - Not impossible; we deal with complex problems every day

2. Dealing with "Wickedness" : Three Part Conceptual Framework

- **Complexity Theory**
  - Defines nature of challenge/ "wicked" problem
  - Define limits of what we can know and do

- **Living Systems Theory**
  - Provides real world working model for complex interactions

- **Decision Making Theory**
  - Dissects systems/ actions into discrete tasks and problems sets

Complexity Theory:
What do we mean by "complex"?

- ## Complicated
  - **Known/knowable, predictable cause and effect chain**
  - **Inputs/outputs proportional**
  - **Whole equals sum of parts**

- ## Complex
  - **Multiple interdependent variables**
  - **Changing cause and effect chain**
  - **Inputs and outputs not proportional; whole does not equal sum of the parts**
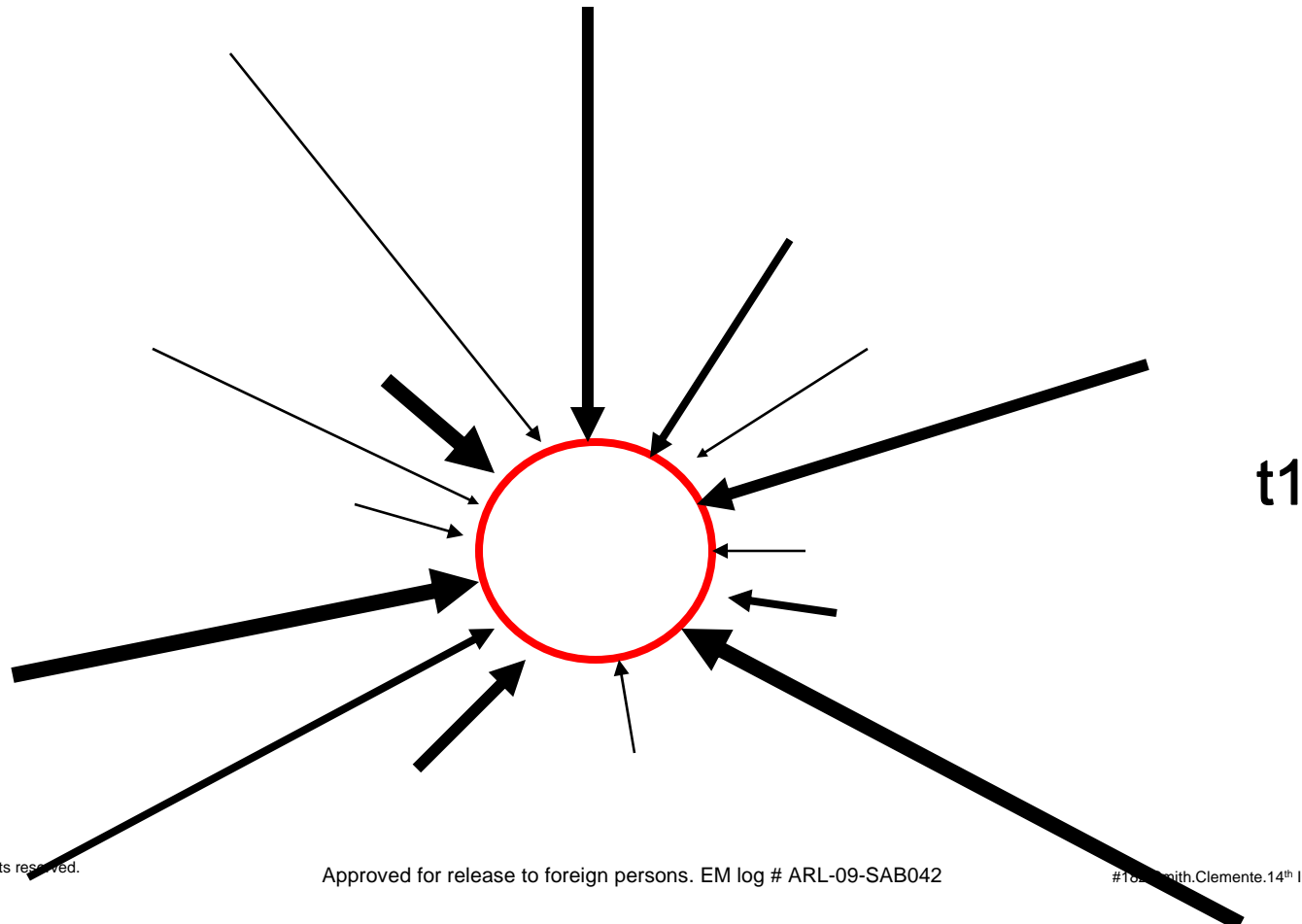
- ## Complex Adaptive System
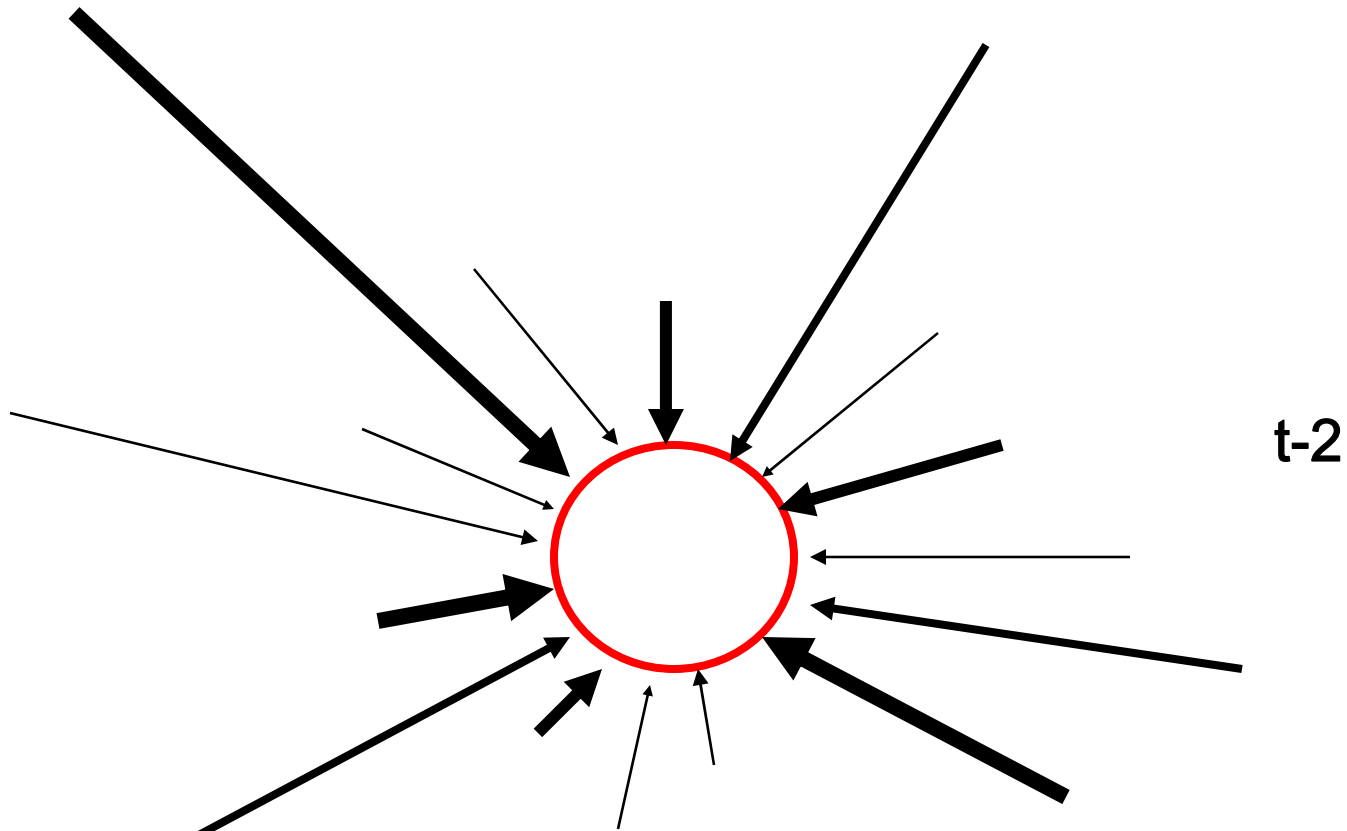 - **Reacts and evolves independently in ways we cannot entirely predict**
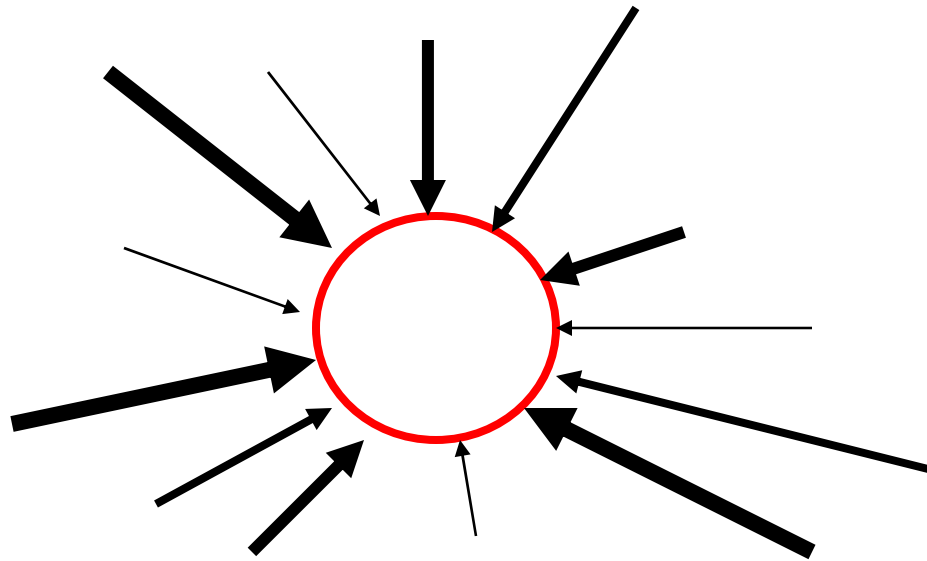
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Complexity: Interdependent Variables

Large numbers of interdependent variables shape the behavior of each actor but continually change
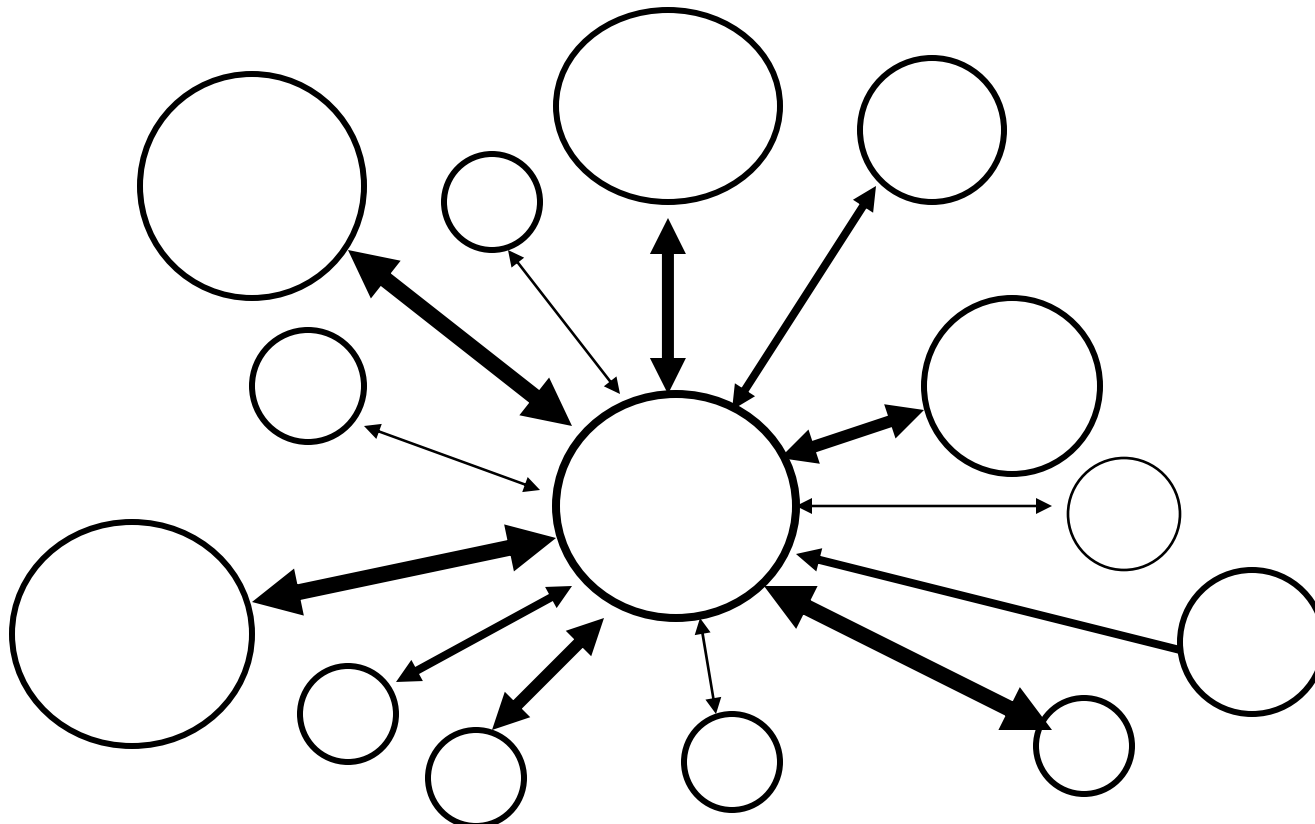
t1

Complexity: **Interdependent Variables**

t-2

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Complexity: **Interdependent Variables**

t-3

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Complexity: **Interdependent Variables**

Each variable is two-directional affecting other actors…

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Complexity: Interdependent Variables

… who in turn co-evolve and affect each other.

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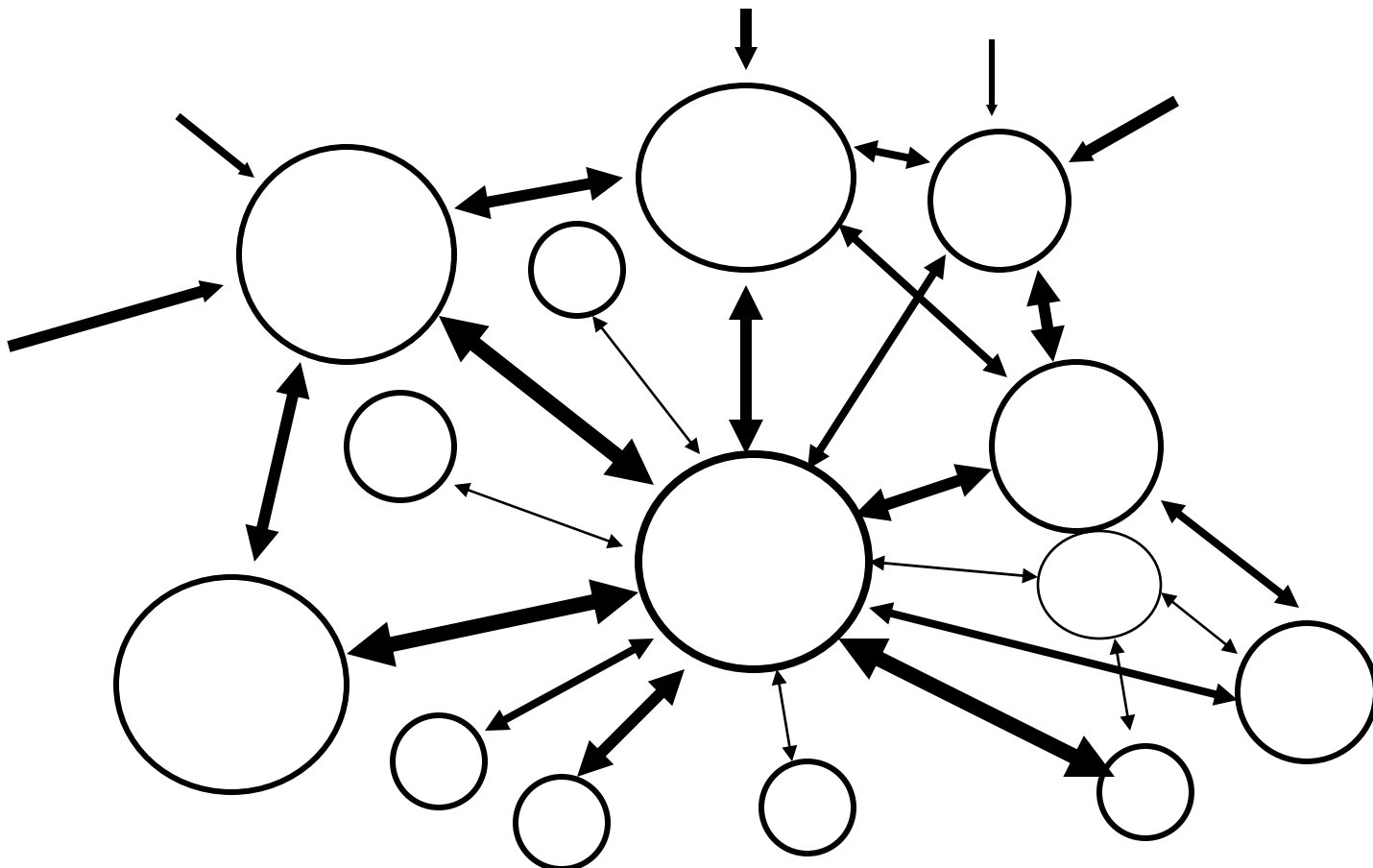
Complexity

- **Key Characteristics and Mechanisms of complex systems become potential analytical tools**

  - Tagging
  - Aggregation
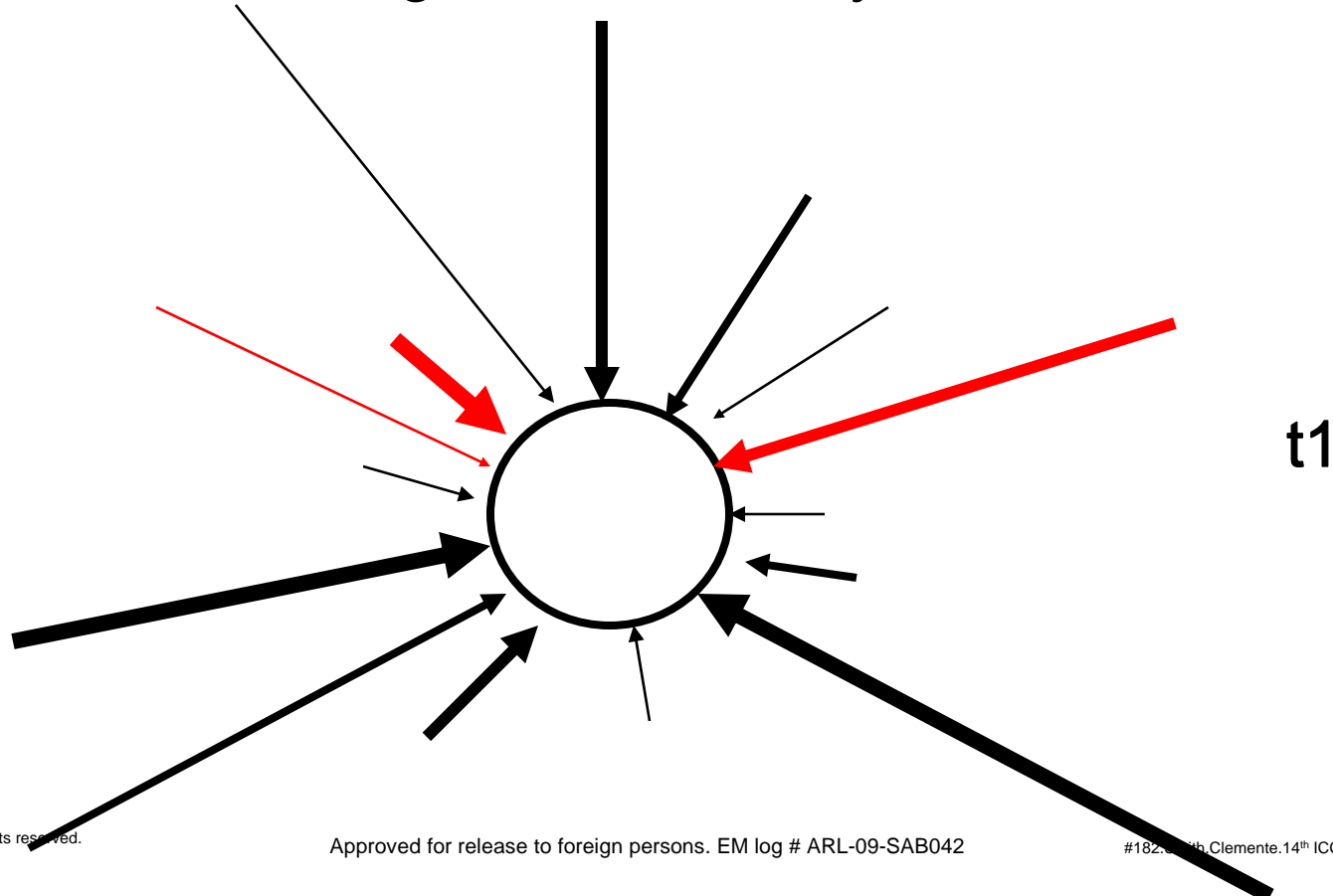 } Pattern Analysis

  - Building Blocks
  - Internal Models
  } Combined with Living Systems

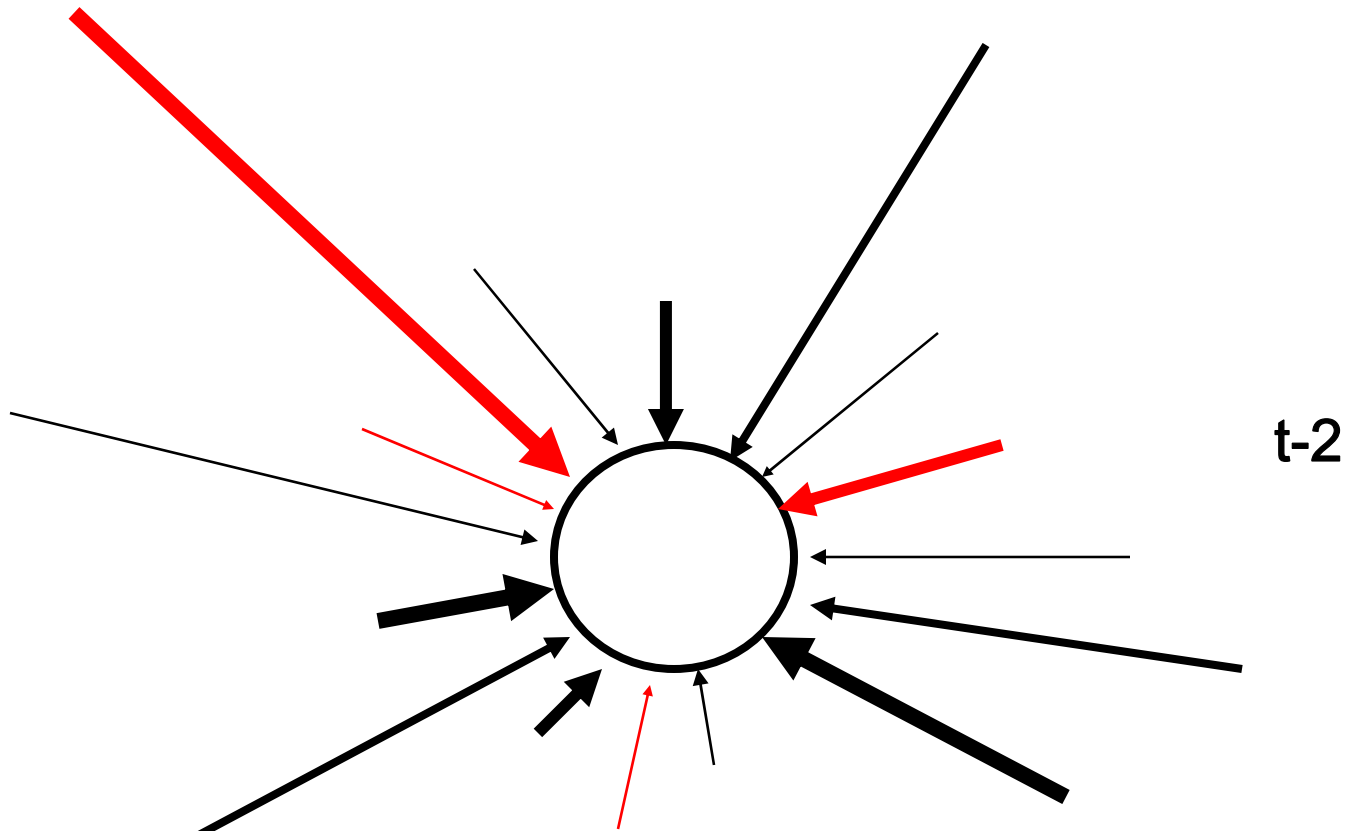Approved for release to foreign persons. EM log # ARL-09-SAB042

Complexity: Tagging and Aggregation

Tagging: Identifying classes of variables – social, economic, cultural, demographic, military….
Aggregation: Watching how these vary over time

t1

Complexity: **Tagging and Aggregation**

t-2

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Complexity: Tagging and Aggregation

t-3

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Complexity: **Tagging and Aggregation**

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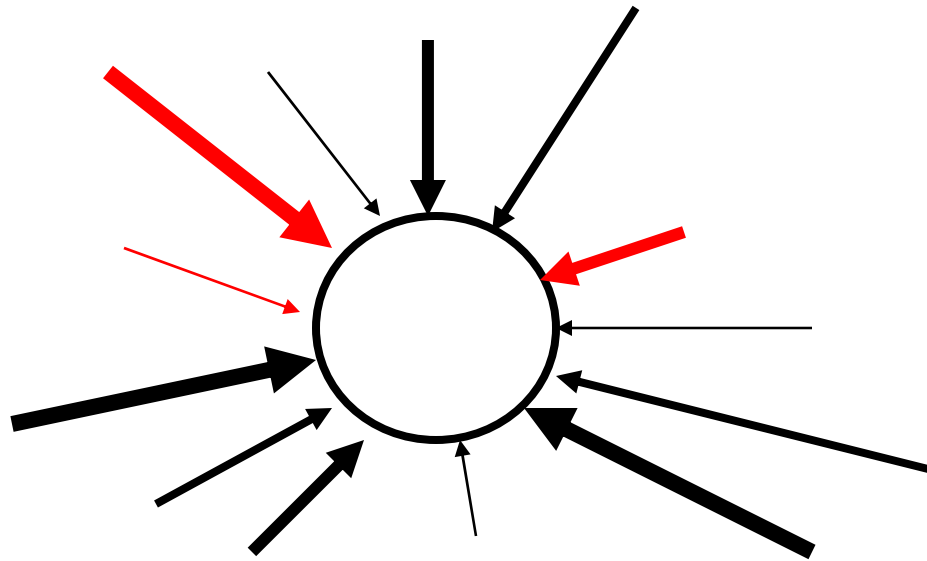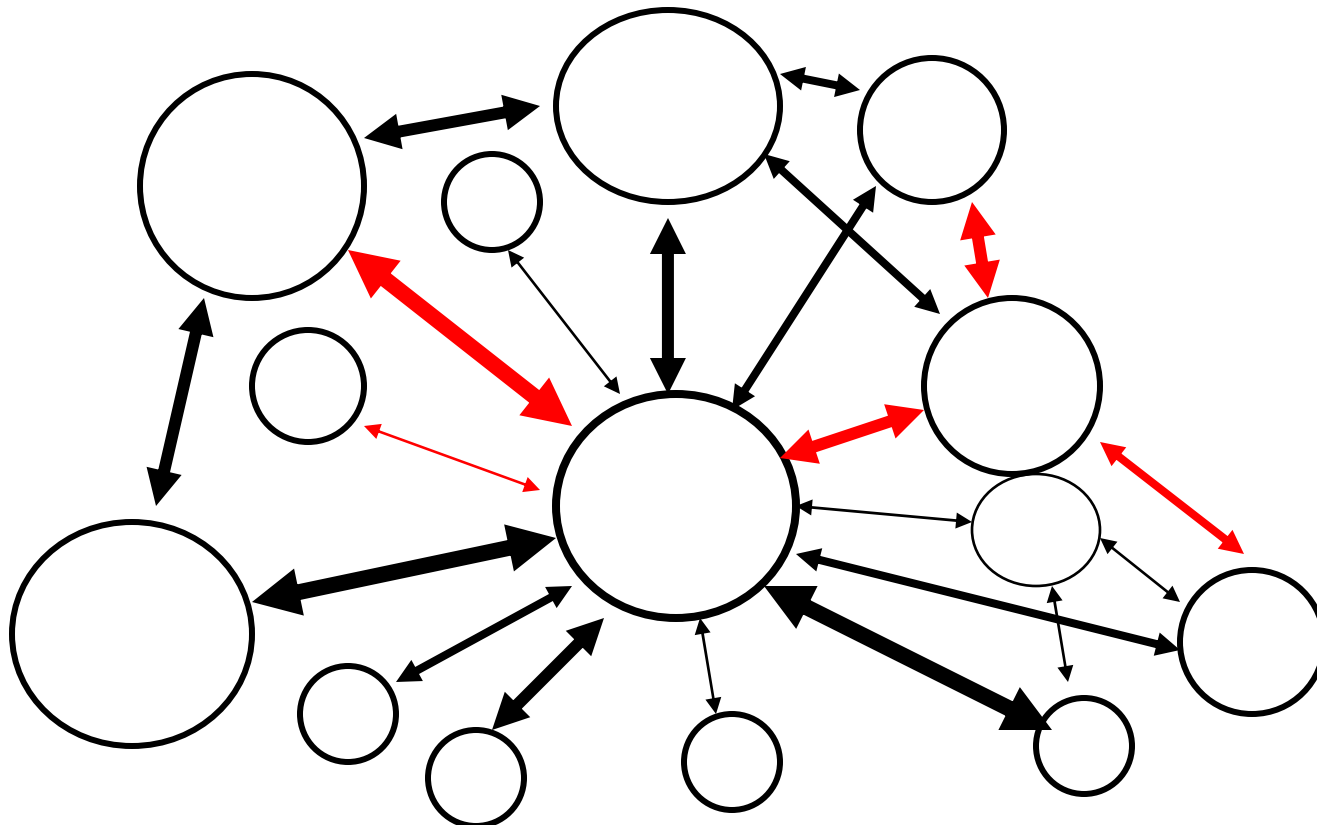
Living Systems Theory

- **Living Systems Theory offers multi-layer <u>system of complex adaptive systems</u>**
  - Provides building blocks, internal models for the living CAS that define IW and CA world
  - Provides <u>real world</u> framework for the system of CAS that make up the IW/ CA world

- **Systems are product of two types of evolution**
  - Biological: Darwinian natural selection, "survival of the fittest"
  - Sociological: Purposeful learning and adaptation by human CAS --Traceable through history

- **Result:**
  - Can understand and trace why CAS succeed or fail
  - Can identify "essential processes" and capabilities needed to succeed
    - Building blocks common to all living systems
    - Identifiable in human systems at every level

Living Systems:
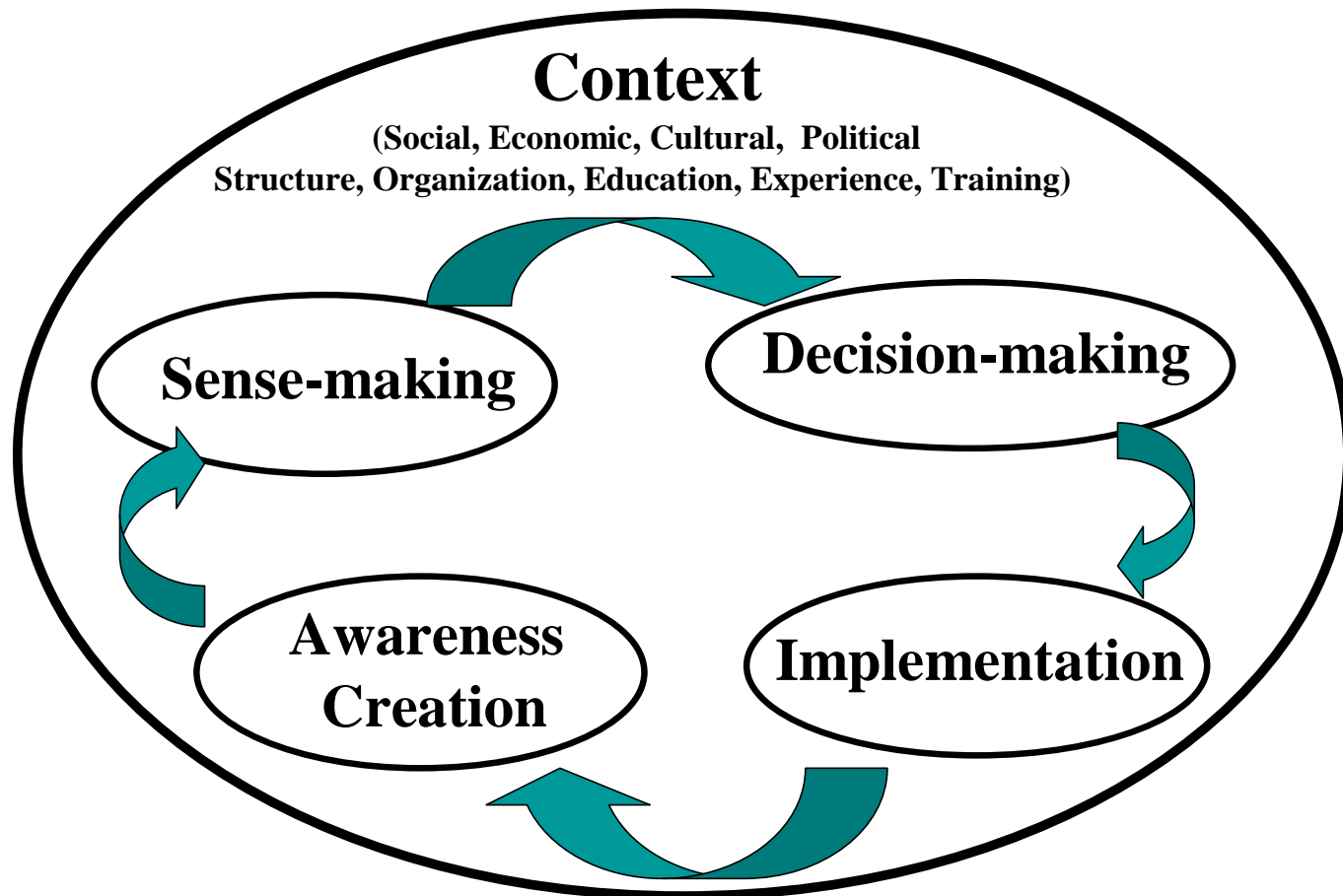# The System of Complex Adaptive Living Systems

Supranational

Societal

Community

Organization

Group

Sociological

Organism

Biological

Organ

Cell

Based on James Grier Miller, Living Systems
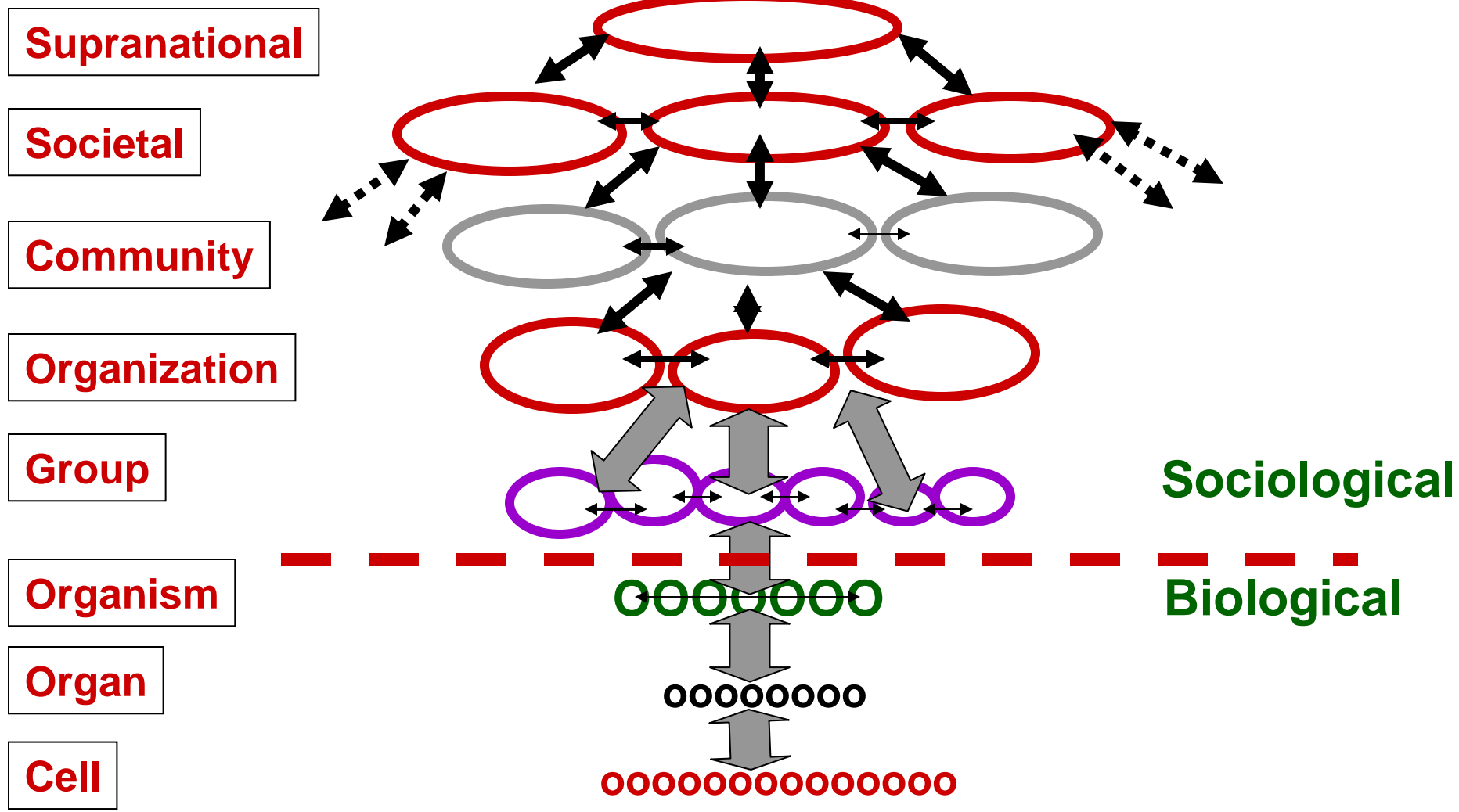
Decision-making Theory:
The "Rational Actor"- Context is Everything

- **Rationality**: *"the latent power to make logical inferences and draw conclusions that enable one to understand the world about him and relate such knowledge to the attainment of ends."*
  - The *irrational* actor = random acts/ no limit/ no bounds
- **"Rationality" is complex behavior only understood in context**
  - **Context: Social, cultural, religious, economic, political…**
    - **"where you sit" structural and organizational**
    - **Individual education, experience, training**
  - **Context changes / evolves**
    - **Context is snapshot of a moving target**
    - **Context is time dependent**

Decision-making Theory:
From Stimulus and Response to OODA Loops to…

… Action-Reaction Cycle

Context

(Social, Economic, Cultural, Political
Structure, Organization, Education, Experience, Training)

Sense-making

Decision-making

Awareness Creation

Implementation

3. Tools and PEOPLE: Coping with Complexity

No *Big Black Box* but…
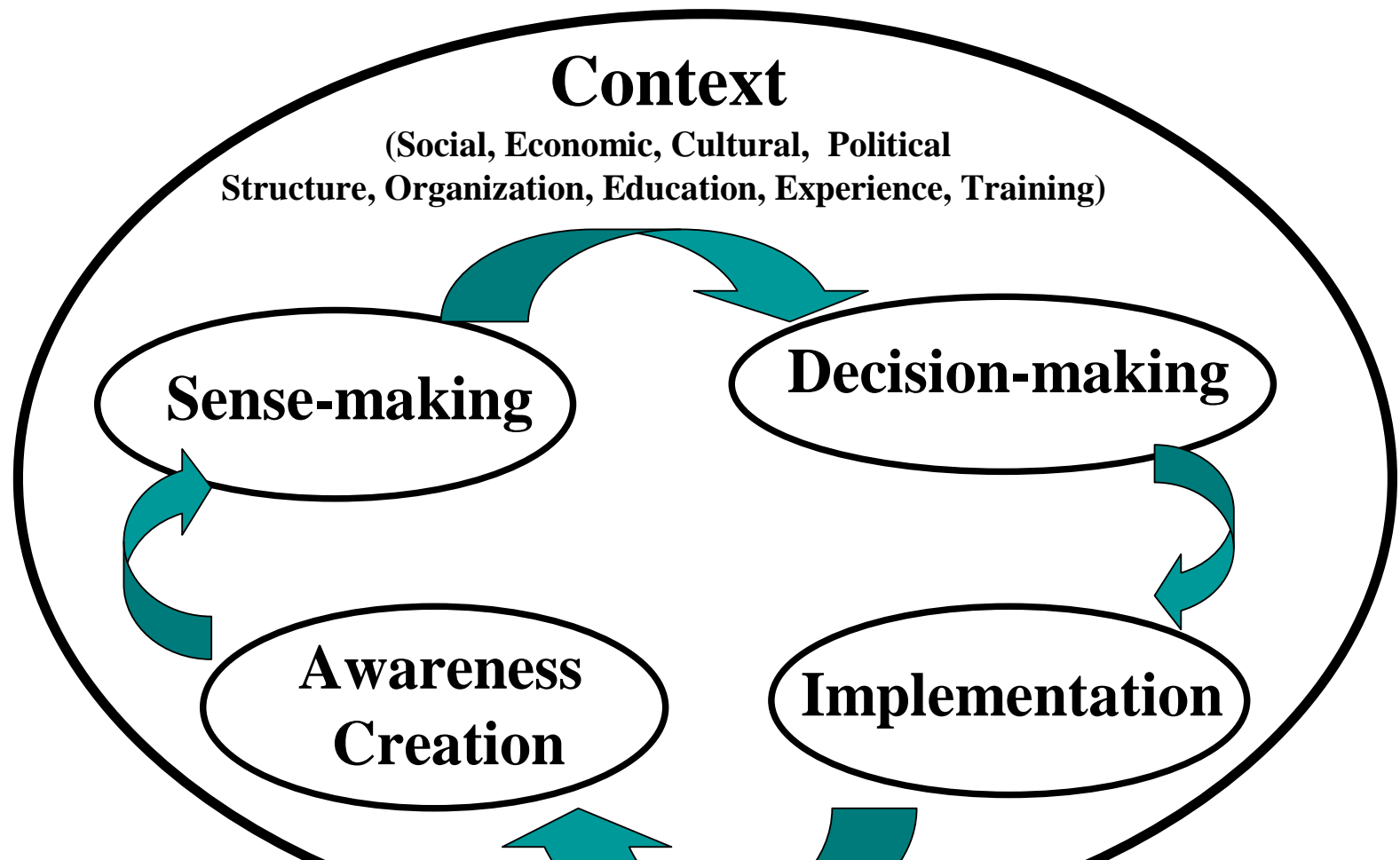
- **Can bound the problem**
  - Use what we know or can know to bound what we cannot know or know in time
    - Distinction between what is linear and can be decomposed and what is complex and cannot
    - Use former to bound the latter

- **Can dissect the decision-cycle to assess who needs what tool/ expertise where and when**

… Action-Reaction Cycle

Context

(Social, Economic, Cultural, Political
Structure, Organization, Education, Experience, Training)

Sense-making

Decision-making

Awareness Creation

Implementation

Awareness Creation

Tasking

System Capability
- Organic
- Non-organic
- Accessible

Priority
- Situation
  - History
- Decision Level
  - History
  - Org.

Collection

Sensors
- Organic
  - Sensor Parameters
  - Data Handling
- Non-organic
- Accessible

Human Reporting
- Organic
  - Manage
  - Validate
  - Assess
- Non-organic
- Accessible

Fusion

Collate
- Electronic
  - Organic
  - Non-organic
  - Accessible
- Human
  - Organic
  - Non-organic
  - Accessible

Fuse
- Sources
- Subjects

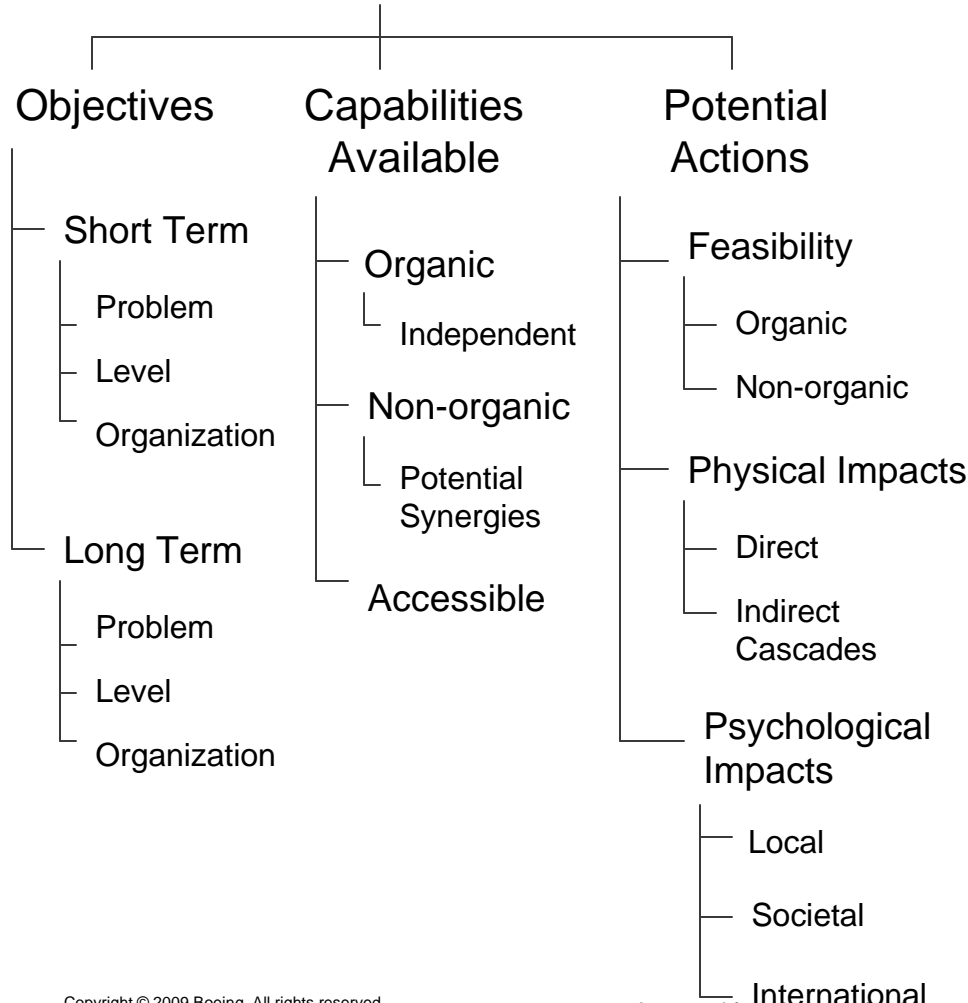Approved for release to foreign persons. EM log # ARL-09-SAB042

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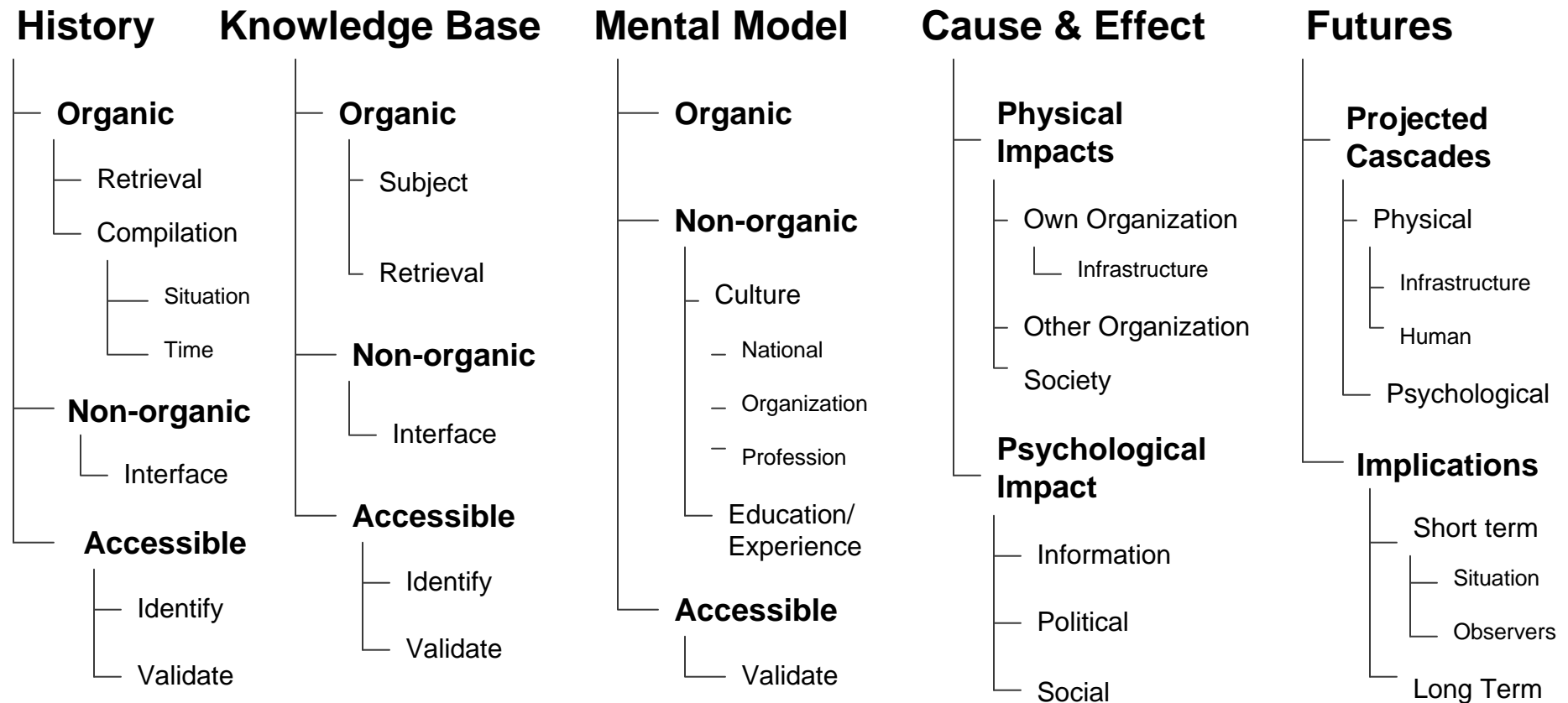
Decision-making

Exploring Options

Objectives
- Short Term
  - Problem
  - Level
  - Organization
- Long Term
  - Problem
  - Level
  - Organization

Capabilities Available
- Organic
  - Independent
- Non-organic
  - Potential Synergies
- Accessible

Potential Actions
- Feasibility
  - Organic
  - Non-organic
- Physical Impacts
  - Direct
  - Indirect Cascades
- Psychological Impacts
  - Local
  - Societal
  - International

Planning

Choosing
- Compare/Evaluate Best Potential Actions
  - Probability of success
    - Timeliness
    - Flexibility
    - Robustness
  - Capability Availability
    - Organic
    - Non-Organic
    - Accessible
- Choose

Planning
- Commit Capabilities
  - By Problem
  - By Level
  - By Organization
- Coordinate
  - Organic
  - Non-Organic
  - Effort-wide
- Communicate
  - Direction/Guidance

Implementation

Contextualize

- Situation at time of Implementation
  - Physical
    - Predicted vs. actual situation
  - Psychological
    - Local
    - Societal
- Actual Actions
  - Unplanned changes

Adapt

- Evolving Problem
  - Changing Variables
  - Asset availability
- Coordinate Adaptation
  - Organic
  - Non-organic

Feedback

- Actual vs. Planned Impact Observed
  - Physical
  - Psychological
- Initial Reactions
  - Local
  - Societal
  - International
  - Effort-wide
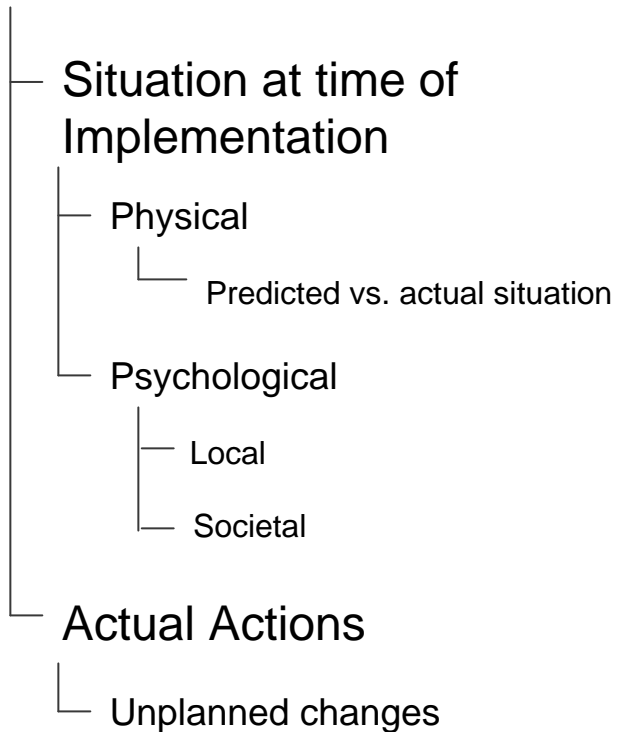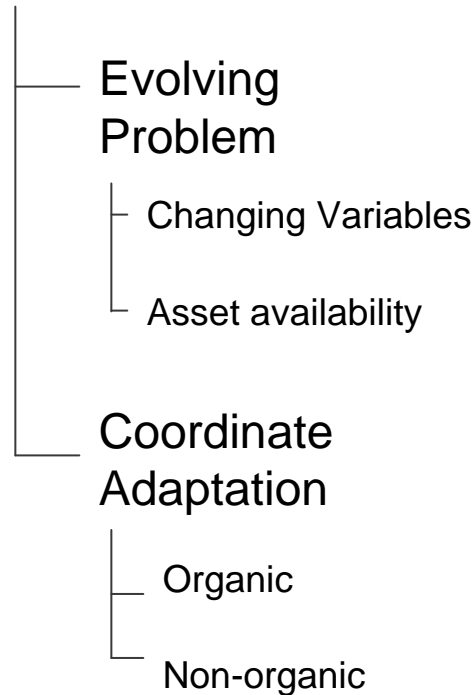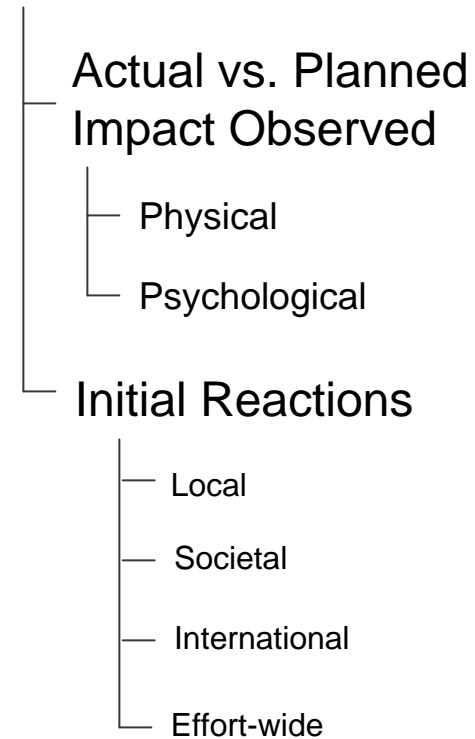
# Tools, PEOPLE… and the Real World: Scale, Timing & Perspective

- **Scale / Perspective:**
  - **Decision-making not only by major "commanders"**
    - Commanders at all levels from strategic corporal to President
    - Analysts, experts, liaison people
  - **Each level aggregates all decision-making from lower levels and adds its own**

- **Tyranny of Time:**
  - **Decisions at all levels are function of time**
    - Time windows for gathering information/ knowledge, for assessing, acting, learning, adapting
  - **Utility of analytical tools tied to time**
  - **Time forces trade-offs between tools and people**
    - Shorter the time, greater the reliance on the individual and his education, experience, training
    - Shorter the time the less information, knowledge, analysis

Losing Perspective
Coordination over Time
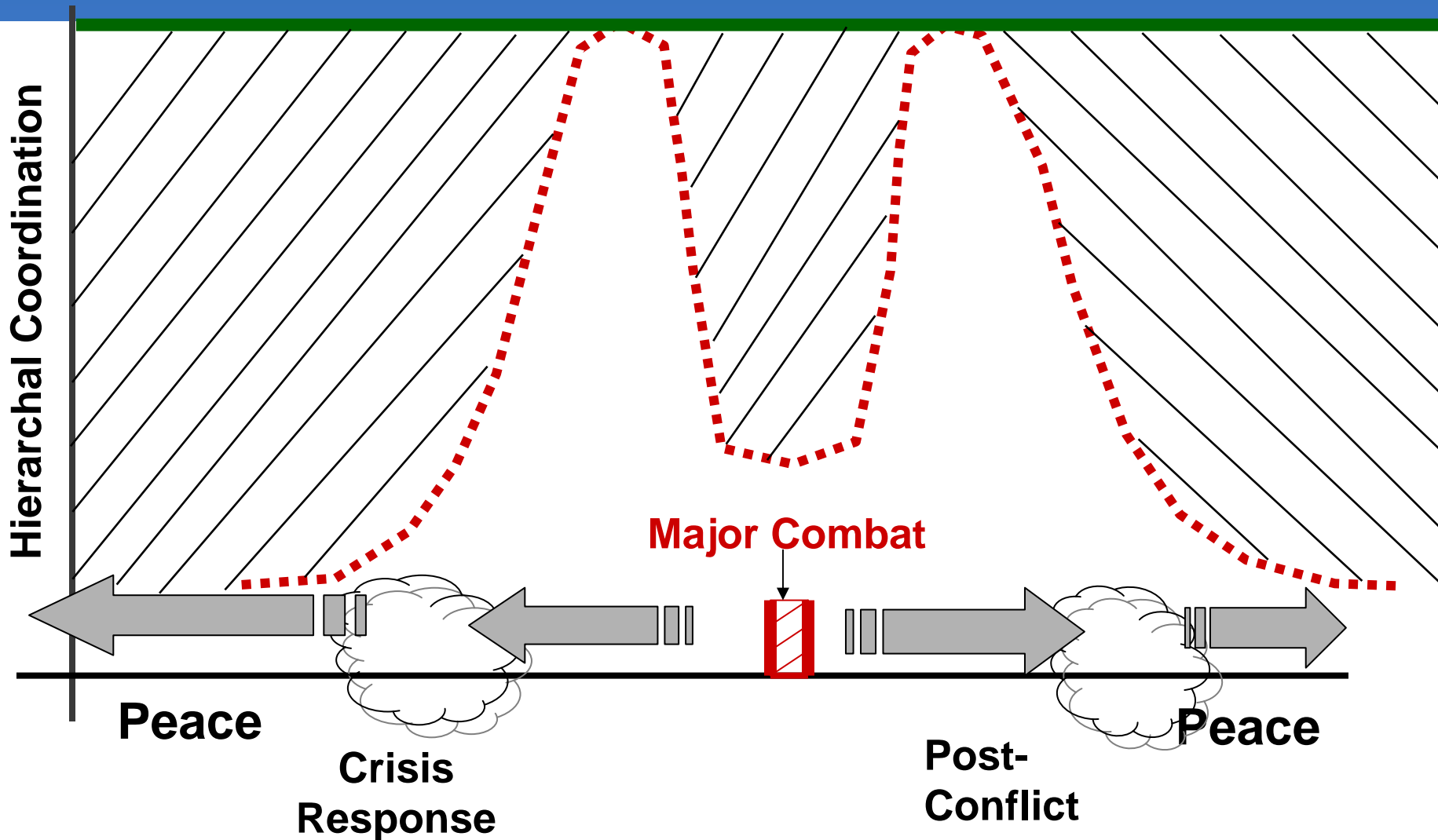
The Other People Factor : Organization & Networking

- **IW Ops are a complex "art"**

  – Require internalized human understanding of complex problems

- **Acquiring/ communicating complex understanding is personnel challenge**

  – Personnel Management tools
  – Organization
  – Social and communications networking

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6. Conclusions

- **Comprehensive Thinking mandated by interlocking complexity of 21st Century World**
  - **Irregular Warfare approach is the military instantiation**
  - **Complex human roles critical**

- **New tools for dealing with complexity revolve about synthesis of**
  - **Complexity Theory:** Defines Problem and what we can do about it
  - **Living Systems Theory:** Defines Complex <u>Real World</u> Context
  - **Decision-making Theory:** Dissects Interactions into Specific Tasks/ Problems for *Tools and PEOPLE*

The Great Paradox: *Complexity Simplifies!*

Objective: Not perfect answers but those timely and good enough to succeed … and better than the competition's

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Questions

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