

Communication, Cooperation, and Organization...

Rethinking security in an increasingly complex world.



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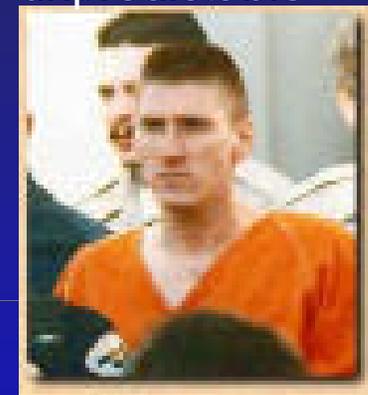


Threats to Security Are Diverse

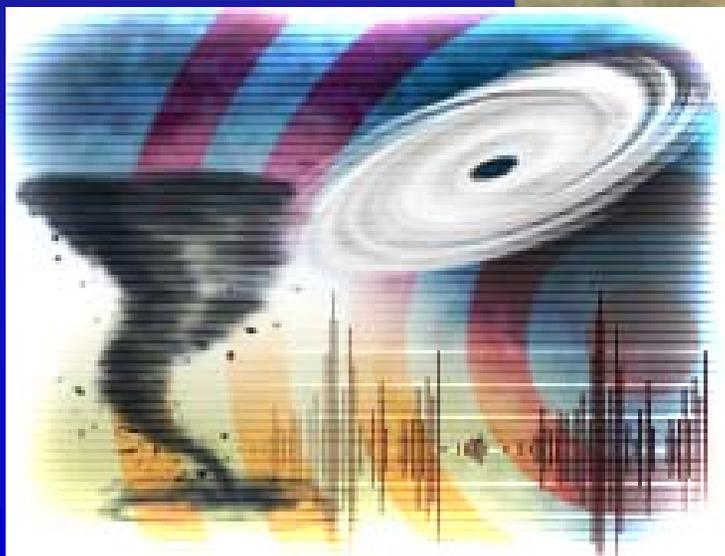
Conventional
Forces



Isolated,
unpredictable



Random, predictable



complex
adaptive
networks

Lessons Learned

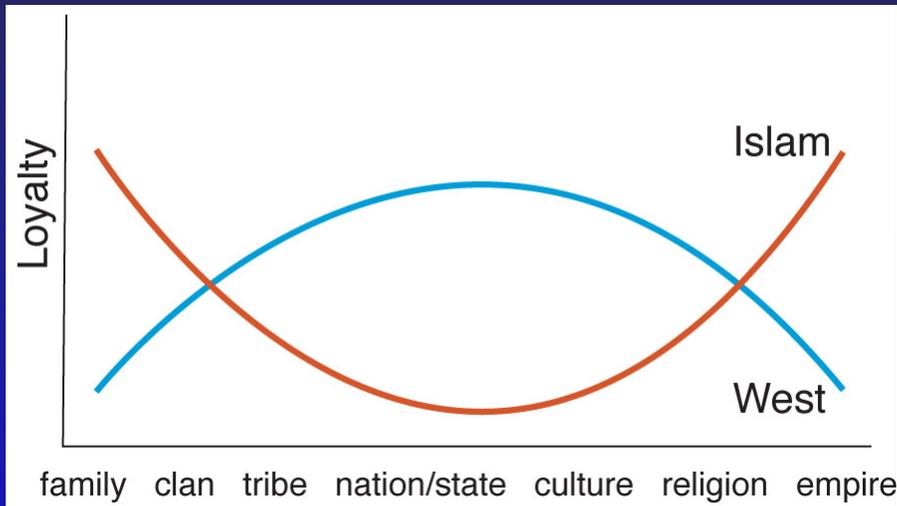


- Require better indicators and warnings
- Infrastructures used to attack society
- Unforeseen cascading effects
- Damage mitigated by improvisation, flexibility of local government and businesses, and rapid response
- Security is a systems problem that transcends technical solutions and includes

- Public confidence
- Organizational resiliency
- Public policy



Underlying Attitudes and Conditions Will Continue to “Fuel the Fire” Against West



Samuel Huntington *The Clash of Civilizations*

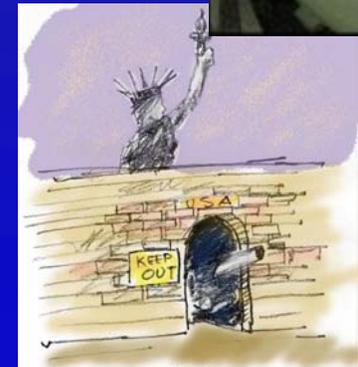
- Fundamental religious movements will continue to foster rebellion against modernism
- Poor economic conditions and low human Capital Development in Arab world will continue
- Cultural Histories, ethnic tensions, hate, superstition, conspiracy... will continue to expound victimization narratives
- Role of US/Israel as crusaders against backdrop of changing balance of powers (EU, Asia,..)

It's the People.....

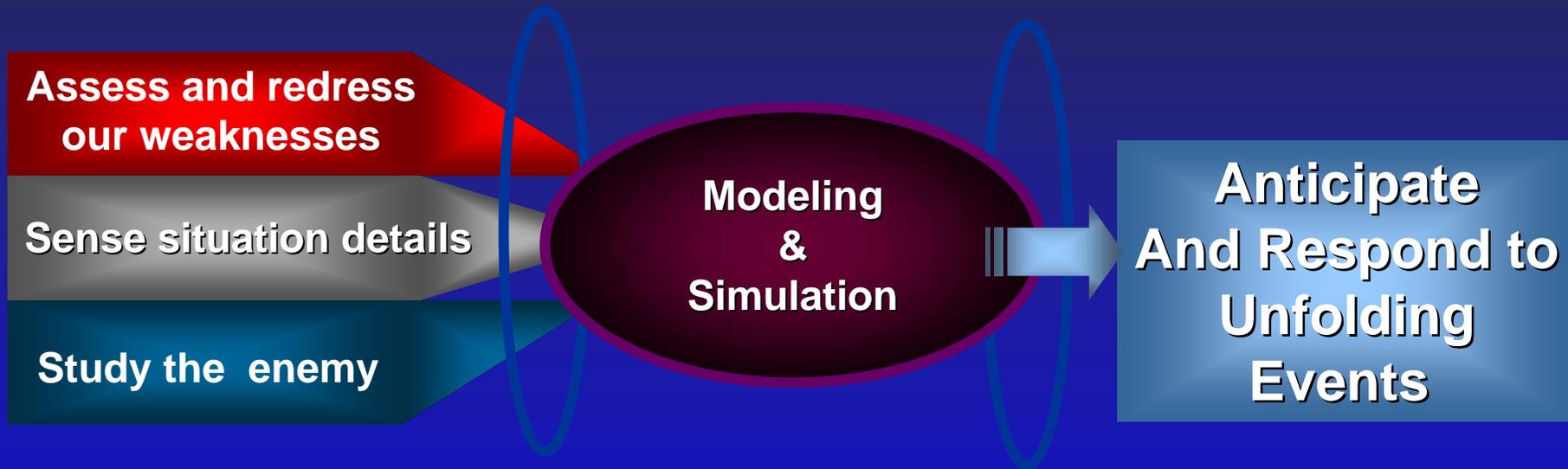
Threat Awareness and Response



Security Requires Layered Approach and Total System Awareness and Understanding



A Strategy for Robustness



The quest to build robust systems requires optimal use of humans and machines across multiple domains of differing natures

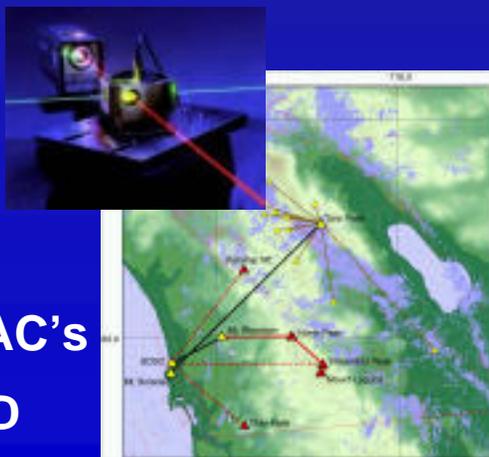
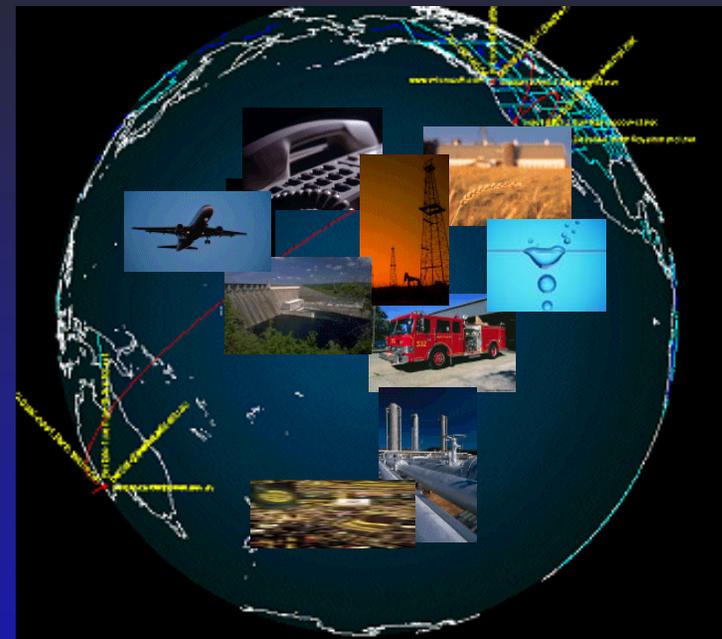
Partial Solution Space

Assess and redress our weaknesses

- Critical infrastructures
- Geopolitical interfaces (borders, communities, states, feds)
- People and organizations

Sense situation details

- Warnings and indicators
- Dynamic systems analysis
- Emergent behaviors



SDAC's
KDD

Study the Enemy

- As individual actor
- Within multiple networks
- As part of transnational phenomena



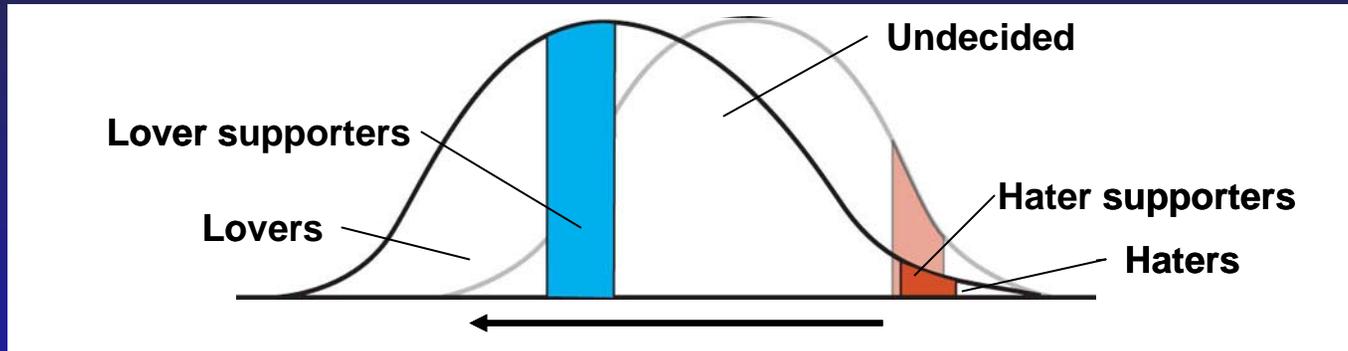
National Science Foundation, April 28, 2003

"We published ... that terror **increased** as security measures were heightened, not the other way around," said (Todd) Sandler, a Robert R. and Katheryn A. Dockson Professor of International Relations and Economics at USC. "Terrorists just substituted places and people who were less protected."

Bypassing facilities and attacking people instead may have resulted in fewer recorded incidents, but it came with the **unintended consequence of greater human costs**, Sandler concludes.

Long Term Solutions...

Goal: understand the society and shift the distribution in our favor

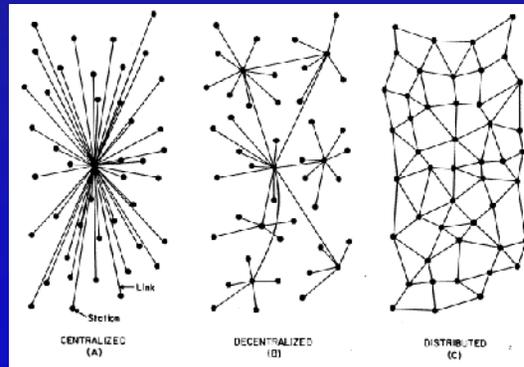
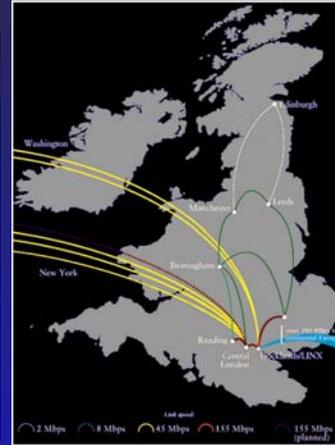
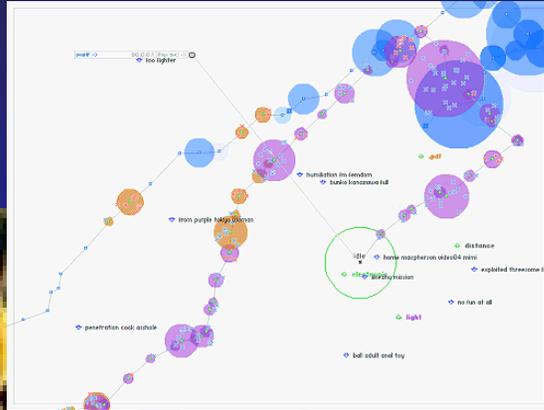


	Create more of	Create less of
Haters	fear	faith in their fundamental beliefs
Supporters of haters	uncertainty	trust of the haters
Undecided	hope for the future	faith in haters cause
Supporters of lovers	positive results	uncertainty
Lovers	generosity, confidence, altruism	fear

Complexity Science Yields New Analysis Paradigms

Santa Fe Institute
Workshop April 10-11, 2003

How Complex Adaptive Systems Dynamics are Related to Understanding and Modeling Terrorist Behavior

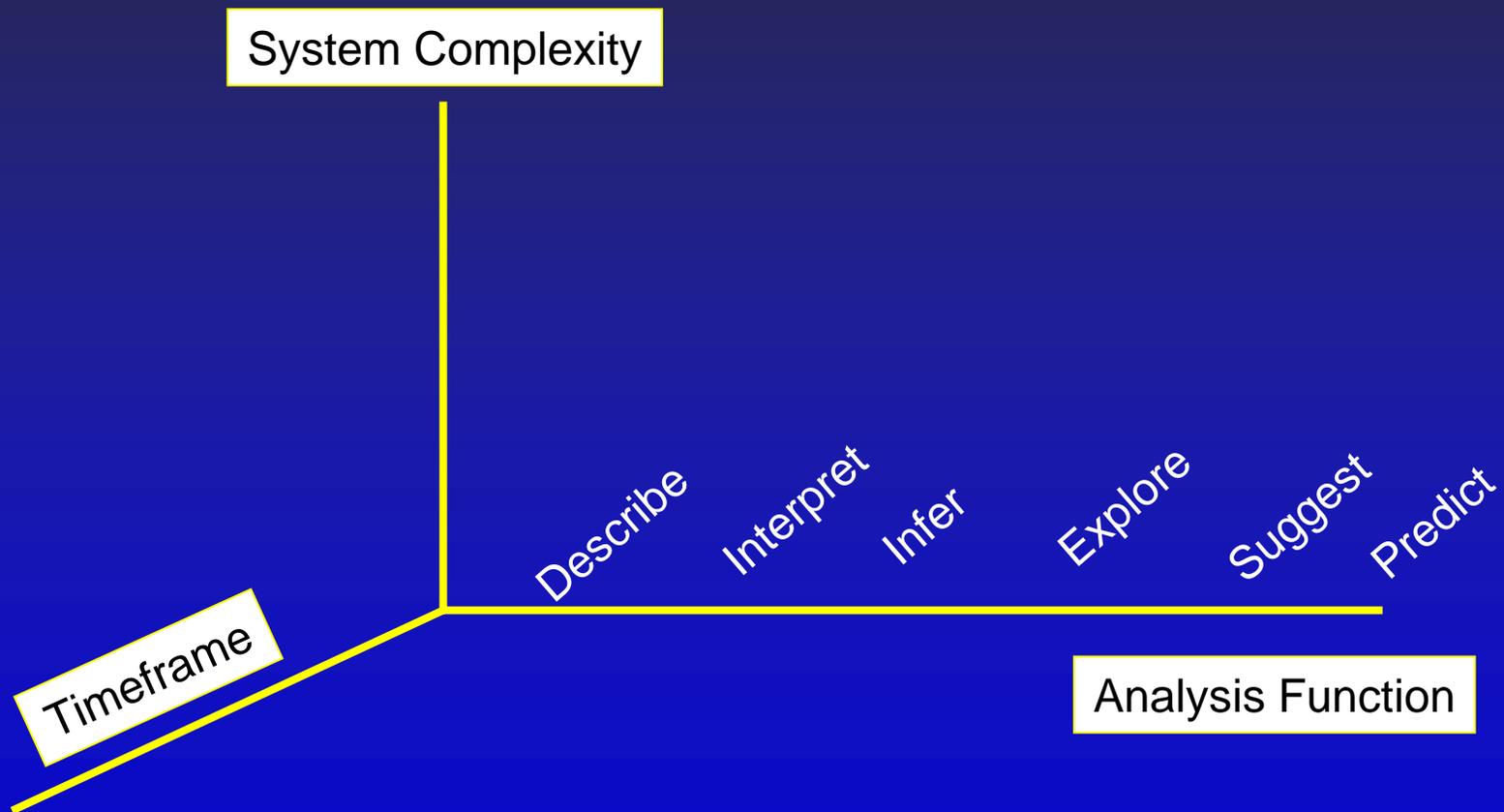


Sandia, Argonne, LANL, CIA, DTRA, MITRE, Navy, Cornell, U of Penn, Intel, CMU, Icosystems, USAF, Galisteo, Humana, Alidade

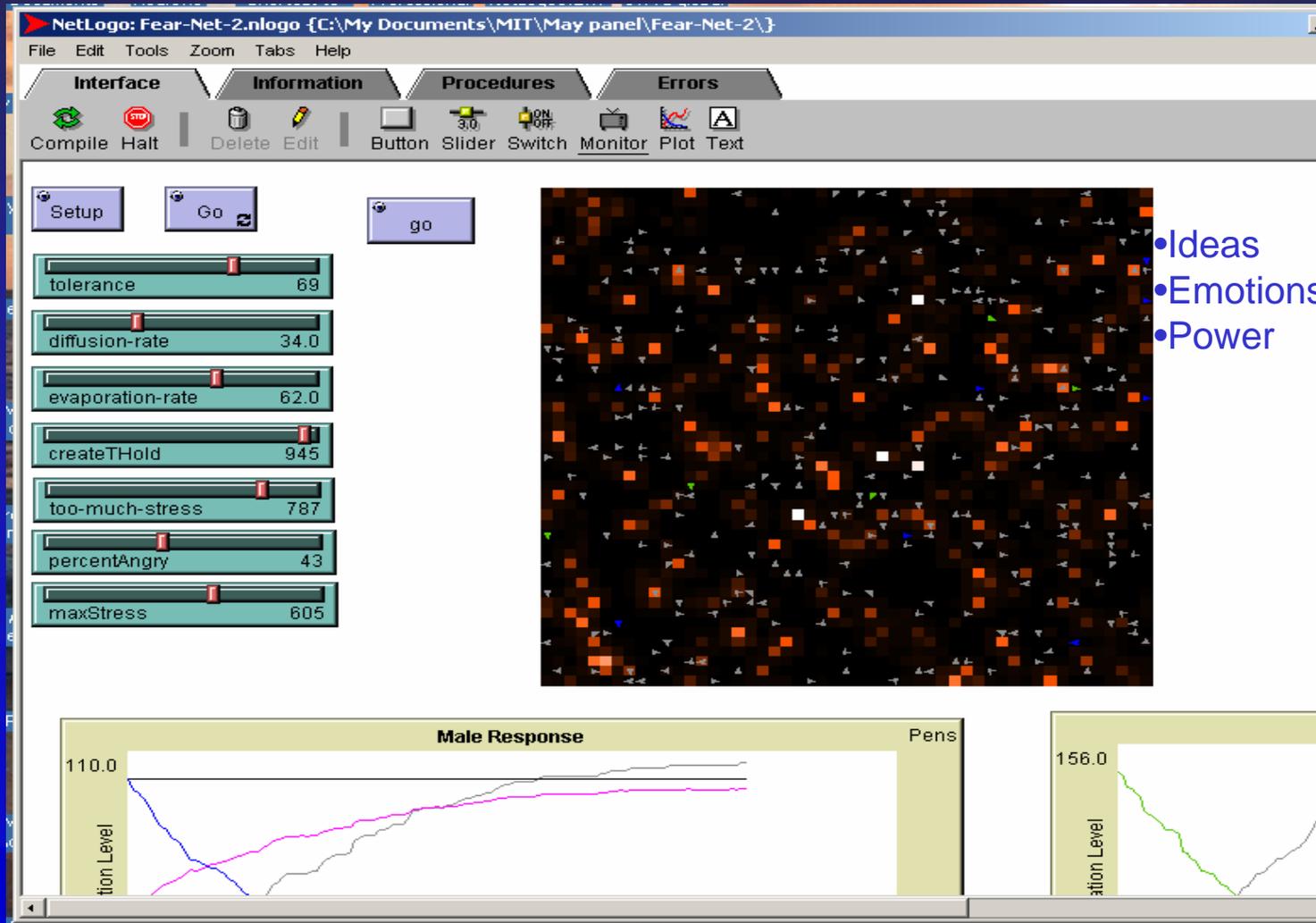
Intrinsic network features transcend domains



Systems Thinking for Social Simulations



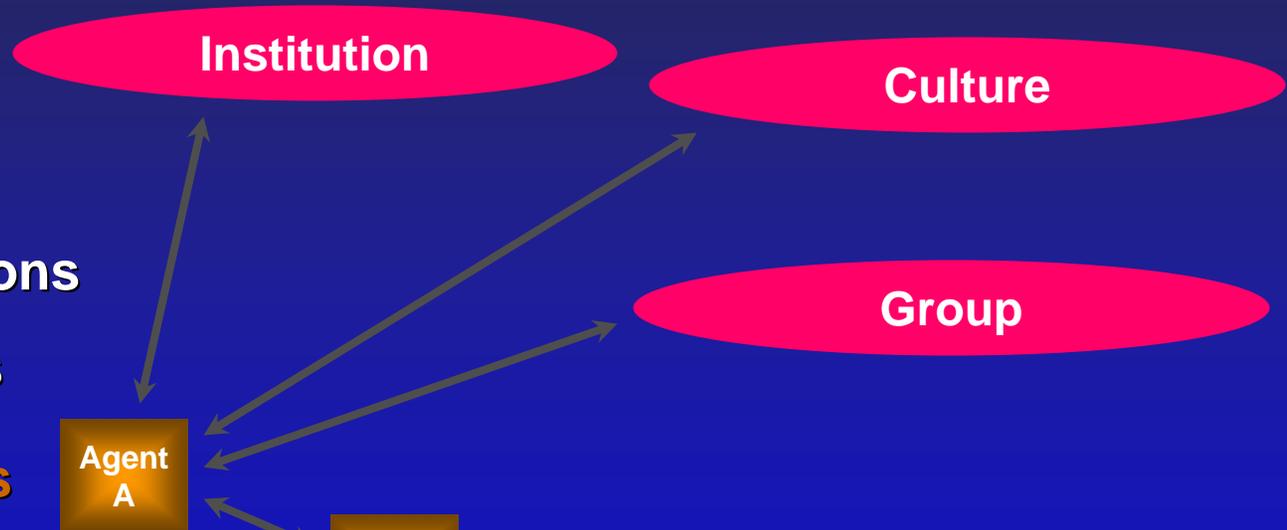
Social/psychological simulations Can Draw on Multiple Modeling Frameworks



- Tipping Points
- Ideas
- Emotions
- Phase Transitions
- Power
- Robustness

Framework for Socially Embedded Agents

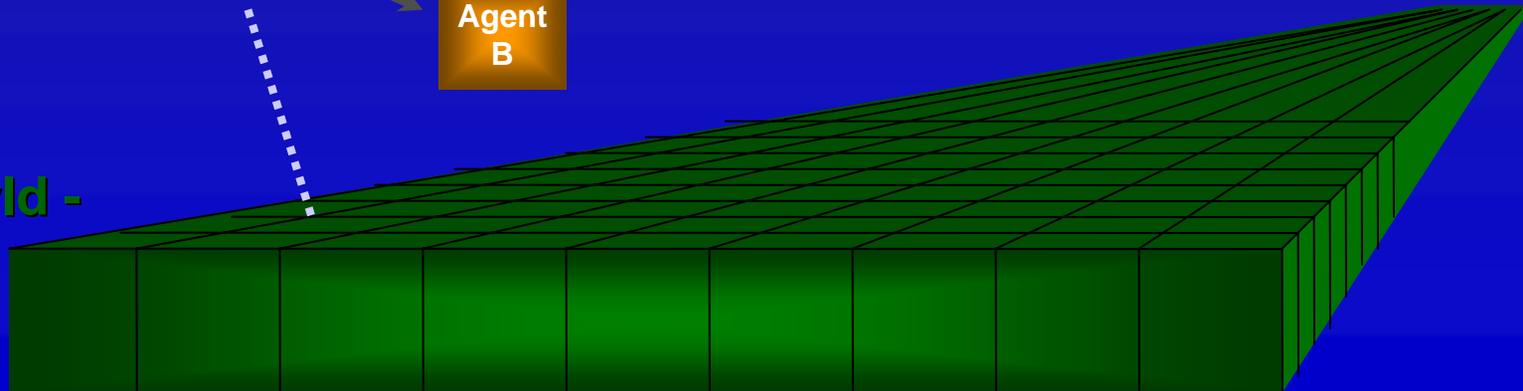
Abstract Agents



Relationships
Communications
Organizations

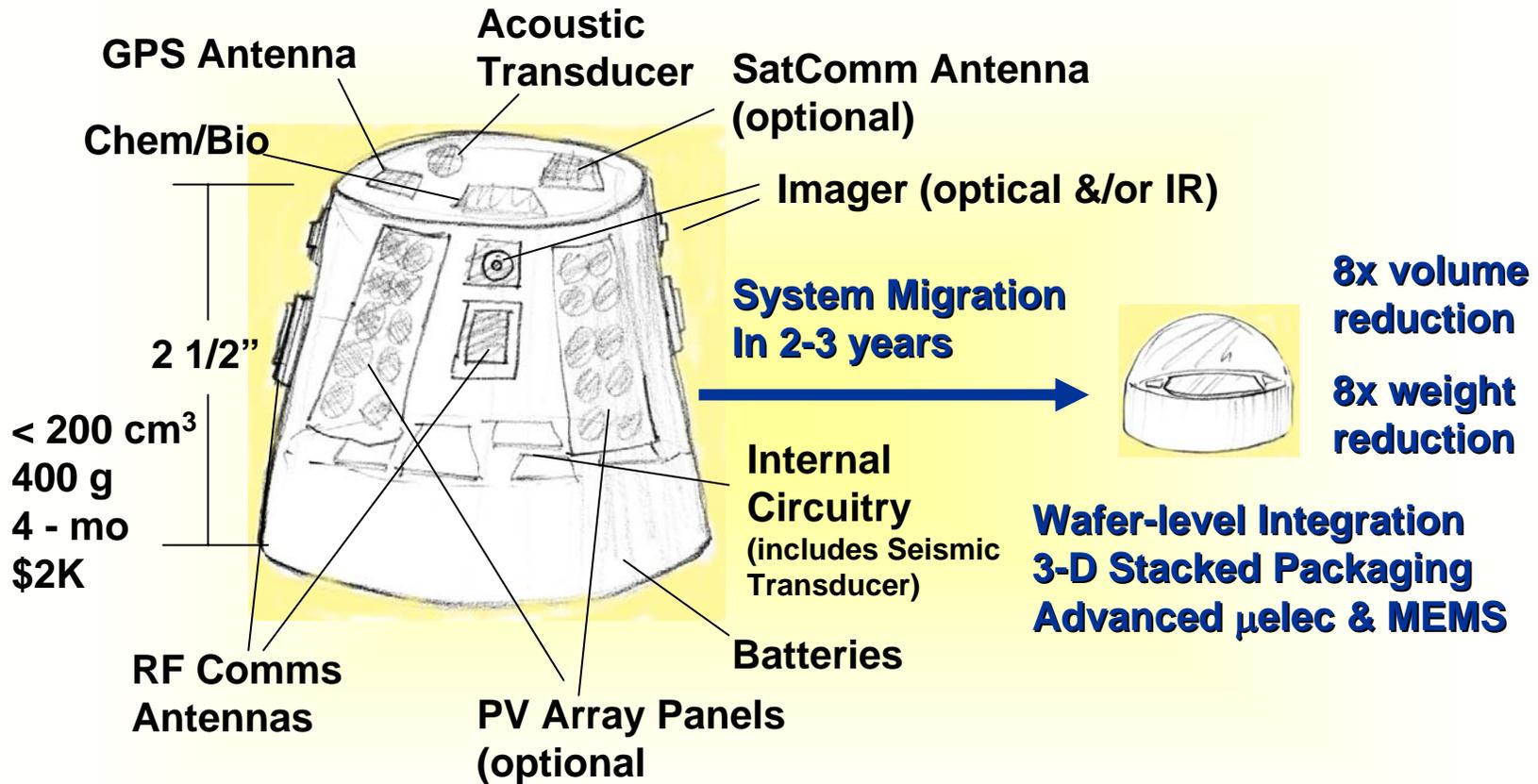
Physical Agents

Spatial World -
Grid



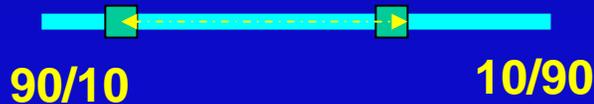
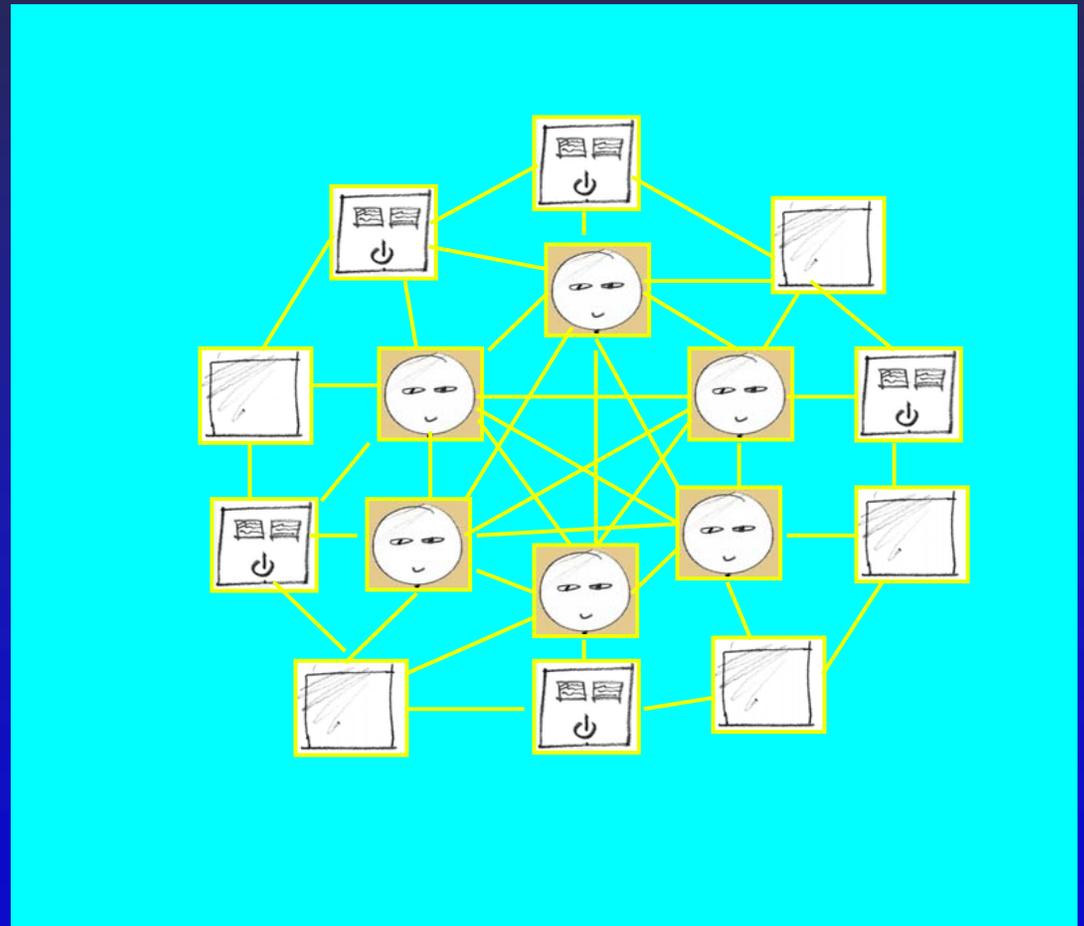
Robust systems require radical innovation in technology :

SDAC system configuration



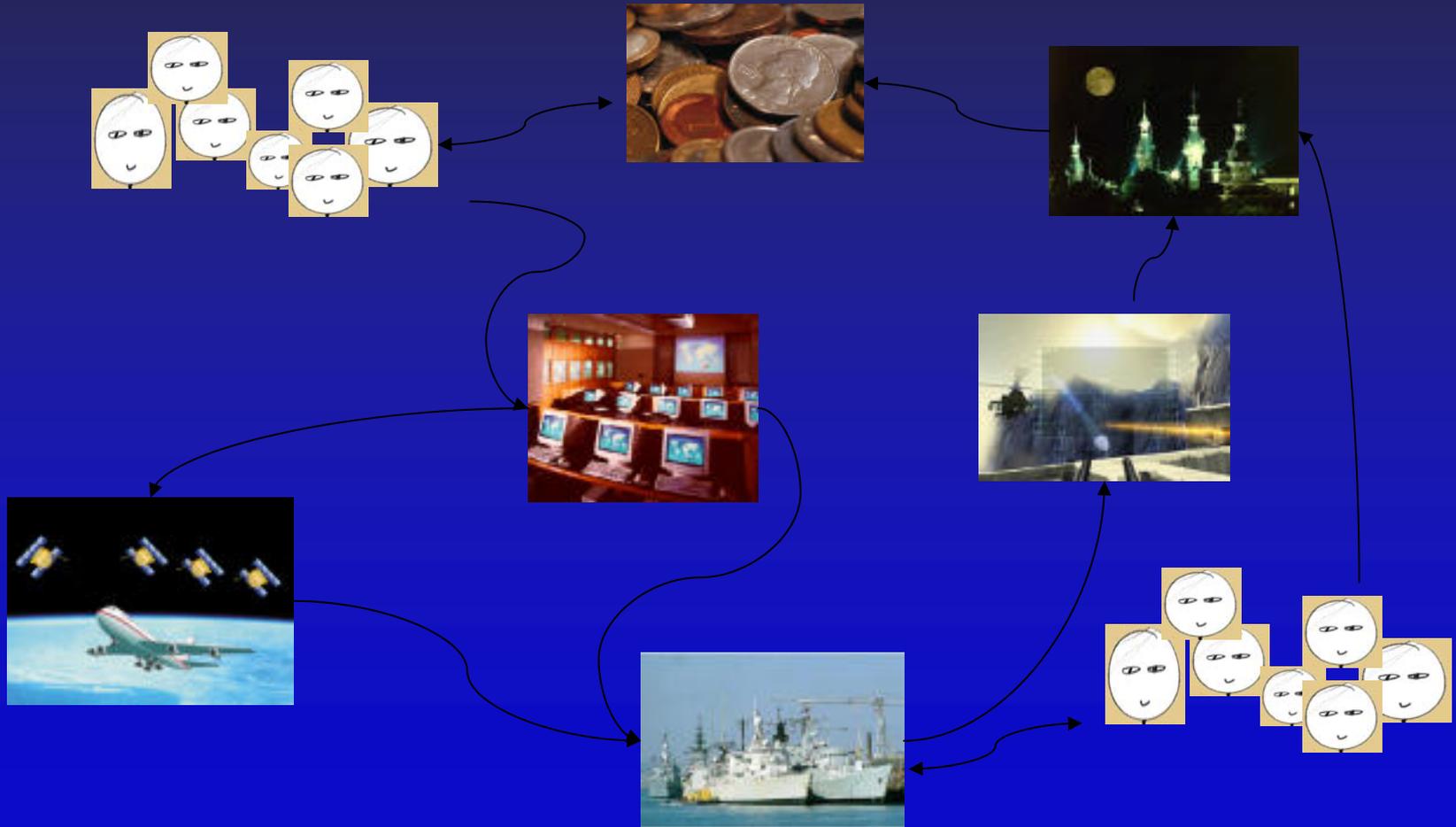
Robust Systems Require New Design Paradigms

An intimate collaboration of people and machines will be a complex adaptive system with emergent properties



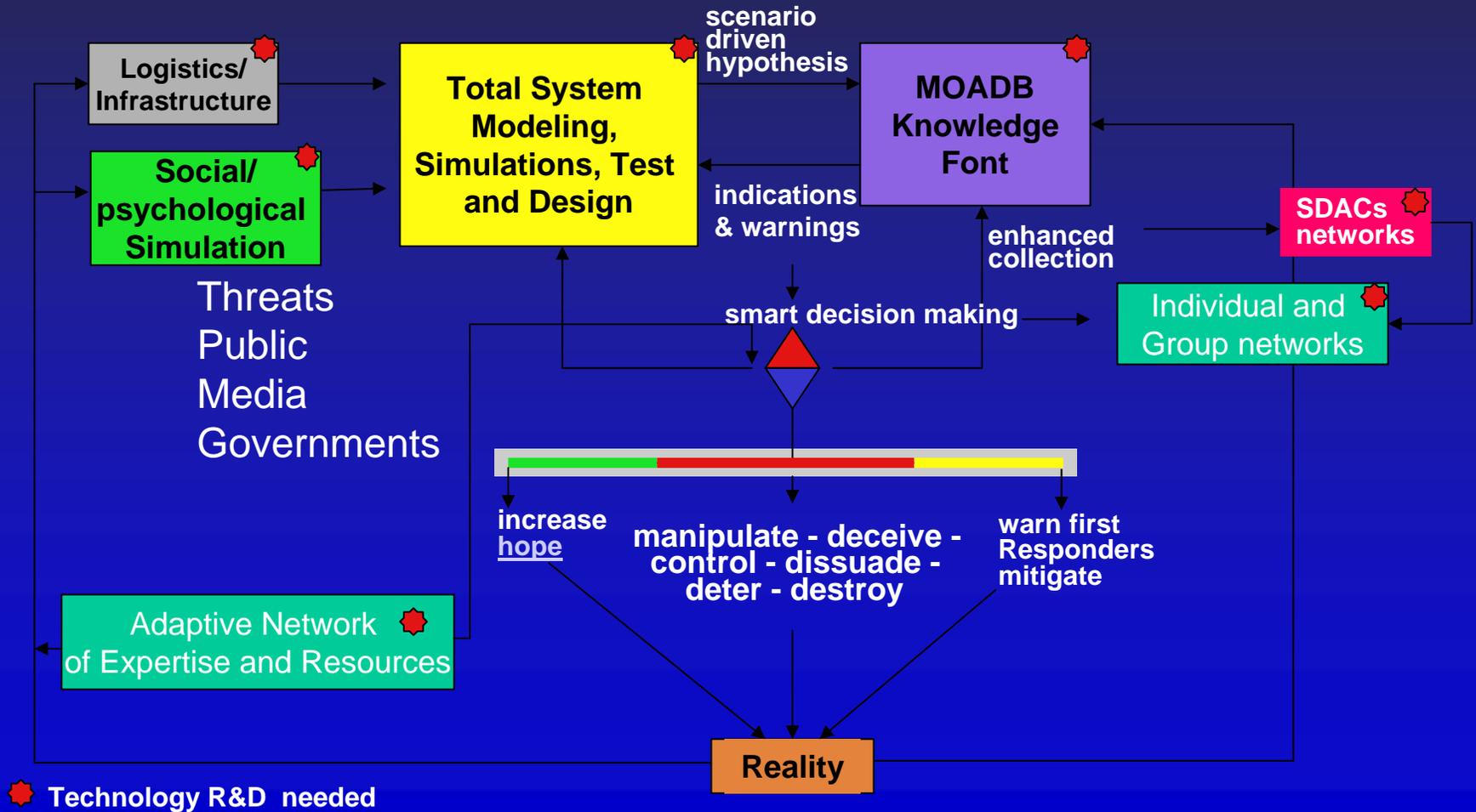
Dynamic ratio: human/machine

Systems of Networks: Uncharted Territory



How does it all fit together?

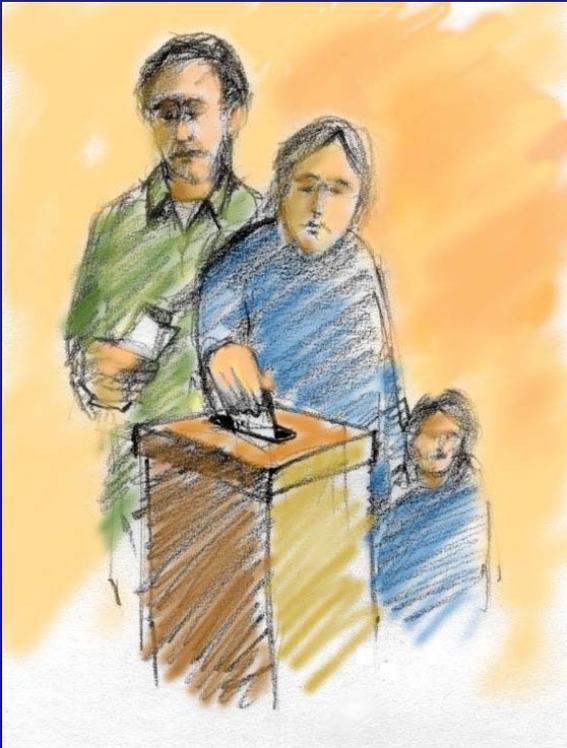
The key is to better understand the future—plan to change it, and change it



High road strategies

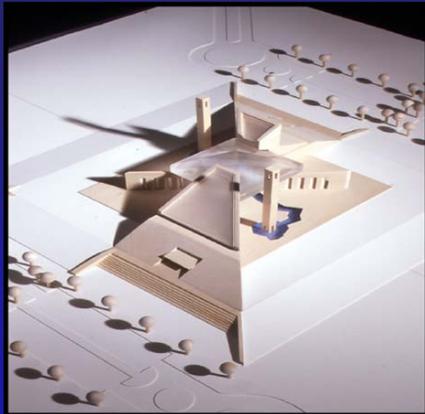
(time is on our side)

Advertise, (build their self respect)



- Make related third party society better (Bahrain, Qatar, Jordan, UAE, Oman)
 - Health, environment, quality of life, economy, culture
- Information strategy against rogue states
- Create credibility in new government
- Build their self esteem, hope for the future
- Make their government synonymous with their people

High road mechanisms



- Sustainable economic development through cooperative R&D
 - security, health, water, education, high value jobs, information access
- Connect real people to real people -- scientists, technicians, business, law



**Learn from each other to solve problems
by sharing a vision of hope and prosperity**

UTAW -- '00

- UTAW scenario 1 - August '00
 - Iraq creates false flag operation using fundamentalist Muslims
 - Carries out infrastructure and bio attacks
 - Creates wide spread suspicion of Muslims and blacks
 - Creates perception that government is over reacting
 - Muslim community becomes radicalized
- Conclusion: seemed unlikely



UTAW -- '01



- UTAW scenario 2 - February 01
 - Began with same perpetrators - Iraq working through Osama bin Laden.
 - Many attacks (violent incidents) escalating to bio, radiological weapons.
 - Tie incidents to Osama bin Laden
 - U.S. vacates Middle East
 - End result: Iraq declares final victory.
- Conclusion: unlikely

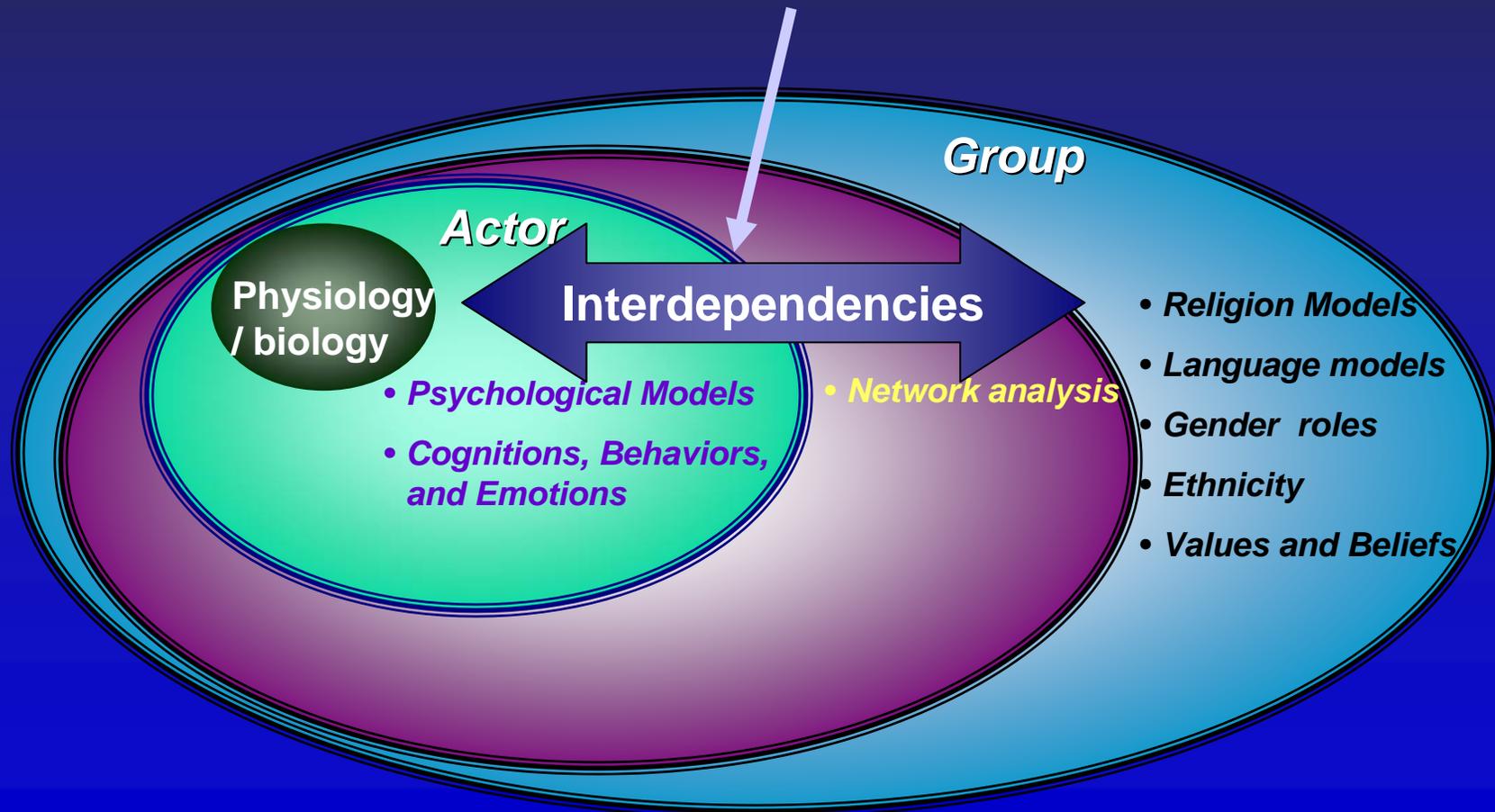
We were -- but not that close



- UTAW conclusions
 - Only Iraq or China could do this.
 - Our diversity and interdependencies across geopolitical boundaries make homeland defense difficult
 - We have real vulnerabilities through manipulation of race and ethnicity -- but...
 - Orchestrated asymmetric attack over a long time is highly unlikely and unlikely to work...but if it did work, it could be devastating (low probability, high consequences)

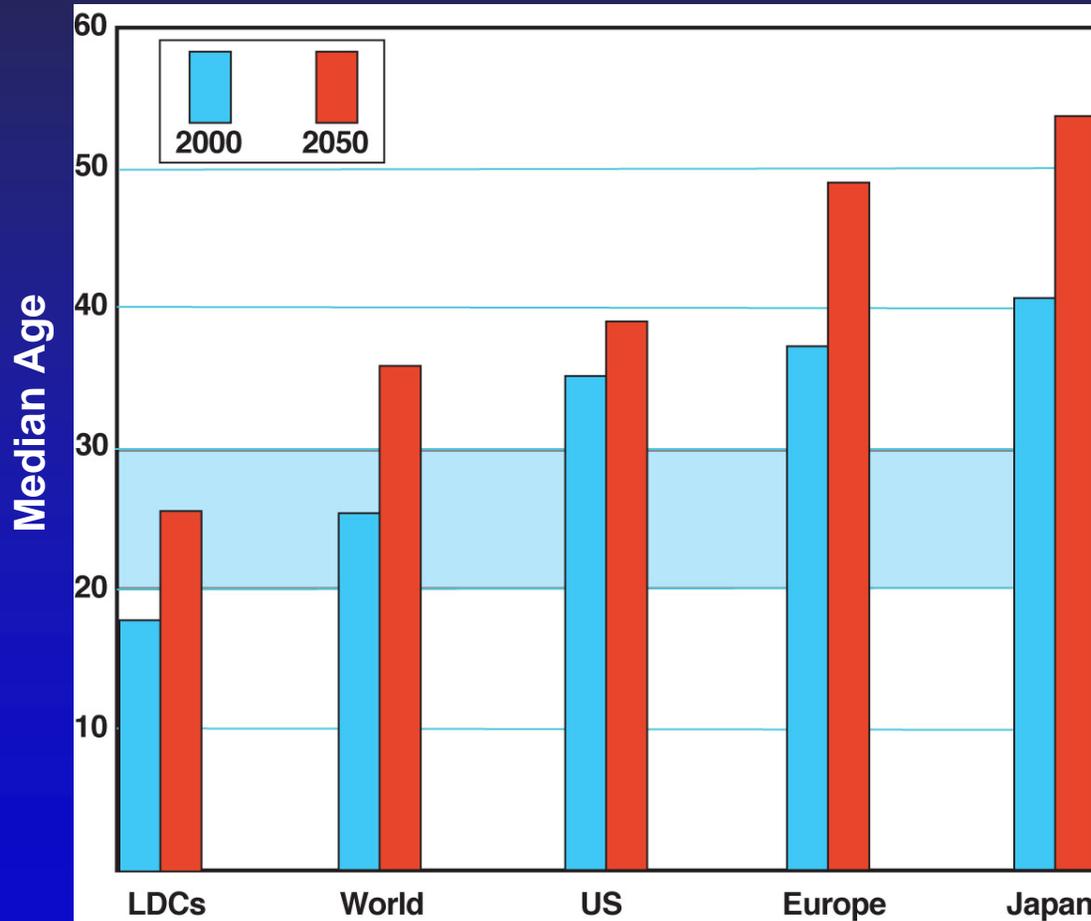
Social/psychological simulation

MODEL REALM



Who is the threat?

Change in Median Age, 2000 - 2050



Breeding ground of terror

[return](#)

Source: UN; Census Bureau for U.S.

* Includes all Europe plus Russia (47 countries)