

# **Future Adversary Technologies** **(Thinking about the future is “Wicked”)**

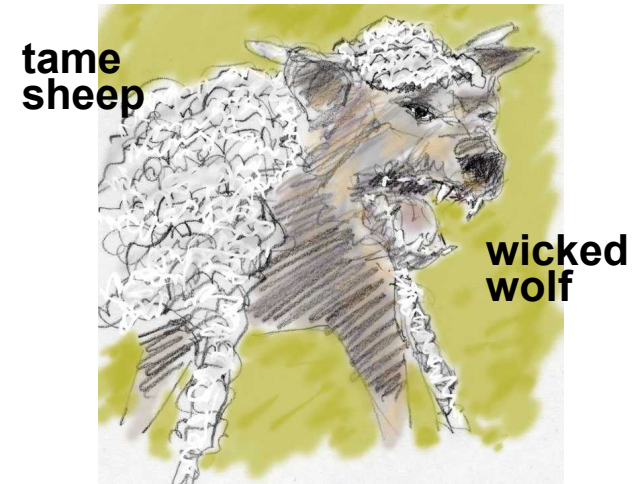
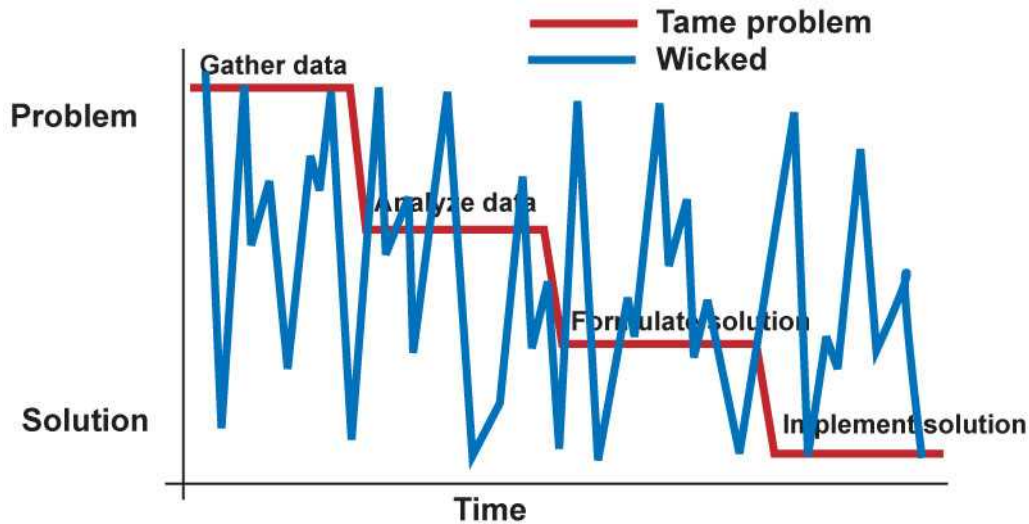
*Presented at*

The Stanley Foundation/Potomac Institute  
**Future Weapons of Mass Destruction**  
**Panel Discussion**

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**Vice President and Principal Scientist**  
**Sandia National Laboratories**

# The usual approach to a “wicked” problem is to pretend it is tame



1. Freeze problem definition prematurely
2. Measure variables, drive toward targets
3. Ignore complicating factors
4. Select from a few over simplified solution options
5. Give up, do as you are told
6. Assert problem is solved

**"if we could only get organized and put somebody in charge, we could solve this problem"**

# The first step is to admit that the problem is not tame

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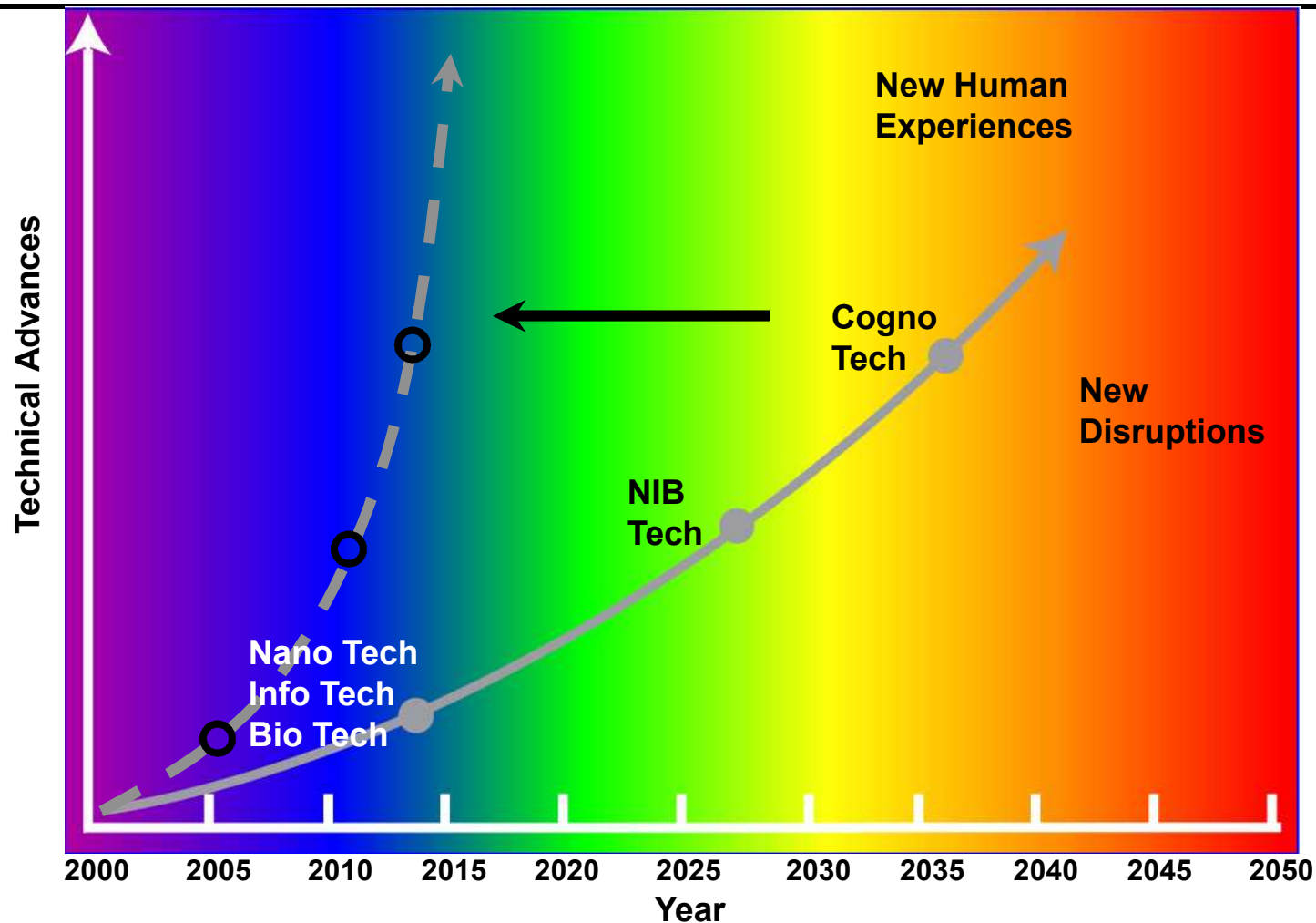
## The wicked approach:

1. “Formulate the mess”
2. Develop a spiral (not linear) process
3. Share awareness of changing context
4. Communicate often, with high fidelity, to all levels
5. Focus on system issues, not just pieces.
6. Remember: “success is the devil”
7. Trust each other as the game changes



**Rapid advances in technology lead to wickedness**

**The advance of technology  
will be available to all sooner than we think...**



**Infotech drives globalization and tech acceleration**

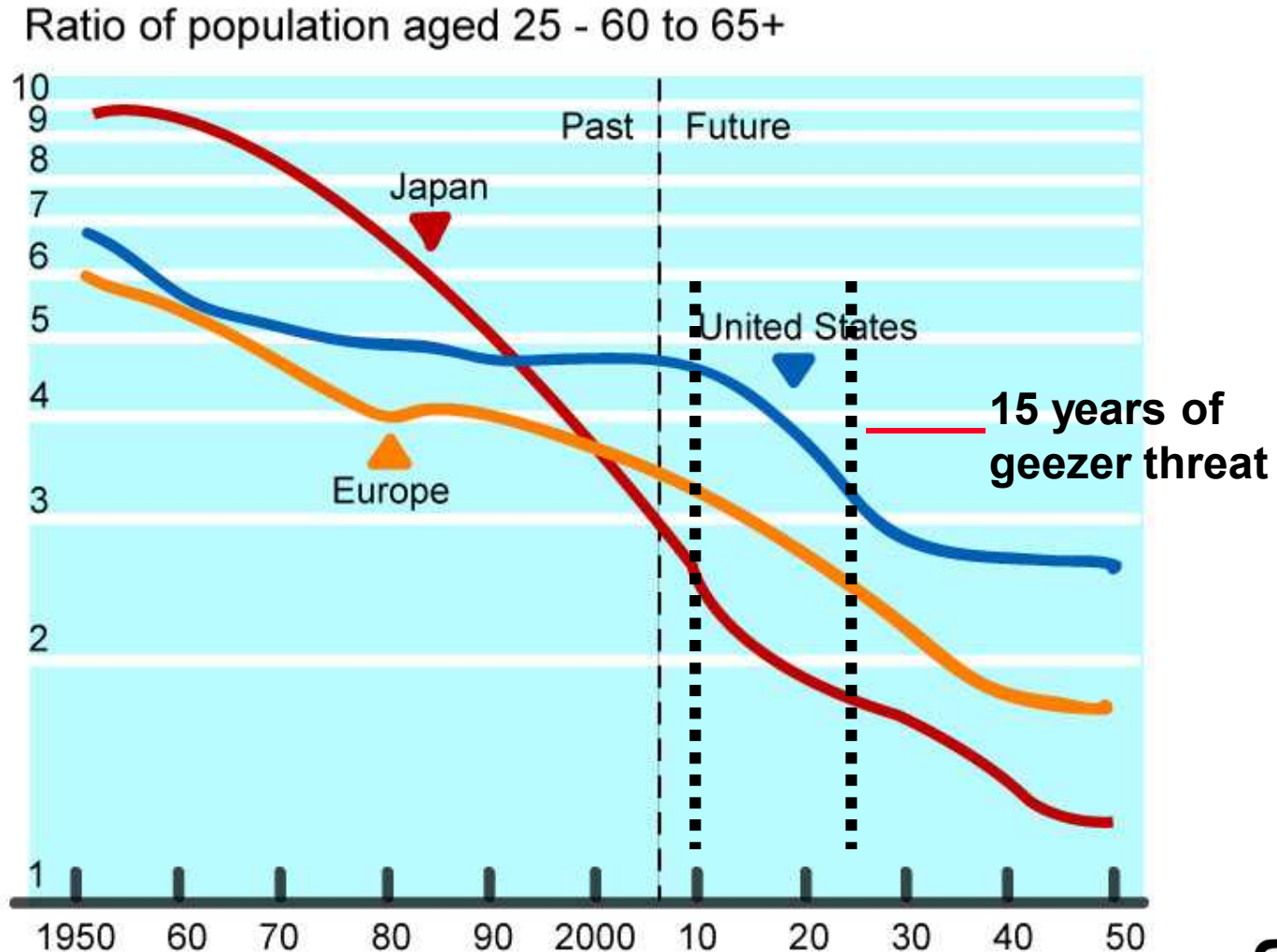
# Ubiquitous Infotech is an enabler



**Adversary capabilities and societal vulnerability  
can arise from complex interdependencies**

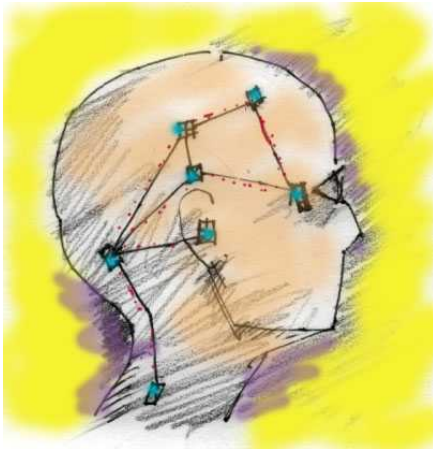


# The Age Wave will drive tech advances and societal vulnerabilities



# Aging population will demand technology

- Wearable monitors
- Sensory and neural prosthetics
- Behavior & cognitive enhancement

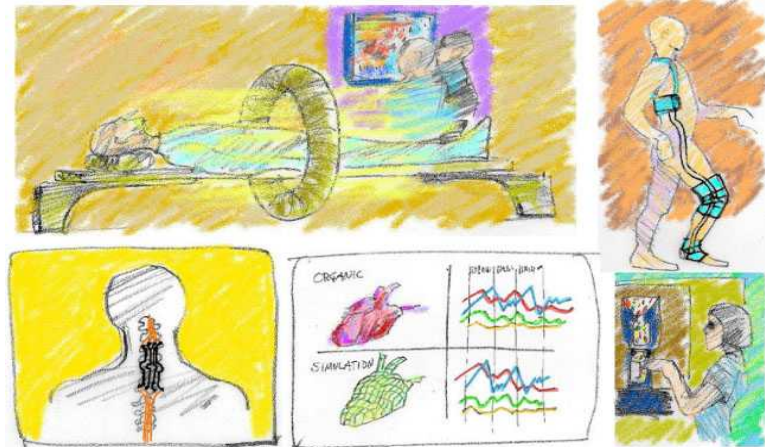


**Economic and social implications  
will drive technology advances**

# Everybody will demand applications of biotechnology

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- Disease detection/prevention
- Injury healing
- Disability reduction
- Affordable health care



Bioweapons?

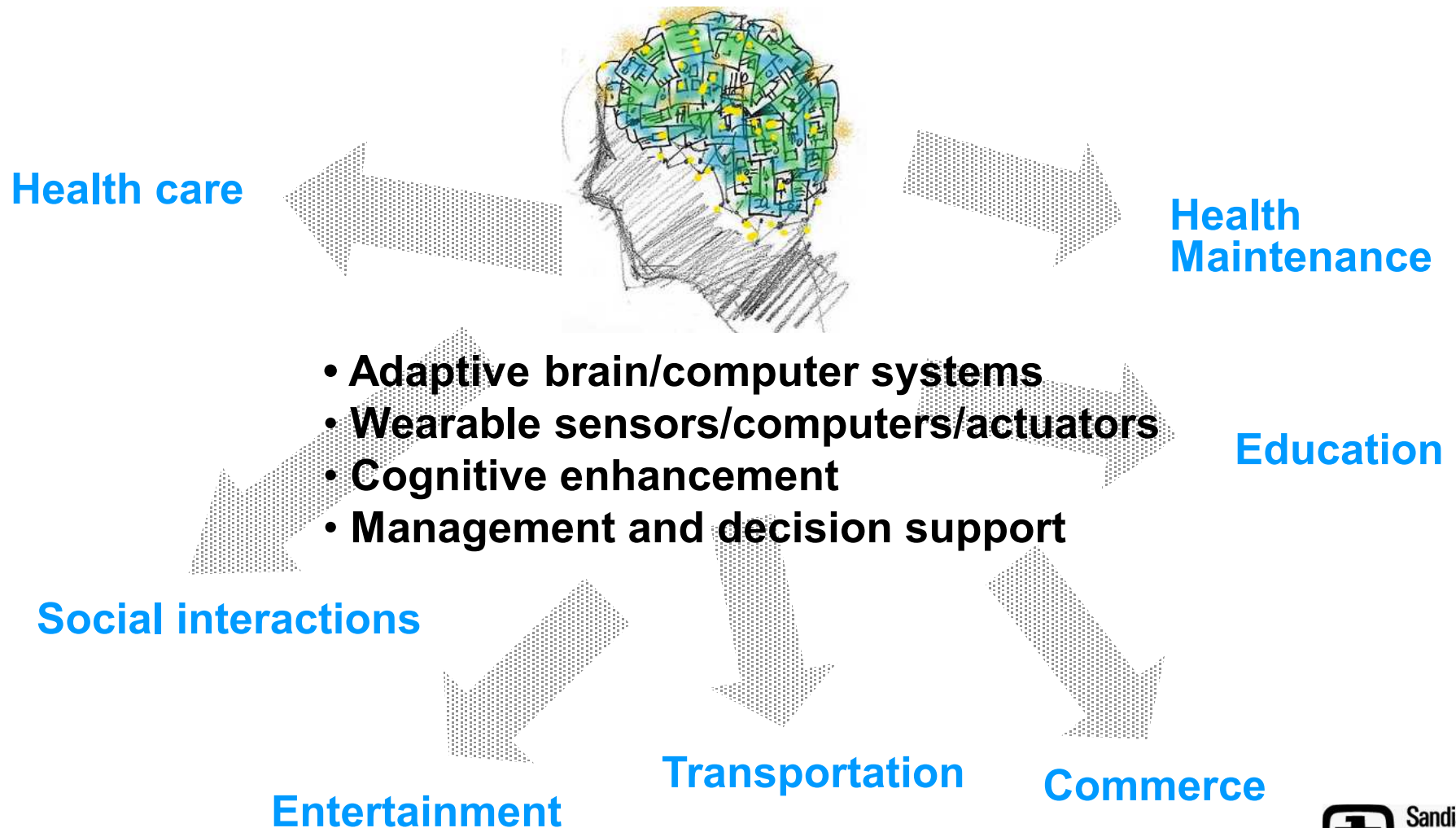


Tracking advances in biotech will be very challenging



# Advances in neuroscience will have wide impacts

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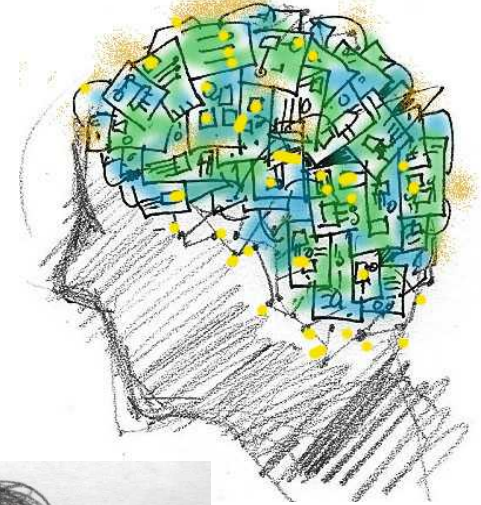


# Military technology will be driven by “Non-Kinetics”

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**Brains – biotech – biomed**

**Sensors – systems - signals**





# The Neuro Spectrum

## Understand

- brain trauma
- attention
- sleep
- stress
- peer pressure
- decisionmaking
- learning
- trust
- religious feelings

## Restore

- treat injury
- manage fatigue
- treat disease
- stress mitigation
- pain management
- addiction correction
- manage depression

## Enhance

- trauma “armor”
- custom attention
- improve decisions
- pain tolerance
- drug tolerance
- instant learning
- improved cognition
- improved memory

## Degrade

- reversible trauma
- artificial fatigue
- artificial narcolepsy
- unreasoning fear
- false pain
- substance sensitivity
- memory loss

Acceptable

Controversial

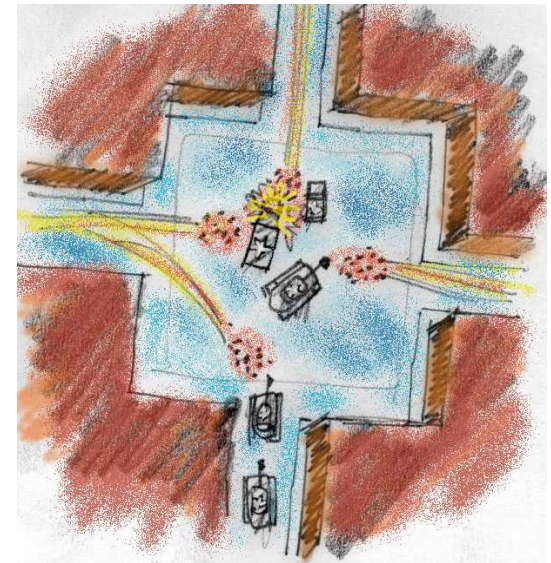
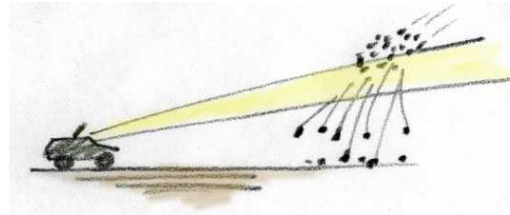
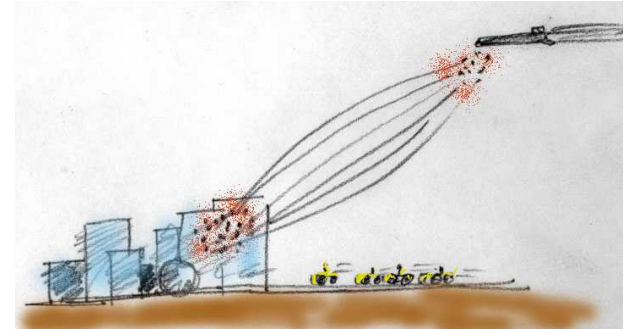
Questionable

**Social, moral, ethical**

# Robot battlefield swarms

## Small, cheap, mobile robots

- Swarm behavior
- RSTA & attack ops
- Sensors & weapons



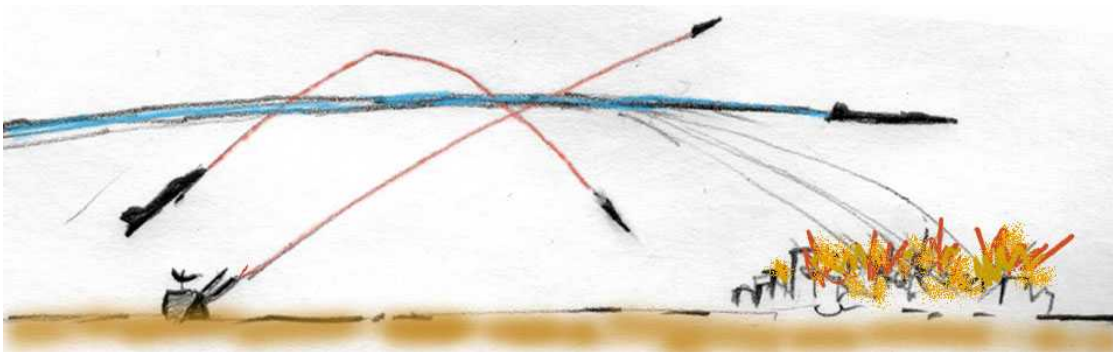
**Our swarms vs. their swarms**



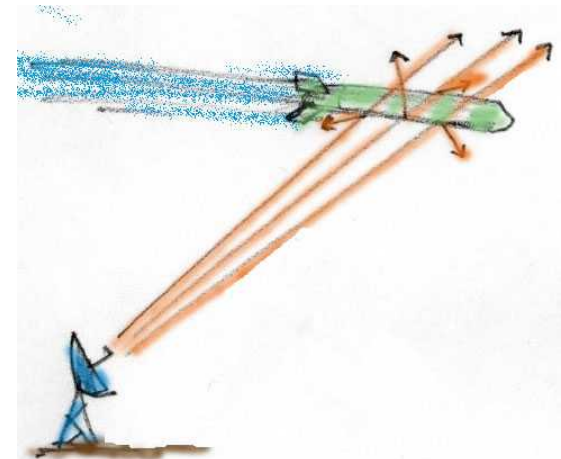
# Hypersonics and Stealth

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Hypersonics



Stealth



**Surprise attack / instability / psychology**

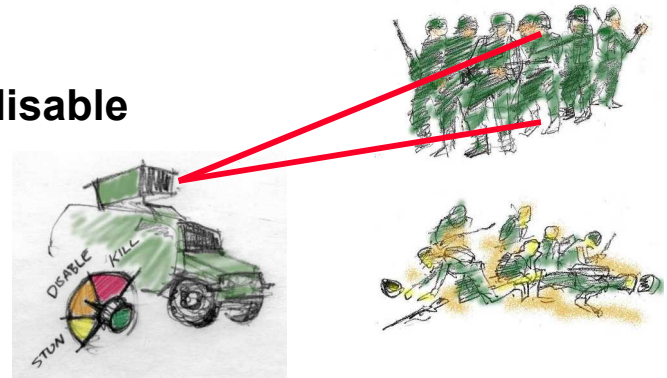
# Beams as weapons for defense & offense

**Lasers, HPM,  
& particle beams**



**Non lethal weapons  
tunable to**

- stun
- permanently disable
- kill



**Doctrinal / legal / ethical issues / limits our use**



# The Tools of Future Adversaries

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## Strategic

- Nukes
- Special nukes
- Very special nukes

## Conventional

- ASATs
- Cyber attack
- Global strike
- Fleet attack
- Robot swarms
- Nano attack

## Irregular

- IEDs
- RDD
- Bio/Ag attack
- Hostage
- Assassination
- Infrastructure attack
- Anti-material
- Cyber

## Social

- Psyops
- Induced chaos
- Insider
- Non-violent resistance
- Exponential immigration
- Financial attack
- Military coup
- Race war

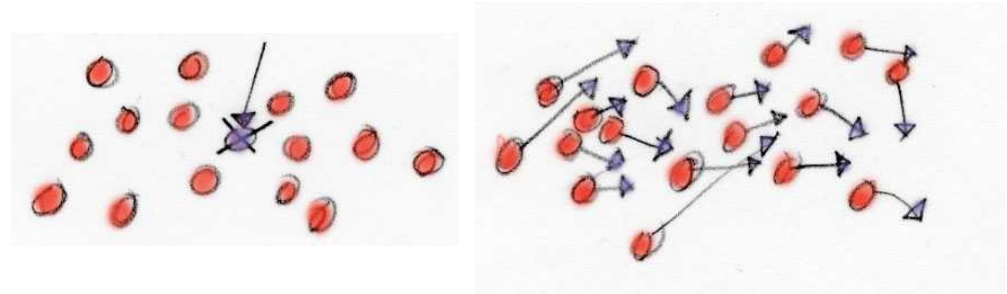
# The societal manipulator vs. the robust, distributed, semi-chaotic society



The brittle society single point failure



Robust, distributed, semichaotic







# Societal stability

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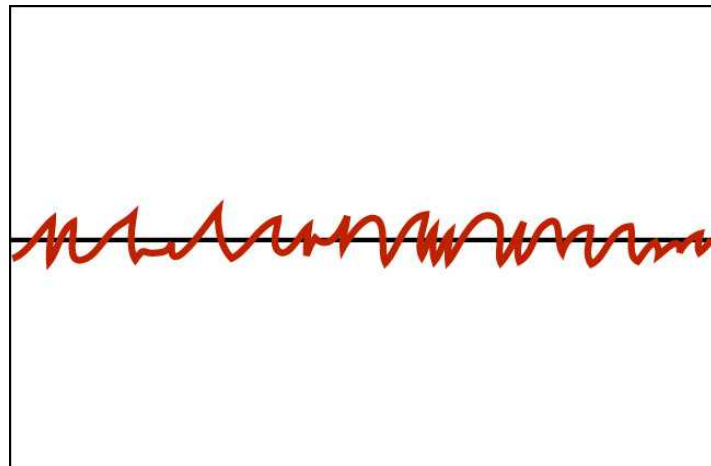
**Fragile**



**Chaotic**



**Dynamic stability**



# Our Goal Should Be Dynamic Stability

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