

OPERATIONAL WARFARE and COMMAND AND CONTROL
In an
AGE OF ENTROPY

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Axioms

I. Concerning Resources and Conflict

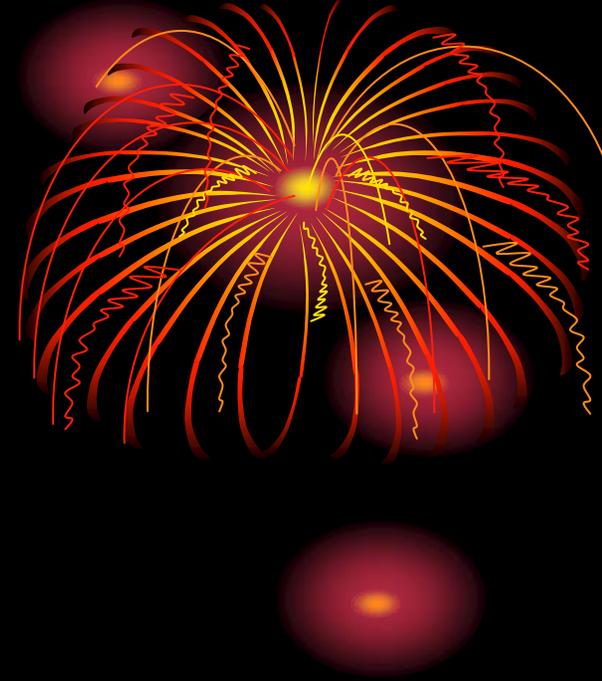
- **Humans exist in a resource constrained reality or system subject to periodic exogenous change**
 - **Humans require resources to survive/adapt**
 - **All resources are information based**
- **Humans use two methods to obtain resources**
 - **Competition**
 - **Cooperation**
- **Though research has demonstrated that cooperation is more effective, humans tend to compete with each other more than cooperate.**
 - **Possible genetic/evolutionary hardwiring**
- **Competition engenders conflict**
- **Conflict can be peaceful or violent, personal or societal (groups)**



AXIOMS

II. Concerning War and Warfare

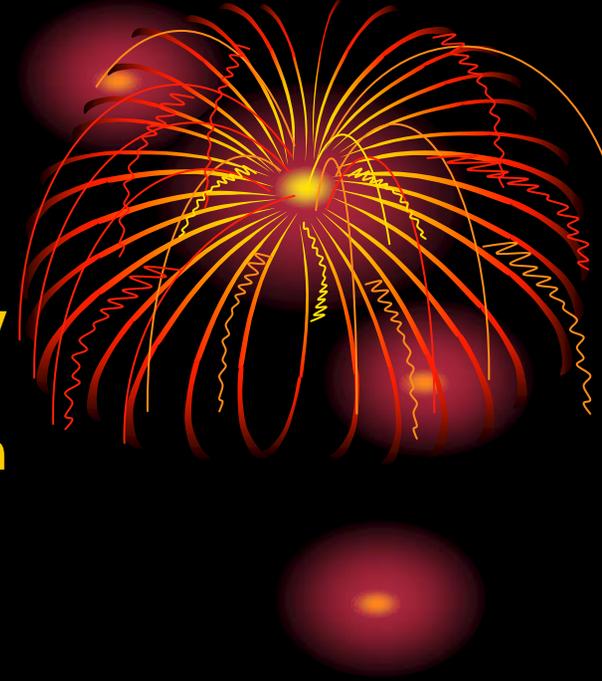
- **War is an extreme form of conflict.**
 - It is the societal behavior of violence performed for some purpose associated with obtaining resources.
 - It always involves information
- **War endures and does not change**
 - Involves societies (groups)
 - Involves violence (bloodshed)
 - Involves information (resources)
- **Warfare, the means of war, changes**
 - Depends on societies (culture)
 - Depends on tools (technology)
 - Depends on resource constraints (information)



Axioms

III. Concerning Information

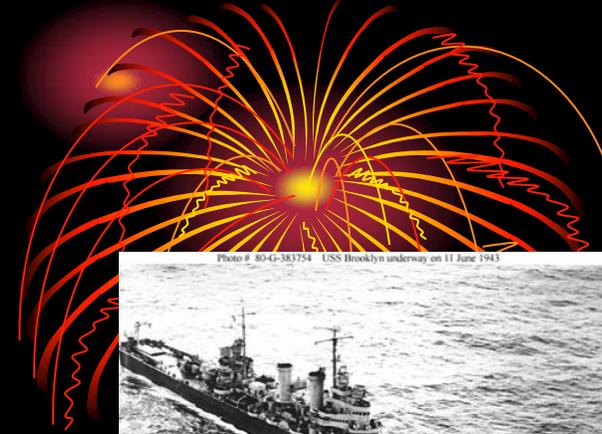
- Information is a basic dimension of reality
- Information is completely interrelated with the other basic dimensions of reality:
 - Time \leftrightarrow Space \leftrightarrow Mass \leftrightarrow Energy
 - When manipulated, these produce Force
 - Force produces change
- Information, as with the other dimensions, is subject to the constraints of physical laws. The most relevant of these are:
 - Thermodynamics and Information
 - Incompleteness
 - Uncertainty
 - Systems
 - Complexity



AXIOMS

IV. Concerning Entropy

- Entropy is the cost of doing business in the universe (reality)
 - It cannot be ignored
 - It cannot be evaded
 - It can locally be reversed for a short time
- Entropy affects all dimensions of reality
 - Space, Time, Energy, Mass, Information
- Entropy is the amount of dissipated energy that occurs during the production of force or work.
 - It always occurs
 - The net output is always less than the input
- Entropy affects information in similar fashion
 - There always is noise and it cannot be eliminated
 - Received information is always less than transmitted information
- Entropy is what Clausewitz called friction, only bigger



Operational Warfare Defined

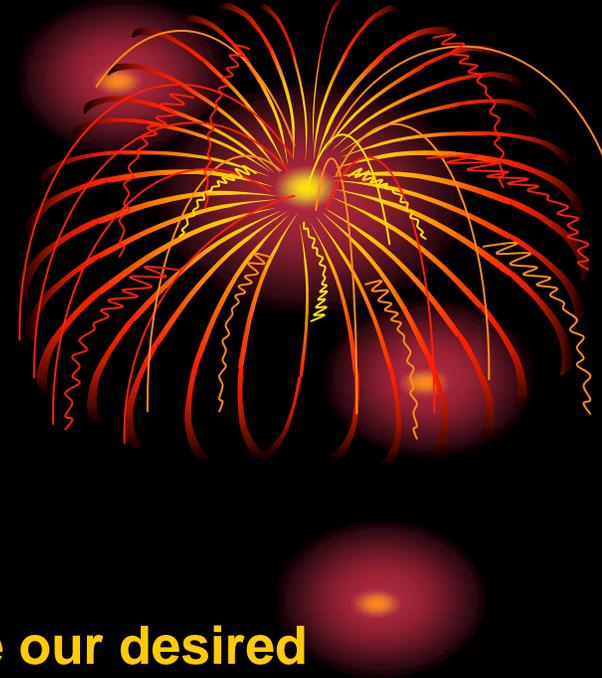


Operational Warfare is a method by which a social group conducts complex military tasks against another social group to achieve some operational objective(s)

- **Method is a system repeatedly converting inputs into operations**
- **Complex military tasks are those sequenced and synchronized actions that make up an operation**
- **Operational objective is strongly related to Strategic Objective and Tactical Objective. It is narrower in scope than Strategic and more complex than Tactical.**
- **Operational Warfare is strongly affected by individuals (leaders), organizations (institutions), culture (doctrine), and technology (weapons).**

Operational Warfare Characteristics

- **The Method applies:**
 - **(Operational) Art**
 - **(Operational) Science**
 - **(Operational) Capabilities**
 - **(Operational) Planning**
- **The Method seeks nothing less than to impose our desired multi-dimensional reality upon the enemy's thru use of Violent Force**
 - **Extreme in-formation of our reality**
 - **Extreme de-formation of enemy reality**
- **To this end, Operational Warfare has six functions:**
 - **Command and Control**
 - **Logistics**
 - **Fires**
 - **Maneuver**
 - **Intelligence**
 - **Protection**



Operational Command and Control Defined



It is the directed application, adjustment and adaptation of Operational Warfare to the interacting environment where friend and foe engage.

- **Command and Control is the “brain” for conscious and autonomic operational warfare functions**
 - **Sensing/pre-sensing**
 - **Processing**
 - **Deciding**
 - **Integrating/coordinating**
 - **Learning**
 - **Cybernetic looping and systems dynamics**
- **Command and Control completely depends on information (management)**
- ***Command and Control completely depends on entropy (management)***

Operational Command and Control Entropy Management



- **Must account for system (method) complexity**
 - Design parameters are:
 - Robustness
 - Resilience
 - Redundancy
- **Must recognize and include uncertainty and incompleteness**
 - No plan lasts after first contact with the enemy
 - Intelligence always is flawed and will always be so
 - Information always is flawed and will always be so
- **Must account for minimization of maximum loss**
 - *Not maximize the maximum benefit of the operation*
 - More structure, more loss
 - More time, more loss
 - More technology, more loss
 - More people, more loss
 - More action, more loss
 - More energy, more loss

Implications of Proto-Theory



- Spend too much effort seeking unattainable perfection
- Powell-Weinberger approach better than Expeditionary Warfare
- Spend too much on technology that *cannot* work as promised
- Do less with less and do less with more; it does not matter
- What matters is how to manage the loss (graceful degradation)
 - Those who manage loss most “gracefully” will win always
 - Gracefully means robustness, resilience, redundancy
- Clarity of End States and Strategic Objectives becomes imperative
 - Recognize that even clearest will have ambiguity and incompleteness
- Must spend much more on common training and learning – much more!

Theoretical

US

THEM

Minimize:

- Entropy
- Uncertainty
- Incompleteness

Maximize:

- Entropy
- Uncertainty
- Incompleteness



*Aim for the Head!
Don't Miss!*

Pro

M

US

Maximize:

- Effectiveness as operations metric
- Continuous common training
- Trust
- Virtual and physical collaboration

Minimize:

- Metric meaning
- Training time
- Trust