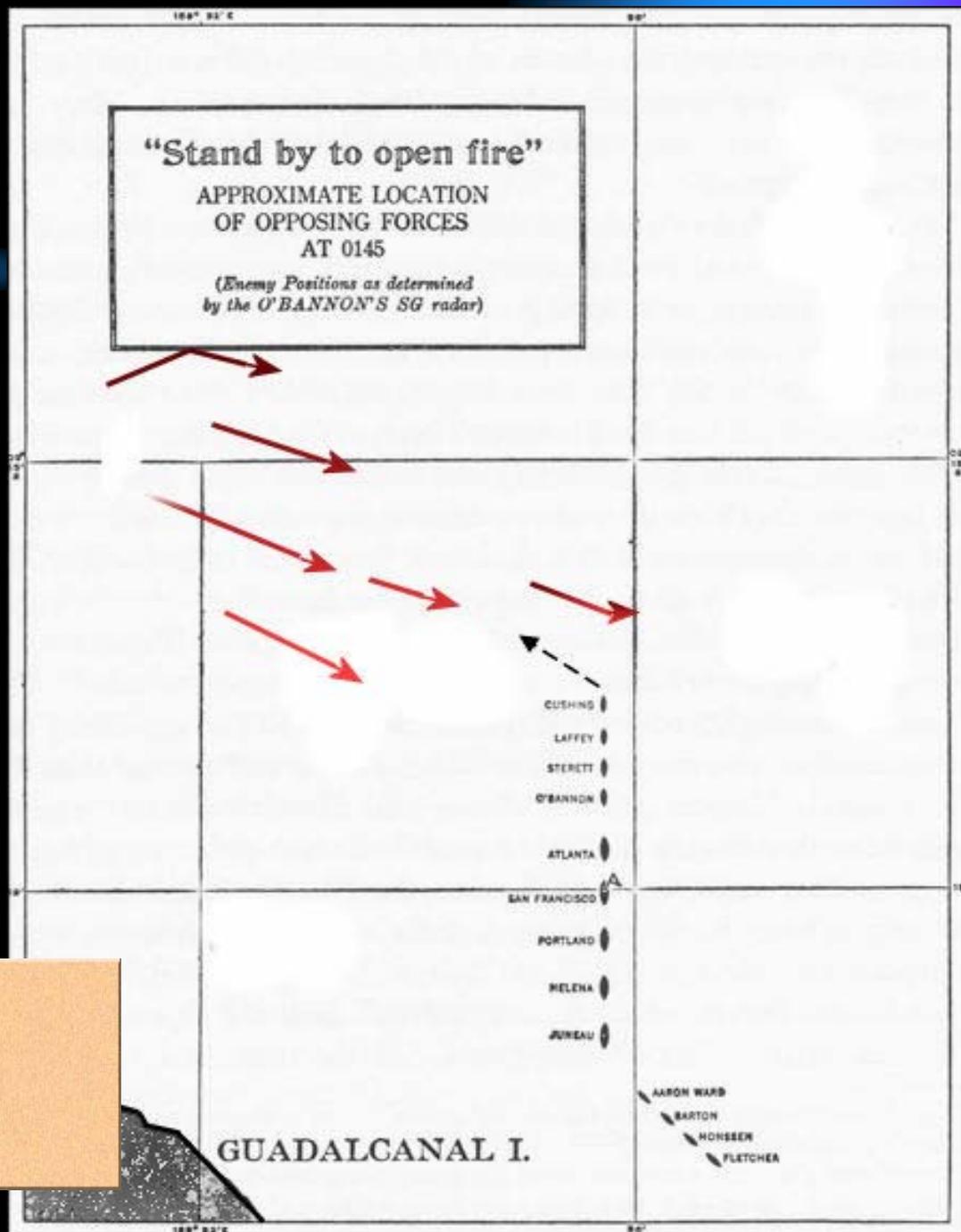




**The Failed Thermostat:
The Dangerous Illusion
of Control of the Battlespace**

A Parable on Command And Control: 13 November 1942



WAR INSTRUCTIONS
UNITED STATES NAVY
1944



The Objective

- 1. Present a compelling argument to abandon the concept of "Control" from C2 related doctrine.**
- 2. Provide an alternative concept that replaces "Control" with a more descriptive and useful term.**

Method

- 1. Reasoned argument and logic from the existing and relevant body of theory and evidence.**
- 2. Case studies illustrating the validity of the argument and logic.**

Definitions: Ashby' s Law of Requisite Variety

$$V(E) \geq V(D) - V(R) - K$$

Where:

V is a function of variety

E is system or process environment

D is a disturbance to be regulated

R is the regulation

K can be considered friction or entropy

Definitions: Gödel's theorems of Incompleteness

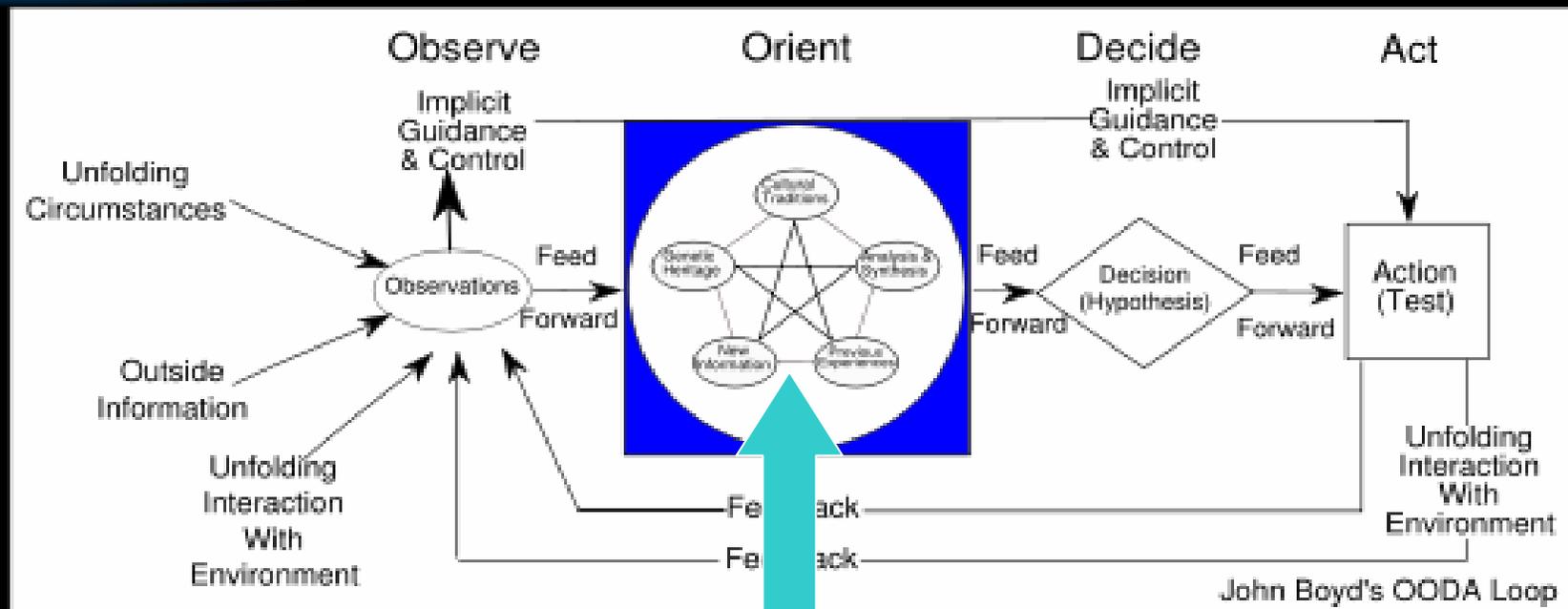
Theorem 1: *For any consistent formal, computably enumerable theory that proves basic arithmetical truths, an arithmetical statement that is true, but not provable in the theory, can be constructed. That is, any effectively generated theory capable of expressing elementary arithmetic cannot be both consistent and complete.*

Theorem 2: *For any formal recursively enumerable (i.e. effectively generated) theory T including basic arithmetical truths and also certain truths about formal provability, T includes a statement of its own consistency if and only if T is inconsistent.*

Definitions: Deming's Principles of Statistical Control

1. *Appreciation of a system*: understanding the overall processes involving suppliers, producers, and customers (or recipients) of goods and services (*explained below*);
2. *Knowledge of variation*: the range and causes of variation in quality, and use of statistical sampling in measurements;
3. *Theory of knowledge*: the concepts explaining knowledge and the limits of what can be known;
4. *Knowledge of psychology*: concepts of human nature.

Definitions: Boyd's Command and Control Theory



The Big "O"
-Leadership
- Appreciation

Definitions: CCRP Concepts of Command & Control

Command and Control Approaches

1. Cyclic
2. Interventionist
3. Problem-Solving
4. Problem-Bounding
5. Selective Control
6. Control Free

Factors:

1. Warfighting environment
2. Continuity of communications across echelon
3. Volume and quality of information moving across echelon and function;
4. Professional competence of the decision-makers and their forces;
5. Degree of creativity and initiative the decision-makers in the force, particularly the subordinate commanders, can be expected to exercise.

Argument and Logic

1. **All definitions agree: control of complex system environments is impossible.**
2. **This leaves two choices:**
 - a. **Reduce the complex environment to simplicity (and control-ability)**
 - b. **Or, abandon the attempt to control**

Evidence: Examples

- 1. Callaghan at Guadalcanal**
- 2. McClellan at Antietam**
- 3. Prussians at Jena and Auerstadt**
- 4. ROLLING THUNDER**
- 5. ANACONDA**
- 6. Russians at Grozny 1994**
- 7. BARBOROSSA**

Observations

- 1. There are two ways of dealing with “control”**
 - a. Technology - Data**
 - b. Training – Meaning**
- 2. Quantity of Information (Q(H)) approaches infinity**
 - a. Q(H) complicates environment**
 - b. Q(H) decreases time to Information Overload**
- 3. Speed accelerates (2) above**
- 4. What is left to control?**

Recommendations

- 1. Control is Newtonian in its implications and effects.**
- 2. We live in an increasingly Quantum world.**
- 3. It is time to leave “control” behind.**
- 4. Replace with whatever suits/fits the circumstances, e.g.**
 - a. Collaboration**
 - b. Coordination**
 - c. Monitoring**
 - d. Appreciation**