
Rethinking Command & Control

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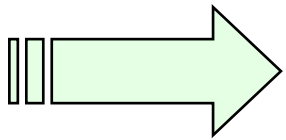
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Agenda



- **Introduction / Background**
- **Directives & Systems**
- **Command & Collaborate**
- **Command & Self-Control**
- **C2 Process Concerns**
- **Summary / Conclusions**
- **Future Research**

What is Command & Control?

- Simply, Command & Control can be defined as the actual process of directing and controlling forces.
- It is the authority that a commander exercises over his subordinates by virtue of his rank or assignment.



More specifically:

“Command & Control is the exercise of authority and direction by a properly designated commander over assigned forces in the accomplishment of the mission. Command & Control is performed through an arrangement of personnel, equipment, communications, facilities and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission.”

JCS Pub 1-02

DoD Definitions

- **“... command and control is the exercise of authority and direction by duly designated authorities.” [DoDD 5100.30]**
- **“Command describes the authority and the methods/means that a commander utilizes to direct and influence action. Control describes the methods/means that information flows within an organization that allow it to adjust its actions.” [MCDP06]**

...More Definitions...

- **“Control is those structures and processes devised by Command to manage risk.”**
- **“Command is the creative expression of human will necessary to accomplish a mission.”**
- **“Command emphasises its uniquely human nature, while Control is given a supportive (though still important) role.”**
- **“Command and Control: The establishment of common intent to achieve co-ordinated action.”**

[McCann, 1999]

Canadian Definitions

- **“Command is associated with authority, responsibility, initiative, courage, trust and leadership.”**
- **“Control, by contrast, is associated with plans, procedures, rules of engagement, communications protocols, software, and equipment.”**
- **“Control is a tool of Command.”**

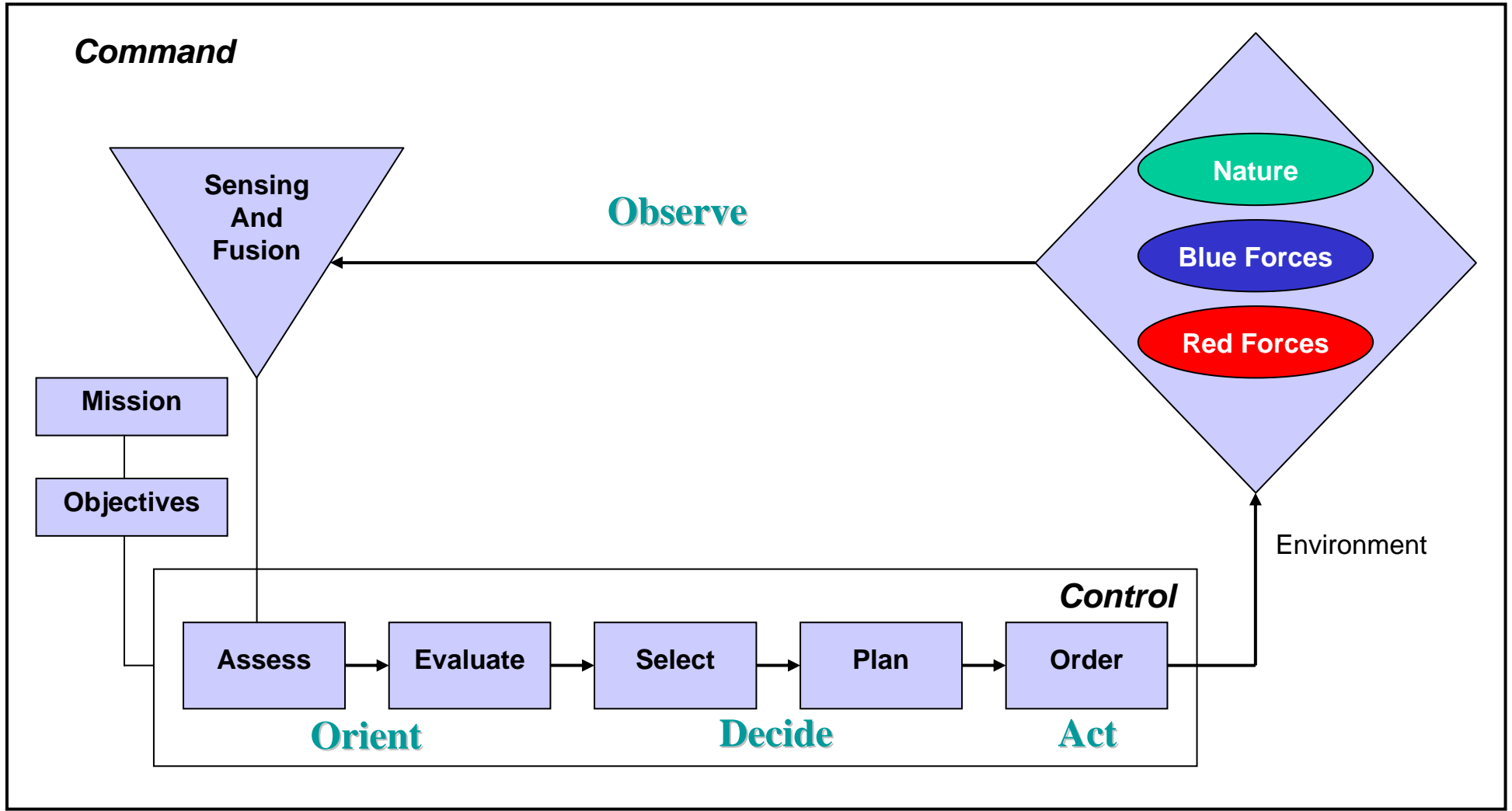
[McCann, 1999]

...Then Add the Human Aspects of C2

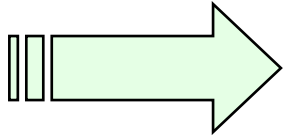
- **“Command – The creative expression of human will necessary to accomplish a mission.”**
- **“Control – Those structures and processes devised by Command to manage risk.”**
- **“Command & Control – The establishment of common intent to achieve coordinated action.”**

[McCann, 1999]

Command & Control Process



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Directives

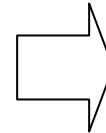
- DoDD 5100.30, World-Wide Military Command and Control System (WWMCCS), dated 1974.
- WWMCCS deactivated 30 August 1996.
 - On August 30, 1996, Lieutenant General Albert J. Edmonds, Director, Defense Information Systems Agency, officially deactivated the WWMCCS Inter-computer Network (WIN).
- In practice, no DoD level C2 policy exists from 1996 – 2006.
 - One could argue that we have been without a C2 Policy directive for almost 10 years. Yet, by all accounts, we are conducting C2 better today than ever before. Which begs the question:

Are we doing better at C2 today because we have no strong C2 Policy or in spite of that fact?

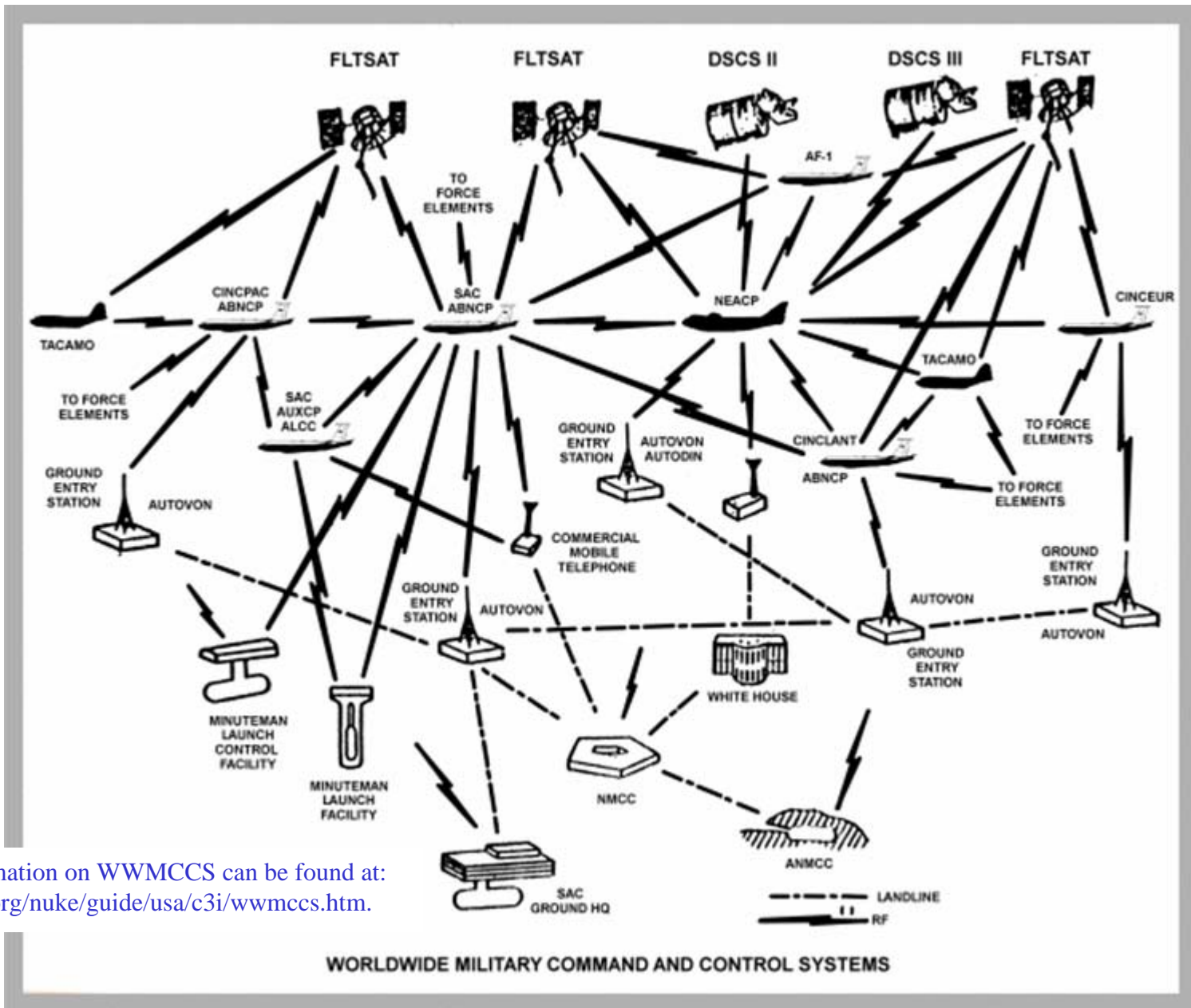
- Revised 5100.30 in draft for signature.

Systems

- **World-Wide Military Command and Control System (WWMCCS), circa 1960s, deactivated 30 August 1996.**
- **Global Command & Control System (GCCS) replaces WWMCCS in 1996.**
- **Joint Command & Control (JC2) capability will replace GCCS and will rely on GIG.**
- **National Command Capability will provide nationwide, interagency, command and control capabilities relying upon the Nuclear Command & Control System (NCCS) as its “survivable core.”**



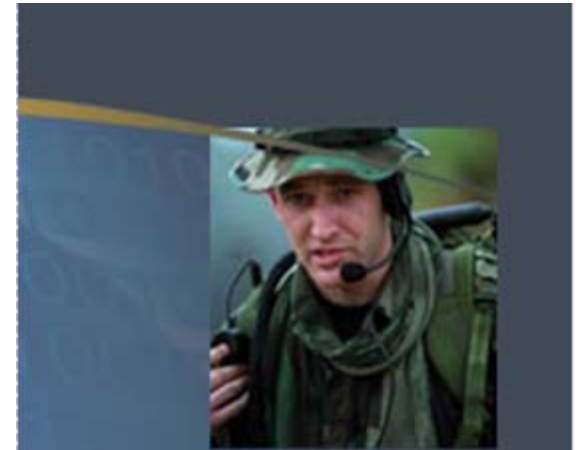
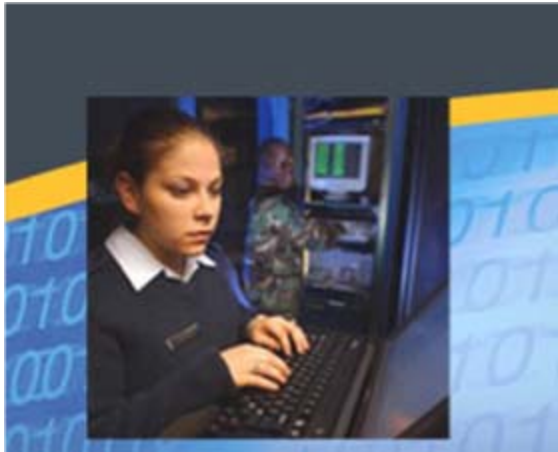
WWMCCS



Additional information on WWMCCS can be found at:
<http://www.fas.org/nuke/guide/usa/c3i/wwmccs.htm>.

JC2

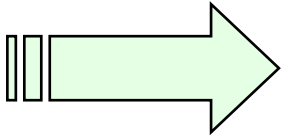
DISA's Joint Command & Control



Additional information available at:
http://www.disa.mil/pao/fs/jc2_3.html.

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Command & Collaborate

DARPA's Command Post of the Future (CPoF)



Decision Making

“Studies have shown that as more and more information about any given situation is accumulated, the confidence in the accuracy of a diagnoses increases dramatically. But, as it turns out, the actually accuracy of the diagnoses does not change significantly. It remains pretty constant at about 30 percent.”



[Galdwell, 2005, p.141]

Centralized Decisions



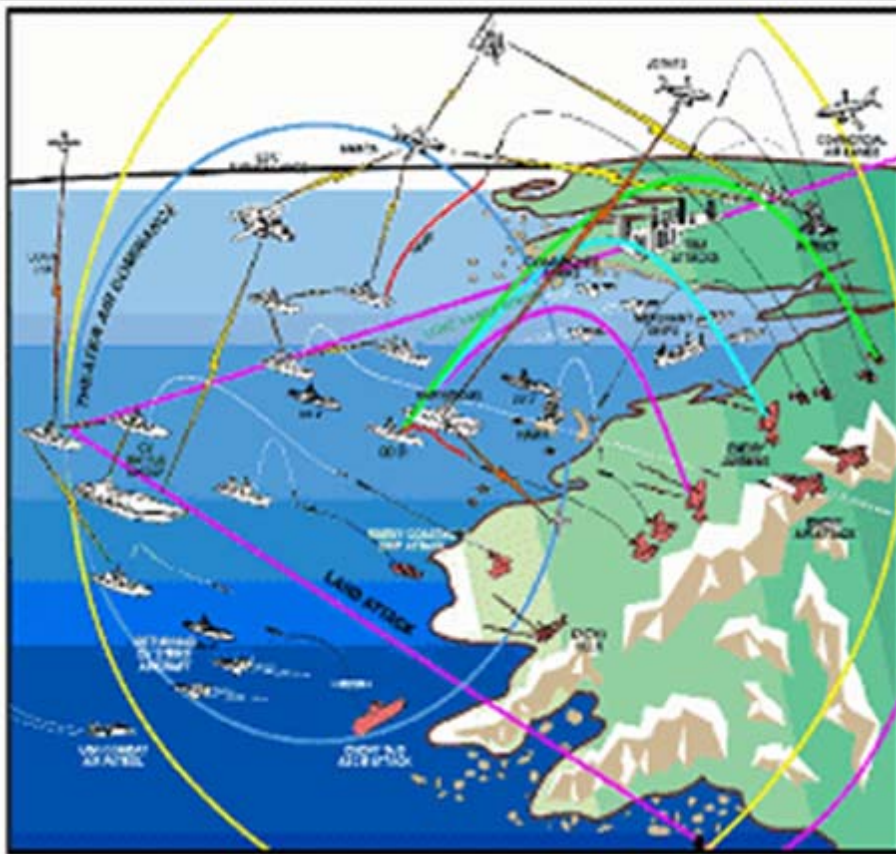
- “... the increased information transparency often enabled more, not less, centralized decision-making as senior leaders asserted control over distant decisions that nonetheless unfolded right before their eyes.”
[Chisholm, 2002]

Two good examples of centralized decision disasters: Vietnam and the USS PUEBLO.



Intuition

- “Intuition depends on the use of experience to recognize key patterns that indicate the dynamics of the situation.”



[Klein, 1998, p.31]

By our increased reliance on IT, are we stunting the decision-making growth of ‘experienced’ leaders / decision makers?

Intuitive Decision Makers

Characteristics of Intuitive Decision Makers

- Performance is markedly better than average
- Good sense of what is going to happen next
- Can explain how the situation developed
- Aware of their fallibility
- Relish the challenge when plan fall apart
- Confident, particularly in the face of time pressure and uncertainty
- Can anticipate problems in time to avoid or defuse them
- Know how to work around unexpected events
- Know the routines and the limits of the routines so they are not trapped by them
- Are still trying to improve – they know they aren't perfect



[Klein, 2003]

Intuition vs Analysis

Conditions favoring Intuitive and Analytical Approaches

- **Intuition**

- ✓ **Time pressure**
- ✓ **Ill-defined goals**
- ✓ **Dynamic conditions**
- ✓ **Experienced participants**

- **Analysis**

- ✓ **Conflict resolution**
- ✓ **Optimization**
- ✓ **Justification**
- ✓ **Computational complexity**



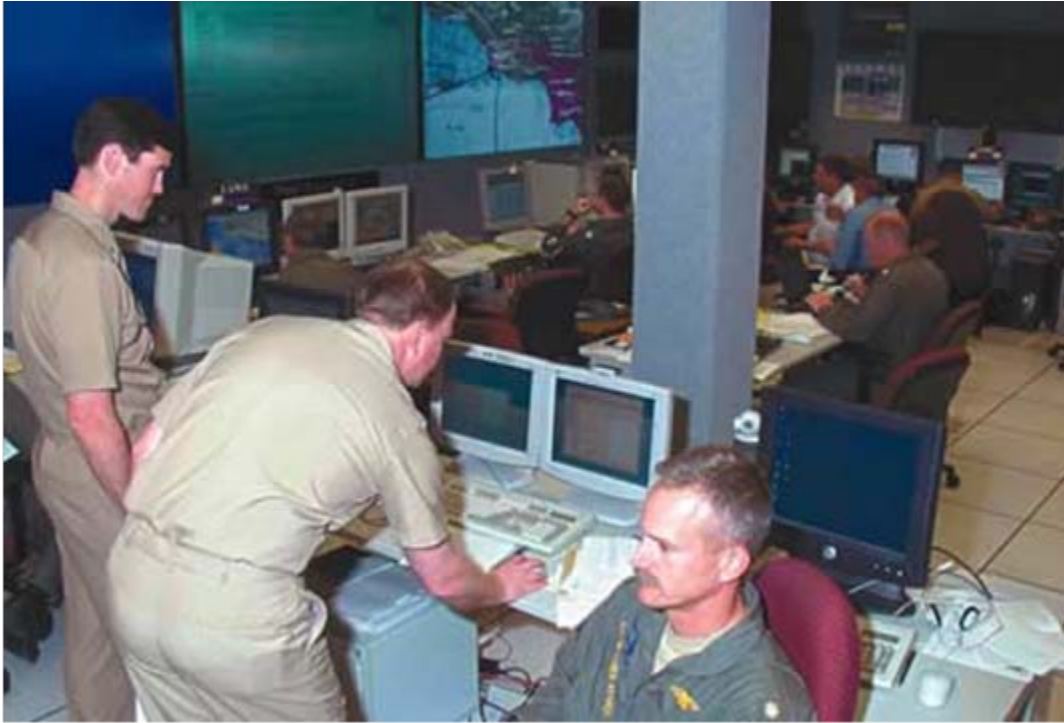
[Klein, 1998], [Klein, 2003]

IT & Decision Making

- Klein



Information



“In Millennium Challenge, Blue Team took it for granted that because they had more information at their fingertips than Red Team did, they had a considerable advantage.”

The Goldman algorithm says: “Quite the opposite: that all that extra information isn’t actually an advantage at all; that, in fact, you need to know very little to find the underlying signature of a complex phenomenon.” [Galdwell, 2005]

Limited Information

- **“This is how the human body reacts to extreme stress, and it makes sense. Our mind, faced with a life-threatening situation, drastically limits the range and amount of information that we have to deal with. Sound and memory and broader social understanding are sacrificed in favor of heightened awareness of the threat directly in front of us.”**

[Galdwell, 2005]

Information Technology # 1

- **“... information technologies are taking their toll. ... decision aids and smart systems are reducing their operators to clerks.... Operators come to passively follow what the information technology recommends rather than relying on their intuition.”**

[Klein, 2003]

- **“Information technology can flood us with material. ... the appropriate level of detail depends on what you are searching for.**

[Klein, 2003]

Information Technology #2

- **“Information technology doesn’t let us see how it does its reasoning....**
- **Information technology can hide the pedigree of the data....**
- **If it’s inscrutable, you can’t coordinate with it.”**

[Klein, 2003]

Information Technology #3

- **“Information technology makes us less adaptive by pressuring us to follow the prescribed procedures.”**
- **“Information technology discourages adaptations by being difficult to modify.”**
- **“Information technology can reduce adaptability by introducing a type of advanced information technology called an ‘adaptive system.’”**

[Klein, 2003]

Information Technology #4

- **“Information technology ... deprives us of the skills we will need once we leave the training environment.”**
- **“Information technology can diminish the active stance found in intuitive decision makers and transform them into passive systems operators. (It) ... makes us afraid to use our intuition”**

[Klein, 2003]

Information

- **“There are ... two important lessons here. The first is that truly successful decision making relies on a balance between deliberate and instinctive thinking.”**
- **“The second lesson is that in good decision making, frugality matters.”**

[Galdwell, 2005]

Operational Limits

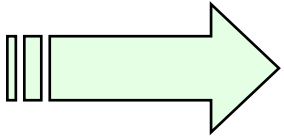


“Information may become intoxicating, turning tactical challenges into quantitative equations and distracting commanders from such basic military principles as initiative and decisiveness. Too much information may cause commanders to ‘tune out.’

Ultimately, the appropriate information – not just data – must be matched to the differing requirements of tactical commanders and theater commanders.” [Luddy, 2005]

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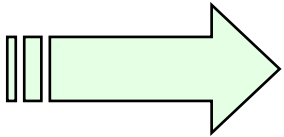


Command & Self Control

- The delegating authority must exercise self control by refraining from exercising *control* of the subordinate while maintaining some semblance of *command*
- The subordinate must have the ability (or self control) to work independently or with a team to achieve the mission goals.

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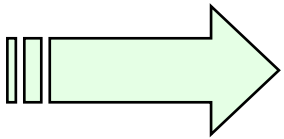
C2 Process Concerns

- All of the systems and services mentioned earlier take C2 well beyond the original concept of “commander’s intent.”
 - Many refer to a C2 capability “... from the President to the Foxhole.”
- While technology can certainly provide such a capability, it may be prudent to stop and ask ourselves if this is a good thing.
- We have actually exercised similar capabilities several times in the past:
 - Vietnam and the USS Pueblo incident come to mind. Both of these, by many accounts, led to less than optimal results.

[Sharp, 1978], [Pueblo, 2005]

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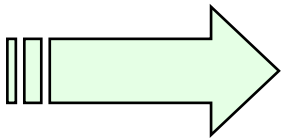
Summary / Conclusions

- **“Experience counts.”**
- **“Expertise depends on perceptual skills.”**
- **“The computer metaphor of thinking is incomplete.”**
- **“Skilled problem solvers and decision makers are themselves scientists and experimenters.”**
- **“Skilled problem solvers and decision makers are chameleons.”**
- **“Sources of power ... operate in ways that are not analytical.”**

[Klein, 1998]

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Future Research

1. How can we enable all appropriate C2 decision makers to successfully achieve information dominance?
2. How can IW opportunities and risks be considered in the design, acquisition, accreditation, and employment of information-based systems for the DoD?
3. How can a common tactical picture be readily available to those who need it which, at one level or another, is virtually everyone?

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Backup

Explanation / Accountability

- “... people who were asked to explain themselves ended up solving 30 percent fewer problems than those who weren’t.”

[Galdwell, 2005, p.121]

Information Operations

- **“The five sources of uncertainty are**
 - **Missing information,**
 - **Unreliable information,**
 - **Conflicting information,**
 - **Noisy information, and**
 - **Confusing information.”**

[Klein, 2003, p.122]



Sources of Power

- **Intuition**
- **Mental Simulation**
- **Using leverage points**
- **Seeing the invisible**
- **Storytelling**
- **Analogical and metaphorical reasoning**
- **Reading peoples' minds**
- **Rational analysis**
- **Team mind**

[Klein, 1998, p.288]

Chess

- **“Hey, say you are looking at a chess board. Is there anything you can’t see? No. But are you guaranteed to win? Not at all, because you can’t see what the other guy is thinking.”**

[James Van Riper as quoted in Galdwell, 2005, p.144]

Slogans

- **“... those who focus on the technology, the science, tend towards sloganeering.”**
- **“What I see are slogans masquerading as ideas.”**

[Van Riper, 2002]

- **“There were accusations that Millennium Challenge was rigged. I can tell you it was not. It started out as a free-play exercise, in which both Red and Blue had the opportunity to win the game. However, about the fourth day, when the concepts that the command was testing failed to live up to their expectations, the command then began to script the exercise in order to prove these concepts.”**

[Van Riper, 2002]

- **“Any moderately informed person would know enough not to count on those technologies. ... Who would use cell phones and satellites after what happened to Osama bin Laden in Afghanistan?”**

[Paul K. Van Riper as quoted in Galdwell, 2005, p.109]