Modern C31

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If you have had your head down, concentrating on technology, then...

You may not have had time to see how that technology might fit into the bigger picture

Yet, your next posting might be to:—

– OR, Ops, Pol, Int., PM, DPA…

And the military job is changing fast, too:—

– From Threat to Capabilities
– Peacemaking, Peacekeeping, Peacebuilding
– Increasing stretch as the World becomes more turbulent
Perspectives on Conflict

- A major rôle is in Peace Operations
  - Calls for a revised view of conflict management
  - The value of hi-tech is less obvious, perhaps

- Meanwhile, the threat of nuclear conflict is never far away
  - China, Iraq, Pakistan Vs. India

- An Issue common to all viewpoints—military, political, economic—is that of Command and Control of forces, and of C³I.

- A broad view of C³I includes sensors, weapons, processing, networks, IS, planning systems, deconfliction, etc., etc.
First, what is Command & Control?

Come to that what is Command, Control, Communications and Intelligence (C³I) — or should it be C⁴I, or even C⁷I?
Command & Control—Decisions and their Execution

"The exercise of authority and direction by a properly designated commander over assigned forces in the accomplishment of his mission.

Command and Control functions are performed through an arrangement of personnel, equipment, communications, facilities and procedures which are employed by a commander in planning, directing, co-ordinating and controlling forces and operations in the accomplishment of his mission."

Publication 1, US Joint Chiefs of Staff
C2 Process—The Lawson Model (c.1980)

- **Sense**
- **Process**
- **Compare**
- **Decide**
- **Act**

**Environment**
- Own forces
- External Data
- Desired State
- Decision Aids

**To Higher Authority**
The Cybernetic Model

- CU compares Actual with Desired Output
- AU receives signals from CU - responds by making changes in CP
- CP - that which is being controlled
- IS - measures actual output, relays information to CU
Typical Paradigms for Understanding C²

**The Decision Theoretic Structure of C³ Paradigms**

- **Environment**
  - **Observation**
  - **Action**

**User/Commander**

- **Staff**
  - **C³I System**
  - **Weapon System**

**Environment**

**The SHOR Paradigm**

- **Hypothesis**
  - **Stimulus**
  - **Response**

- **Option**

**Environment**

**Situation Assessment**

**Information Fusion**

**Command Interpretation**

**Response Selection**

**User / Technocrat Perspective**

**SICR**
Information-Decision-Action Systems

Information
Decision
Action
Environment
Action
Decision
Information

Human part can, and will, work without technology

Information

Dynamic Simulation

Machine Model

GRM in Action

Information Warfare

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Understanding C²

• It is not possible to understand C³I in isolation.
  –C²/C³I has no effect in isolation

• E.g. C²/C³I Effectiveness can only be observed through the effect of one force on another.
  »Cost exchange ratios
  »Casualty exchange ratios
  »Cost Effectiveness
  »ROCE
Themes:—

• Decisiveness
• Doctrine
• Leadership
• Discipline
• Force cohesion
• Decision space

C², Doctrine, Strategy & Tactics

Agility, mobility
Command architectures
Decisiveness
Manoeuvre warfare
Perception
Judgement
Command (team) training
Schwerpunkt
Vision
Leadership
Command & Control
Auftragstaktik
Precedent, practice
Organizing
SOPs
Campaign analysis
Limited decision options
Deplying
Agility, mobility
Rules of engagement
Activating
Limitations of forces under command
Peace Dividend—Uncertainty

• Cold War — predictable, high tech. stand-off
  – NATO reinforced by WP, and vice versa
• Peace has brought: —
  – Granby/Desert Storm
  – Former Yugoslavia...Kosovo
  – Ethiopia, Rwanda, Congo, Sierra Leone...
  – Granada...Panama City...Haiti...
  – East Timor...
• ...different lessons, new ideas, CNN Effect, even more politics...
Manoeuvre Warfare

How two nations can use the same words to mean quite different things
US View of Manoeuvre Warfare?

• American Football analogy
  – series of set pieces
  – attackers have covert plan
  – hit opposition at all points
US Manoeuvre Warfare

• Hit enemy in depth (Panama City 26—28 separate points simultaneously)
  – communications
  – information sources & sensors
  – command centres
  – *shatter* the enemy
• …no subsequent opposition
• This is *Information War*
US View of 
Manoeuvre / Information Warfare

Extracts from BBC2 Horizon Programme
Joint Vision 2010

Advanced Technologies

New Operational Concepts and Doctrine

Organizational Change
ABIS Capability Framework

- Effective Force Employment
  - Rehearse, Evaluate and Adapt Plans Rapidly
  - Synchronize Distributed Force Operations
  - Acquire Targets, Execute Timely Response

- Battlespace Awareness
  - collaborative situation awareness
  - Consistency of view across all forces
  - Tailored Information Distribution

- The Information Grid
  - Single federation of heterogeneous Information Systems
  - Infrastructure support of distributed processes, Information search and collaborative work
  - Seamless responsive communications
  - Assured managed resources support mission priorities

- Execution of Time-critical Missions
- Integrated Force Management
- Participative Planning and Preemption

- Consistent Battlespace Understanding

- Precision Information Direction

- Distributed Environment Support

- Universal Transaction Services

- Assurance of Services
• Separates Planning from Execution
• All planning done at high level, in depth, in detail
Blue indicates crushing blow
Red indicates resistance to crushing blow
UK View of Manoeuvre Warfare
UK View of Manoeuvre Warfare?

- Soccer analogy
  - fluid game, players moving on and off ball
  - strategy, but detailed plan develops as game progresses
    » mission command
  - fast moving, *blitz-krieg* action
• Mobile forces acting in concert to outflank, outmanoeuvre (mobile?) enemy

• Fluid, unpredictable, forces enemy on to “back foot”

• Requires commanders with initiative, flexibility, mutual trust, shared goals
• Hence *Auftragstaktik*, Mission Command
  – every officer develops planning and command skills at every level
• Hence regimental system
  – personal knowledge, shared experiences, mutual trust…

N.B. Both US and UK, in different ways, reflect Ghengis Khan’s Command & Control of exclusively-cavalry forces
N.B. N² chart appears at each and every C² location
Fractal Nature of Mission Command Decision-making
Fractal C2 Organization

- C2 presents its control aspect
- an overall force comprises
  - several formations
  - each with several Force elements
  - each force element can be broken down further to reach the smallest separate fighting unit
  - for Warrior-based architectures, this is the individual Warrior
- reasonable to view each level as having C2
  - each conveys information up the command chain
  - each receives orders and instructions down the command chain
Comparing Flat-planning and Fractal C² Decision-making —US Flat Planning

- Centralized high-level planning* promises
  - optimal deployment of resources across whole battlespace, plus
  - close political/financial control
- Takes maximum advantage of / heavily dependent on (according to viewpoint) communications and processing technologies
- Execution element potentially isolated from planning, and vice versa
  - potential for “us-and-them” friction/loyalties/cultures, and...
  - “efficient”, impersonal, inhuman(?) decisions/executions

- Flat organization faster, extensive, but brittle?
- Extended infocomms = irresistible target?

* May be dispersed using technology, but still essentially one system
C² speed determined by Force under Command

Fast planning may be helpful, but…
Comparing Flat-planning and Fractal C² Decision-making
—UK Fractal

- Virtually indestructible—same generic capabilities at each level.
  - fractal structure ideal to accommodate chaotic battlespace even without central planning
- Inherent “succession” training
- Will continue to operate without communications for extended periods
- Potential to adapt in real time, e.g. peacekeeping

Fractal organization slower, but adaptable and robust?

- So, does UK really *need* digitization?
- probably, if only to inter-operate with US
Dangers in Digitization

• US/World stockmarket crash brought about by automated dealing, using digital networks
  – Independent dealers used same software, with same thresholds.
  – As a stock fell below threshold, each system responded at same instant
  – Flooded market - price fell again, and so on.

• JBD is not the stockmarket, but…
  – It does introduce much tighter coupling between force elements which can be good, but…
  – Can also led to chaotic behaviour
Close-Coupled Architectures—Risk

Coupling & Chaos

Effects of coupling on system behaviour

“Scares” & Chaos

Effects of interactions on systems behaviour

“Climate” Effects

Lorenz’s Butterfly Effect

Bifurcation

Logistic Curve behaviour
Decision-making & Decisiveness
Inspires confidence
- self belief
- morale
- cohesion

Decisions:
Outcome Vs. Process Vs.?

Improves control of / reduces entropy in/ disordered situation

Fast & decisive

Less risk of enemy a "free ride"

Rate of Change of situation

Anticipate reaction

Bold, unpredictable

Decision Process

Cost-exchange ratios

Force multipliers

Rational consistent, logical, attainable

Employs all relevant information

Nodes
Battle Between Belief Systems

- Command and Control is about *two* distinct struggles:
  1. The struggle within Blue/Red Force to maintain its own Belief System
  2. The struggle between Blue Force’s Belief System and Red Force’s Belief System

Arrows show propagation of Belief System
Belief System Battle

Assyrians besieging a city
—from the Assyrian Marbles, British Museum
1. Unpredictable situations, conflicts, necessitate flexible, adaptable, rapid-reaction go-anywhere forces
2. Immediate UK command issues concerned with Peace Operations rather than global or theatre warfare.
3. UK Doctrine is Mission Command
4. Risks inherent in close coupling of complex systems is well understood
   • For all 4 reasons, JBD seems unlikely priority
   • In this particular instance, US has:
     — Developed a new Doctrine
     — Designed future technology & force structures around that Doctrine,
     — which is different from UK’s Military Doctrine