



# A Capability Architecture for 2020

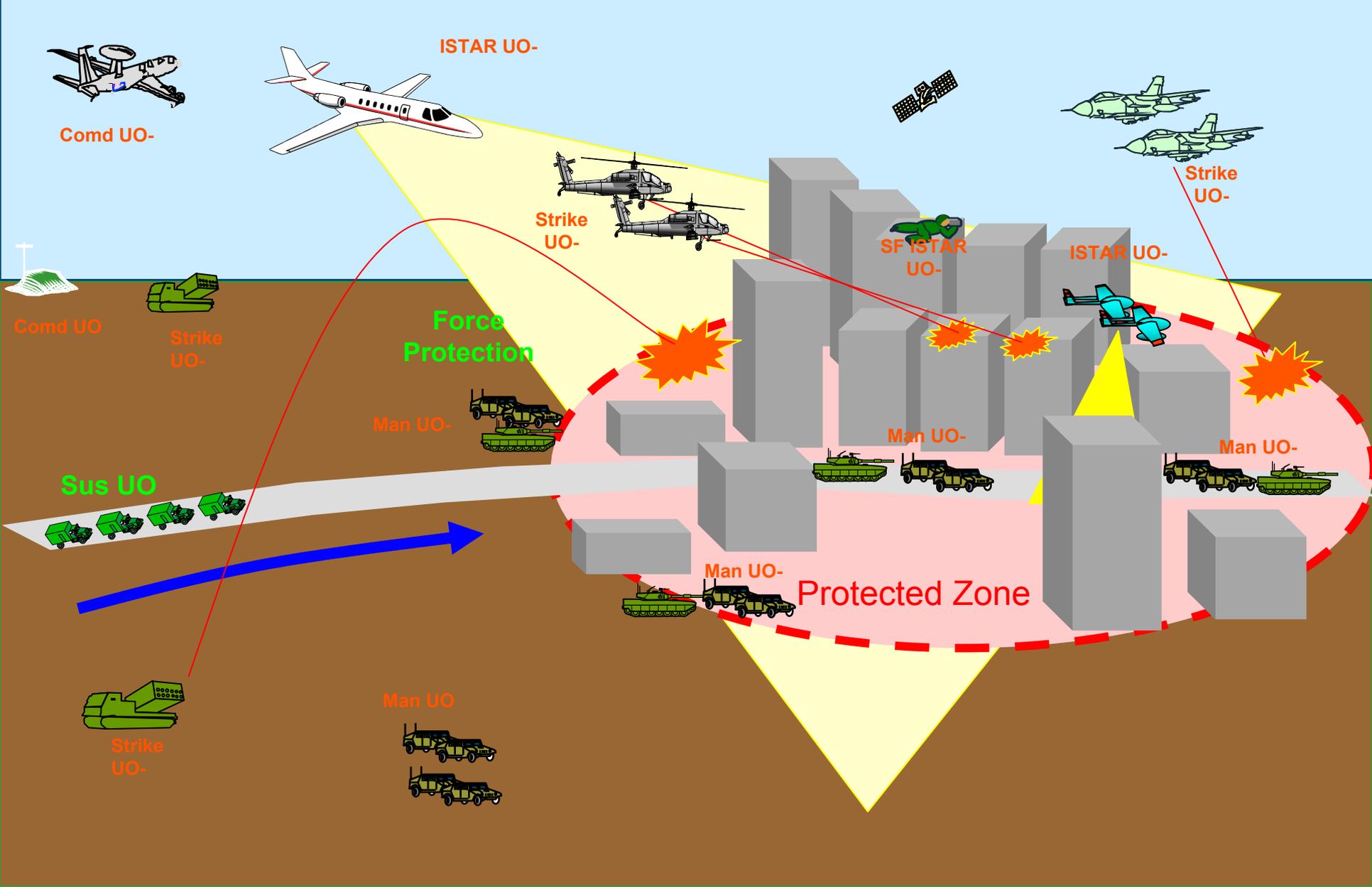
**Merfyn Lloyd**

# Quote

- Need a visionary common C2 construct that identifies functional clusters and boundaries:
  - Common terminology.
  - Assumes interoperability.
  - Can disclose discontinuities and gaps.
  - Facilitate co-ordinated capability developments.

*Dr Richard Roca*

*John Hopkins University /Applied Physics Laboratory*



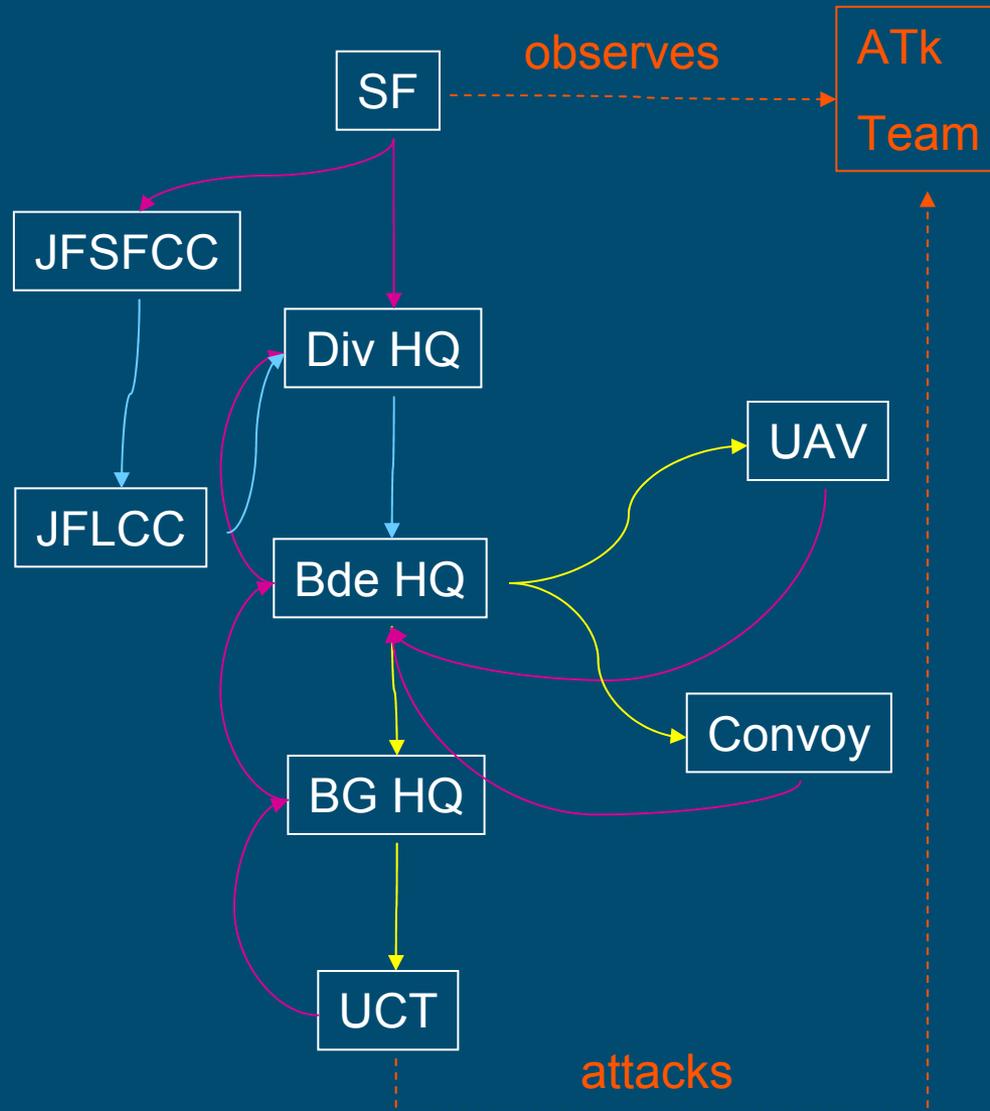
# OV 1- Urban Operations - Clearing MSR

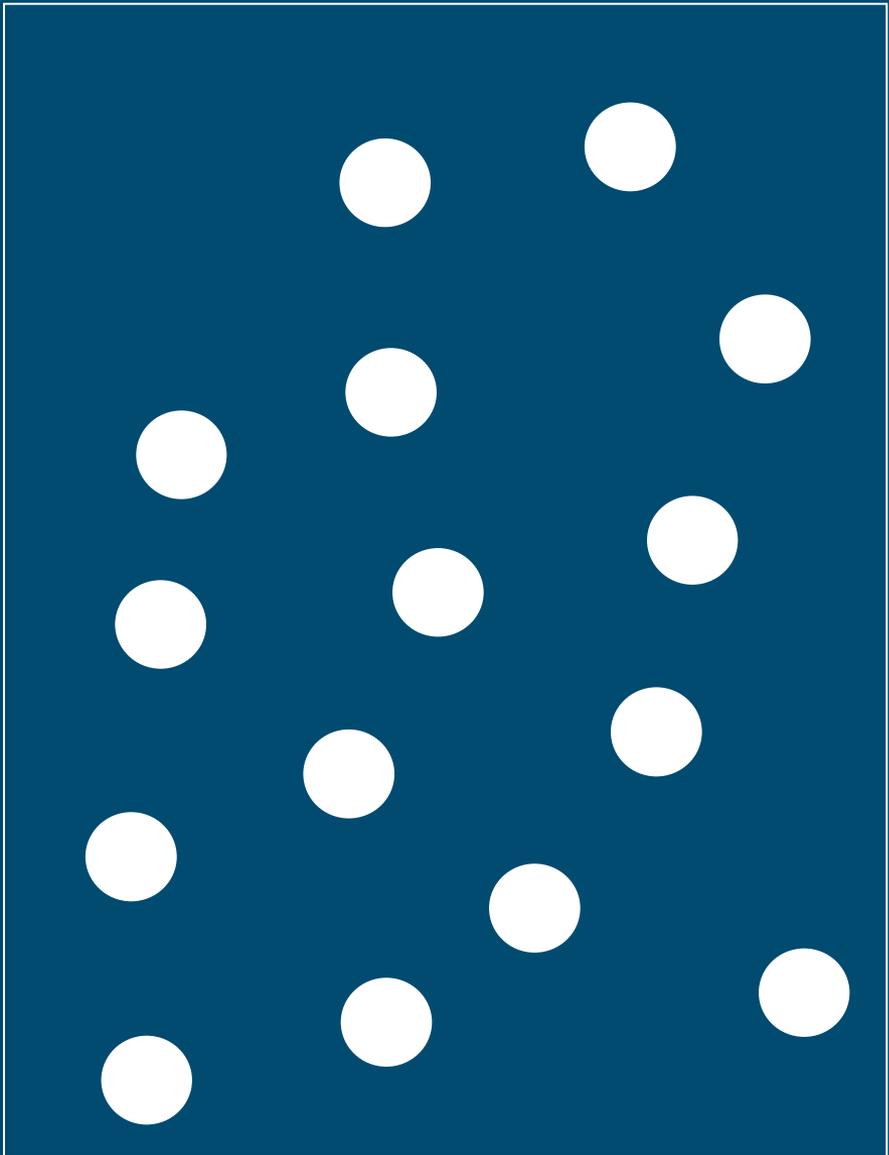


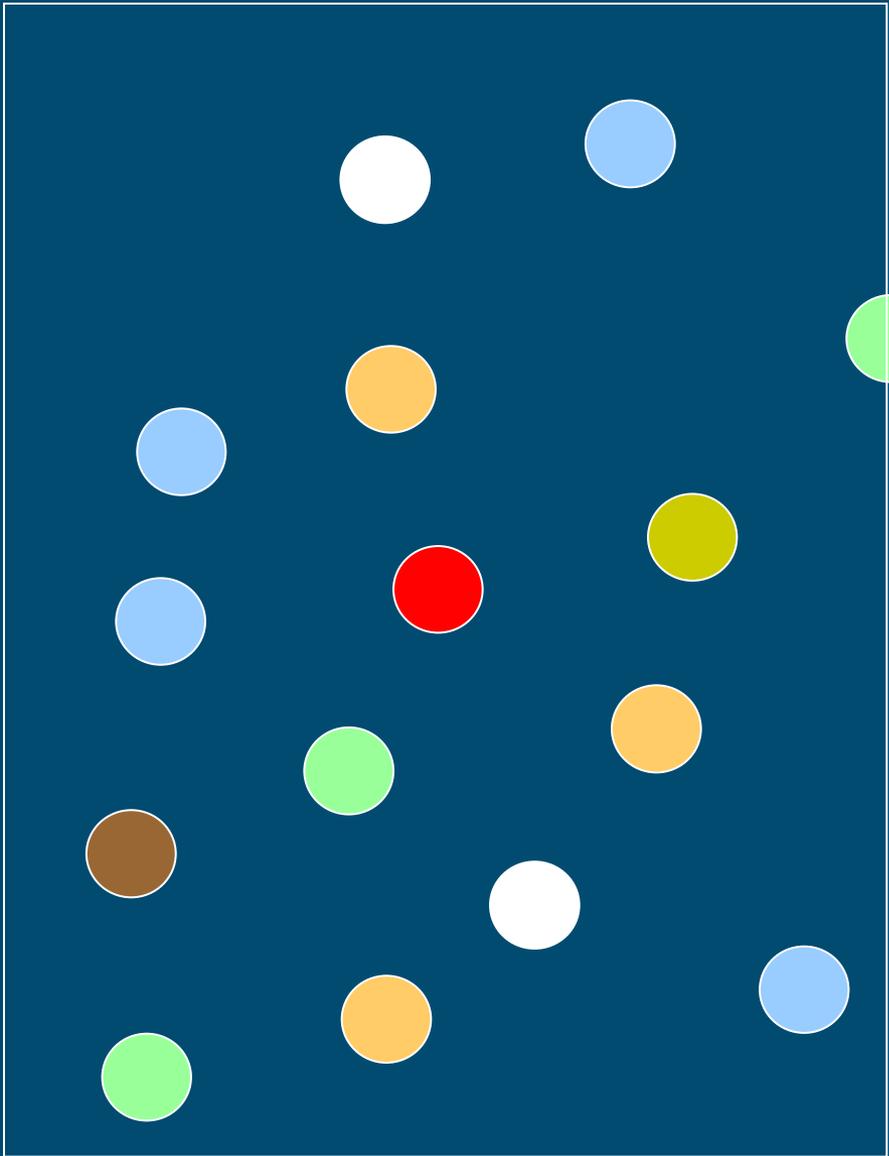
# Information View (OV 2)

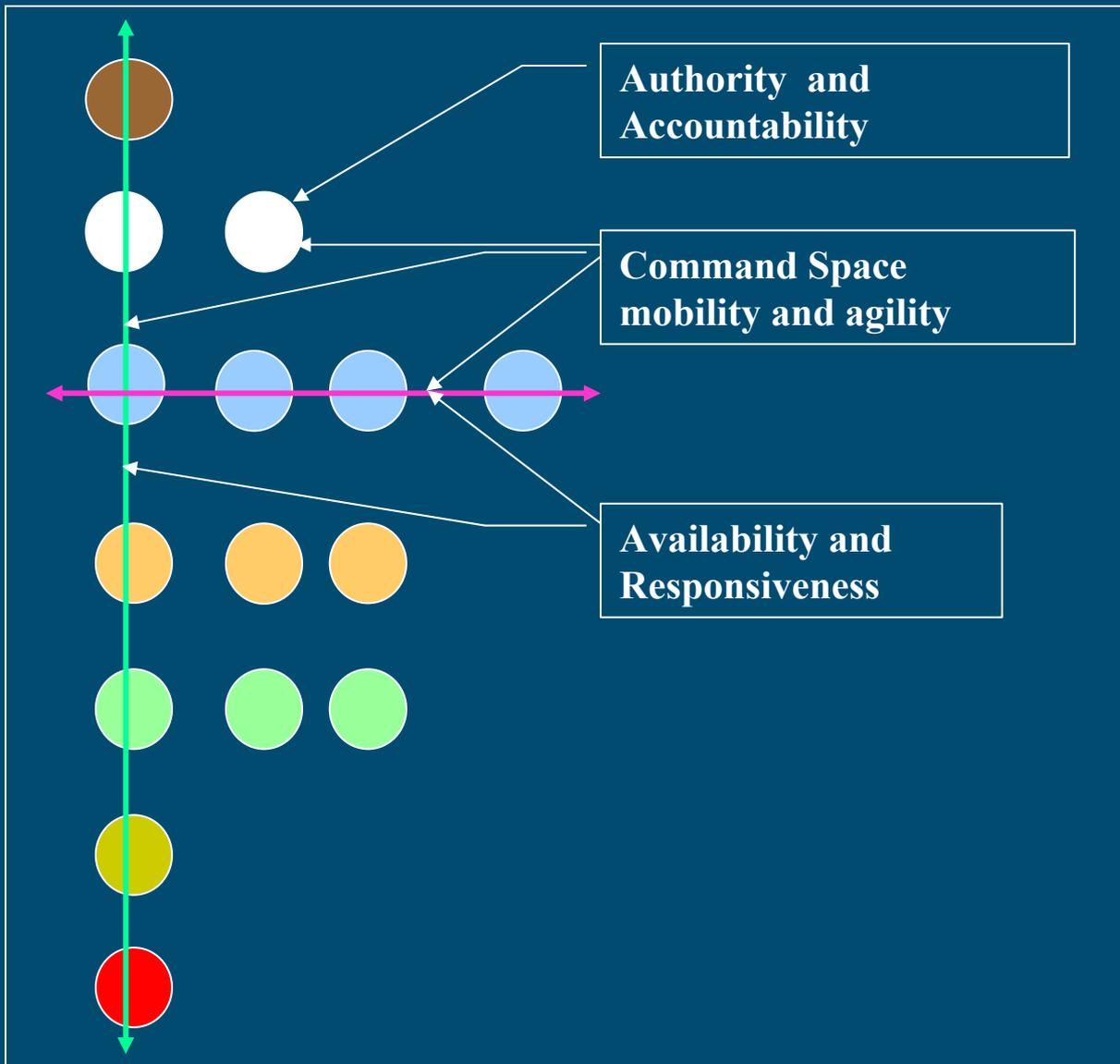
From Left to Right	JTFC	JFLCC	JFACC	JFSFCC	Div	Bde	BG	UCT	Convoy	Th ISTAR	UAV	E3D	AH 64
JTFC		Direction, SA	Direction, SA	Direction, SA									
JFLCC	Status, SA		Status, SA, Requests for tasks and information	Status, SA, Requests for tasks and information	Direction, SA	Awareness							
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Fire Sp		Status, SA			Coord	Coord	Coord	Coord	Coord	Coord	Awareness	Coord	Awareness
SF				Status, SA	Awareness	Awareness	Awareness	Coord		Awareness	Coord	Coord	Coord

# Chain 1









# Describing Future Capability

- Deployed Operational Groups (DOGs) are stable, utilitarian structures that can be assigned a mission.
- Need to describe the relationship between DOGs in terms of :
  - Their *command relationships*,
    - Authority, accountability.
  - The *nature of their interdependency (functional integration)*,
    - Responsiveness, availability.
  - The *rules* that allow this to happen in manner that accords with the vision.

# Interdependence (1)

- The provision, sharing, reinforcement or substitution of functional capability across DOGs is a key part of interdependency.
  - The dynamic networking of capability has to be placed in a sound context of command and organisation.
  - The effectiveness of pools of capability assets / resources in providing services to other groupings will always be dependent on having a sufficiency of capability.
  - If, as is likely always to be the case for the UK, assets and resources are scarce, then allocation of these assets and resources becomes a command decision of prime importance.

# Interdependence (2)

- Can be valued in terms of availability and responsiveness.
- A critical effect is to create a 'buffer' in resources.
- Requires a set of certainties from which options can be developed.
- Increases the command space 'options'.
- One of the 'ways' which the DOG can exploit.

# Command Relationships

- How command will be exercised.
- How to achieve:
  - Force wide expression of Command Intent.
  - Clear lines of authority and accountability.

# Drivers

- Conceptual:
  - The need to empower commanders so that they can deal with rapidly changing situations using opportunistic, innovative and creative solutions.
- Interdependency
  - However, the freedom of command to create such novel actions is meaningless unless DOG can access the wider range of capabilities offered by the notions of interdependency.
- Need a architecture that will resolve any conflicts that might arise between these two drivers.

# Uncertainty

- The complex nature of (current and future) operations means that they are inherently unpredictable and outcomes are uncertain.
  - Lack of certainty is an inherent feature of complex non-linear systems, and can be augmented by insufficient evidence and cultural misinterpretation.
  - Concepts which rely on certainty and predictability, such as notions of 'just in time' or 'predicted delivery' cannot apply when dealing with complex and unpredictable circumstances.
  - Equally, the applicability to conflict situations of concepts which rely on perfect knowledge of the value of information are still to be proven.

# Dealing with Complexity

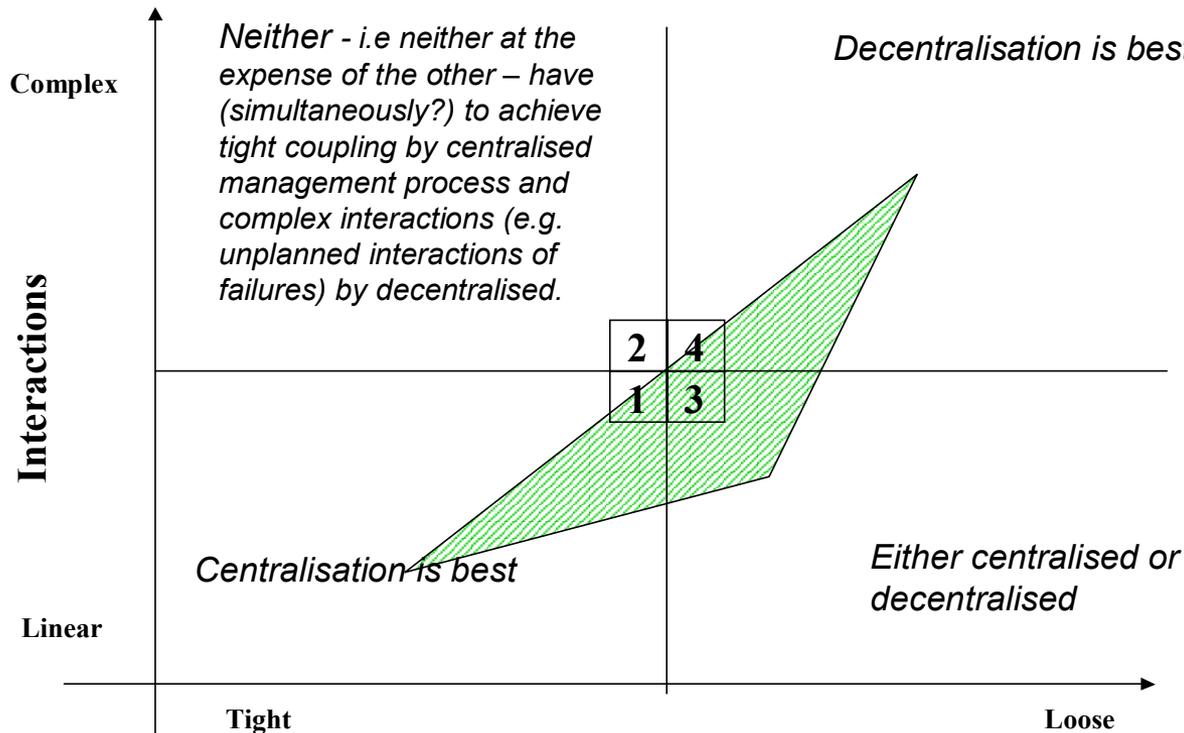
- Must be given the freedom to form the relationships they understand will allow them to deal with the situation and its inherent unpredictability
  - ie exercise choice over the appropriate degree of mission command and the associated command and control arrangements.
- Their ability to do this can be expressed in the form of a 'command space' within which command can act.
  - The ability to vary command freedom as appropriate to the nature of the operational setting must be considered as a value in its own right.

# Command Space

- Location within the command space constrains the options available
  - each option can be characterised by its utility value (usually expressed in terms of cost-benefit) and entropy (a measure of disorder, uncertainty and confusion).

Complex interactions are less predictable. Breakdowns within one or more units and or subsystems may occur because of unplanned or unforeseen interactions.

## Perrow's quadrants



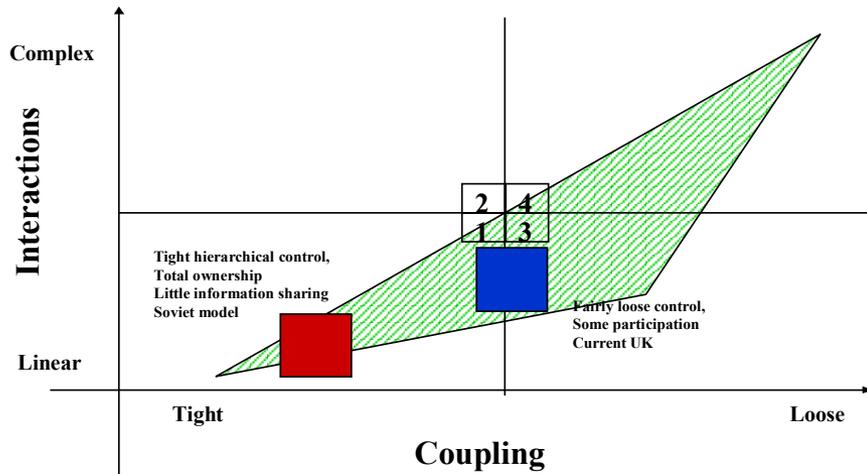
Linear interactions describe highly structured systems which are logical, sequential and planned. If damage to a part occurs, the problem can be identified and corrected with little disturbance to the overall system.

**Coupling** = “the amount of slack, buffer or give between two items”

Tight coupling characterised by centralisation and rigidity, specified tolerances – change causes massive ramifications throughout the system.

Loose coupling characterised by decentralised operations, flexible control mechanisms

## Perrow's quadrants given capability abundance



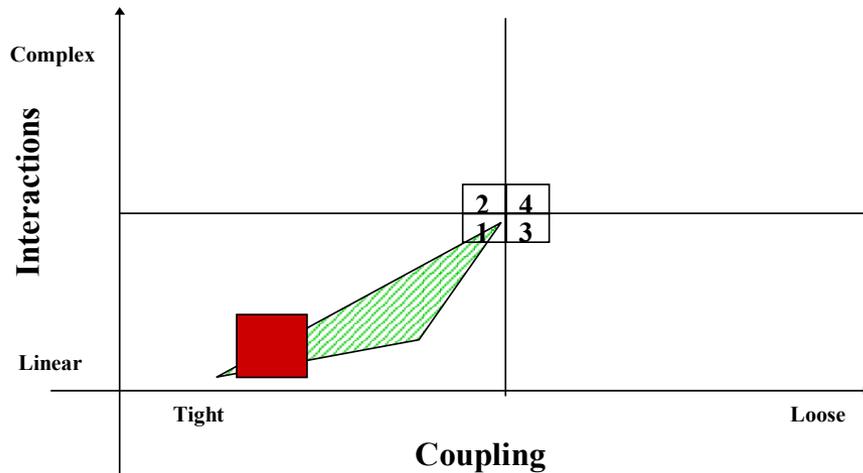
*Scope for command freedom to be tuned to interactions complexity and desired degree of coupling between activities*

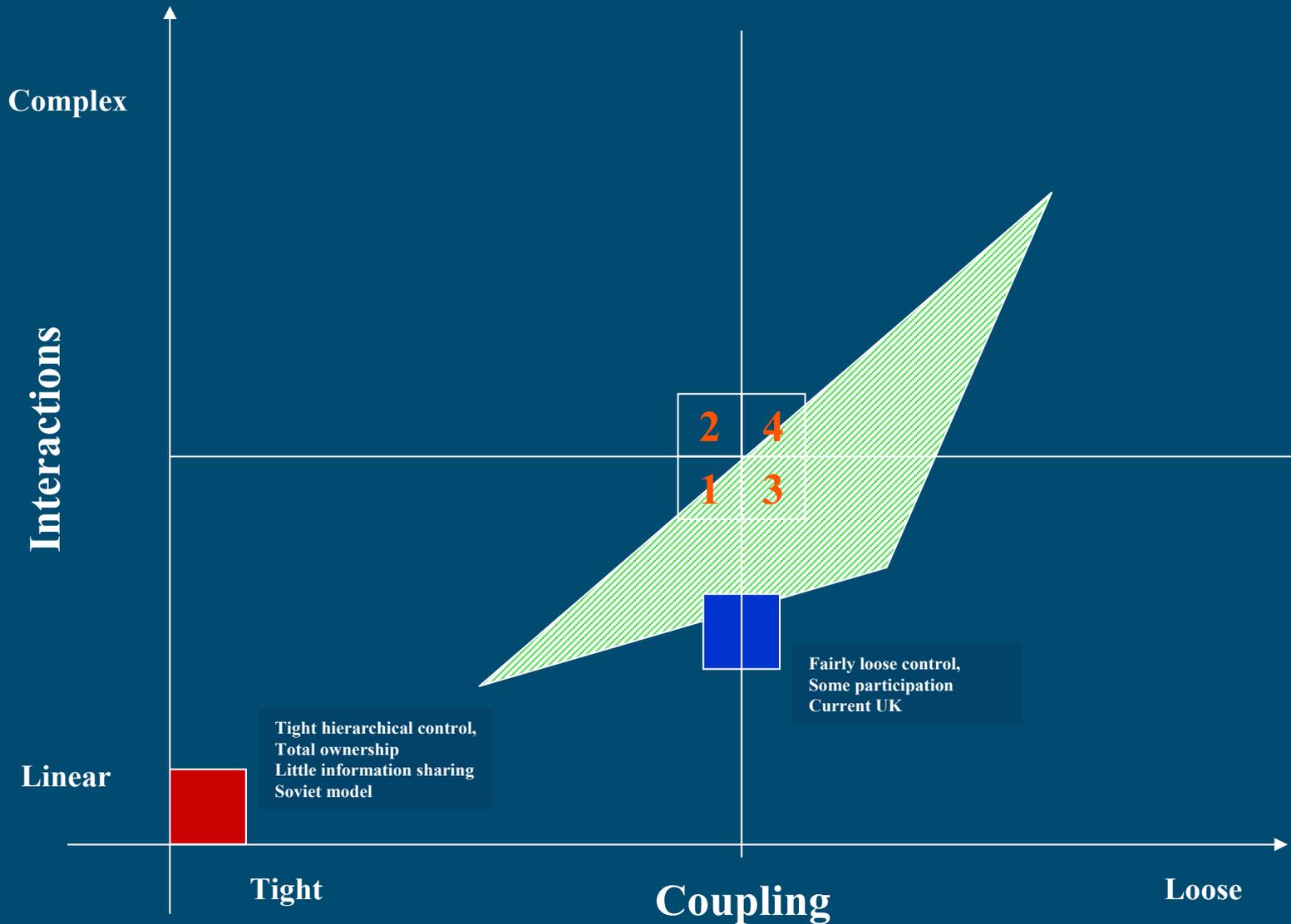
Tight hierarchical control,  
Total ownership  
Little information sharing  
Soviet model

Early loose control,  
Some participation  
Current UK

## Perrow's quadrants given capability scarcity

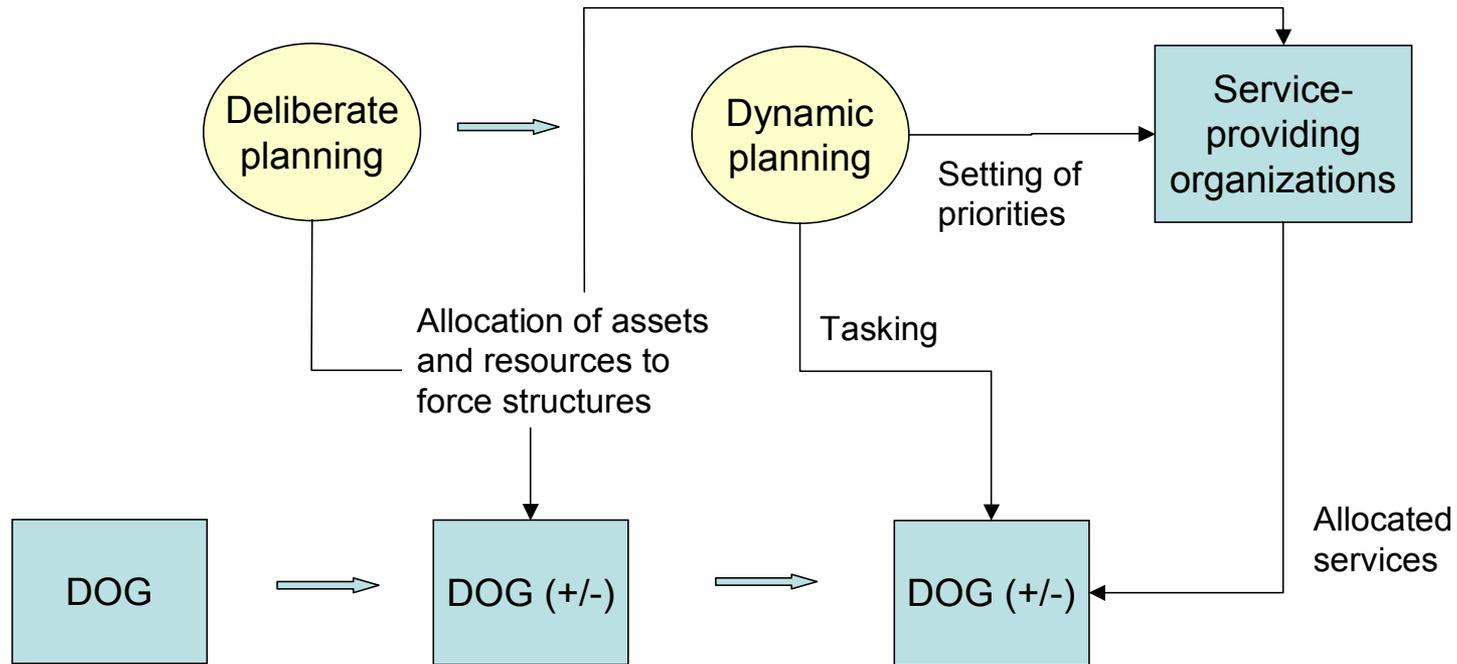
*No scope for loosening coupling and giving true commander autonomy – and attempts to increase functional participation by sharing resources are vulnerable to complex interactions emerging through own system*





# Values

- The values of responsiveness and availability, of authority and accountability and of command space mobility and agility, will not always align.
- In particular, when resources are scarce, freedoms are generally undermined and the conflicts of interest that arise can lead to loss of operational effectiveness.



Deployed Force

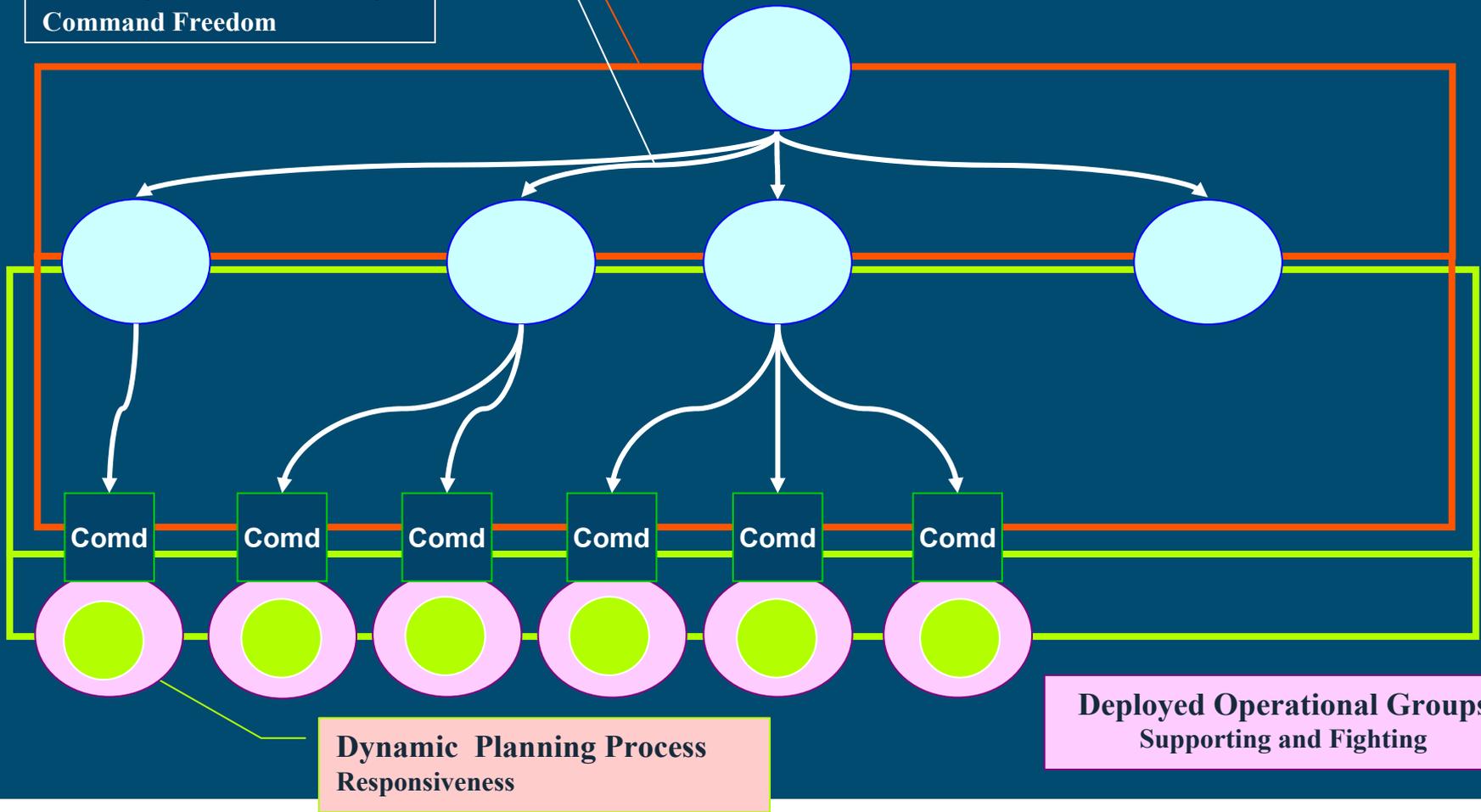
Built Organization:  
 • TASKORG

Dynamic tasking of Built Organization:  
 • Mission  
 • Services allocated  
 • Co-ordinating instructions

**Deliberate Planning Process**  
Apportionment

**Chain of Command**  
Authority and Accountability  
Command Freedom

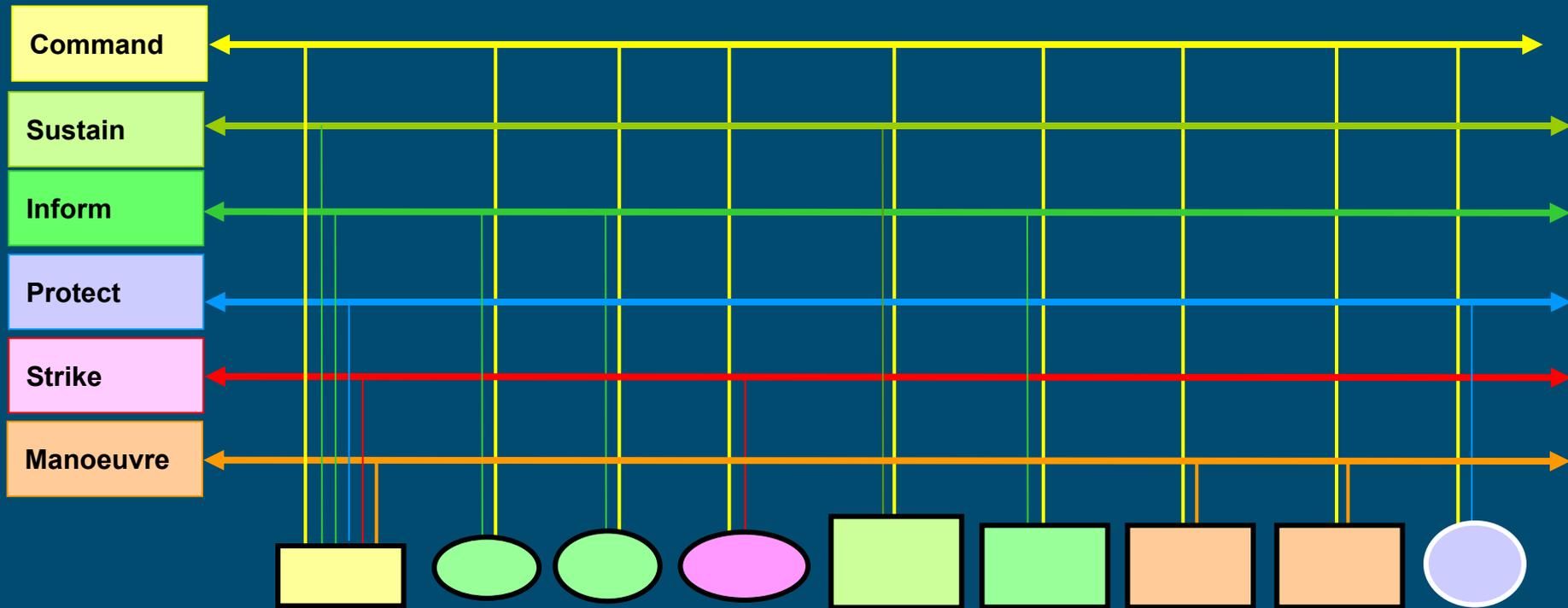
**Higher Command Organisation**  
Directing and Coordinating

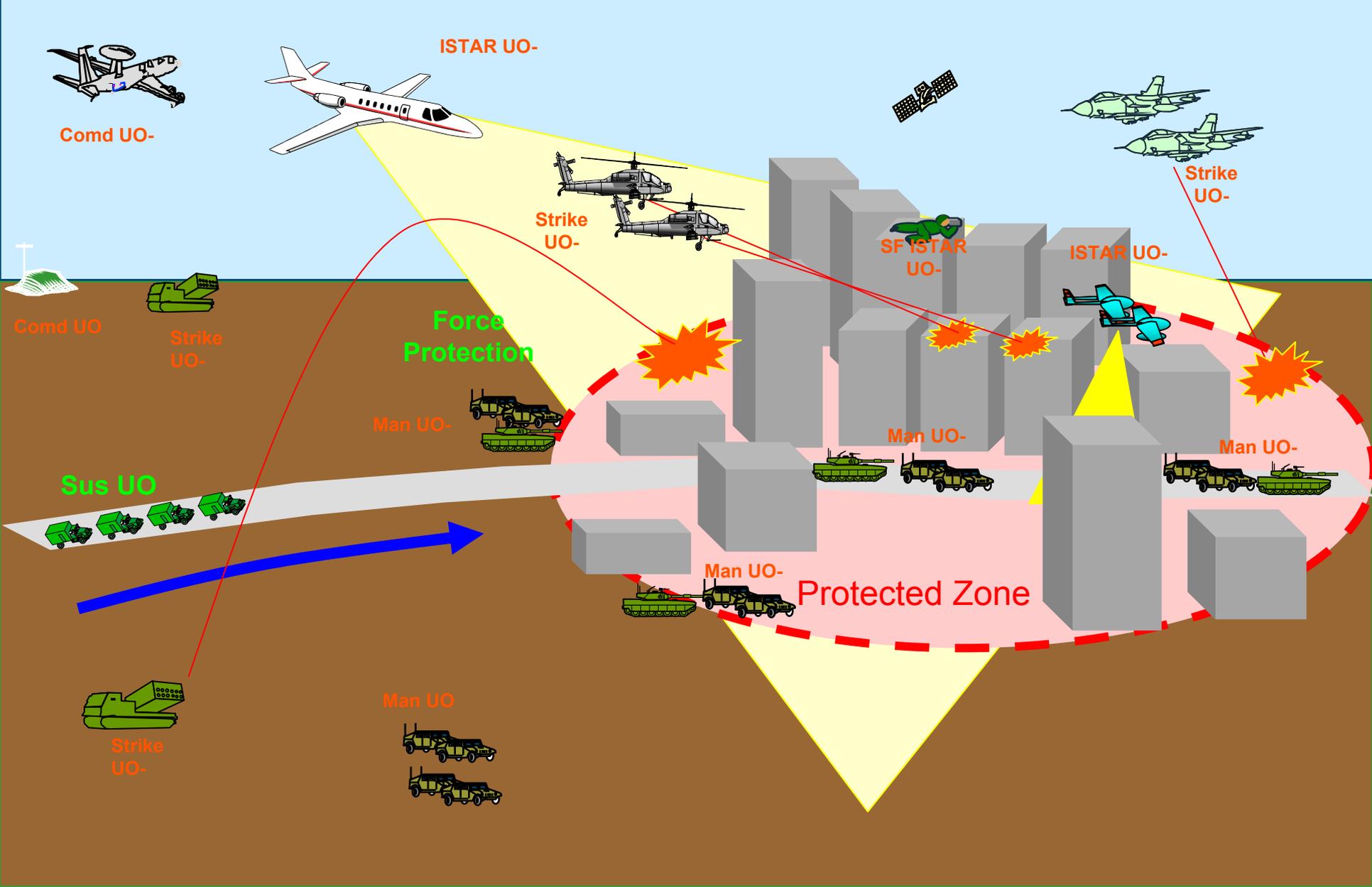


**Dynamic Planning Process**  
Responsiveness

**Deployed Operational Groups**  
Supporting and Fighting

# Functional allocation within a GM DOG





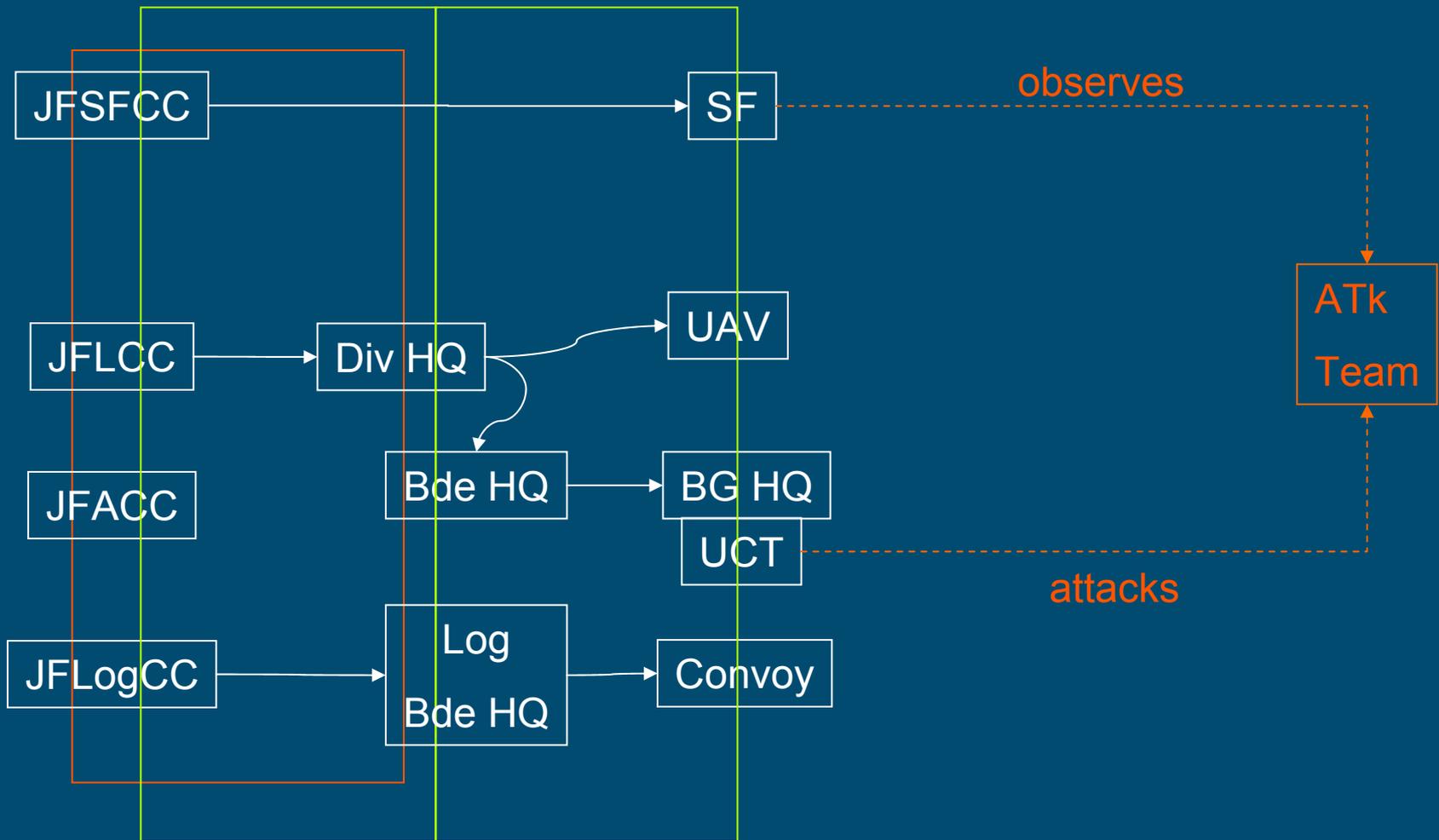
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# Revised Chain 1



# Comments

- DOGs demonstrate that:
  - there are requirements for adaptability, agility and re-configurability which will affect all Lines of Development.
  - the exploitation of Information Age possibilities takes us straight back to the commander's ability to build effective organisations.

# Command Locus

- There appears to be a need for a locus for command.
  - This could be virtual across a number of entities or a single person.
  - Legal and other ‘non-edge’ requirements may make the latter a necessity.

# Some thoughts:

- Integration - coherence among a group.
- System Integration /Coherence - people are glued together by common procedures and rules.
- Social Integration/ Coherence - people stay together through a common understanding that they keep working out among themselves.

*After George Myerson in 'Heidegger, Habermas and the mobile phone'.*

***“Reaching understanding is considered to be a process of reaching agreement among speaking and acting subjects”.***

***Theory of Communicative Action***

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