The military requirements for a Battle Management Language

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British Army (1972 – Now)

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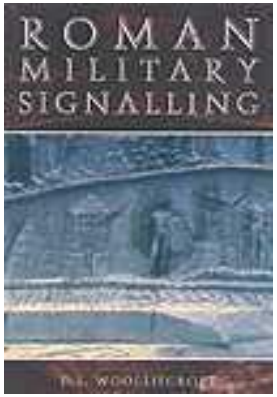
The Requirement to pass Information

- Military Forces have always required a means to communicate information on operations.
- Through the ages mechanisms to relay information or orders that were clear and concise were developed. In essence they needed to be understood so that the recipient could take the appropriate action.
- These were all Battle Management Languages

Roman Military Signalling on Hadrian's Wall

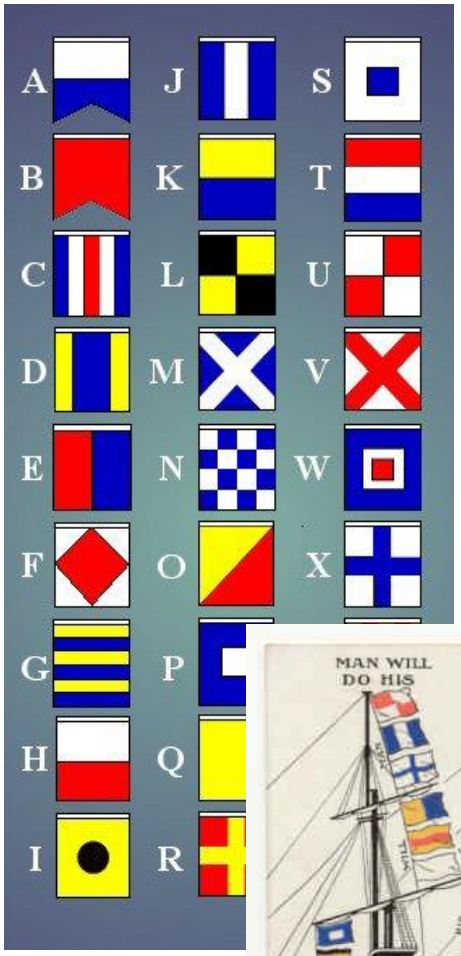
- Every mile castle and fort along Hadrian's Wall was in line of sight with signal towers. They used two groups of 5 flags were used to signal with an alphabet on a crib sheet for interpretation. For example, two flags raised on left and one on right might meant the letter 'A'.
- Beacons were also used in conjunction with amphorae of water. Each signal station would have an identical amphora containing a float with graduated marks which indicated certain messages, e.g. "send for the cavalry." At the signal of a lighted beacon the stopper would be removed and water poured out until the appropriate marker was reached. The Beacon would be waved again and both signal stations should have the float at the same point in the water and each read the same message.
- The principal of codes used by the Romans is used in electronic communications today.
- The Roman Army also used Musicians, in this case, the cornicen, were used to play salutes to senior officers, but their main job was signalling orders.



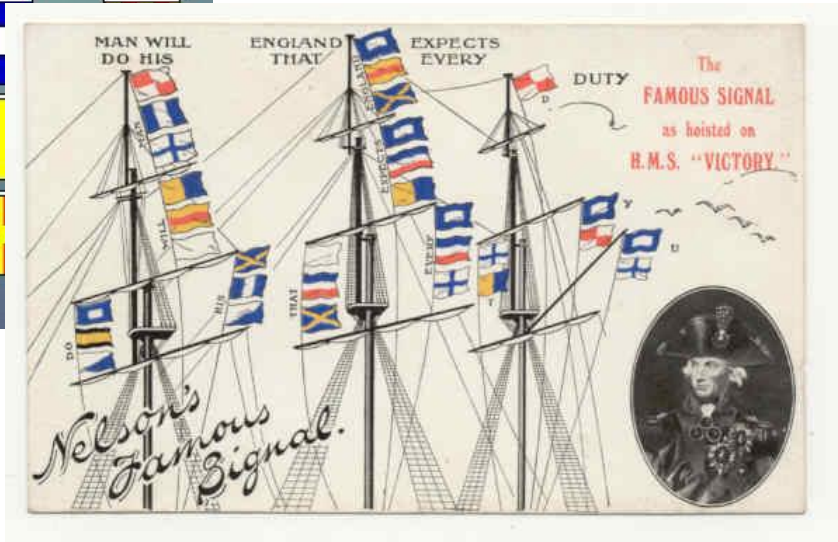
Smoke Signals

Native Americans sent signals through the air. Smoke Signals which connected people miles apart …sharing important information … the first Internet …Smoke Signals

Naval Signalling

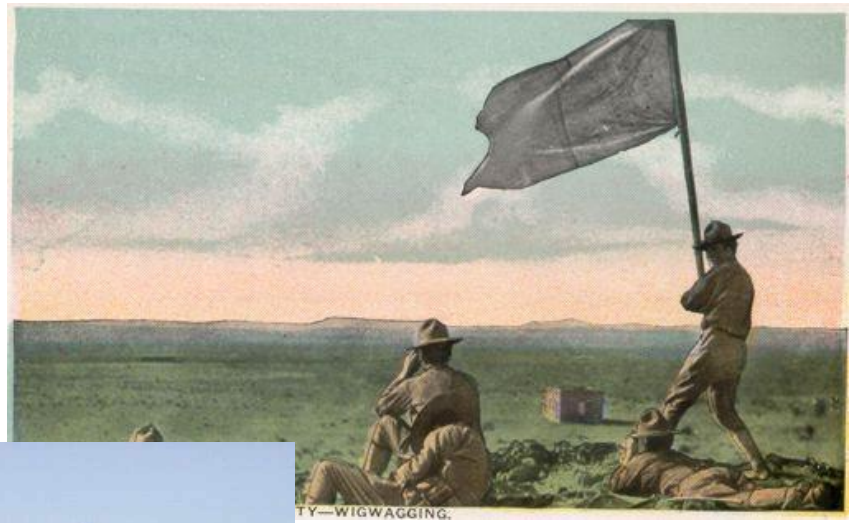


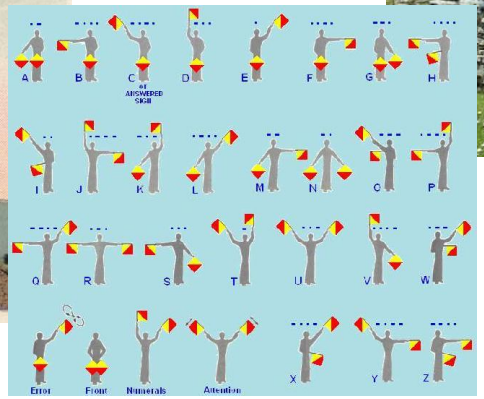
Semaphore method of signalling was an old favourite of the Navy because it was the fastest way of sending messages by flags and is even faster than flashing light. It can be used only in the daytime and at distances of less than 2 miles. It is even more secure than light signalling because there is less chance of interception by an adversary.

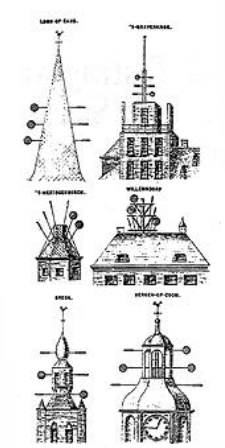


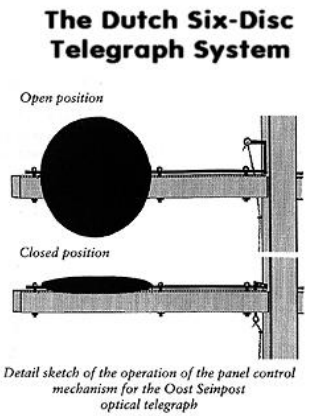
Army Signalling

By the 1870s two methods of Signalling families were identified, WIRED (Telegraph-lines) and WIRELESS, (Flag, lamp, heliograph, mechanical telegraph or semaphore, beacons, cannon or firework and later "Verey pistols", the horse and later motorcycle dispatch rider, and often forgotten, the dispatch cyclist and the human runner or animal messenger).



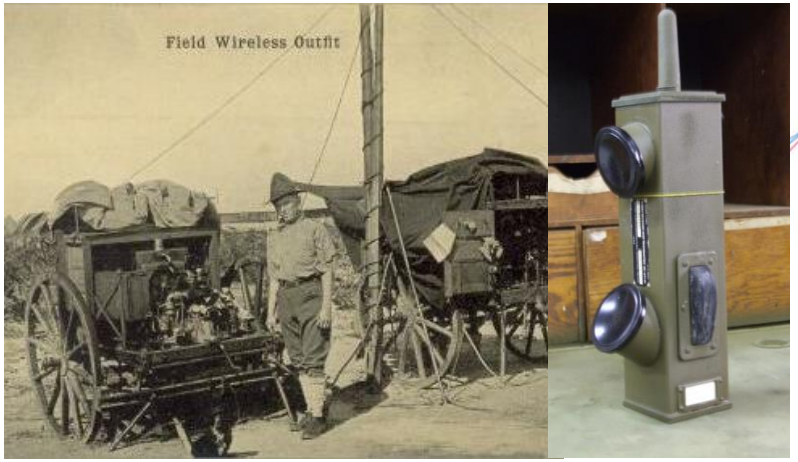




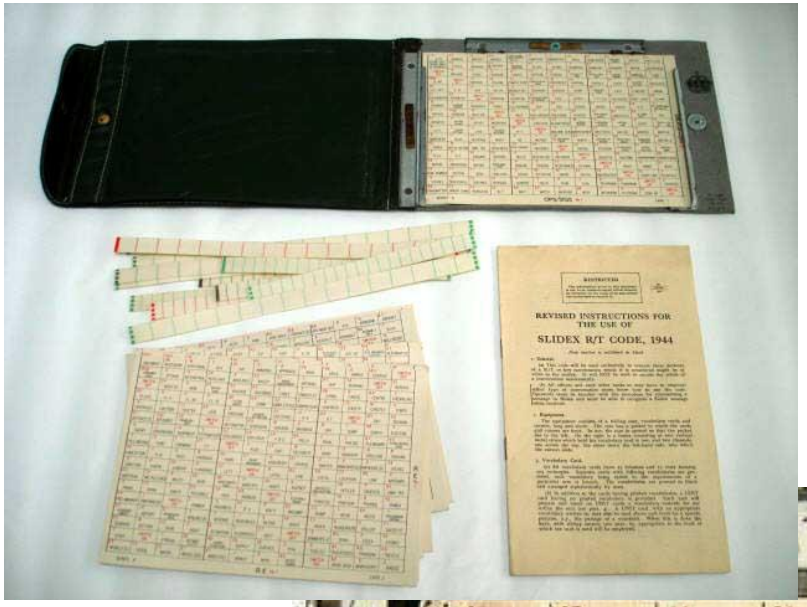


Military Radio

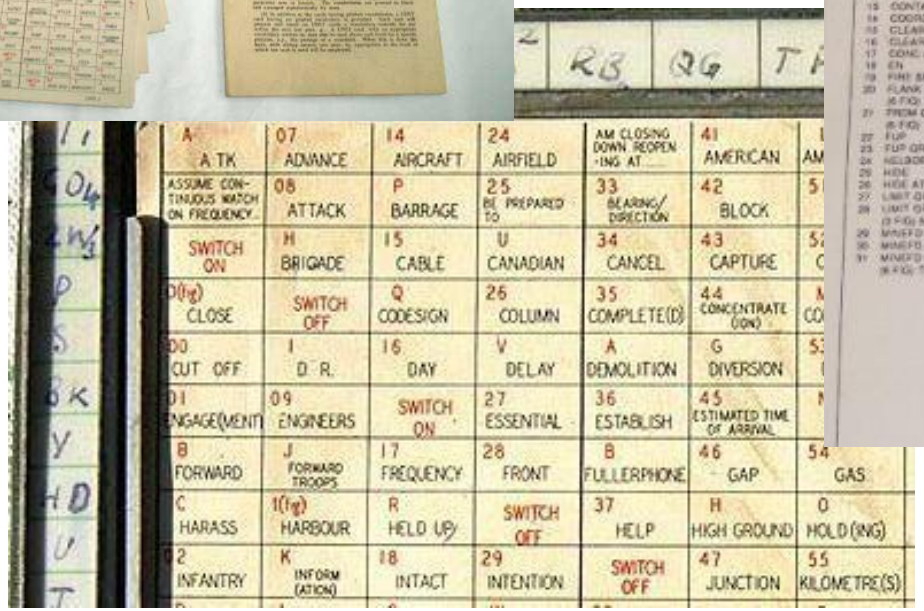
- The development of radio enabled information to be passed over greater distances by armed forces.
- By itself however it was not secure and a number of encryption or coding devices were developed.

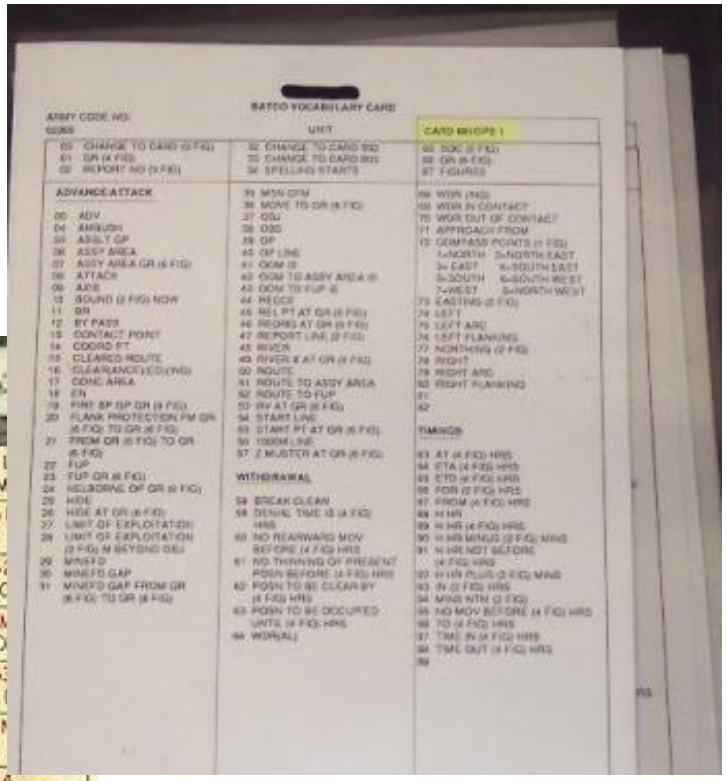


Mechanisms for passing information by British Armed Forces by Radio



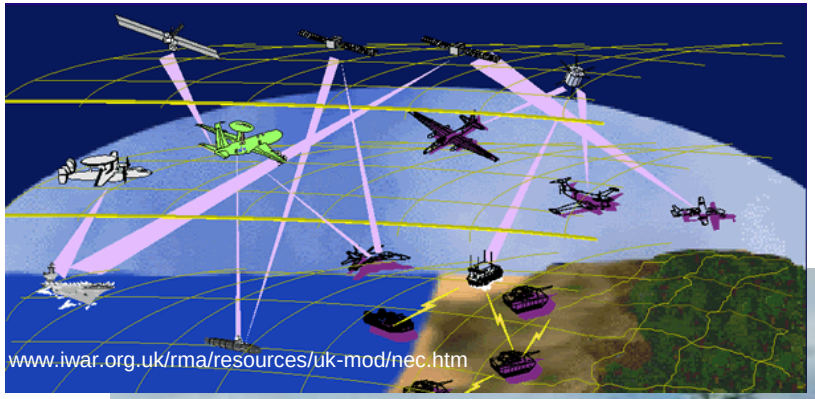
SLIDEX





BATCO

The 21st Century Battlespace



"Linking sensors, decision makers and weapon systems so that information can be translated into synchronised and overwhelming military effect at optimum tempo"

The problem now faced

- Today we live in a digital age and need to not only move information faster and with more accuracy over a widely dispersed battlefield, but also control robotic forces and conduct rapid Course of Action analysis and Mission Rehearsal.
- In the case of the latter two the use of simulation can greatly enhance mission effectiveness … but they are often stand alone applications uncoupled from the digitized Command and Control systems that each nation is seeking to or are deploying.

BML Exists Today

- It is the language found in our Field Manuals, Joint Staff Publications, NATO and other publications and it is used on a daily basis by military personnel.
- Unfortunately it lacks structure and clearly defined rules governing its use (semantics and syntax), riddled with ambiguity and overlapping definitions.
- As such incapable of transitioning to the full range of automation that many seek and will not support the advanced modelling and simulation with digitized C2.

Easy to solve?

- In theory yes … in practice no.
- Why? Because C2, simulations and Robotics are not developed coherently and quite often use proprietary solutions that either can not be accessed by another system or require translators to be developed in order to achieve a degree of interoperability.
- With regards to many simulations they do not have the capability of directly interfacing with C4I systems although some such as OneSAF are being developed with C4I Adaptors. In addition they require significant non-training audience intervention in order to support digital battle staff training and they will continue to do so unless and until a standardized capability is developed for communicating between these systems.
  - It was considered that the most difficult aspect of this problem was communicating mission type orders from the command nodes to the supporting simulations or robotics. Generically this was known in the US as the “Free Text Problem”.
- The current refinement and standardization of a BML is the proposed solution to this problem.
- However the requirement is not national but multi-national hence a need for a Coalition Battle Management Language (C-BML)

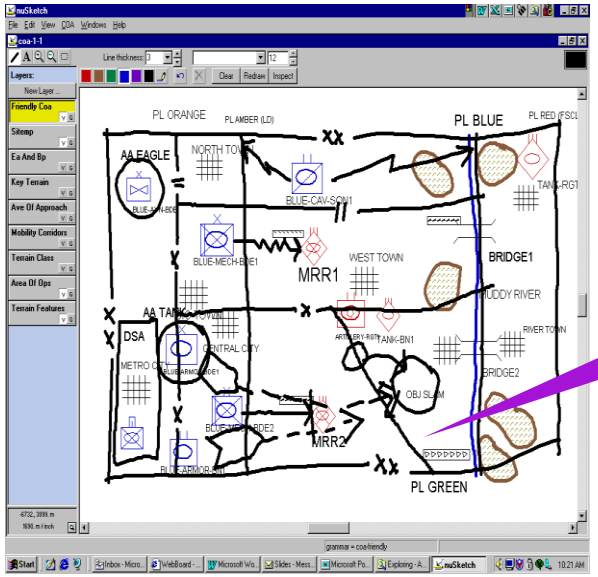
Perceived Benefits

- Reduce or eliminate the need for Lower Controllers ‘fat fingering’ control data into simulations.
- Enable Command and Intelligent Agents in simulations / robots.
- Reduce time and effort by only having to input units / graphics once into system since they are stored and are accessible through a common database.
- Facilitates auto-fill of large portions of units Operational Orders based on data from a higher headquarters’ Operational Orders.
- Reduce time / effort to produce Operational Orders.
- Increase preciseness and conciseness in communications.
- Improve Service, Joint, Combined, and Coalition interoperability.

BML Representation – 5Ws

Division Mission

Division attacks on order in zone to seize OBJ SLAM.



C2 Plans & Orders (C2IEDM)

As Graphics

As Data

Division Concept of Operations

Who	What	When	Where	Why
BLUE-MECH-BDE1	Attacks	On order	Zone	Fix (MRR1)
BLUE-MECH-BDE2	Attacks	On order	Zone	Penetrate (MRR2)
BLUE-ARMOR-BDE1	Follows & Assumes (B-M-BDE2)	On order	Zone	Seize (OBJ SLAM)
BLUE-AVN-BDE	Occupy	On order	AA EAGLE	Reserve
BLUE-ARMOR-BN1	Follow and Support (B-A-BDE1)	On order	Zone	Support (B-A-BDE1)
BLUE-CAV-SQN1	Screen	On order	Zone (PL AMBER to PL BLUE)	Protect (Division left flank)
BLUE-MECH-TM1	Tactical Combat Force	On order	DSA	Protect (Division Rear Area)

Why 5W Representation?

- WHO: which unit is to accomplish the task.
  - Normally identified by a Unit_ID.
  - When Unit_ID is in doubt, could be identified by location.
  - Could be identified by ROLE (Main Effort, Security Force, etc.)
- WHAT: the task to be accomplished.
  - Could be either an operation or as in the US by designating an ARTEP task.
  - Selection maybe dependent on how much the higher commander wants to limit his subordinate. The more specific the task the less it conforms to “mission type”.
- WHEN: the timing of the task.
  - Control type (AT a certain time, NLT a certain time, EVENT_PLUS_T (D+1, H+2, etc.)
  - Parameters: (DTG, Event, Time, Unit_ID, etc..)

Why 5W Representation? (2)

WHERE: the location for accomplishing the task.

- Lat/Long, UTM, MGRS, etc.
- Terrain_Feature_ID, Graphic_Control_Measure_ID

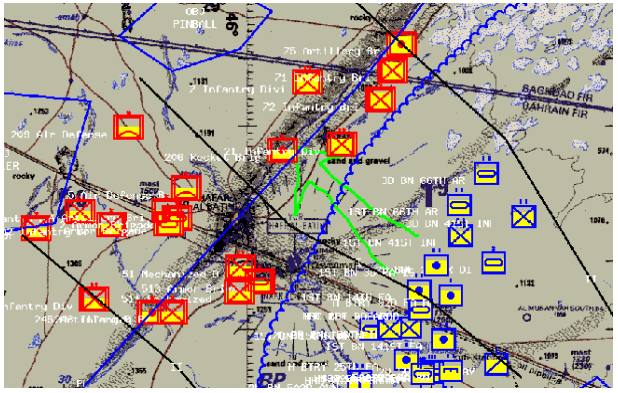
WHY: the reason for accomplishing the task.

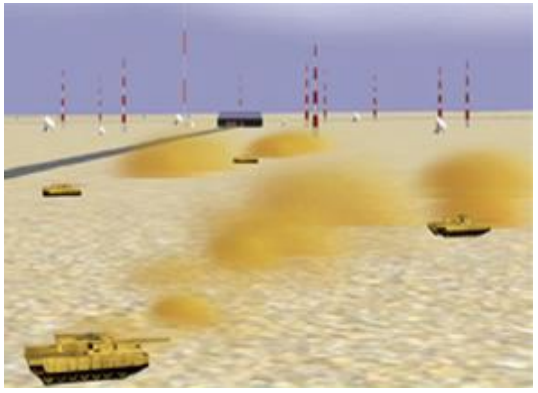
- Purpose term. (Attrit, Defeat, Destroy, Contain, Clear, etc..)
- Parameters: (dependent on the term but required for clarification: Destroy what? Enemy Force, Terrain Feature)

HOW: In mission type orders, how to do a task is left up to the subordinate. The “general” ‘How’ for the order itself is found in the context of the Commander’s Intent and the Concept of Operations.

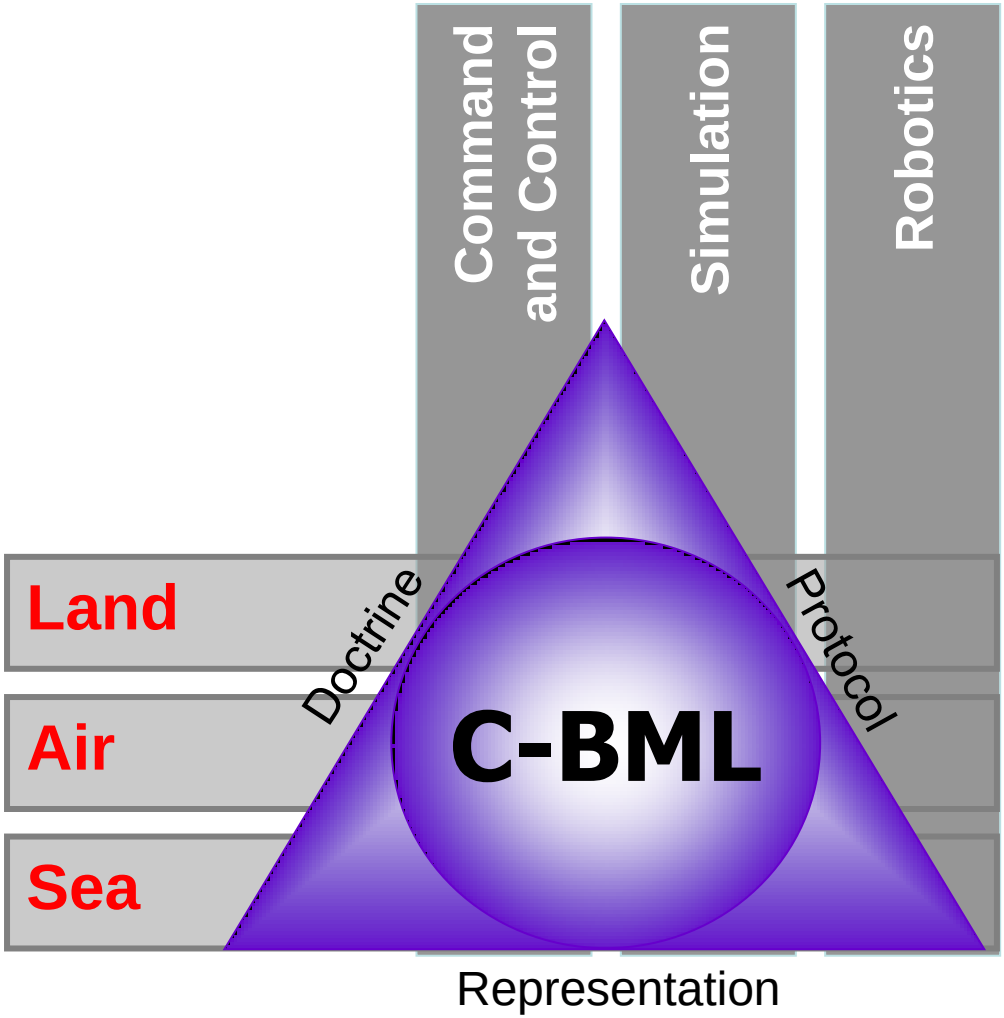
The End State – A Personal View

- If we are to increase our operational effectiveness, then we must be able to communicate C2 information via the same C2 devices in all environments:
  - **Both in training (Live, Constructive, Virtual) and on operations (soldier to soldier, soldier to robotics).**
  - **With the C2 devices stimulating and being stimulated by simulations where appropriate for training, wargaming and mission rehearsal.**





Questions


Command and Control
Simulation
Robotics
Land
Air
Sea
Doctrine
Protocol
C-BML
Representation