FUTURE "BATTLE COMMAND PROTOTYPE" FOR MILITARY EXPERIMENTATION AND TRAINING

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ABSTRACT

The Army is transforming itself into a lighter, modular and more rapidly deployable force. The new Army will be capable of adjusting to a changing set of missions, ranging from warfighting to peacekeeping, as requirements dictate. Desired operational capabilities will be achieved via evolution to a System of Systems (SOS) utilizing mobile-networked command, control, communication and computer (C^4) functionalities. The SOS functions include: autonomous robotic systems, precision direct and indirect fires, airborne and ground organic sensor platforms, and adverse-weather reconnaissance, surveillance, targeting and acquisition. Using modeling, simulation and experimentation will facilitate this evolution to this design. The primary focus of this paper is to provide an overview of CERDEC's Future Battle Command prototype, the Mobile Command and Control (MC2) system: its capabilities and how it is supporting Future Force M&S, experimentation and training.

1. INTRODUCTION

As part of the recently completed Agile Commander ATD, CERDEC's Command and Control Directorate (C2D) has evolved a Battle Command Prototype named the Mobile Command and Control (MC2) System. MC2 has become instrumental in providing a collaborative set of planning, rehearsal and execution tools for Future Force Battle Command experimentation and training. MC2 is currently active in several venues including the following:

- Training and Doctrine Command (TRADOC) Battle Labs
- Modeling Architecture for Technology Research and Experimentation (MATREX), RDECOM
- Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) On-the Move (OTM) Testbed, CERDEC (Fort Dix, NJ)
- Network Enabled Battle Command ATD, CERDEC, C2D
- Networked Sensors for the Future Force (NSFF) ATD, CERDEC, NVEOS
- Command and Control of Robotic Entities (CCORE) ATD, CERDEC, C2D

What follows is an overview of MC2 capabilities and a discussion of MC2 participation in two different experimentation environments: 1) TRADOC Unit of Action Maneuver Battle Lab, UAMBL (Virtual, Constructive Simulation) and 2) C4ISR OTM Testbed (Live, Virtual and Constructive Simulation).

2. MC2 OVERVIEW

MC2 consists of a set of temporal, geo-spatial battle planning, rehearsal and execution software applications executing in a Microsoft Windows environment. The Map-based Geographic Information System software is the ESRI Commercial Joint Mapping Tool Kit (C/JMTK). With MC2, the focus is on a single battle command system verses a suite of systems as used in the current force. Various interfaces to the Army Battle Command System (ABCS), other systems and simulations have been developed to provide MC2 with information necessary to drive experimentation. MC2 translates "data" from other systems into "information" thru the representation of higher-level concepts, such as missions, plans, tasks, activities and resources. This focus on information vs. data allows MC2 to support low bandwidth collaboration, and ultimately Battle Command On The Move (BCOTM).

3. EXPERIMENTATION VENUES

3.1 TRADOC UAMBL (Virtual, Constructive)

Late in FY-03, MC2 was selected as the "Battle Command Surrogate System" for experimentation at UAMBL beginning FY-04. Since that date, MC2 has participated in four major experiments and is expected to participate in future TRADOC experimentation until the Boeing Lead Systems Integrator (LSI) delivers the Future

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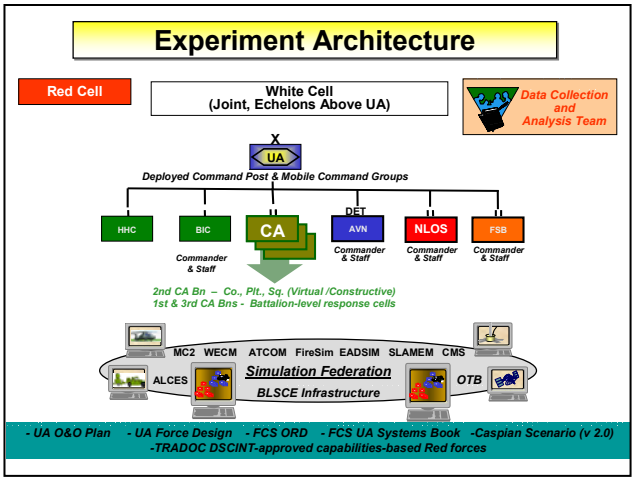
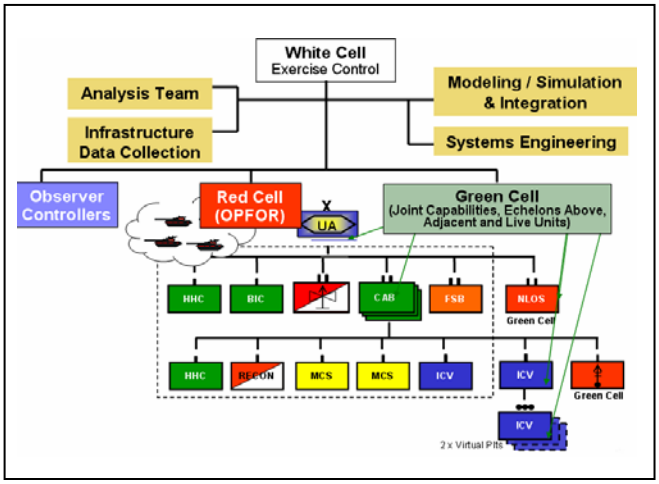
Combat System (FCS) Warfighter Machine Interface (WMI). Utilizing the Battle Lab Collaborative Support Environment (BLCSE) WAN, up to 350 MC2 systems have participated collaboratively between approximately twelve geographically disbursed Battle Lab locations. A typical experiment architecture is shown in Figure 1.



[Figure 1: UAMBL Architecture]



[Figure 2: C4ISR OTM Architecture]

3.2 C4ISR OTM Testbed (Live, Virtual, Constructive)

C4ISR OTM Experimentation is an ongoing effort supported and conducted by CERDEC, Fort Monmouth, NJ. The purpose of C4ISR OTM is to provide "early and continuing demonstrations of enhanced survivability and lethality of Future Combat Systems (FCS) platforms through the effective employment of integrated C3 On-The-Move systems". MC2 is the current Battle Command system for this experimentation. MC2 serves as a single point access for Command and Control of all Battlefield assets. This System of Systems (SOS) is connected via a hybrid tactical network usually communicating over low bandwidth (and sometimes intermittent) communications emulating a realistic battlefield environment. C4ISR OTM Assets consist of live soldiers, sensor suite and FCS-like platforms augmented with simulated adjacent and higher echelon units. All assets are connected via a collaborative infrastructure provided by MC2 and it's associated Collaboration Server. The flexibility of MC2 allows experimenters to add new platforms, modify force structure and control combinations of "real" and simulated FCS platforms.

3.2.1 Experimentation Structure and entities:

One of the biggest advantages of MC2 is its ability to support combinations of real time, virtual and constructive simulation. C4ISR OTM is a good example of such variety, consisting of:

- *One live platoon (Manned by real soldiers)*
- *(Supported by) two virtual platoons*
- *(Reporting to) live HHQs through Brigade, within UA context*
- *(Responding to) multiple groups of live OPFOR*
- *(In) "Controlled Free Play" operation*

3.2.2 Expected outcomes of C4ISR OTM:

C4ISR OTM is a series of discovery experimentations, serving two major purposes.

1. Support FCS Program Risk Reduction
   - *Explore proposals to reduce identified C4ISR technology challenges.*
   - *Investigate the value and contribution of emerging technologies.*
   - *Determine challenges associated with integration of emerging technologies.*
   - *Expand the understanding and definition of conceptual requirements.*
2. Enable and Inform Spiral 1 of the Air Assault Expeditionary Force (AAEF) Experimentation Campaign Plan
   - *Experiment SOS Capabilities*
   - *Allow technology to mature*
   - *Refer to acquisition process*
   - *Determine Lessons Learned*

4. CONCLUSION

As the Army evolves to become Joint, lighter, modular and rapidly deployable, MC2 will function as a Battle Command Surrogate until the Boeing LSI delivers the FCS WMI and associated services. MC2 serves as a key method of risk reduction for FCS Battle Command by actively participating in a variety of venues where FCS concepts are integrated and tested early on in the development cycle.