Special Training for Special Forces

Major Michael Newell
PM CATT (STS) PEO STRI
Orlando, Florida

Tom Burch, Jim Combee, Jim Caylor
CAE USA Military Simulation & Training
Tampa, Florida

ABSTRACT

The 160th Special Operations Aviation Regiment (Airborne) (SOAR(A)) conducts extraordinary operations that require unique training capabilities. This paper describes those capabilities, and the methods used to achieve them. The paper first looks at the mission of the 160th and how that mission dictates the need for special training capabilities. These capabilities encompass integrated mission planning, mission rehearsal, and rapid prototyping. An overview of the methods used to achieve these capabilities is presented, in the context of the Light Assault/Attack Reconfigurable (LASAR) A/MH-6M Combat Mission Simulator (CMS), currently undergoing development and integration into the existing SOAR(A) training system. The Requirements Analysis/Concept Exploration (RA/CE) sustainment effort is also described, with particular emphasis on its role in achieving timely capability enhancements and aircraft/simulator concurrency.

ABOUT THE AUTHORS

Major Michael Newell is the Project Director for Army Special Operations Forces Training Systems at PEO STRI. He is currently responsible for all Army air and ground simulation and training systems that support the Special Forces community. Current major projects include the LASAR CMS, upgrades to the existing 160th CMS systems, and procurement of two new CMSs. Major Newell has a Bachelors Degree in Chemistry from the State University of Georgia and a Masters in Procurement and Acquisition from Webster University.

Thomas E. Burch is a Program Manager at CAE USA Military Simulation & Training. He is a former US Army helicopter pilot. After retiring from the US Army he joined Singer-Link, where he was involved in the USAF B-2 Program and later led the Link training analysis team for the Comanche. He joined CAE USA in 1995. He is the CAE USA Program Manager for the LASAR Combat Mission Simulator program for the 160th SOAR(A).

Jim Combee is the CAE USA Project Engineer for the LASAR Combat Mission Simulator program. He joined CAE in 1979. Jim has held a number of senior engineering positions, including Manager of Electrical Engineering, Manager of Electronic Systems Design, and Project Engineer on several commercial and military programs. Jim has a BSEE degree from the University of South Florida.

Jim Caylor is a System Architect with CAE USA Military Simulation & Training. He joined CAE in 1982, following five years as an electronics design engineer with Smiths Industries Aerospace and Defense Systems. He is a former dismounted infantryman and a member of the Institute of Navigation, Simulation Interoperability Standards Organization, and International Council on Systems Engineering. Jim has a Bachelor of Engineering Technology degree from the University of South Florida and is a registered Professional Engineer.

Special Training for Special Forces

Major Michael Newell
PM CATT (STS) PEO STRI
Orlando, Florida
michael_newell@peostri.army.mil

Tom Burch, Jim Combee, Jim Caylor
CAE USA Military Simulation & Training
Tampa, Florida
tom.burch, jim.combee, jim.caylor@cae.com

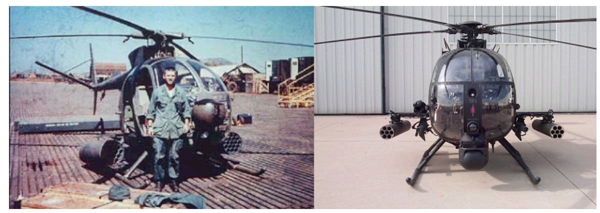
INTRODUCTION

The 160th Special Operations Aviation Regiment (Airborne) (SOAR(A)) conducts extraordinary operations that require unique training capabilities. This paper describes those capabilities, and the methods used to achieve them. The paper first looks at the mission of the 160th and how that mission dictates the need for special training capabilities. These capabilities encompass integrated mission planning, mission rehearsal, and rapid prototyping. An overview of the methods used to achieve these capabilities is presented, in the context of the Light Assault/Attack Reconfigurable (LASAR) A/MH-6M Combat Mission Simulator (CMS), currently undergoing development and integration into the existing SOAR(A) training system. The Requirements Analysis/Concept Exploration (RA/CE) sustainment effort is also described, with particular emphasis on its role in achieving timely capability enhancements and aircraft/simulator concurrency.

Scope & Significance

The H-6 Light Observation Helicopter (LOH) has been around since the mid 1960s. As a scout helicopter (OH-6A Cayuse), it played a significant role in America's longest asymmetric war. Several H-6 variants have surfaced over the years (Figure 1). The 160th has flown the assault (MH-6) and attack (AH-6) versions of the "Little Bird" since the 1980s. The LASAR CMS will be the first ever Virtual mission simulator for the Little Bird. One of the main reasons for developing a simulator at this time, and the primary focus of this paper, is mission rehearsal.

Collective training technology and standards have evolved to the point where efficient, effective mission rehearsal using a variable mix of Live-Virtual-Constructive distributed components is within reach. Using the LASAR CMS as an example, this paper looks at several of the requirements associated with collective training and mission rehearsal of special operations and how those requirements are fulfilled.



OH-6G (1968) **AH-6J (2001)**

Figure 1: Two Examples of H-6 Variants

THE MISSION

The lead pilot entered a few last minute changes on the portable flight planning system before generating the AWE card and loading it into the simulator avionics. The plan called for two Little Birds, with passengers, to depart the Navy ship at 0400 and proceed to 48PXS605253. Once over land, he will establish contact with two MH-60s carrying a ready reaction force, and two Air Force F-16s on call to provide close air support. A Marine unit was onboard the ship, ready to provide a more substantial reaction force if necessary. He will also establish contact with an A-Team operating near the objective. The Little Birds will deliver their passengers, who are tasked with securing the local District Chief and moving him to a nearby LZ. The Little Birds will remain in the area while the A-Team provides LZ security. An MH-47 will arrive (just in the nick of time) to extract the Little Bird passengers, District Chief, and sundry indigenous personnel. The Little Birds will then return to the ship.

This hypothetical scenario is not necessarily representative of 160th missions or tactics. Its does, however, highlight just some of the complexities associated with mission rehearsal of special operations. Add equipment malfunctions and mission complications (Mogadishu) and the reader can quickly see where a rehearsal exercise involving joint and multinational Live-Virtual-Constructive components poses a significant training challenge.

While Battalion, Brigade, or Division level training exercises present their own unique challenges, it's probably fair to say that mission rehearsal complexity is inversely proportional to unit size – at least from a Virtual training perspective.

160th SOAR(A)

Figure 2: 160th SOAR(A) Unit Insignia

The 160th SOAR(A) emerged as a result of the 1980 failed hostage rescue attempt in Iran. Constituted as Task Force 158, the unit designation has included Task Force 160, 160th Aviation Battalion, and 160th Special Operations Aviation Group (Airborne). The unit was redesignated the 160th SOAR(A) in 1990. [1] Since its inception, the 160th has played an essential role in most conflicts. They are at the forefront in the war on terrorism.

In addition to Little Birds, the 160th flies MH-60 Black Hawks and MH-47 Chinooks, providing Special Operations Forces (SOF) with a wide range of dedicated helicopter capabilities. One primary mission is the insertion and extraction of SOF personnel from uninvited locations (precision overnight delivery and incredibly close air support).

Figure 3: MH-6 Formation

Little Birds can fly "…in and out of spaces where it would be hard to insert them with a crane". [2] Factor in things like low-level multi-aircraft NVG operations, adverse weather conditions, turbulence around buildings, fast rope insertions, doors-off operation and olfactory cues, and the demands on a Virtual flight simulator are quite simply profound.

LASAR CMS

The LASAR CMS is a full-fidelity flight simulator with state-of-the-art visual and motion systems, reconfigurable between the assault and attack versions of the Little Bird and capable of supporting the types of missions summarized earlier. [3] It will be delivered to the 160th training complex at Fort Campbell, Kentucky, and will network with existing and future MH-60 and MH-47 simulators. Given the mission requirements and the Little Bird's field-of-view, the visual system is a story unto itself and beyond the scope of this paper. [4] Other program challenges, such as acquisition of flight test data, after action review (AAR) capability and efficient database generation, although significant, are not unique to special operations and therefore not addressed here.

The LASAR CMS is just one Task Order under the Army Special Operations Training and Rehearsal Systems (ASTARS) program. Others include concurrency upgrades, Requirements Analysis/Concept Exploration (RA/CE), Rapid Prototyping, and additional part-task and full-fidelity simulators. [5] RA/CE and concurrency are touched on later in the paper.

Rapid Prototyping

Given the unpredictable nature of the contemporary Opposing Force (OPFOR), Rapid Prototyping capability is critical to meeting the needs of special operations training and mission rehearsal. Examples of systems or subsystems that may require Rapid Prototyping include:

- Computer Generated Forces (CGF) functional enhancements based on new threat data.
- Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) interoperability enhancements.
- New technology insertion and integration (aircraft, mission, and simulator unique systems).
- Hardware and software upgrades associated with new capabilities.
- New Database generation tools.

NeTTS

To no small degree, the need for rapid and quick reaction prototyping drove the architectural design of the simulator. CAE's Networked Tactical Training Solutions (NeTTS) modular architecture was used for the LASAR CMS. NeTTS, Figure 4, takes the technologies associated with the networking of multiple simulators and applies it to each of the major subsystems *within* the simulator. A fundamental component of the NeTTS architecture is the Synthetic Tactical Real-time Interactive Virtual Environment (STRIVE) Framework that resides within each networked subsystem. [6] STRIVE is a next generation, open-standards based software architecture and development framework that provides each subsystem with a complete set of simulation services (connectivity, presentation, database management, data structure, distribution and definition, and simulation control). [7]

generally target aircrews fully qualified to operate the weapon system of interest. The emphasis is on tactics, situational awareness, decision-making, and crew coordination. [8] This represents a new focus for Virtual simulator development engineers, who are accustomed to concentrating on aircraft subsystem performance modeling. In order to ensure the LASAR CMS program objectives were met, a Mission Planning and Rehearsal (MP&R) Working Group was established. Since mission planning and rehearsal are high-level training requirements that impact nearly all subsystem designs, the Working Group was tasked with clarifying and deriving requirements, reviewing designs for compatibility with mission objectives, and generating mission oriented acceptance test procedures. The first directive issued by the MP&R Working Group was that the existing Little Bird mission planning system must play a central role in the LASAR CMS mission rehearsal solution. Given its importance, it is described here at some length.

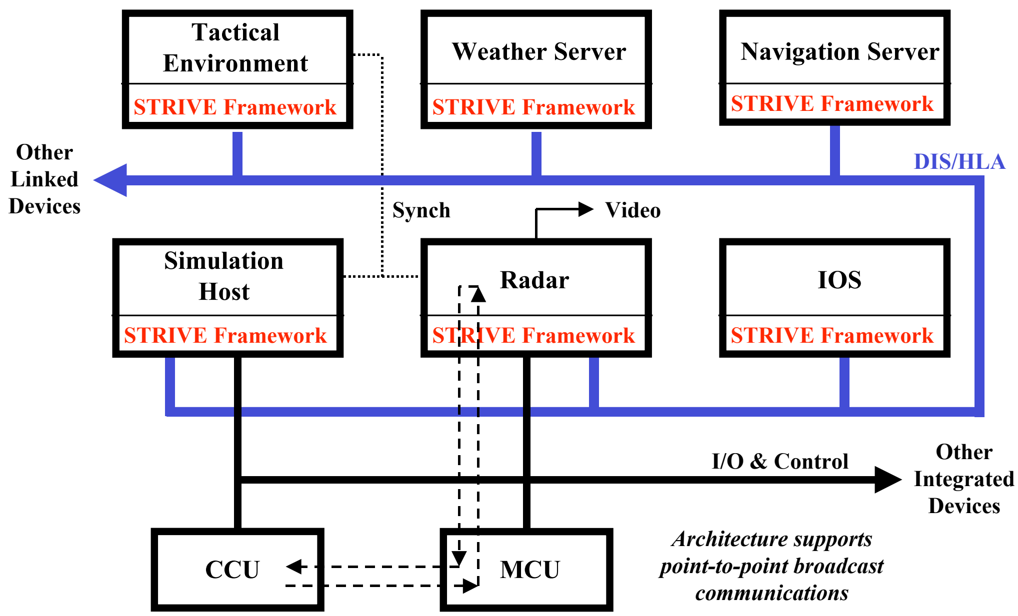


Figure 4: NeTTS Architecture - Simplified Representative Implementation

The NeTTS architecture embraces the concepts of modularity, reusability, composability and interoperability - all of which are necessary to achieve Rapid Prototyping capability.

MISSION PLANNING SYSTEM

In order to maximize the probability of mission success, Little Bird aircrews must carry out real-world mission rehearsal to practice, validate, and verify mission plans. [3] Mission rehearsal training systems

Portable Flight Planning System (PFPS)

automated transfers of mission data from SOF mission planning systems. [3]

The 160th uses the Portable Flight Planning System (PFPS) to support A/MH-6, MH-60, and MH-47 operations. PFPS is a constantly evolving suite of PC-based mission planning tools. It is produced by the 46th Test Wing Mission Planning Systems Division at Eglin AFB, and distributed by the Mission Planning Systems Support Facility at Hill AFB. The primary PFPS tools used by the 160th are:

<u>FalconView</u>: Developed by the Georgia Tech Research Institute (GTRI), FalconView is a Microsoft Windows based mapping application that displays various types of maps and geographically referenced overlays (Figure 5). Many map types are supported, including Compressed ARC Digitized Raster Graphics (CADRG), Digital Terrain Elevation Data (DTED), and Controlled Image Base (CIB) aerial images. PFPS contains resident map files, which are updated monthly. Many overlay types are supported, including navigation aids, military training routes, flight plans, and threat data. FalconView has editors for displaying and modifying the various overlays. PFPS also contains a resident Digital Aeronautical Flight Information File (DAFIF) database to support relevant overlays. A 3-D viewer (SkyView) is also included.

underlying 'RouteServer' allows FalconView, CFPS, and other relevant PFPS components to share data without client applications needing to know the internal structure of the route data, or how it is stored on disk. The RouteServer is accessed through a series of function calls.

<u>Performance Planning Cards (PPC)</u>: PPC, developed and maintained by Great Pond Technologies, provides flight plan performance data for the A/MH-6, MH-60 and MH-47. It can print performance planning cards, as the name implies, or its output can be linked to the CFPS flight plan in order to produce aircraft specific calculations.

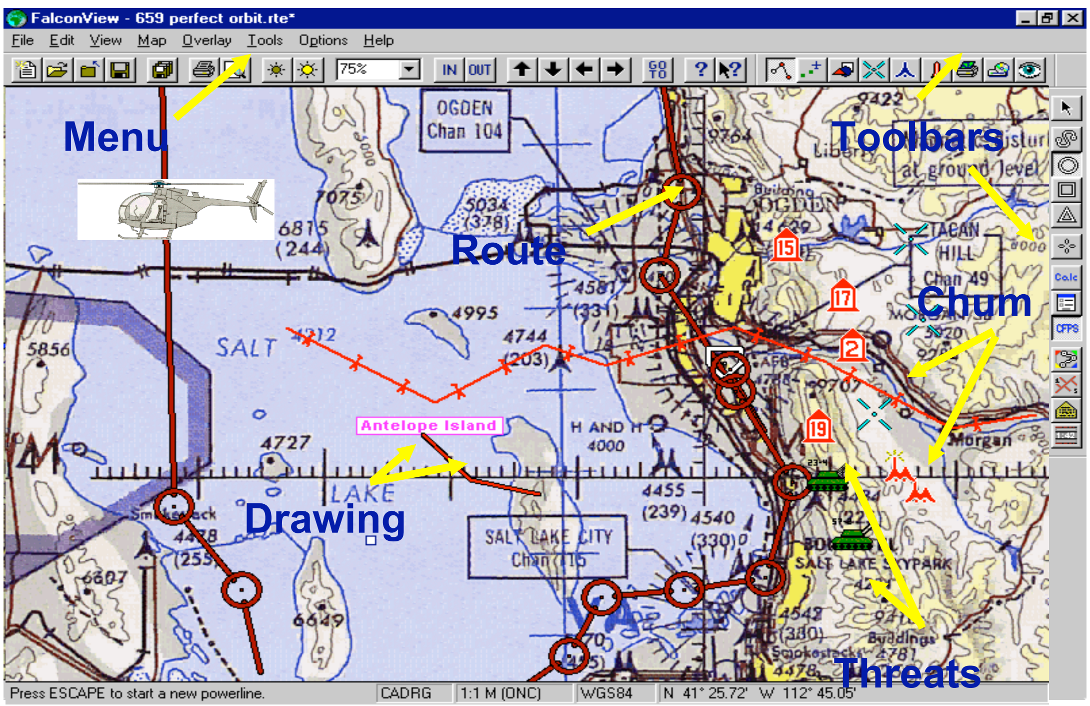


Figure 5: Typical FalconView Display

<u>Combat Flight Planning System (CFPS)</u>: CFPS, developed and maintained for the 46th Test Wing by Tybrin Corporation, is a tabular flight-planning tool. A planning screen presents a worksheet for data entry and evaluation. The entered plan can be 'calculated' and previewed prior to printing on various standard forms. The plan may include waypoint position, elevation, magnetic variation, predicted winds, temperature; and aircraft altitude, airspeed, bank angle and fuel quantity. Leg distances, times, and fuel consumption are calculated based on stored or crew entered aircraft specific performance and configuration data. CFPS can also access the DAFIF database. An

<u>Aircraft Weapons & Electronics (AWE)</u>: AWE, developed and maintained by CAS Inc., supports the entry of aircraft data, which is then written to a Personal Computer Memory Card International Association (PCMCIA) card and loaded into the aircraft or simulator avionics. The data includes flight plans, COMM/NAV presets, and weapons configuration. AWE can also retrieve flight plans from CFPS via the RouteServer.

Weather Tool: There are a couple weather tools available for use with PFPS. These tools support the importation, via the Internet, of current or predicted weather conditions anywhere in the world.

Intel Feed: This tool supports the importation of tactical electronic intelligence updates via the Internet.

Mission Planning Challenge

When viewed from a Virtual simulator perspective, a mission planning system might be considered as simply a source of initial conditions to support a training scenario. PFPS is much more than that. Once a route is created, it can be previewed in two or three dimensions using FalconView. The DTED and CIB map displays, coupled with the DAFIF and threat overlays, provide a very useful mission preview capability. Due to the utility of PFPS, and the energy already spent mastering its extensive capabilities, the 160th insisted it form an integral part of the LASAR CMS design.

The Solution

A typical simulator Instructor Operator Station (IOS) provides a cross-country map display that aids the instructor in controlling and monitoring training scenarios. Supplemental data and tools are normally provided with the map, such as: ownship position and configuration, threat locations, airport and navigation aid locations, planned routes, range and bearing calculations, weather conditions, and time. There is a substantial overlap between the information displayed on an IOS cross-country map and the information displayed on PFPS. Except for intelligence and weather updates, Global Positioning System (GPS) recorded routes and flight plan preview, PFPS displays static information. An IOS cross-country map is dynamic, displaying ownship movement based on aircrew actions, and threat engagements based on CGF models. The position of other simulators, networked via an HLA Federation, can also be displayed on the cross-country map. PFPS is a planning system showing initial conditions, while the IOS is both a planning and rehearsal system. Nonetheless, given the significant overlap in functionality and the fact that LASAR CMS instructors and students were already familiar with PFPS operation, the decision was made to fully integrate PFPS into the IOS and use FalconView as the cross-country map.

The primary technical challenges associated with this approach were data extraction and correlation, and retention of the supplemental dynamic information displayed at the IOS. The 46th Test Wing supplies an outstanding PFPS software development kit (Interface Control Documents, Application Program Interfaces (APIs), Dynamic Link Libraries, Test Drivers, etc.). With this kit, extraction of route, configuration and threat data from PFPS for use in the simulation did not pose a significant challenge. The data is extracted, reformatted, and passed to relevant simulator subsystems. For example, threat locations, established via the Intel Feed or by the aircrew during the planning phase, are passed to the CGF to align the Constructive training scenario.

Retention of the IOS dynamics was a challenge. Since FalconView replaced the conventional cross-country map, it then had to display ownship, companion aircraft and threat movements as the training exercise unfolded. PFPS was not designed to accept inputs from real-time man-in-the-loop simulations or CGF systems. However, using the existing API (Map Server and GPS interfaces), some control was achievable. In order to display realistic threat movements (including removal if killed) a special software interface had to be developed. Since this required a modification to the FalconView software, GTRI was added to the team.

The Future

Although developed specifically to meet LASAR CMS requirements, the mission planning system design approach was influenced by several longer-term objectives. For example: a) the ability to easily integrate new versions of PFPS, b) networking the Little Bird mission plan to the MH-60 and MH-47 simulators, and c) dynamically integrating Internet derived weather reports into the training scenario. To support integration into Live-Virtual-Constructive training exercises, development of an HLA interface for PFPS is also being considered.

Once fully integrated, tested and documented the PFPS embedded training enhancements identified by the 160th SOAR(A) should be of value to the entire PFPS user community (which includes a wide range of Air Force, Navy and Marine platforms).

TACTICAL ENVIRONMENT

As with most U.S. military simulator programs these days, the LASAR CMS requires High Level Architecture/Distributed Interactive Simulation (HLA/DIS) connectivity with the OneSAF TestBed Baseline (OTB), and the capability of migrating to the OneSAF Objective System (OOS). At the same time, the CGF solution must provide all the physical and electronic threat entities necessary to support the mission training and rehearsal requirements of the 160th, which tend to be somewhat unique.

Given the special needs of the 160th, the requirement to dynamically correlate the CGF and PFPS entities, and the OOS Full Operational Capability (FOC) projected release date, the decision was made to supplement the OneSAF functionality with CAE's STRIVE CGF. As a subsystem within the NeTTS architecture, it will be fully interoperable with OneSAF, and provide currently available high fidelity functions pertinent to special operations helicopter training.

RA/CE AND CONCURRENCY

"Concurrency" is achieved when the simulator configuration is kept current with, or slightly ahead of, the aircraft configuration. This allows aircrews and maintenance personnel to train on new systems before they experience them on the aircraft. Most simulator procurement specifications now include a concurrency requirement. In the case of the Little Bird, the requirement was "…the design shall include features that allow all changes to aircraft systems that impact training to be incorporated into the LASAR CMS in a timely manner, in order to maintain configuration with fielded aircraft". [3] In order to demonstrate the benefits of the RA/CE provision, recent upgrades to the Little Bird mission avionics are described.

Avionics Evolution

Once an aircraft is fielded, the avionics designs (communication, navigation, identification, surveillance, and weapon systems) tend to be the most volatile. Today's avionics systems are software intensive with substantially more functionality contained in a single "box". As software complexity and functionality grows, updates become more frequent. For newly developed avionics systems, it's not uncommon to see a multiyear plan reflecting a series of incremental releases, each with enhanced functionality. Constant technology advances and new operational requirements have contributed to the almost constant flow of avionics upgrades. The initial simulator avionics architecture (design) is the primary factor in achieving concurrency objectives.

The Little Bird is undergoing two significant avionics upgrades. The first, which is the primary ingredient of the new Mission Enhanced Little Bird (MELB) "M" configuration, is the baseline for the LASAR CMS design. This avionics package was developed just slightly ahead of the simulator.

CAAS

The second significant upgrade, known as the Common Avionics Architecture System (CAAS) program, will incorporate common avionics systems in the MH-60, MH-47, and A/MH-6 (Figure 6).

The first article design and development contract was awarded to Rockwell Collins in 2002. CAAS will incorporate common, reusable processing elements that are used in each piece of hardware, and an open systems architecture based on commercial standards. The commonality of hardware components is expected to provide lower total lifecycle cost and lower costs for technology insertion and supportability.

Figure 6: CAAS Cockpit Configuration

So, the LASAR CMS was under development concurrent with a significant avionics upgrade (MELB) - and would soon be subjected to another (CAAS). In order to achieve the overall concurrency objectives established for the program, it was necessary to look at CAAS in the context of the evolving LASAR CMS design. Since CAAS was beyond the scope of the funded LASAR CMS effort, a RA/CE task was initiated. The primary purpose of the task was to better understand the impending CAAS related changes to the MELB avionics systems. In addition to providing an opportunity to minimize the effort required to transition the simulator to the CAAS configuration, this knowledge would be applied to the ongoing LASAR CMS simulate/stimulate analysis. For example, it may not make sense to expend the effort to develop a sophisticated software simulation of a particular system if it is due to be replaced in the not too distant future. Stimulating that system in the simulator might make more sense as an interim solution. Along similar lines, knowledge of CAAS may impact the decision to modify aircraft Operational Flight Programs to accommodate simulator unique functions (freezes, slews and repositions). It could also be a factor in decisions to modify hardware to provide "repeater displays" at the IOS, and in the AAR facility.

A side benefit of the CAAS RA/CE task was that, by fostering a working relationship between the avionics and simulator manufacturers, Little Bird training interests could be represented early on in the avionics development process (which rarely occurs).

ARINC Report 610B

ARINC Report 610B, *Guidance for Use of Avionics Equipment and Software in Simulators*, was used to guide the initial LASAR CMS avionics design, and to evaluate the implications of CAAS. [9] 610B has several objectives, but the primary reason it was created is concurrency. It primarily targets avionics designers, providing them with guidance for incorporating simulator unique interfaces into their designs. It also provides background information on the unique situations encountered by black boxes when operating in a simulator. For details on how 610B was applied to the LASAR CMS program, see [10].

The RA/CE provision provided an ideal mechanism for rapidly funding the concurrency investigation.

COLLECTIVE TRAINING

As stated earlier, the LASAR CMS must support a full complement of training scenarios, including collective mission rehearsal of joint operations. Similarly, the ability to interoperate with other "Live-Virtual-Constructive (LVC)" elements is required. This requirement now appears in most Army Virtual simulator requirements documents. In fact, all branches of the Armed Forces are now specifying "interoperability" at some level.

Since interoperability standards are rapidly evolving, and the overarching requirements are somewhat open ended ("rehearsal of joint operations", "LVC training"), short and long-term objectives were established to meet the needs of the LASAR CMS. This way of approaching interoperability was in line with the program's phased approach, that is, quickly deliver a simulator whose architecture supports a smooth growth in capabilities.

Virtual Reality

Since the LASAR CMS was first and foremost a Virtual training device, the Synthetic Environment Core (SE Core) Operational Requirements Document (ORD) was consulted for general guidance on collective training issues. Although still in draft form, SE Core encapsulates the principles and standards necessary to meet legacy, interim, and objective force Virtual training requirements.

SE Core will integrate new and existing hardware and software products to create an Army Common Virtual Environment (CVE) and to link Virtual simulations to LVC training environments. Several key performance parameters (KPP) are described which, if achieved, will enable fair fight training exercises. [11] Some of the existing or evolving standards and systems referenced in SE Core are:

- High Level Architecture (HLA)
- One Semi-Automated Forces (OneSAF)
- Army Constructive Training Federation (ACTF)
- Joint Technical Architecture – Army (JTA-A)
- Global Information Grid (GIG)
- Master Terrain Database (MTD)
- Battle Management Language (BML)
- Common Training Instrumentation Architecture (CTIA)
- Army Training Information Architecture (ATIA)
- National Imagery and Mapping Agency (NIMA)
- Defense Information Infrastructure (DII) Common Operating Environment (COE)
- Joint Conflict and Tactical Simulation (JCATS)
- Army Battle Command System (ABCS)

SE Core also highlights the need for open standards, certified weapon systems performance models, and common, rapidly generated terrain databases. SE Core provided a good foundation for establishing short and long-term collective training solutions for the LASAR CMS.

Short-Term Solution

The LASAR CMS will be delivered HLA (and DIS) compliant – capable of joining a federation using the Real-time Platform Reference Federation Object Model (RPR FOM) and the SOF FOM. While configured to connect to a wide area network (WAN), initial integration will focus on supporting the local area network (LAN). The LASAR CMS design will support the Constructive (CGF) and Virtual (MH-60 & MH-47) simulations as they migrate to HLA. An independent Communications (COMM) LAN will also be implemented – connecting the cockpit, off-board IOS, and AAR facility.

Long-Term Solution

Future interoperability was the primary motivation for implementing the NeTTS architecture, described earlier, on the LASAR CMS program. The software architecture uses Object Oriented Design (OOD) techniques, and the hardware architecture is based on high performance/low cost commercially available Intel PCs. HLA is the primary interface between subsystems, enabling interoperability with a wide range of military applications. In the final configuration, the LASAR CMS NeTTS implementation will include Weather, Navigation, and Radar Warning Receiver subsystems.

Is it Alive?

Except for the regeneration of audio if required, interacting with Live elements in an LVC collective training exercise does not impose additional hardware demands on a simulator. That is, all the data needed for LVC entity interaction should be available via the HLA network. A new FOM may evolve, and the LASAR CMS software will need to support it.

Ultimately, the LASAR CMS aircrew will not be able to determine whether the dynamics of an entity displayed in the visual scene originate from a Live, Virtual, or Constructive element. For the interim and objective force, interaction between Live and Virtual/Constructive "players" will primarily occur via C4ISR systems. For example, Force XXI Battle Command Brigade and Below (FBCB2), a digital battle command information system, receives Live unit location data across the Tactical Internet. This data can then be translated from Joint Variable Message Format (JVMF) to a format usable by Virtual/Constructive simulations residing on the HLA LAN (and vice versa).

Data latency (time from source to destination) is an issue of special interest to Virtual (real-time) simulation engineers. Most of the Simulation to C4ISR interoperability experiments conducted so far involved Constructive simulations at the Battalion level and above. Movement of large ground forces is relatively slow (except for the 3rd ID in Iraq). Small unit tactics, such as those employed by Special Operations Forces, demand near real-time responses if LVC collective training is to be truly effective.

SUMMARY

In way of a summary, this section presents a mixture of lessons learned, recommendations and observations, as follows:

- Special Operations Forces are indeed special. They perform special missions that require special training capabilities.

- A particular LVC mix for a collective training exercise that makes sense when viewed from a conventional unit's perspective may not make sense when viewed from a special operations perspective. Given the characteristics of the contemporary OPFOR, perhaps more emphasis should be placed on the latter.

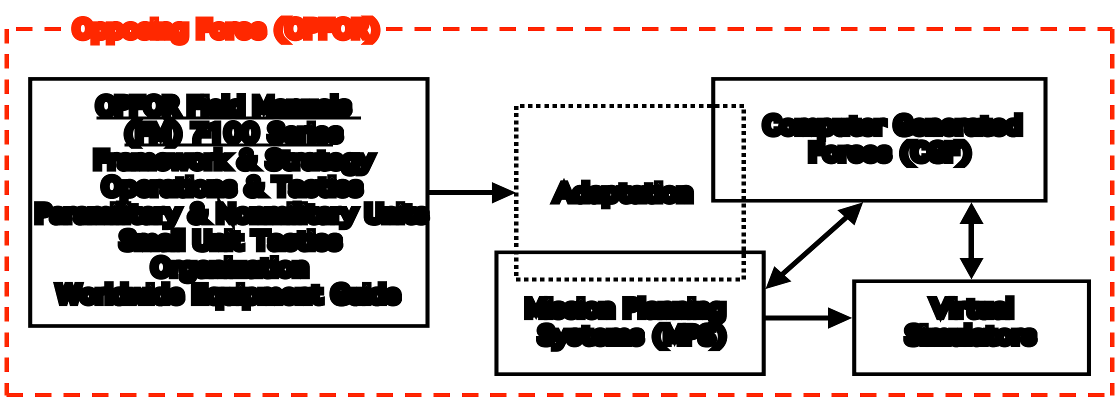


Figure 7: Asymmetric Warfare and the Contemporary Operational Environment (COE)

In order for LVC collective training to be effective, "Simulation to C4ISR" interoperability must be seamless. The issues associated with making it seamless are largely related to developing common standards between the two communities, and allowing time for those standards to propagate. The inevitable mix of fielded legacy, interim, and objective force systems will make for an interesting training challenge. These issues are not unique to the 160th SOAR(A), in fact, they're not unique to the Army.

- To promote interoperability and commonality between mission planning systems and mission rehearsal systems, an attempt should be made to relate doctrine to requirements (Figure 7).

- Army, Navy and Marine simulation developers should take a close look at the Air Force Distributed Mission Training (DMT) program.

- Air Force, Navy and Marine simulation developers should take a close look at the Army 'Simulation to C4ISR' interoperability initiatives.

- Virtual simulation interests should increase their involvement in standards development organizations, such as the Simulation Interoperability Standards Organization (SISO). Real-time man-in-the-loop design issues are often not considered early on in the standards development process.

- As regards the future prospects of distributed training and mission rehearsal, don't listen to the naysayers. Whether it's HLA, HLA2, or some yet to be discovered protocol, it will happen.

- SE Core is a good thing. It will provide Virtual simulation developers with the guidance they need.

- RA/CE is a good thing. It provides a mechanism to quickly fund advance studies.

- A phased approach to mission rehearsal device development makes a lot of sense. It accommodates funding constraints, promotes compromise, and facilitates progress.

- Night Stalkers Don't Quit!

Figure 8: Yet another Special Operations challenge for Virtual and Constructive Simulations [12]

DISCLAIMER

This paper was written from the perspective of the LASAR CMS developers and does not necessarily reflect the views of the 160th Special Operations Aviation Regiment (Airborne).

REFERENCES

1. Dolan R.E., *A History of the 160th Special Operations Aviation Regiment (Airborne)*, A Report Prepared by the Federal Research Division, Library of Congress, Washington DC, 2001.

2. Bowden M, *Black Hawk Down, A Story of Modern War*, Penguin Books, New York, NY, 2000.

3. *System Requirements Document, Light Assault/Attack Reconfigurable Combat Mission Simulator (LASAR CMS)*, PRF-PT-00028, 13 Mar 02, PEO STRI, Orlando, FL, 2002.

4. Joseph D, Burch T & Connolly R, *Comparison of Display System Options for Helicopter Aircrew Tactical Training Systems*, I/ITSEC, Orlando, Fl, 2002.

5. *Statement of Work for Army Special Operations Aviation Training and Rehearsal Systems (ASTARS)*, AMSTI-02-W036, N61339-01-D-0725/0001, 13 Mar 02, PEO STRI, Orlando, FL, 2002.

6. Campbell D W, *Expanding CAE's Modeling and Simulation Expertise to New Markets*, MS&T Issue 2, Halldale Media Ltd, Farnborough, UK, 2003.

7. Siksik D N, *STRIVE: An Open and Distributed Architecture for CGF Representation*, 9th-CGF.033.doc, Conference on Computer Generated Forces and Behavioral Representation, Orlando, FL, 2000.

8. *Statement of Objectives - Light Assault/Attack Reconfigurable Combat Mission Simulator (LASAR CMS)*, 7 Aug 01 Draft, PEO STRI, Orlando, FL, 2001.

9. *Guidance for Use of Avionics Equipment and Software in Simulators*, ARINC Report 610B, 12 Dec 01, Aeronautical Radio, Inc., Annapolis, MD, 2001.

10. Caylor J, *Concurrency – A Moving Target,* I/ITSEC, Orlando, Fl, 2002.

11. *Operational Requirements Document for Synthetic Environment (SE) Core Program ACAT III*, 01 Jul 03 Draft, Fort Leavenworth, KS, 2003

12. DoD Photograph, *U.S. Special Forces troops ride horseback as they work with members of the Northern Alliance in Afghanistan during Operation Enduring Freedom*, Washington, DC, 2001.