



TRAINING FOR AN INTEGRATED ADF

Live, Virtual and Constructive (LVC)

A seminar by The Sir Richard Williams Foundation
Wednesday 3rd of June, 2015

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INTRODUCTION

On the 3rd of June, 2015 The Sir Richard Williams Foundation held its first seminar for 2015, titled “Training for an Integrated ADF – Live, Virtual and Constructive (LVC)”. Top Defence and Defence Industry players gathered to discuss the current and future state of joint collective training and the advancement of LVC. The seminar highlighted the relevant authorities responsible for facilitating LVC collective training and what systems and platforms were being used and provided by industry to help support this capability. The theme of the day was interoperability and how government, different branches of the ADF and industry need to work together in order to operate in an increasingly complex and evolving environment to maximise fifth generation technology opportunities.

LVC

WHERE WE ARE AND WHERE WE NEED TO BE – VICE ADMIRAL DAVID JOHNSTON, CHIEF OF
JOINT OPERATIONS COMMAND, ADF

VADM David Johnston spoke about the current state of LVC, highlighting that “from a joint perspective... we need to be in the future” as most of the LVC efforts are focused on individual and team training on the tactical level. The use of LVC is exercising high-end capabilities, routinely, is currently expensive and complex to implement. The ADF and joint operational command is increasingly able to integrate their simulators; this is done through the Defence Training and Experimentation Network (DTEN).

The ADF needs to be collectively prepared for a broad spectrum of operations, which need to be supported through the conduct of timely, realistic and relevant training. An example of how Joint Operations Command (JOC) is moving towards where they envision the future of LVC is JP3035 Phase 2. JP3035 will provide more effective and efficient collective training, through the support of the ADSTC. It will facilitate a persistent and distributed core simulation capability through the acquisition of services and products, collectively referred to as the Defence Synthetic Environment

(DSE). The Chief of Joint Operations see that collective training methods must be made better aligned with strategic direction and single service activities.

JOINT PERSPECTIVES

JOINT EXPERIMENTATION – REAR ADMIRAL PETER QUINN CSC, RAN, ADF

RADM Peter Quinn discussed the necessity of utilising LVC in the joint space, highlighting that “simulation in its many forms needs to be central in the way we design, build, train and employ the joint force”. While this vision was partially realised in 2002, the goal of seeking a joint task force in the ADF was lost between 2002 and 2006 due to funding cuts. RADM Quinn stated that the ADF is once again gaining traction with regard to simulation, and it has been recognised as being a future priority across the ADF. This is evident in the forward-looking goals of Plans Jericho, Pelorus and Beersheba.

With regard to the Australian Joint Operation Concept (FJOC), which is currently under development, RADM Quinn stated that their focus was on the objective future of the ADF for the next seven years. This concept will provide a warfighting narrative on how we will train and fight as a collective force and will highlight the necessary requirements for the future operating environment. The FJOC will inform future capability needs over the next 7-30 years and will ensure interoperability in the ADF using an alternative-futures approach. Joint experimentation is necessary to develop these concepts, including wargaming exercises.

RADM Quinn stated that simulation will not feature in the objective future as much as he would like, due primarily to time constraints and the necessity to further develop the simulation environment. This joint concept work will highlight the necessity of simulation in the ADF to ensure interoperability and integration as part of the vision for the joint force in the future.

WHAT ACTIONS ARE REQUIRED TO FACILITATE PROJECT DEVELOPMENT? – AIR VICE MARSHAL
MEL HUPFIELD AO, DSC, HEAD CAPABILITY SYSTEMS, CAPABILITY DEVELOPMENT
GROUP

AVM Hupfield spoke about integrating modelling and simulations (M&S) into the capability life cycle. Capability Development Group (CDG) is looking at the viability of having a dedicated M&S function that would seek to improve both knowledge and the requirements of any complex system or problem regarding LVC training. The actions needed to facilitate project development are;

- Aligning defence simulation policy with simulation standards and manuals.
- The Modeling and Simulation Certificate Review Board (MSCRB) to assess and review standards and make sure that M&S is aligned with defence policy.
- Satellite communications and technology to support the implementation of M&S.

Much of the CDG's LVC efforts were very labour intensive, time consuming and reliant on expert knowledge. CDG provides JP2008 as an example of where the organisation used a modelling and decision support tool that will support the ADF with satellite technology to support the data and communication needs of developing future LVC capabilities. AVM Hupfield concludes that exploiting the growing Australian Defence simulation expertise will help to enhance ADF capability developments. He also noted that modelling and simulation support is growing but is not mature in its current state and needs continuing attention.

THE CASE FOR ADF LVC – COMMODORE PHILLIP SPEDDING DSC, AM, RAN, ADF AND GROUP
CAPTAIN BERNIE GREALY, ADF

CDRE Phillip Spedding and GPCAPT Bernie Grealy talked about the roles and outputs of the ADSTC and examined the concept of LVC in the ADF. The role and vision of the ADSTC is to provide a mature systems centre that streamlines and coordinates the DSE governance, development and delivery to provide greater effectiveness in supporting joint, collective and individual training across the entire ADF.

This goal is tied with JP3035 and includes the management and architecture of the DSE. The ADSTC seeks to provide DMT that is linked, interoperable and allows personnel to train as they would expect to fight.

CDRE Spedding provided an analysis of the LVC training continuum, determining the role that LVC can play in the ADF. This highlighted the necessary role of LVC in every stage of the continuum. In essence, high fidelity training tends to be expensive, including simulations that use visuals, sensory, tactile and auditory fidelity. Given that they are expensive, they are less likely to be used by the ADF on a regular basis.

It was also determined that if an exercise is done frequently, the size and complexity of the training increases. GPCAPT Grealy went on to describe the intricacies of the synthetic training model and applied the model to the LVC training continuum. The main output of the ADSTC is a Distributed Integrated Synthetic Training Environment which bundles services to meet the requirements of a specific training exercise, supporting the needs of an integrated ADF training continuum.

ADF PERSPECTIVES

HOW WOULD ARMY PROGRAMS CONTRIBUTE? – MAJOR GENERAL FERGUS ‘GUS’ MCLACHLAN
AM, AUSTRALIAN ARMY

MAJGEN McLachlan provided an overview of how LVC can be utilised to develop and train army personnel and establish an integrated ADF. MAJGEN McLachlan stated that while “we have come a long way, we do have some way to go” and was frank in stating that the goals of the Australian Army are aspirational, requiring realistic self-imposed constraints to achieve an integrated defence force.

The Australian Army will be unlikely to achieve superiority through size and platform superiority due to existing constraints. Decision superiority and human performance advantage are more realistic goals for Army personnel insofar as Australia already has significant advantages in these spaces that could be furthered through the integration of LVC, both in a single service and joint environment.

This is reliant on linking networks between the ADF to better our training capabilities. The Army is currently at the end of 1st generation implementation of simulation systems, though these are stand-alone propriety systems that cannot be linked. The Army is currently in the process of building a “lego wall” to integrate these systems into a collective training process, though much work is still left to do.

In the future LVC environment Army personnel should be trained to the highest standard that renders them efficient and effective, rather than just training efficiencies. Army’s priority will be using LVC to maximise the potential of humans in the system and improve their decision-making capabilities. MAJGEN McLachlan stated that Defence Industry will be vital to this process in building an integrated and agreed architecture for LVC that can be coordinated to build joint capabilities as in Joint Project 3035. Using LVC operational simulations will include decision-making, resilience, ethical behaviour and rules of engagement to improve human performance aspects.

HOW WOULD NAVY PROGRAMS CONTRIBUTE? – COMMODORE ANDREW GOUGH RANR, ROYAL AUSTRALIAN NAVY

This session focused on how, how much, and how effectively LVC capabilities should be combined in the ADF with reference to Plan Pelorus and the current state of the RAN. CDRE Gough stated that there are a variety of drivers for utilising simulation within RAN. These drivers include the costly nature of live training; increasingly complex ship-fitted systems that make replication for training difficult without the use of simulation; and an increasing demand for discretion.

Through the use of LVC, CDRE Gough highlighted that simulation can improve the efficiency and effectiveness of training by reducing the time and money spent on live exercises, reducing the risk that it can pose to Navy personnel, and by creating a planned and standardised training schema that does not rely on on-the-job training. LVC will eliminate potential “choke points” that can impact individual training and provides more “complex, realistic and repeatable training events”.

Through Plan Pelorus, the RAN will utilise simulation to provide effective and efficient training. The Plan is reliant on building relations with Defence Industry to ensure that the future LVC environment allows for individual and collective training both at sea and ashore, reduces the reliance on at-sea training to achieve qualifications and ensures of warfighting capabilities are practiced.

HOW WOULD AIR FORCE PROGRAMS CONTRIBUTE? – AIR COMMODORE MIKE KITCHER, ROYAL AUSTRALIAN AIR FORCE

AIRCDRE Mike Kitcher discussed RAAF’s Plan Jericho, a plan established by the Chief of Air Force, to determine how RAAF will be transformed in the information age. The Plan highlights the significance of having an agile, adaptive and truly joint Air Force, factors that can be assisted by LVC. AIRCDRE Kitcher highlighted that LVC needs to be functioning in the ADF within the next 10 years or Australia will fall behind in defence capabilities in the region. As such, we should strive towards innovation and integrated simulation and experimentation as key aspects of the future LVC environment.

LVC has a variety of potential benefits in the RAAF, but challenges must be met to determine how LVC will be integrated into training. AIRCDRE Kitcher stated “we need to train as we should, not as we can”. With that in mind, LVC simulators should be designed that allow for joint and collective training wherein all systems and simulators are integrated within the Air Force. Further to that, the implementation of LVC into RAAF training is of paramount importance as some training can only be conducted in the virtual environment.

AIRCDRE Kitcher also notes that there are real security issues that must be addressed when implementing LVC, including the integration of the F35 into the broader LVC environment, which is bound by security challenges. These security challenges cannot be simply wished away in any domain. Despite this, AIRCDRE Kitcher ultimately highlighted the potential for LVC to establish an integrated ADF in the future.

INDUSTRY PERSPECTIVES

AN INDUSTRY PERSPECTIVE - MR MARK PHILLIPS, CHIEF ARCHITECT- LVC ENVIRONMENTS – MISSION SYSTEMS AND TRAINING, LOCKHEED MARTIN.

Philips' presentation highlighted the need for services and government to create the specifications and methods for LVC to work across different platforms so industry can adequately support their capability requirements. Lockheed Martin is providing a representation of everything in the real world as a template in the synthetic world. Integrating a large array of platform simulators within a distributed mission-training (DMT) environment is complex. Standards, protocol and the wireless links between platforms within LVC needs to be developed, maintained and led by Government and not by industry.

Current acquisition and sustainment models of LVC need to be addressed with industry partnerships well above the project level. Philips highlighted the importance of the ADF and its service personnel to list the requirements needed for the training systems provided to them. Some considerations included in utilizing LVC include interoperability between platforms, network design, and the security requirements concerned with these networks.

Lockheed Martin will continue to support growth of sensor and mission system needs and creating LVC solutions that injects virtual/constructive entities into an environment with a realistic replication of all live subjects.

LVC – THE VISION IS HERE NOW - MR YOEL LINK, DIRECTOR, ELBIT SYSTEMS

Link provided a discussion of the LVC systems that his company has already delivered and stated that the “vision of LVC is here today”. Link focused on the technology and platforms that Elbit has produced and currently developing that concentrated on interoperability. Elbit Systems is involved in the integration of LVC platforms with FA/18's in the US Air Force with land based assets and Typhoon

trainers in the UK to work with both land and maritime assets. Link stated that focus of the products developed for LVC, was “mission orientated training”.

Elbit presented technology such as the Targo Helmeted Mounted System that provided an augmented reality environment within a pilots helmet HUD to be used on live training missions. In addition to the various products discussed, one of the most notable examples LVC platforms was the mission training centre. This facility was designed to create an immersive simulator that can reduce the cost of having to use live mission training.

AN INDUSTRY PERSPECTIVE – MR SHAWN PARR, CEO/PRESIDENT, CALYTRIX

Parr provided a technology perspective on their work with the Australian Defence Simulation and Training Centre (ADSTC) and more broadly the ADF. Calytrix provides software and network solutions to support a growing LVC capability. Parr’s opinion was that services needed to “understand [their] training needs first, the technology will follow”. He also stated that the ADSTC is a “world leading capability” that we need to develop our understanding of to understand how to use it to its full advantage.

Parr’s discussion of the Virtual Machine Layer provided an insight into the system in which Calytrix provides networks, data services and applications (communications MIS services) that are involved in the complexity of running LVC platforms. One of the major challenges was the sheer number of systems and standards that services wanted to connect together. Calytrix sees that there are two complimentary ways forward in the future of LVC: simplify and codify, by solving issues related to standards across different simulator context and scenarios and to create LVC to be accessible, on demand, and cost effective; and refresh our standards, by unifying them in a common simulation environment.

The technology that the ADF needs in order to make LVC an important element of their joint training environment is available but is not yet in place in a coherent way across the organisation.

Q AND A

Q: How will the ADF use LVC within their collective projects (Beersheba, Jericho and Pelorus)?

A: CDRE Spedding stated that the ADSTC is working on implanting common threat and operational scenarios into single service LVC platforms. VADM Johnston added that CJOPS and ADSTC are working on a common standards approach to support the interoperability of LVC platforms across services.

Q: Who is the lead capability designer behind LVC for the ADF as a whole?

A: AVM Hupfield stated that he thinks that CJOPS is the lead capability designer, although this was not fully considered. VADM Johnston, surmised that CJOPS has a role in making sure that collective training regimes and processes are able to generate the joint force that is required. On balance, there was a sense that there were multiple leadership points.

Q: What is the role of a joint experimentation capability?

A: RADM Quinn responded by saying that there has not been a lot of joint experimentation, rather much of it is done an individual service level, but that he definitely sees a role for it. There's still a strong role for single services experimentation to feed up into things like force design processes (bottom up approach).

Q: How can we ensure that there are no negative learning opportunities when training and reality is blurred in the constructive realm?

A: The panel noted that in using LVC devices, variables must be controlled in order to minimise negative outcomes. Participants will be aware that some experiences are built into the context of the training. These exercises will also be designed with back end components that stretch the capabilities of the exercise to draw out key lessons that participants may not get.

Q: What is the distinction between modeling and simulation (as the two are often conflated together)? Does modeling need to be gripped up, and if so, how?

A: RADM Quinn stated that modeling does need more ADF head space and that we need highly realistic models in order to adequately replicate a modern high-end battlefield. The rest of the panel added that security was also a concern with modeling and that there should be a specialized body to specifically manage and support it.

Q: In regard to professionalisation and education of simulator operators and developers, how would such education be implemented?

A: CDRE Spedding stated that partnership with Defence Industry provides much of the expertise needed in developing LVC. CDG invested money into a joint force battle lab to trial JP3035. Mark Phillips added that we needed joint, continuing professional development and education on simulators and that TAFEs, rather than universities should foster the development of skills in simulator operations and development.

Q: What can industry do to better serve the needs of the ADF with regards to LVC so that simulation and LVC can gain momentum?

A: AVM Hupfield stated that at the moment, requirements are poorly articulated and industry responds commercially and as such risks and potential innovations are not being realised. The ADF needs to cooperate with Defence Industry to work out innovative ideas and how they can be achieved.

CONCLUSIONS

The Williams Foundation seminar on Training for an Integrated ADF - LVC highlighted that the interoperability of Army, Navy and the Air Force is central to Australia's defence, in an environment that is ever-changing and increasingly complex. Yet this interoperability is not yet being serviced in a coherent way with the range of LVC assets in place and those on the horizon. The realistic representation of live entities within virtual and constructed training environments will be essential to ensuring the readiness of the ADF in meeting the challenges of the changing defence landscape.

As such interoperability of services must also be met by interoperability of LVC platforms. While LVC has inherent technological complexities that make its implementation and understanding difficult in some cases, this seminar highlighted that it is achievable and can afford great benefits with the help of Defence Industry as well as top down design and bottom up innovation. It is essential that the discussion and development of LVC continues, helping to shape the future training and conduct of the ADF.