

WHITEPAPER - COMMAND AND STAFF TRAINING

"There are no secrets to success. It is the result of preparation, hard work, learning from failure"

- Colin Powell

"Sweat saves blood, blood saves lives, but brains save both"

"Training errors are recorded on paper. Tactical errors are etched in stone"

- General Erwin Rommel

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Cervus' view of Command and Staff Training

Aim

The aim of this white paper is to present ideas for improving the Command and Staff Training (CAST) construct in the UK specifically, but also more generally, and transforming it into an entirely data-led enterprise. This is prompted by two specific events in the UK: the Army Warfighting Experiment 21 (AWE21) which focused on supporting the British Army's Collective Training Transformation Programme (CTTP); and the recent release of a CTTP Information Paper, providing industry and stakeholders with an overall update on the programme.

Introduction

We are a UK and Veteran owned company developed to provide governments and frontline users with a systematic and data driven approach to insights and innovation. We started out as '3 men in sheds' in 2014 and have grown to an international business which services military and industry customers in the UK, US, Europe and Middle East.

Cervus have been involved in the majority of British Army Close Combatant (in UK parlance Dismounted Close Combat (DCC)) experimentation events of the last 15 years. Our journey started with the Future Infantry Soldier Technology (FIST) trials in 2005 as soldiers and analysts then, via roles at the Development, Concepts and Doctrine Centre (DCDC), and then as capability providers working in a major training and simulation company. We developed our thinking further as project leads in a series of Niteworks Dismounted and Mounted Close Combat (DCC/MCC) experiments, a series of Command, Control, Communications, Computers, Intelligence (C4I) related projects with the Land Warfare Centre and HQ ARRC, with a sequence of Army HQ training pilots, and lastly with a series of related Defence and Security Accelerator (DASA) initiatives. Our particular journey has also taken us to the US and the USMC, and to supporting their clear, ambitious, and fully resourced vision for a wargaming enterprise on a scale never previously attempted. In providing our analytics platform into this enterprise, we have had our horizons expanded, through exposure to an array of constructive and virtual simulation tools little known in the UK. Outside of the UK and US we have gained invaluable experience taking our approach to performance measurement and evaluation into the Dutch Army and to the UAE Armed Forces.

In sum, these experiences have been accumulated across the whole range of operational environments and a whole range of widely recognised Analysis & Experimentation tools. These tools include live simulation, virtual simulation, constructive simulation, live fire, literature review, workshops and Military Judgement Panels, Operational Analysis, and Wargaming – and in aggregate mean we bring significant breadth to our offer.

What influences us?

We believe we uniquely combine a very particular set of influences: experience as users and operators; experience working for defence primes on training and simulation projects; experience as a start-up developing products and services for close combat, combined arms, joint and multi-domain contexts; and experience leading experiments using live, virtual and constructive simulation. We also bring to bear a healthy interest and focus on data science, on emerging workplace analytics techniques, on innovation

in sports analytics, on the relationship between team and individual performance, as well as a healthy interest in innovation in gaming, simulation, and extended reality. We particularly like analogies with team sport: we want to see our customers make equally big moves to the integrated understanding of performance and result. We want to see emerge a full appreciation of how individual and sub-team performances aggregate together in ways that are greater than simply summing their parts. We are therefore passionate about seeing the Close Combatant and Multi-domain user in possession what we see as durable and enduring optimisation tools. We do not hold to the notion that there is a technology fix for every problem or issue – but we do hold to the notion that with some imagination and ingenuity there are no Close Combat issues that we cannot improve upon through more reliable and understandable evidence.

The problem:

A need to change Command and Staff training

In the UK the Collective Training Transformation programme (CTTP) emerged out of the Army Training Review in 2015, a Governance Review in 2016, a Collective Training Review in 2017, and has been attempting to build momentum through recent and upcoming Army Strategic Balance of Investment (BoI) decisions. Drivers for change include approaching Out of Service dates for its major collective training capability elements, specifically the Command and Staff Trainer (CAST) and Combined Arms tactics Trainer (CATT), as well as a substantial list of growing capability gaps. These gaps include capacity, inadequate fidelity levels particularly across domains, a lack of flexibility in training design, as well as issues around efficiency and training delivery control. But even more pertinent for us is the refrain around the lack of objective assessment, the inaccuracy and incompleteness of performance assessment, the inaccessibility of training data and the lack of re-use or sharing of existing data. These last stated gaps have been long identified, are likely to be similar across NATO and Allied countries, where the introduction and sustainment of these types of capabilities have stayed closely aligned to each other over a sustained period.

The next sections therefore introduce the drivers that emerged out of the UK's Army Warfighting Experiment 21, the MAK One simulation suite, and the Hive analytics platform, before this paper then explores a view of the "as is" position and then what the desirable "to be position" might look like. This "to be position" is what we set out to explore, and in part to demonstrate components of, during AWE21.

Army Warfighting Experiment 2021 (AWE21)

AWE21 was conducted to support CTTP and set a series of challenges which it invited industry to respond with innovative solutions. These challenges were:

- Challenge 1: Provide a common, immersive and credible synthetic wrap that seamlessly supports training across the Live, Virtual and Constructive environments.
- Challenge 2: Transform the quality of, and replicate scale within, the Urban Training environment.
- Challenge 3: Provide an immersive, complex and multifaceted Audience, Actors, Adversaries, Enemies and Specialist (A3ES) ecosystem that challenges the training audience across the human, physical and information domains.

- o Challenge 4: Improve the capture, access, feedback and exploitation of data across all training systems.
- o Challenge 5: Demonstrate a single, deployable and scalable Connectivity solution

Whilst expressed by the British Army about its own position, these issues are likely to be common and widely applicable. NATO countries have similar generations of training capabilities in operation, in some instances using the exact same simulation tools, and share views on the main training drivers inherent in a relatively consistent view of the future character of conflict.

Cervus were generously invited by our partners ST Engineering Antycip to collaborate on AWE21. We rapidly concluded as a team that the combination of the MAK One product suite and Hive analytics platform could provide meaningful answers to all of these challenges, but that to illuminate this is a meaningful way required the use of a case study against which to frame this assertion – and we opted to use CAST and Future CAST for this purpose.

MAK One and Hive

The MAK One suite of products provides a high fidelity, All domain Constructive and Virtual Simulation, with best in class Computer Generated Forces offering semi-automated and intelligent entity behaviours. It scales from Squad to Brigade/Division, and combined with MAK Legion can simulate city-scale pattern of life. It is built for the cloud, with flexible architectures to meet scale and load balancing demands. It is capable of rapid scenario generation, and uses open standards (HLA, C2SIM, WebLVC specifically) across the platform. The MAK One roadmap highlights in its next planned releases include:



accelerated scenario creation; enhanced path planning features; weather simulation enhancements; improvements to Air/Surface attack; improvements to Call for Fire/Artillery simulation; substantial enhancements to behaviour representation, ease of scripting and use of terrain by entities; and refresh of effects simulation in urban terrain.

Key to the exploitation of data is the ability to measure, track, interpret and report the progress of any innovation. We call this method ‘Aggregated Analytics’ and to meet this challenge we aim to make data science easy through our proprietary analytics engine called Hive. There are many tools, frameworks, libraries and platforms that solve different parts of a data project, but they are disparate and don’t easily talk to each other. Hive unifies proven technologies into an end-to-end data environment that allows our clients to quickly integrate, explore and exploit their data. Integrating the “best in class” open-source technologies delivers easy to use powerful analytics at your team’s fingertips often at real-time speed. This empowers data scientists by providing access to the most common data



science/AI tools, managing model governance and simplifying the data engineering requirements to productionise solutions. An ever more important dimension to this is a focus on User Experience and Interface – we challenge ourselves to generate and display insights that can be interpreted by all users, from soldier to scientist. The Hive product is now an increasingly important part of what we do and how we differentiate ourselves.

Command and Staff Training (CAST)

CAST is a fixture in the collective training armoury and the collective training progression of most NATO countries. For very good reasons the CAST construct has remained a durable training model, retaining significant commonality across armies, and retaining a focus on planning as opposed to execution.

We would concur fully with the British Army' assessment of general capability gaps across its training enterprise. But in respect of CAST we would go further than this, and assert that there are more specific issues that need addressing and that are likely to be common across most if not all currently fielded CAST training capabilities.

“As is”

We assert that the “as is” state of CAST displays a number of obvious limitations:

- Computer Generated Forces have advanced significantly over the last few years – but CAST’s use of a previous generation of CGF is constraining, lacking the ability to simulate scale with any fidelity, difficulty with simulating multi-domain, and acute difficulty simulating the complexity of urban operations.
- CAST as a training milestone traditionally emphasises procedural practice of HQs planning processes, with the execution phase usually not emphasised as strongly, not least because of the points made above.
- In turn this has tended to mean the emphasis on training evaluation has been placed largely on evaluating the planning process, in some respects the most difficult part of the cycle to apply objective, data-based evaluation on.
- Evaluation is manpower intensive, requires significant SQEP, and is largely based on detailed checklist evaluations derived from a disaggregation of Collective Training Objectives.

The consequences of this “as is” state are considerable – and in our view increasingly awkward looking in light of the CTPP agenda and other similar efforts in NATO and partner countries. Pains therefore include:

- Difficulty *objectively* evaluating the planning undertaken
- Difficulty *objectively* evaluating the selected plan
- Limited scope to *objectively* evaluate the conduct or execution of the plan
- Consequently, no ability to generate contrasts between planning performance, plan effectiveness, and ability to execute a selected plan.

- o The consequences of having low fidelity, typically aggregate level CGF is that LOCONS are used to stimulate against a Main Events List, and derive significantly less training value than the primary training audience
- o As a consequence of poor fidelity at the LOCON component the ability to assess the effectiveness of plan execution is diminished
- o The ultimate consequence is that little of what is created at CAST could be consistently stored, exploited, and re-used as a digital artefact of worth to the *whole* enterprise.

A solution - “to be”

We believe that much of this is addressable now, and that which needs to be planned and prepared for now. Our “To be” vision for a Future CAST is one in which it is possible to simulate execution at scale, in high fidelity, across all domains, and achieved with greater efficiency than is currently the case. We believe there are then four critical requirements for Future CAST:

- o Enhanced evaluation of planning
- o Automated evaluation of the selected plan
- o Full objective evaluation of a high-fidelity execution of the plan
- o A substantially enhanced approach to the AAR and to learning

Figure 1 below illustrates this proposed construct, whilst the sections below develop each of these components more fully:



Figure 1 - FCAST Requirements

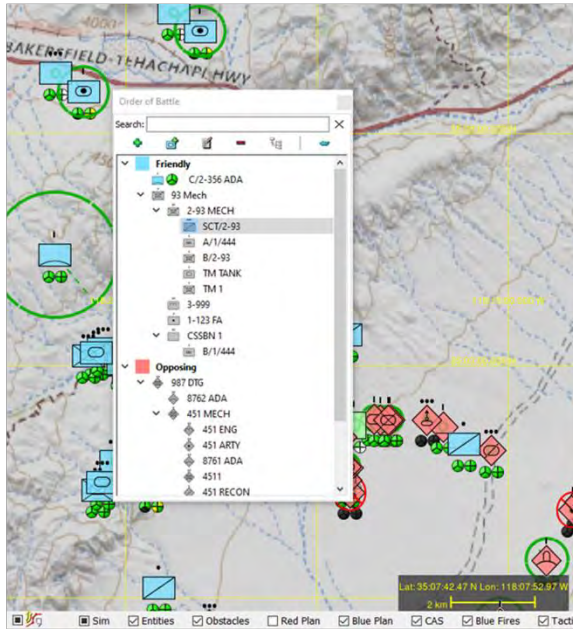
Enhanced evaluation of planning

We can anticipate future Battle Management Systems (BMS) being delivered with significant enhancements to current Decision Support tools. This means that we assume future BMS will have the ability amongst other things to generate Courses of Action (COA) quicker than is possible now, and to evaluate them more objectively. Until this is the case much of this part of the planning process will continue to be substantially analogue, despite the fact that CGFs like VR Forces already provide significant capability to begin training and experimentation with this type of capability. VR Forces is designed to build and test scenarios rapidly, and support widely used

formats like C2SIM to allow ingestion of planning information from current generations of BMS.

 VR-Forces supports C2SIM for:

ORBAT Laydown



Tactical Graphics

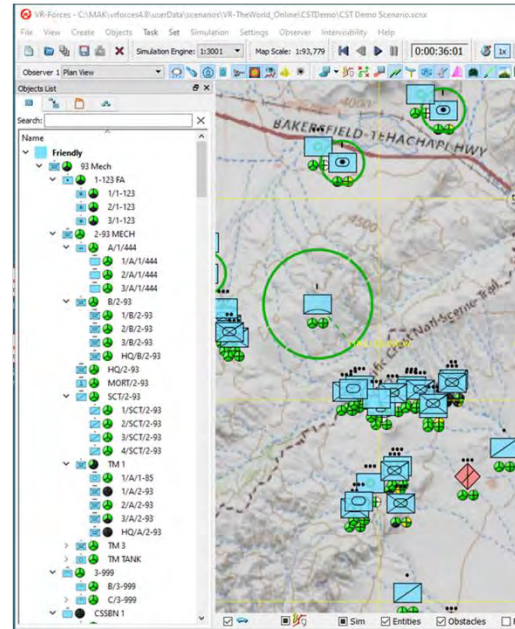


Figure 2 - VR Forces C2SIM Ingestion

But how planning will change goes significantly beyond just this. The ability to iterate rapidly and conduct COA runs at far greater than x15 means that planning will no longer be constrained by the typical convention of 3 x COAs always measured against an Enemy Most Dangerous and Most Likely option. This will materially change the existing process and needs substantial experimentation now.

As important as having tools to build and run COAs quickly, is having an analytics platform able to get far beyond simple outcome measures (remaining Combat Effectiveness for example) that typify the use of models in this part of the process. In this respect again we see a synergy between a VR Forces COA development tool and Hive – with Hive able to add granular measurement of all the Tactical Functions, to compare these against known “good” yardsticks, and an ability to re-weight functions or specific metrics that are deemed by a commander to be more significant.

There is also another dimension by which we believe this element of CAST training needs to change. We believe strongly that there will be an enduring role for expert human judgement, ideally assisted by tools like Exonaut. But there is enormous scope to introduce more objective and more automated evaluation of the planning process and the teamwork required to make it effective. We have significant experience in other C2 experiments of using indoor tracking tools that identify time spent by key staff in particular activities and particular dialogues. We have used during VRLT a very capable voice analytics package from Vocavio¹ capable of measuring teamwork, workload, and communications effectiveness between speakers in small teams. And wider than this we have been part of research looking into Heart Rate Variability as a

¹ <https://vocavio.com/our-solutions/vconnect-collective-training>

marker for stress, anxiety and workload in individuals under arduous conditions. All of these types of approach offer illumination into this space, which might in turn generate objective measures of the performance of the team of teams that that underpins the generation of high quality planning outputs in a military HQ.

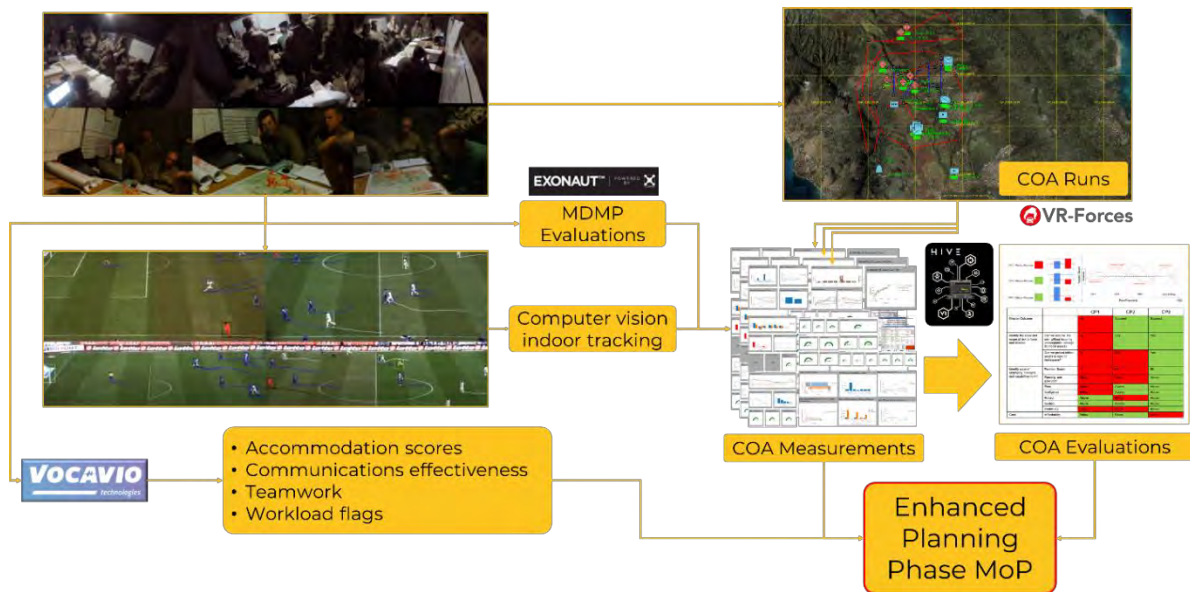


Figure 3 - Wide Angle Objective Team Evaluation in Planning

In summary, and illustrated below, we envisage this component of a Future CAST being conducted and evaluated quite differently to the current paradigm. This is a direct consequence of the convergence between BMS and Simulation and a consequence of new and more powerful, more insightful evaluation methods now being available.

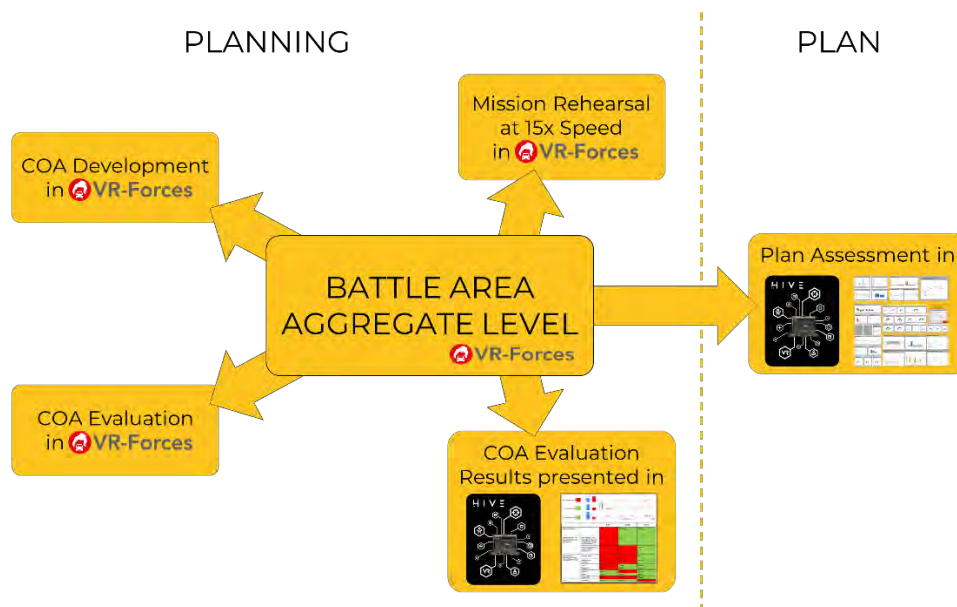


Figure 4 - VR Forces and Hive in Planning and Plan Evaluation

Plan Evaluation

This next component of Future CAST is a key stage in being able to untangle and distinguish between teams that do or don't plan well, do or don't select good plans,

and either can or can't then execute these plans effectively. In this instance the pairing of VR Forces and Hive leverages the ability of VR Forces to potentially activate many additional back ends in order to run orders of magnitude greater numbers of runs than is possible by the Player HQ or primary training audience. This then allows a far more robust evaluation to be completed over the quality of the plan – and therefore to distinguish whether an effectively conducted planning process has or has not led to a good plan. Without this stage the value of more granular simulation, more demanding execution, is lost since whilst there is objective evidence on the conduct of the process, there isn't anything to connect this to the quality of the plan, and then to the ability to deliver it.

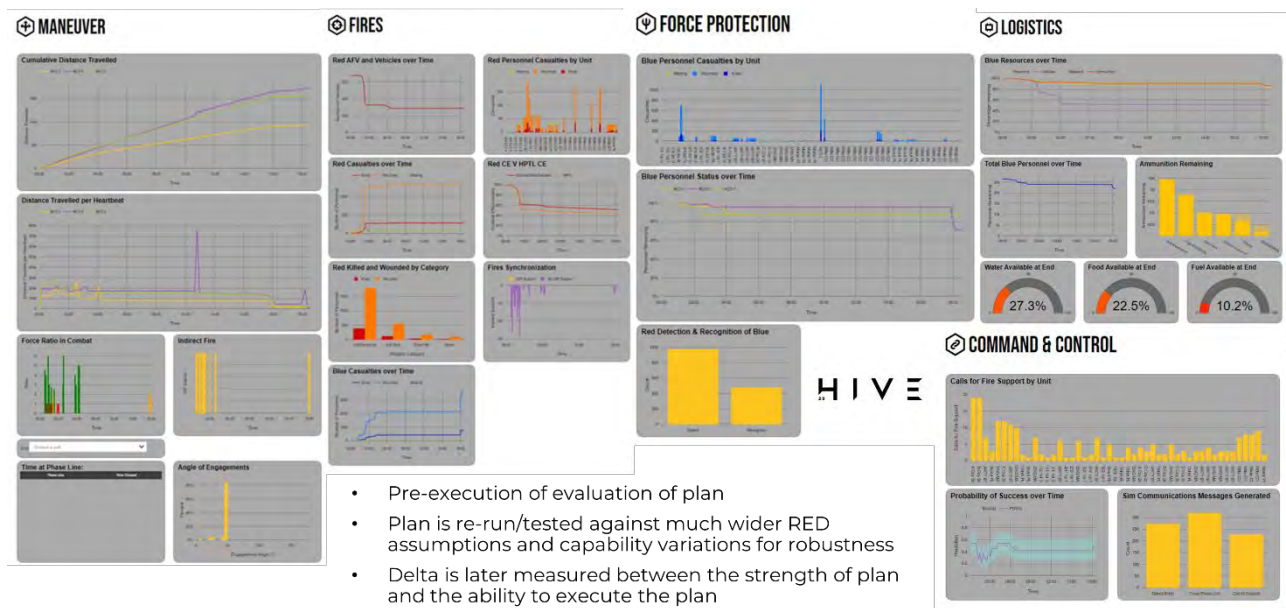


Figure 5 - Hive Functional Evaluation of COAs and selected plan

Execution

A significantly more advanced level of capability to support the typically under-emphasised Execution phase is a key enabler to unlock this aspect of Future CAST. In order to assess the ability of a HQ placed under representative cognitive burden it is critical that the supporting LOCONs are immersed in the scenario and themselves placed under an appropriate cognitive burden that comes from high fidelity simulation. In our assessment this means different ways of conducting LOCON roles, which in turn needs to be enabled by more immersive, higher fidelity simulation than has been typical with typical 2D UIs, typically controlling highly aggregated subordinates against a mandated Main Events List or Inject List. Mak One of course can support both aggregate and entity – VR Forces can function in an aggregated mode, albeit where aggregate units can be broken down to as small as platoon and squad entities. But more powerful is employing it in entity mode which unlocks the use of immersive virtual interfaces for LOCONs, which could as easily be MAK's own VR Engage solution as it could be Bohemia's VBS4. This is illustrated at Fig 6 below:

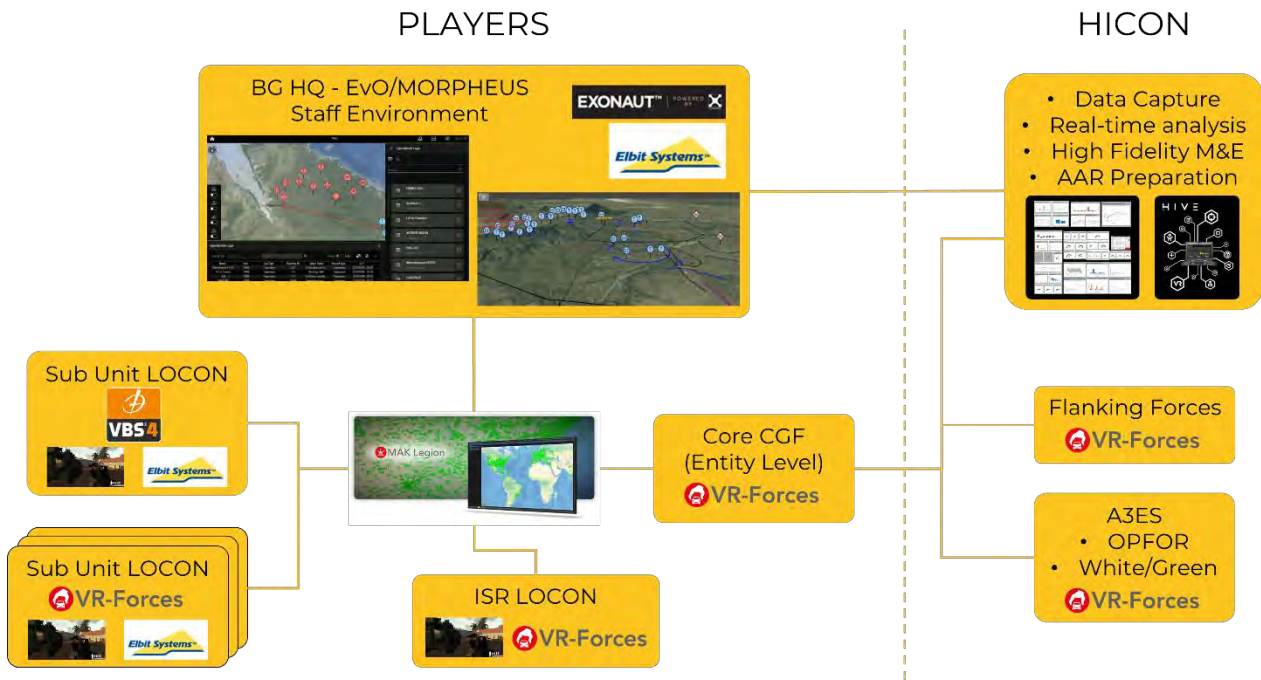


Figure 6 - Mak One product suite and VBS enabling high fidelity Execution

The combination of immersive VR Engage or VBS4 interfaces for LOCONs, all underpinned by VR Forces, would have users placed under more realistic Move-Communicate-Survive pressures at the same time as exercising command over AI subordinates. This element is also vital – the Constructive simulation needs to be capable of delivering credible behaviours in response to LOCON commands. And in this respect MAK have invested heavily in improving behaviours with improvements to its existing behaviour trees, improvements to its already powerful LUA behaviour language, and improvements to the GUI for rapid behaviour composition and understanding. One final consideration to add to this is how the LOCON controller/commander actually commands these entities if already faced by the cognitive burden of having to Move-Communicate-Survive his own command vehicle or Command Post. Cervus have previously experimented with an AI-enabled Voice Control layer for VBS, provided by Wingman AI², which would in principle allow LOCONs to command their subordinate entities using voice, again adding to the immersion, to the cognitive burden and to the realism.

² <https://wingman.ai/index.html>

LOCON Immersion

- FPV view for Sub unit comds – mounted/dismounted – VR Forces
- Stress ability to Move, Communicate and Fight for survival – which generate significant cognitive burden before trying to provide C2 for subordinate entities
- C2 would be through MORPHEUS BMA
- ...and through 'Wingman AI' AI-enabled voice control of synthetic entities



Figure 7 - Enhancing the LOCON Environment

In addition, the full array of multi-domain effects will need to be represented. This is again an area in which VR Forces excels, which is evident in its strong Air-Maritime user base. And where needed it can and does readily incorporate 3rd party modules to access best in class physics modelling for communications, emissions and signatures.

Multi-Domain

- Enhanced ISR LOCON, SIDECON and HICON representations
- With Plug-Ins giving full modelling of EMS emissions and signatures enhancing ISR and comms performance simulation

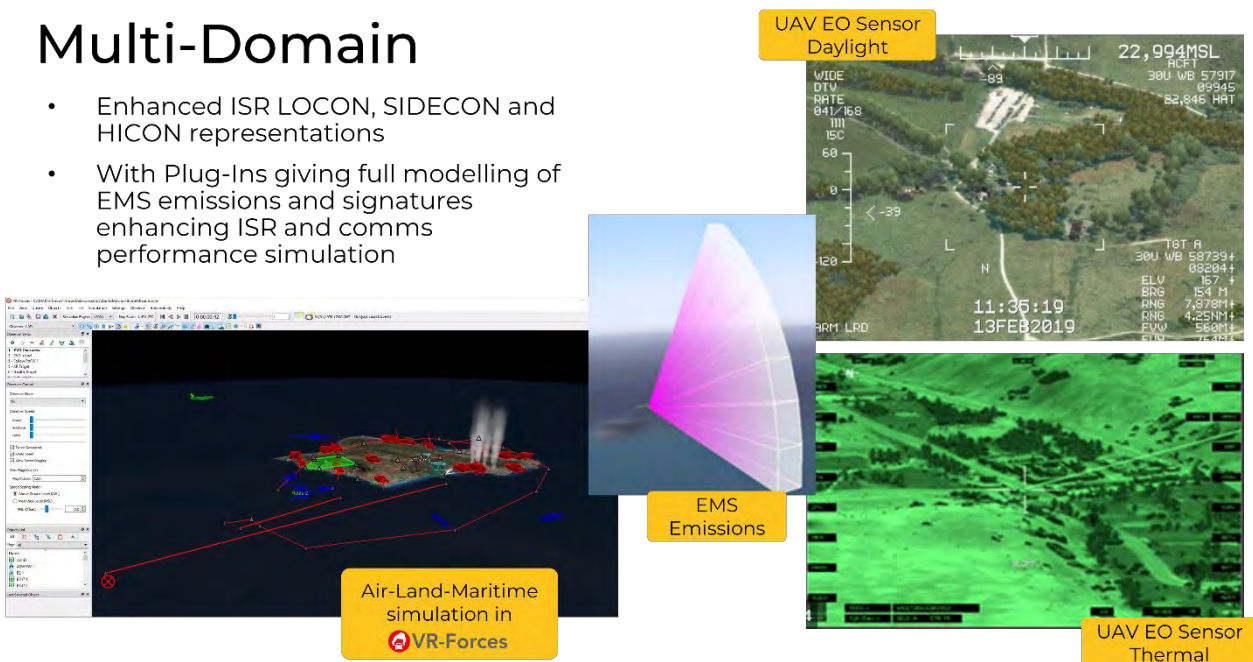


Figure 8 - Enhancing Multi-domain, ISR, Emissions, and Signatures Simulation

Learning

The AAR as a paradigm has remained remarkably stable over a period that has conversely seen significant change to the way in which teaching and education are designed and delivered. It is our view that this paradigm is overdue a substantial overhaul.

We would seek firstly to draw contrast between simulation systems that market an AAR capability and those that more modestly market playback capabilities. Playback is not AAR, even if it is somewhat difficult to conceive of AAR without playback. In our view the AAR paradigm needs to transform to exploit the capabilities now inherent in simulation systems like VR Forces and VBS4, the capabilities inherent in analytics platforms like Hive, as well as to leverage the myriad of distribution, display and visualisation technologies now available to users.

LEARNING

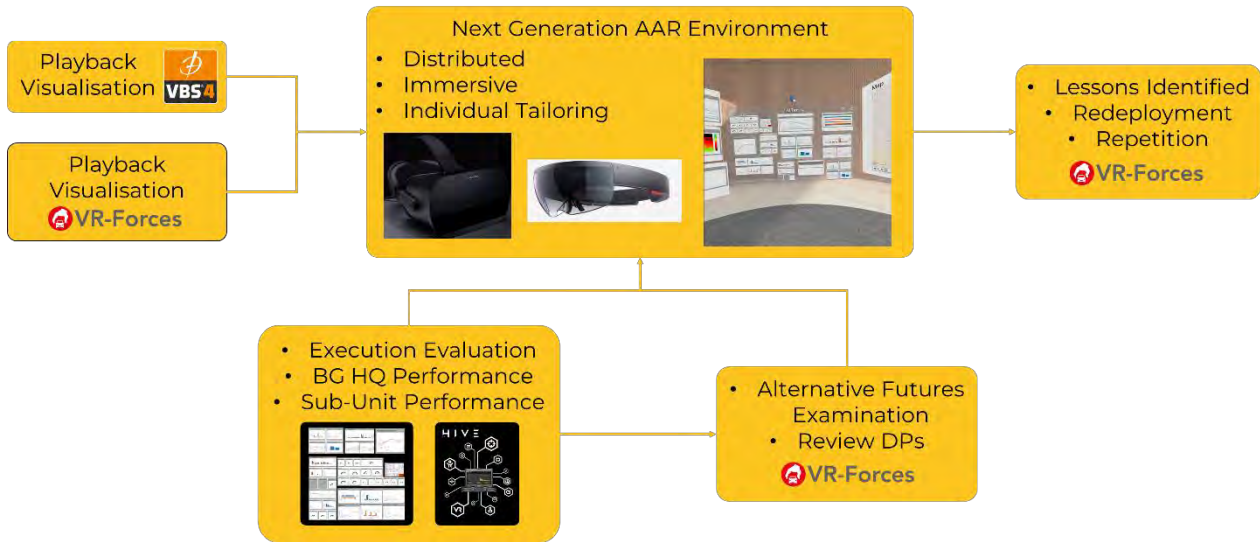


Figure 9 - Transforming the AAR

The AAR will also need to access and exploit more than just the Observer-Mentor assessments, and more than just metrics derived from the simulation data. In our experience there is typically little or no exploitation of the information exchanges between the different nodes conducted training, whether cells inside the HQ or between commanders and subordinates. We would assert that there is enormous value in this - and the Hive Combat Net Radio Analysis Tool (C-NAT) illuminates this area extremely effectively. This uses voice to text transcription, with a proprietary Machine Learning (ML) algorithm to tag dialogue by its content and its purpose, against a recognisable information taxonomy. This tool, along with the Vocavio vConnect platform mentioned earlier would bring unparalleled objective and automated measurement to information exchange within HQs and between HQs and subordinates.

Combat Net Radio Analysis Tool (C-NAT) Module

- Voice Recognition Layer
- Voice-to-text Layer
- Information taxonomy-based ML tagging Layer



Figure 10 - C-NAT Module

It is also abundantly clear to us that the means by which even playback can be done has changed radically over the last 5 years. The paradigm currently is for AARs to be conducted in theatres or with auditorium style seating, to suit the convention and confines of projected displays and “on stage” facilitators. The explosive growth in mobile device delivered content and access, the explosive growth in VR applications, and the steady growth in AR applications, suggest that new and more powerful ways already exist to deliver playback and the other critical aspects of an AAR. Figure ? below illustrates an example of early experimentation we have been conducting with VR – which in this case allows for a fully distributed AAR, with a 3D urban terrain model, 2D VR Forces playback, and access to Hive mission metrics.



Figure 11 - In-VR AAR - TALLINN Mission

With a largely unaltered purpose, our assessment is that future AAR could and should do a number of things differently:

- o It should exploit far wider array of data sources.
- o It should offer more evenly balanced learning value to all attendees, regardless of whether they are nominally the primary training audience or nominally LOCONs.
- o It should distribute information to the point of need directly – not necessarily just by/through the medium of a single/double projector screen. Performance information will be distributed directly to the consumer according to their need.
- o It should facilitate engagement in the totality of the process by more than just the convention-limited dialogue between facilitator, commander, and subordinate participant.
- o It should fully integrate metrics with playback and playback with metrics
- o It should provide for data-supported learning – descriptive, predictive, and prescriptive analytics will all play a part.
- o It should create immediately realisable opportunities for the exploration of alternative futures based on simulation branching (also termed simulation forking) at each and every Score Decision Point of note.
- o It should allow for the evaluation of what has actually been learned in the process
- o It should create additional/new digital content beyond the carefully curated COAs from the planning, COA evaluation, and actual execution data files.

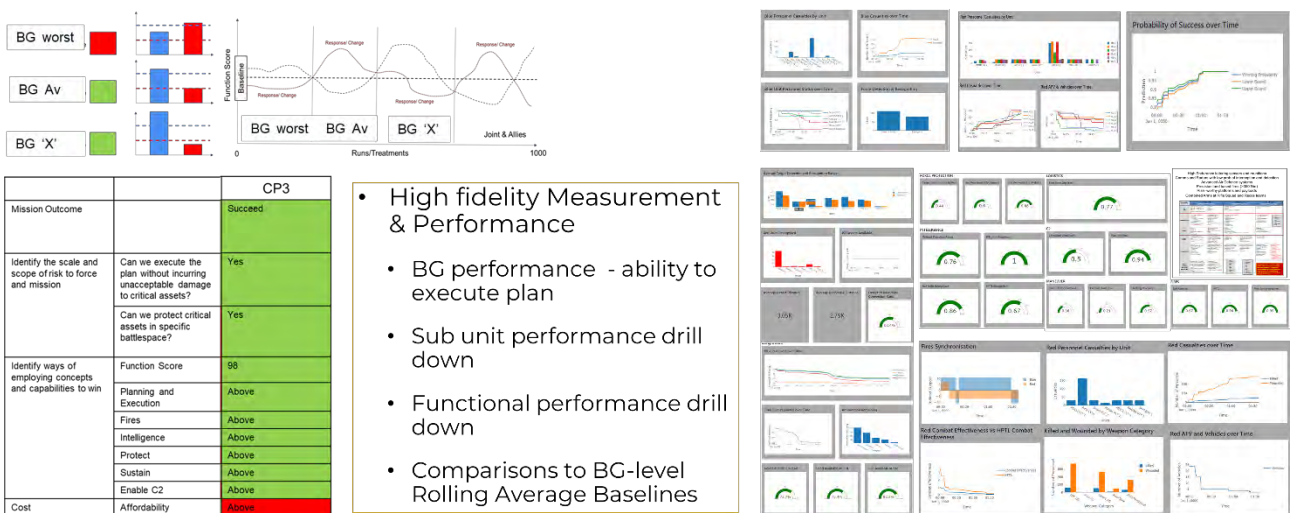


Figure 12 - Hive unit level evaluation and benchmarking

AWE2021 – what we demonstrated – what we concluded

AWE21 presented us with an opportunity to develop and illustrate some of this thinking to Army and other industry CTP stakeholders. Whilst not possible in this setting to recreate the entirety of this construct we did do the following:

- o Built a Battlegroup/Battalion/Task Force scenario in VR Forces using real world urban terrain dataset for Tallinn, acting as surrogate for high-speed/rapid COA creation tool.

- o Measured multiple COAs from this scenario as a surrogate for the use of Hive to evaluate COAs for COA selection, AND as a surrogate for the use of VR Forces and Hive to evaluate the plan.
- o Built an entity level scenario nested within the BG scenario to demonstrate a high-fidelity simulation in an urban environment with a VR Engage LOCON UI, as a surrogate for an enhanced approach to LOCON participation.
- o Demonstrated these 3 elements to AWE visitors.



Figure 13 – AWE BG/TF/Bn scenario and Company Group Vignette – TALLINN

In addition to this we created an environment to meet other challenges that had been put to us by AWE: generate opportunities to put the technology into the hands of users. To meet this requirement, we create a “battleships”-style environment to have BG/Bn HQ staff fight competitively against other, taking it in turns to act as a BLUE BG in defence, and a RED Motor Rifle Brigade (MRB) conducting Offensive operations, learning from mistakes, and getting in “reps and sets”.



Figure 14 – “Reps and Sets” – BG staff vs BG staff

We concluded from this exercise that there are accessible and realisable benefits of the Future CAST approach we attempted to define and demonstrate. These are:

Benefit	Description
Increased collective training competency	Best in class constructive simulation able to represent all domains better than anything in service today will increase competency by creating by re-balancing Planning-Execute at CAST, and improving realism, immersion, and level of test/challenge.
Increased retention through professional fulfilment during CT	Making the employment of LOCONs more realistic, by better immersion, greater cognitive burden, will dramatically improve the level of fulfilment felt by those currently regarded as a secondary training audience. Access to their own performance evaluation and better understanding of their contribution in a richer evaluation of the Player HQ will heighten further levels of fulfilment.
Enhanced Quality of info to support performance and risk reporting	The combination of best-in-class constructive simulation, objective and multi-layered objective data, plus a powerful analytics platform all wrapped inside a new and better framework for CAST, will bring about a step change in the quality of performance evaluation and risk reporting. The prospect of powerfully distinguishing between performance in the planning process, the quality of the selected plan, the ability to deliver that pan, and the demonstration of learning from it, are what separates this approach from any other approach we have seen in realising this benefit.
Increased contribution of training data to WARDEV, CONDEV and CAPDEV	The Future CAST framework we have described, enabled by MAK One and Hive, will mean for the first time the creation of enduring and consistent digital artefacts out of all stages in the construct. Defence will then have access to realistically planned and executed schemes of manoeuvre, all re-useable as digital twins, which can help inform baselines for WARDEV, CONDEV and CAPDEV. Data from the construct described here will also become the bedrock of training data for emerging and future ML and AI applications, that will add value back into emerging and future Decision Support applications within the C4I enterprise.
Increased responsiveness to changes in the operating environment and structures, tasks, and roles	This construct allows environmental, equipment, doctrinal or organisational variations to be more easily introduced, and is markedly more responsive than the current paradigm. It unlocks the role training could play within routine Force Development.
Increased efficiency in collective training management and delivery	The creation of a framework for more objective evaluation of planning, the plan, and execution, will create significant opportunities for streamlining the support typically required by an EXCON and HICON staff. Overhauling the manner and method by which LOCONs are employed, by at the same time increasing realism, and introducing greater use of AI at the entity level, will bring efficiencies in how this is conventionally resourced.

Summary



Our goal here is ultimately to be as disruptive to the paradigm as Billy Beane, General Manager of the *Oakland A's*, was to Major League Baseball, popularised in the film and book “Moneyball: the art of winning an unfair game”³. Competing and winning in the major leagues with smaller, but data driven budgets remains an excellent analogy for defence in our view.

The approach we took at AWE and described in more detail in this whitepaper offers:

- A vision of a blend of Virtual and Constructive (and in the future Live) to address known CAST paradigm limitations directly.
- A route to exploiting data that would optimise the training system by objectively measuring the planning phase, the quality of the plan itself, and the execution of that plan under far more realistic conditions. It talked specifically about a **#SingleMeasurementEnvironment** approach, already employed at VRLT, demonstrated at AWE, that is equally useable in Live simulation settings, and across the CTPP enterprise.
- A means of delivery either by exploiting MAK One + Hive cloud-orientated design principles or delivery through small scale, localised and secure installations.

Requirement	“As is”	“To be”
Military judgement evaluation of planning	✓	✓
Objective evaluation of planning	✗	✓
Assessment of plan	✗	✓
Subjective evaluation of execution	✓	✓
Objective evaluation of execution	✗	✓
Comparing planning performance with plan potential with execution outcome	✗	✓

Figure 15 - "As is" vs "To be" comparison

AWE was therefore a significant success for developing the thinking and partnership between two UK SMEs, with much to contribute into larger training enterprises. It advanced our understanding of each other significantly – but it also accelerated our thinking about the issues in front of training users now, solutions that are open to them now, and how we might best develop these solutions further still in the future.

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³ <https://www.waterstones.com/book/moneyball/michael-lewis/9780393324815>