# ITEC 2019 – Using software to integrate and support complex and dynamic exercises

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**Abstract** — This paper will discuss how we could use recent findings and experience from computer assisted, simulated and live exercises, to present training audiences with sufficient challenge and complexity to "train to the point of failure", whilst delivering training in a manner that supports subsequent reflection, re-training and so enhancing learning. Exercises, such as the Swedish Armed Forces exercises AURORA 17 and VIKING 18 and the UK's HQ ARRC's ARRCADE FUSION, demonstrate how software solutions could be used to improve warfighting capabilities in a cost saving and resource efficient way, in the context of integrating live, command post and computer assisted exercises in a true blended training environment. It will demonstrate how an integrated Training and Exercise Management System can support and enhance this process.

#### 1 Introduction

Today's heightened threat levels in an uncertain political landscape, combined with significant budgetary constraints, has led to an increased demand for auditable individual and collective readiness in the military as well as the civilian domain. Training and exercises are a proven way to build and verify readiness capability.

4C Strategies have worked to strengthen organisations worldwide with their readiness capabilities since 2000. Our software suite, Exonaut<sup>®</sup>, allows trainers and exercise planners to develop programme, plans and design both simple and complex exercises, deliver events in an agile and dynamic manner, enabling live participant decision-making and facilitating the evaluation of performance against defined training objectives.

### 2 Approach

Armed forces across the world face challenges that, amongst others, include the development of capability through focused training against significant resource constraints, the provision of a complete suite of capabilities to support a training audience and the everincreasing exercise control (EXCON) organisation required to deliver complex exercises. It is also frequently difficult to source an appropriate opposing force providing a peer or near-peer threat to test the decision-making, leadership and tactics of the training audience.

In order to meet these demands there is a need to define carefully and prioritise objectives and utilise the most appropriate forms or blends of simulations for each specific activity dependant on the outcomes required. Resources must be synchronised effectively and the whole managed in such a way that provides complete visibility from objectives, through resource control and detailed inexercise management, to outcomes.

It is also clear that training is unlikely to feature a single event; rather it is more often viewed as a progression. Such a progression should facilitate a 'crawl, walk, run' methodology but must also be appropriately challenging to stress a training audience to the point of failure whilst providing sufficient, evidence based and objective feedback and time, to allow the training audience to reflect, retrain and so to learn. The feedback loop from lessons learned into training design is therefore a vital part of any training cycle.

### 3 Discussion

Many trainers now recognise these challenges are best addressed through supporting training and exercises with software based management tools or systems. 4C Strategies' Training and Exercise Management Toolset – Exonaut<sup>®</sup> is such a system and it supports users by managing objectives, tracking performance, visualizing progression, both during and at the end of a training serial. This allows commanders to understand what training risk or performance shortfalls they are carrying and what activities they must complete to mitigate them and develop their capabilities to enhance their readiness for further training and operations. Exonaut is used by, amongst others, the British and Swedish Armed Forces as their principle Training and Exercise Management System.

Delivering successful training and exercises, particularly complex exercises, requires an integrated and adaptable plan. Objectives must be connected to the appropriate units or staff branches and to specific activities. Resources allocated to specific activities and the simulation plan or synthetic wrap agreed. Exonaut is able to connect all these elements in a single, simple and dynamic system whilst facilitating distributed and agile planning and delivery.

Whilst designing a training progression, the levels of difficulty, e.g. component parts or span of command and the complexity, e.g. more challenging and complex terrain or the increased capability of the enemy force, can be modified to suit the training audience state of training. Such scenarios can be designed in advance and a wide variety of scenario injects and incidents, of varying complexity, can be maintained in an exercise database for employment and the exercise director or commander wishes.

During exercise execution, specific objectives can be tested through the integration of both LIVEX and CAX based on specific training outcomes. As an example, it is possible to focus on challenging the manoeuvre units in a LIVEX whilst including many of the functional areas, such as logistics, medical and personnel can be simulated through a CAX wrap in order to address all aspects of decision making for the chain of command. Through different types of injects and simulator control trainers are able to portray a more complex and complete operational picture to challenge and exercise decision makers. The reverse is also true for CPX where some functional areas can be trained live, and manoeuvre units and the wider environment represented in a variety of simulations or synthetic wrap. This is now a routine approach in many military exercises.

Such an approach is also relevant to other enterprises such as the emergency services. Indeed this was the underlying principle of Exercise UNIFIED RESPONSE one of Europe's largest resilience exercises to date in London in 2016. The first-responder emergency services were exercised in a highly sophisticated live incident and the wider control and supporting staffs through a dynamic and distributed CAX all managed in a single exercise management system.

Of course, delivering such complexity through complex computer assisted exercises frequently requires an EXCON organisation that is similar in size to the training audience. Against today's budgetary constraints and a requirement for greater efficiencies there is a strong push for automation in this area. In response to this challenge, the Swedish Armed Forces have been working with 4C Strategies for over 20 years delivering large scale, complex, distributed exercises such as AURORA 17 and VIKING 18. This has led to the development of the Exonaut Integration Engine® (EIE). The EIE has been designed to provide an easily extendable integration with plethora of data sources, simulations and unmanned aerial systems (UAS) in order to greatly improve training design, delivery and evaluation and reduce the EXCON overheads.

Key to understanding where an organization is in a training progression is the objective measure of performance against defined standards. Objective based training allows organizations to train to the point of failure, an

#### Presentation

organization has time to reflect, perhaps through an After Action Review process where evidence based observations and data captured in the supporting simulation is presented to the training audience. The period of reflection allows commanders to reshape plans and procedures before the next training event where the process is repeated. Equally training deliverers, knowing the training state of the training audience can ensure that objectives and the levels of complexity are appropriate. This ensures the most efficient use of training resource and achieves the best training outcomes. This is the approach used by both the British and Swedish Armed forces in their Collective Training (CT) exercises; it ensures that training is objective based, is delivered at the appropriate level and training risk is captured.

In-exercise / activity visualizations can be used to inform training deliverers so the tempo and complexity of an exercise can be adjusted during the execution phase to suit the training audience. Such visualizations might include performance against planned objectives; how the training audience is performing, how many of the planned objectives have been achieved and an indication of whether planned activities have achieved the desired response from the training audience or how successful the exercise has been to achieve the training results required. Overlaying such contextual data with quantitative data such as, for example, weather, entity positional data, shots fired, communication data, equipment availability or medical status enriches commanders' understanding and their ability to deliver agile, appropriate and relevant training responsive to training audience needs. performance and progression.

In order to promote learning, After Action Reviews are used to support military training. These gather Lessons Learned material based on training audience performance throughout the training progression. Software tools can quickly gather and integrate observations, based on specific objectives and incidents, from widely distributed sources, into a coherent and easily displayed picture.

As an example of this approach, 4C Strategies worked with HQ ARRC during Ex ARRCADE FUSION 17, to design and employ an Exonaut Lessons Solution to manage and exploit near-real time imports of observations (proposed lessons) from the Observer teams situated across two countries using the Exonaut Observer tool. The ARRC's Lessons Cell immediately reviewed these observations and tasks were subsequently assigned to individuals and branches to action as part of their routine Lessons process; all of which can be managed and tracked in the same, integrated, system.

Finally, it is necessary to present training data, be it observations, assessments, lessons or training risk to commanders to support higher level decision-making. Integrating BI tools into a Training and Exercise Management system supports such visualisation and enables staff to quickly and efficiently interrogate, collate and present data to commanders. Examples of such data might include unit performance against Collective Training Objectives or Collective Competence Objectives visualized, for example, across the UK's Functions in Combat or NATO's Main Capability Areas. Dashboards can be quickly filtered to show only the data relevant to the individual or commander's information requirement and might, for example, include the planned activity plan or schedule and areas of weakness, trends, progression can be identified. Assuming costs and other resources are understood and attributed for each activity decisions can be made to mitigate, or otherwise, training risk. Finally, such data can be aggregated with other readiness data for manpower, equipment and support to provide an holistic view of readiness.

## 4 Conclusion:

There is a need to improve capabilities and the way we train forces in order to meet existing and future security challenges against a well-equipped competent adversary. Software tools, such as integrated Exercise Management Systems, offer an end-to-end approach that allows complex, distributed, blended exercises to be designed, delivered and exploited both efficiently and effectively, realising the greatest return on the investment and enhanced capability and readiness.