ITEC Rotterdam 16-18 May 2017 Conference Paper

Learning from Games Architectures: An Industry and Academia Collaboration

Staffordshire University (UK) – Stephen J. Webley, Games and Visual Effects Division

Bohemia Interactive Simulations (UK) – Andy Fawkes, Academic Liaison

Introduction

1. For some time, the training simulation community has looked to computer games engine technology for the latest innovations and games-based software packages successfully supports the current day virtual simulation training market. However, games are now much more than the games engines, with connected ecosystems supporting sometimes millions of players allowing them to share, collaborate, learn and compete together. This paper looks principally at Massively Multiplayer Online Games (MMOGs) and identifies how the design of MMOGs to promote serious competitive play has informed the new phenomena of eSports, and explores what can be learnt from such games for military training. It has been an industry/academic collaboration between Bohemia Interactive Simulations (BISim), Ministry Projects, and Staffordshire University and has been partly sponsored by the UK MoD/Dstl through the SE Tower research programme. The study team have drawn from the expertise of over 100 people through interviews and questionnaires from academia, industry and MoD together with a comprehensive literature review.

MMOGs

2. A MMOG is an online game which can support large numbers of players, typically from hundreds to thousands, simultaneously in the same instance. They usually feature a huge, persistent open world. They can be found for most network-capable platforms, including the personal computer, video game console, or smartphones and other mobile devices. MMOGs are a multi-billion £ industry, serving millions of players at any one time across the world. There is immense variety in MMOGs and increasing crossover with other game genres. However, they can be characterised by three principal dimensions: Persistency of the virtual world; persistency of player data; and number of players (see Fig.1). MMOGs typically also have elements such as forums that help to build and maintain their player communities to ensure that players remain interested and loyal, translating into long term income streams.

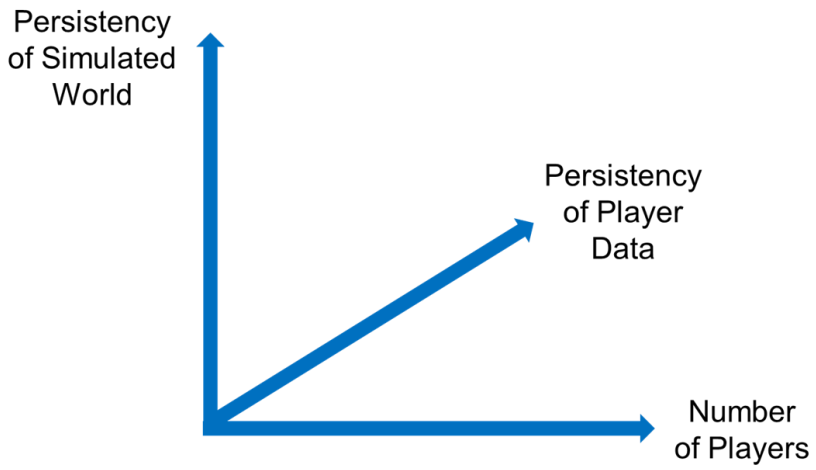

Fig.1 – MMOG's defining common features

3. Our research indicates that the most empowering characteristics that define what a MMOG is, are the ability to form social and political groups, and the players' ability to track their own and other player's behaviour, progress, and learning that is delivered as heuristic performance insights. Large amounts of such persistent data on player behaviours can be directly monitored by customer and player community support staff and simultaneously analysed, audited and made available to the player/customer across platforms and across social media.

4. The technology behind MMOGs is being driven by wider computer hardware and software developments and therefore is advancing rapidly. Cloud computing in particularly is supporting the relative ease now of hosting large numbers of players and deployment to a variety of hardware platforms, from mobile to PC. MMOGs are typically homogeneous in nature with little need or desire for MMOG designers to permit their game to interoperate with another.

5. The market for MMOGs has grown significantly and continues to rise. The Insight Partners March 2017 report estimates that the MMOG market is estimated to reach US$ 26.65 billion by 2025 from US$ 10.32 billion in 2015. Further, the 2014 Global Games Market Report showed that MMOGS generated 22% of the overall computer games market in 2014 with MMOGs being second only to console games for revenue in the gaming industry.

6. To explore what can be learnt from MMOGs in defence context we researched the following areas:

- The Principal Market Leaders
- MMOG Design Affordances and Commonalities
- MMOG Middleware, Typologies & Technologies
- MMOGs Communities
- MMOGs Technology Trends & Future Trends
- MMOGs Data Security and Cheating

7. We believe that defence has much to learn from an MMOG approach, particularly in terms of enhancing training cost effectiveness and in the following table 1 we list key MMOG characteristics and provide comment on their relevance to defence:

Table 1 – MMOG Characteristics Relevant to Defence
Persistent interactive world that can be accessed 24/7
A persistent defence virtual world for defence would parallel its live training areas, providing flexibility, efficiency, reuse and familiarity.
Ranked/Unranked Worlds
A defence virtual world that is both ranked and unranked would allow users to practice and experiment prior to formal test and assessment.
Player data that captures and rewards performance
Linked to learning/training management systems this could provide an informal/formal assessment/career tool and provide anonymised analytical data on trainee and training system/process performance.
Player developed content and sharing
Trainees and Trainers would be able to generate new training and exercise scenarios for sharing across the enterprise.

Easy Discovery of Scenarios, Content and Players
Trainees and Trainers would be able to easily access latest training scenarios and connect with potential fellow trainees.
Online Communities and Support
Forums linked to the defence virtual world would support the scheduling of training events and facilitate the sharing of best practice.
Secure login
Only authorised users would be able to access the defence virtual world with administrative rights on content and sharing depending on position.
Supports Multiple Platforms
Access to the defence virtual world would be possible though multiple hardware platforms with software updates principally being applied centrally, thus increasing flexibility and decreasing costs of ownership.
Millions of Concurrent Users
Very large numbers of military users are unlikely to be engaged in the same exercise at any one time although the scaling of MMOGs would provide flexibility.

8. The beneficiaries of an MMOG approach change depending on the nature of the stakeholder, as follows:

Table 2 – Benefits to DTEC Stakeholders of MMOG Approach

Trainee	**Trainer**
Trainees have a training and education environment that measures and records their performance and provides official goals to be attained. It provides unranked environments where trainees can practice and experiment, both alone and with other users. Training scenarios and other trainees are easy to discover. Environments and interfaces become familiar.	Trainers have access to a training and education environment that is available 24/7 and is maintained and updated centrally. The virtual world can be used to practice and experiment and then switched to a formal testing and assessment environment. Training scenarios are easy to access, develop and share. Training and exercise events are easy to schedule and set up, locally and across the defence enterprise.
Training Analyst	**Defence Enterprise**
Training and human factor analysts can collect centrally held training data and can conduct analysis on human performance and the effectiveness of training systems and methodologies/ pedagogies.	More diverse local training system hardware requirements can be accommodated, with reduced upgrading, as computer processing is more centralised. Secure login from variety of locations are supported and secure data can be held and controlled centrally as necessary. Training systems are more automated and centralised reducing running costs. Software and data is maintained and upgraded centrally reducing costs and responding better to changing operational needs.

9. The following diagram illustrates how an MMOG approach might be blended with a Learning Management System to support training and education across the enterprise.

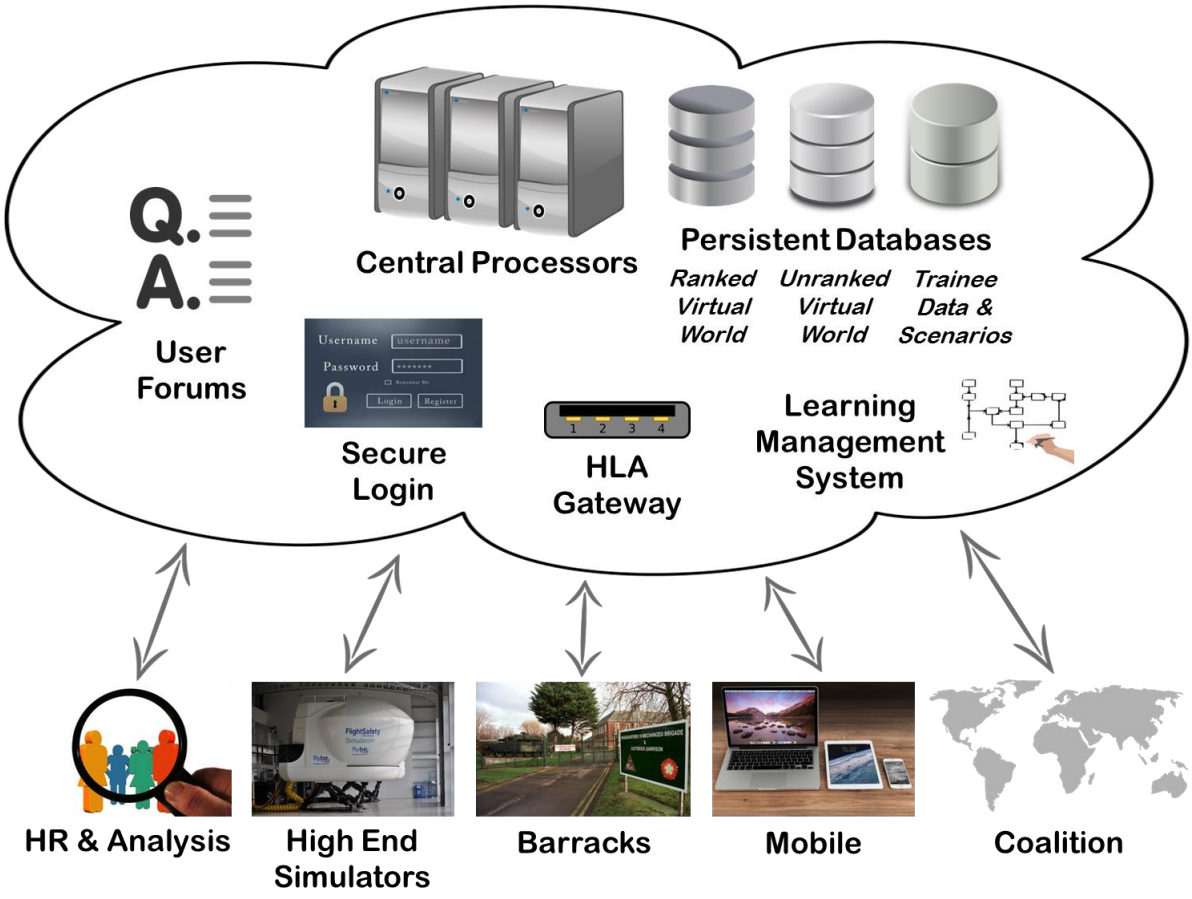

Fig. 2 – MMOG Approach in a Defence Context

10. The study team identified several challenges to defence enterprises that would slow down or prevent an MMOG approach, and these are listed below in Table 3.

Table 3 – Challenges to Moving to MMOG Approach in Defence
Defence IT Systems
A MMOG-like system would rely heavily on defence IT systems and networks, with relatively high network and database requirements. These IT systems can be slow to change with training systems not seen as a priority over C4ISTAR and office applications.
Legacy/Transition
A big bang approach is very unlikely as there are many training systems that have legacy software which would be expensive or impractical to replace at a rapid pace. It may not be possible to connect systems to a central persistent database even if there is some interoperability achieved through HLA/DIS.
HLA/DIS
There have been examples of games interoperating through HLA/DIS but not MMOG software. MMOG to HLA/DIS interoperability needs to be tested and assured.

Coalition Interoperability
Coalition partners are unlikely to move to an MMOG approach at the same time or use the same software. There will necessarily be a period that a MMOG system would have to interoperate through HLA/DIS.
Central persistent database(s)
Establishing a networked centralised interactive database of both simulation and personnel data that can be ranked or unranked is a novel approach for defence. Although technically possible there are likely to be organisational and data/information control challenges.
MMOG Technology is principally aimed at games
MMOG technology is principally aimed at games exploitation and blending games and simulation experts to take forward a defence application may be hindered by culture and language issues. Technology companies can also come and go relatively easily in the games industry

11. Given the above challenges we would see an incremental approach being taken. That is not to say that a rapid transition is not possible, but the disruption to training and cost of changing the existing heterogeneous legacy simulation systems might be prohibitive. However, establishing a persistent centralised interactive database of training and simulation data together with a user forum, networked with all existing and future training and education systems, would be a key first step and a nucleus around which a defence MMOG approach could be built around.

12. Moving forward with an MMOG approach requires the scoping and deployment of a demonstrator. This would test the utility of a defence MMOG and explore how it could be best linked to legacy simulation systems. Fig. 3 illustrates what a demonstrator might look like.

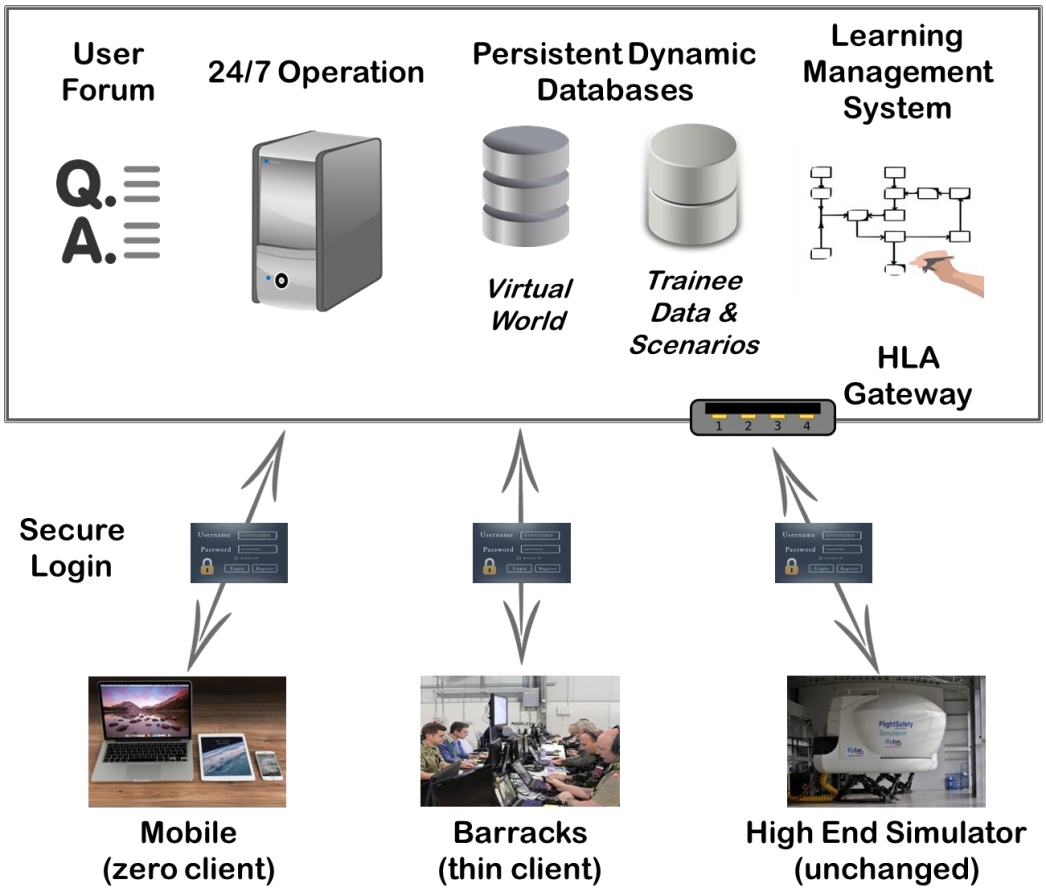

Fig. 3 – Defence MMOG Approach Demonstrator

eSports

13. eSports are organised online and offline videogame competitions. They can take place online with gamers competing from their own homes or offline at specially organised venues. Although competitive gaming has long been part of videogame culture it has only been since 2010 that there has been a huge surge in participation and spectatorship in organised competitive gaming events. Today there is a plethora of game genres associated with eSports but the most popular remain racing and simulation, first-person shooting and combat games, real-time strategy games, and recently multiplayer online battle arena games. The architectures that make MMOGs realizable are largely translated wholesale to eSports franchises. These architectures create a learning environment around the game, account for fairfight issues and latency, and makes a holistic experience realizable for millions of spectators and players simultaneously.

Conclusions

14. There is a great deal for defence to learn in terms of training and simulation from MMOGs and the spectator phenomenon that is now eSports. The very fact that these entertainment products have the capacity to engage, teach, entertain and create vast long-term revenue streams makes them a vital component for further study.

15. Defence can not only learn how to develop future technology but how to manage future innovation with end customer requirements, and their specifics and necessities for change, factored in to the design process to sustain product lifecycle and futureproofing. Further research is required to identify how innovations in learning management and architectural developments can be further exploited in an innovation context.

16. However, there are barriers and obstacles to be overcome. In the history of military innovation, a recurring caveat is that it is vital to recognise how indebted our future warfighting, simulation, and training technology is to societal and cultural developments. Military innovation is closely related to the functioning relationships between society and industry, government and education, and military and warfighting requirements.