Virtual Reality in Land Training (VRLT)

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Project Director - VRLT

Scope

- BISim
- Overview and Background
- Purpose and Objectives
- Approach - when, how, who and where
  - the sprints - 'crawl, walk, run'
- 'Innovation as a Service'
- Results and lessons learned
- Conclusions
- Questions

Bohemia Interactive Simulations

- BISim is a leading software developer in virtual simulation
  - 270+ staff in seven offices internationally
  - 18-year heritage in game-based simulation development
  - Own our Game Engine and have total control of it

- Flagship training product called VBS3 (Virtual Battlespace 3)
  - Trains hundreds of thousands of soldiers every year in 59 countries
  - Tens of millions of dollars of investment from militaries
  - Integrated into many Military Simulators across the globe with numerous leading OEM customers

- BISim is focused on the military/paramilitary marketplace. Enterprise sales with tens of thousands of licences and support services to
  - U.S. Army Game For Training (GFT) program of record
  - USMC DVTE training software program of record
  - UK MOD Defence Virtual Simulation (DVS) platform
 - French MinArm SOCLE Virtual Simulation platform

Overview

- Bohemia Interactive Simulations (UK) Ltd selected to lead Training Capability Branch, HQ British Army Virtual Reality in Land Training (VRLT) pilot study:

    - *Aim: 'to identify the opportunities that VR offers the Future Collective Training System (FCTS)...to investigate the opportunities of VR, the Army approach seeks to conduct a VR in Land training (termed VRLT) Pilot, which explores the strengths, weaknesses, opportunities, threats and benefits of the technology and its employment. The pilot would consider the effectiveness, fidelity, practicality/ constraints, architecture, scale, interoperability, infrastructure and mobility of useable VR capabilities. Insights would be harvested for the FCTS.'*

Industry Delivery Team

CERVUS

Data and exercise management

Bohemia Interactive SIMULATIONS
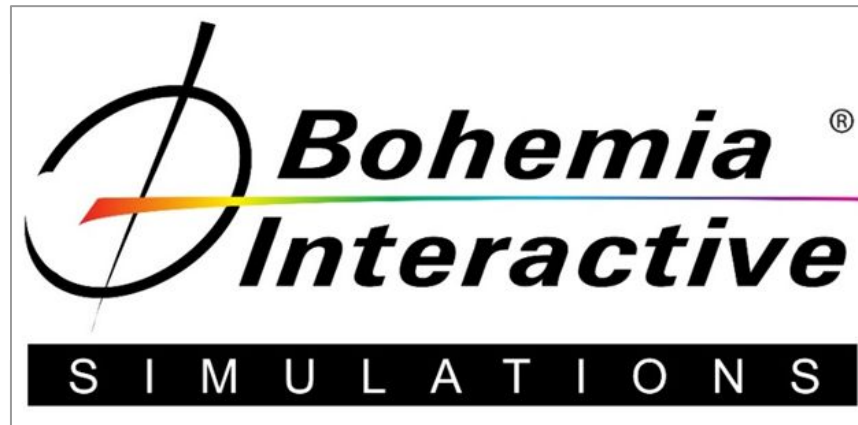
Prime - Sprint design, technology supplier and systems integrator

Roke
Part of the Chemring Group

Project Management and Exploitation

Background - BISim view

- Exploit COTS technology
  - pace of technology development rapid
- Other industries using VR for training e.g. construction, aviation, F1
  - Construction - [crane operator training](#)
- Mission rehearsal, mission repeat (MR2)
- Affordability and accessibility to low availability but highly capable systems
- Immersiveness
- Soldiers more technologically aware through gaming industry - **the PEOPLE!**

Harnessing the Xbox Generation

- **Younger operational staff actively want to use simulation**
  - Take advantage of enthusiastic 'gamers' - you will find plenty of them
  - (In militaries, experience is that young soldiers actively volunteer to get involved and lead)
  - Utilise those staff who 'get it' as instructors and SMEs
  - Offer career development opportunities to learn and grow for instructors and ensure consistency in trainers and participants alike

Soldier at a highly complex individual and team training task

'Generation Z'

- Digital natives with huge dependency on communications

- Greater reliance upon technology and with a different approach to problem solving

- Individualistic, impatient and with differing levels of attention span

- See greater value in work experience than education

- Approach risks differently

Sparks and Honey Report, June 2017:

Meet Generation Z, Forget Everything You Learned about Millennials

Purpose and Objectives

- Investigate the strengths, weaknesses, opportunities and threats **(SWOT)** of Virtual Reality (VR) technology and its application to support British Army Collective Training (CT) focusing on the **flexibility and reconfigurability** of VR to meet changing demands.

- Explore the ability of VR to meet fidelity requirements focusing specifically on limitations in scalability and interoperability and to define a technical architecture and requirements for the future delivery of VR, to help inform future procurement.

Method

- BISim delivered 3 Sprints, 'crawl, walk, run' with VR, as 'Innovation as a Service'
- Each Sprint was a Platoon in a Company Context executing a Combined Arms Armoured Infantry Company attack - Taken from DATE - Lovella scenario, SE Europe
- Increase in complexity through the sprints - assets and scenario

Detailed scenario

Lovella Scenario: Conflict in Southern Protectorate – SE Europe Theatre

- Civil war between ethnic groups backed by professional military and militia in historically volatile region (war in mid 90s)
- Widespread violence
- NATO Intervention to create safe and secure environment, UN deadline not met resulting in NATO military action to clear UWS forces from occupied EKDE region
- 90 days into NATO operation, UK have cleared BADAO town (*Bath*) and are static preparing to clear LOVELLA up to National Boundary Line (NBL)

Delivery - [video (You Tube)](#)

- Sprint 1 (Jan 19) - the baseline - 17 players
- Sprint 2 (Feb 19) - 37 players, high fidelity model,avatar customisation,crew trainer, cloud architecture, AAR and data
- Sprint 3 - (Mar/Apr 19) 54 players, (37 in VR), mixed reality, facevoice analysis, instrumented live gun, briefings

Who

1 YORKS (AI Bn)

- 3 x WR Crew and Dismounts
- Provide feedback on VRLT pilot training experience

Armour Centre

- Challenger 2 Crew
- Provide feedback on VRLT pilot training experience

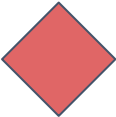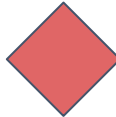**1 R WELSH (AI Bn) & Land Warfare Centre**

- Observer Mentors
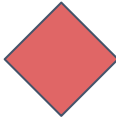

Royal School of Artillery

- Fire Support Team
- 105mm Lt Gun Crew

VRLT Timeline

Dec 18	Jan 19	Feb 19	Mar 19	April 19

Contract Award

Sprint 1

18 Soldiers in VR

Oculus Rift, Vive, DVS/VBS3

Sprint 2

36 Soldiers in VR

Oculus Rift, Haptics, Polystream Cloud, Training Data Cloud Capture, Unity, DVS/VBS3

Sprint 3

36 Soldiers in VR

OR, Vive, Mixed Reality, 105mm Gun Integration, Haptics, Unity, Polystream Cloud, Training Data Machine Learning, DVS/VBS3
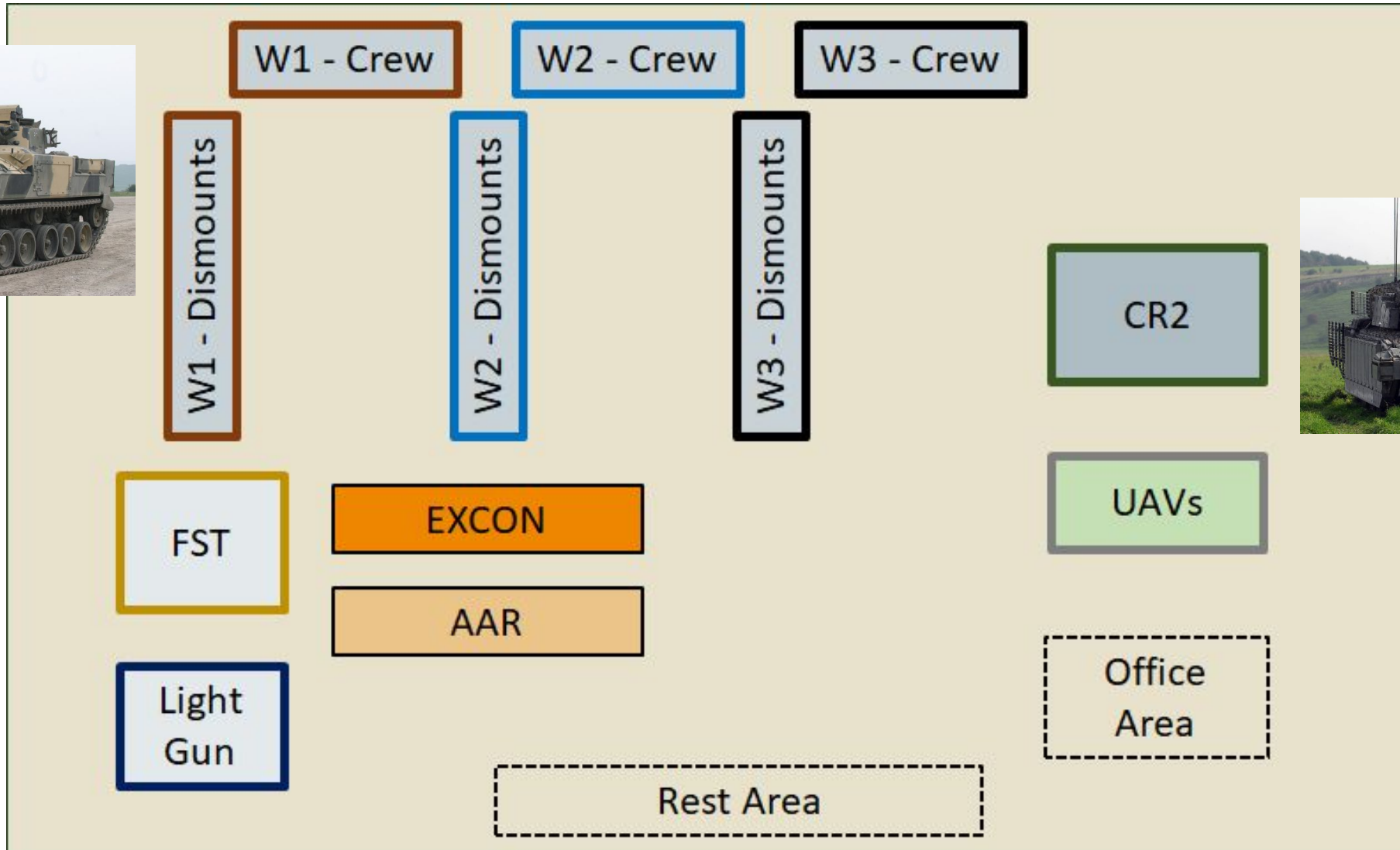
Where - the set up

- Tank shed, Warminster, Wiltshire, UK

- Power!

Garage Plan for Sprint 3

Player Preparation

- It is normal training
- Get the soldiers familiar with the technology
- Its a pilot study - require feedback and ideas
- Data - collect for training improvement
- Opportunity to shape what the Army gets in the future

Example Daily Routine

	0800-0830	System run up	Garage	JD	Technical Team
	0830-0900	Morning Brief	Garage	AR	Project Team
	0900-1030	**Vignette 2-ADVANCE TO CONTACT**	Garage	AR	Participants, Observers Project and Technical Team
	1030-1100	Data Capture	Garage	AR/CR	Participants, Observers Project and Technical Team
	1100-1130	BREAK			
	1130-1200	AAR	Garage	Observer 1/AR	Participants, Observers
23-Jan-19	1200-1300	LUNCH	Cookhouse		
	1300-1500	**Vignette 3-CLEAR RURAL**	Garage	AR	Participants, Observers Project and Technical Team
	1500-1545	Data Capture	Garage	AR/CR	Participants, Observers Project and Technical Team
	1545-1615	BREAK			
	1615-1645	AAR		Observer 1/AR	Participants, Observers
	1645-1700	Close down brief and look forward		AR	Participants, Observers
	1645-1700	Project Team Brief		AF	Project Team

Results and Lessons Learned - Sprint 1

- Established the baseline with 17 players in VR
- Established could probably support ~100 players in VR
- Power resolved - generators
- VBS3 engine good enough for VR
- Frame rate fine and minimal nausea
  - 30-60 mins in VR
- Identified need for high-fidelity 3D model
- VR experience better than desktop 2D
- Targeted fidelity grips difficult (impossible) to use

Sprint 2

- 3D high-fidelity model introduced
  - more immersive
- Scaled to 37 players in VR
- UAV and Fire Support introduced
- Observer Mentors immersed in the game
- DIS inter-operability with Challenger 2 tank and Cloud enabled thin clients
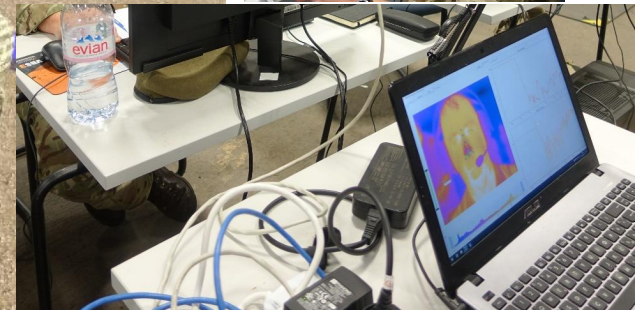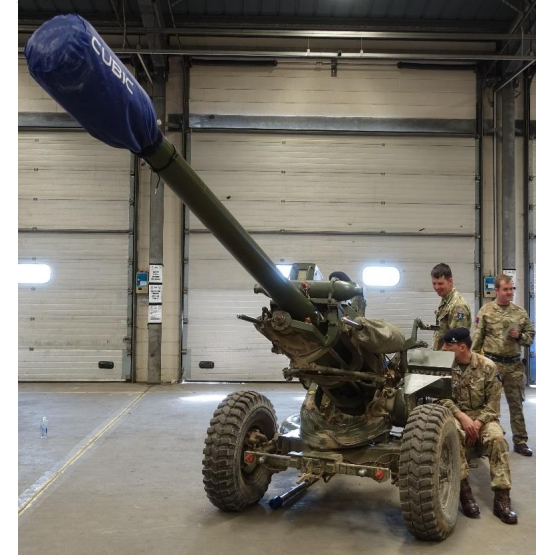- Customised avatars

Sprint 3

- 'Innovation as a Service' - the whole system
  - Novel technology - voice and face analysis to assess challenge
- Mixed reality to view the Battlefield Management System
- Review of Concept in VR
- Out of the hatch tank commander view
- Instrumented live simulation light gun

Recommendations

- VR can be used in the collective training environment - further investigations required
- Targeted grips in VR are challenging
- Simulation application control schemas need re-designed
- Choose a suitable level of fidelity for immersion and training benefit
- VR greatly enhanced by MR
- Simulation standards need to evolve beyond DIS/HLA and embrace APIs to exploit commercial sector
- Use novel performance measurement tools regularly used in other industries

Conclusions

- VR has a place - works now!
- Targeted levels of fidelity for immersion
- Exploit the commercial sector; military standards can hinder
- Performance measurement tools
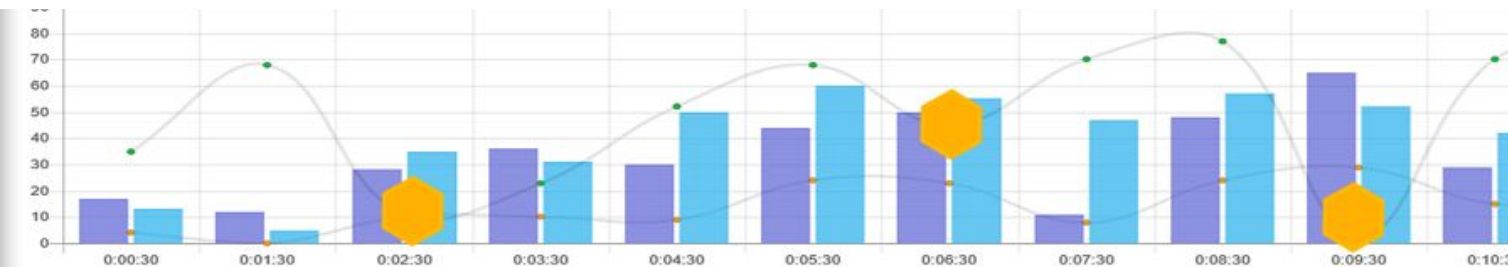
Questions

- Fire away

Author and Speaker

David 'Rusty' Orwin was the Project Director for VRLT. Rusty spent 14 years in the British Army in operational and training roles and has worked in the live and virtual simulation domains in industry. He has a BSc in Communications and Media Studies and an MSc in Information Management and Technology.