



7th Annual SMi
Future Armoured Vehicles
Central and Eastern Europe
18 May 2021

Training and Simulation Trends

Andy Fawkes

Credit – American Rheinmetall



THINKE



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Before



Now



Presentation Overview

- **Operational trends**
- **Future Soldiers**
- **Training Systems Trends**
- **XR – eXtended Reality**
- **Some Other Technologies...**

Operational Trends



The Character of Warfare & Future Threats

29 Apr 2021
(Edited)



A Mixed Fleet for Many Years to Come





**No battle plan
withstands
contact with
the enemy**

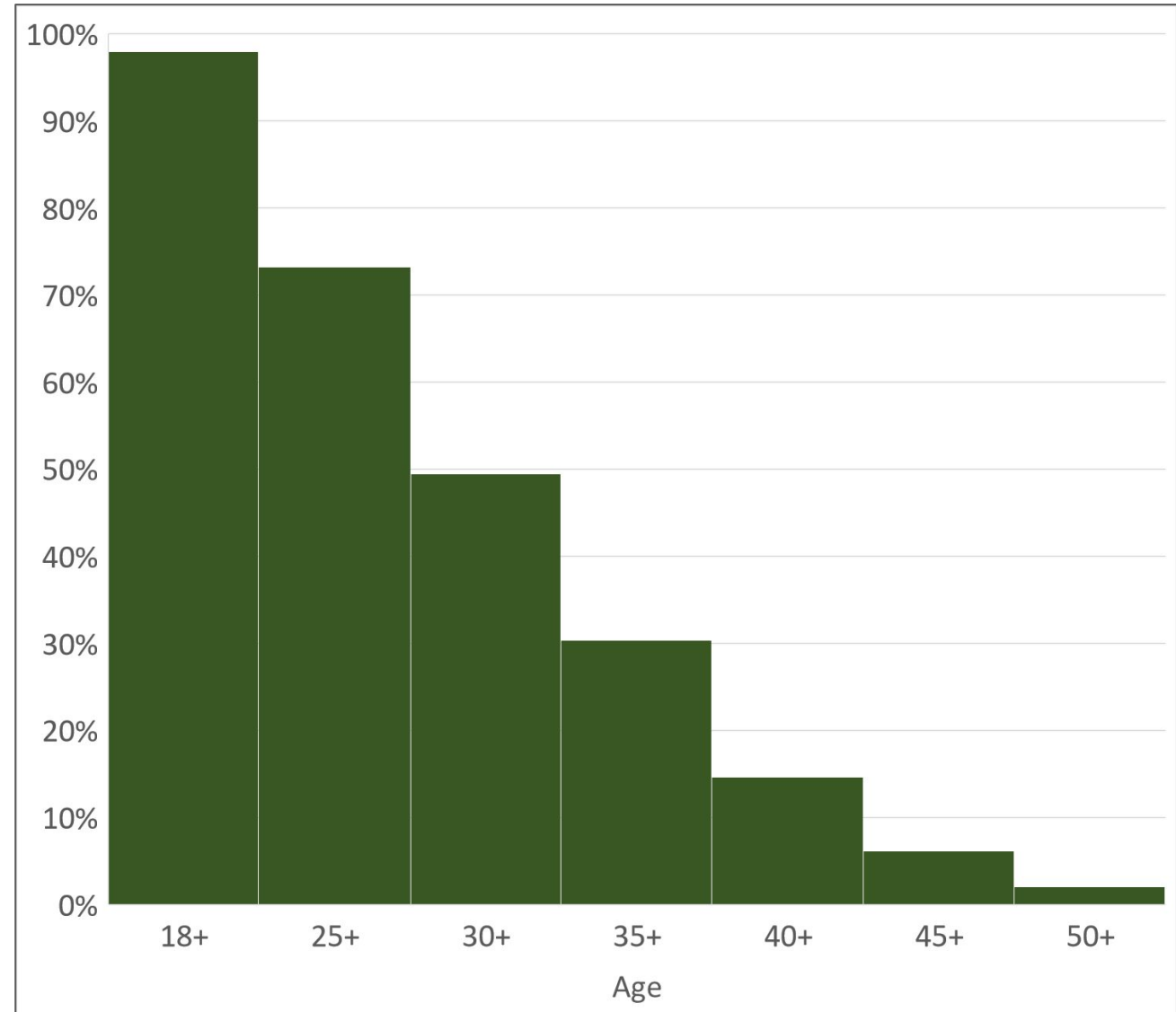
Future Soldiers

(Digital) Soldier of the Future?



- Who will they be?
- What will they do?
- Where will they be?
- How will they train?
- Will we need them?

(British) Army Age Distribution



UK Defence Personnel Statistics - CBP7930, 12 June 2018



“Digital Native”

Over 2/3^{rds} of the Army are Digital Natives and 95% by 2030



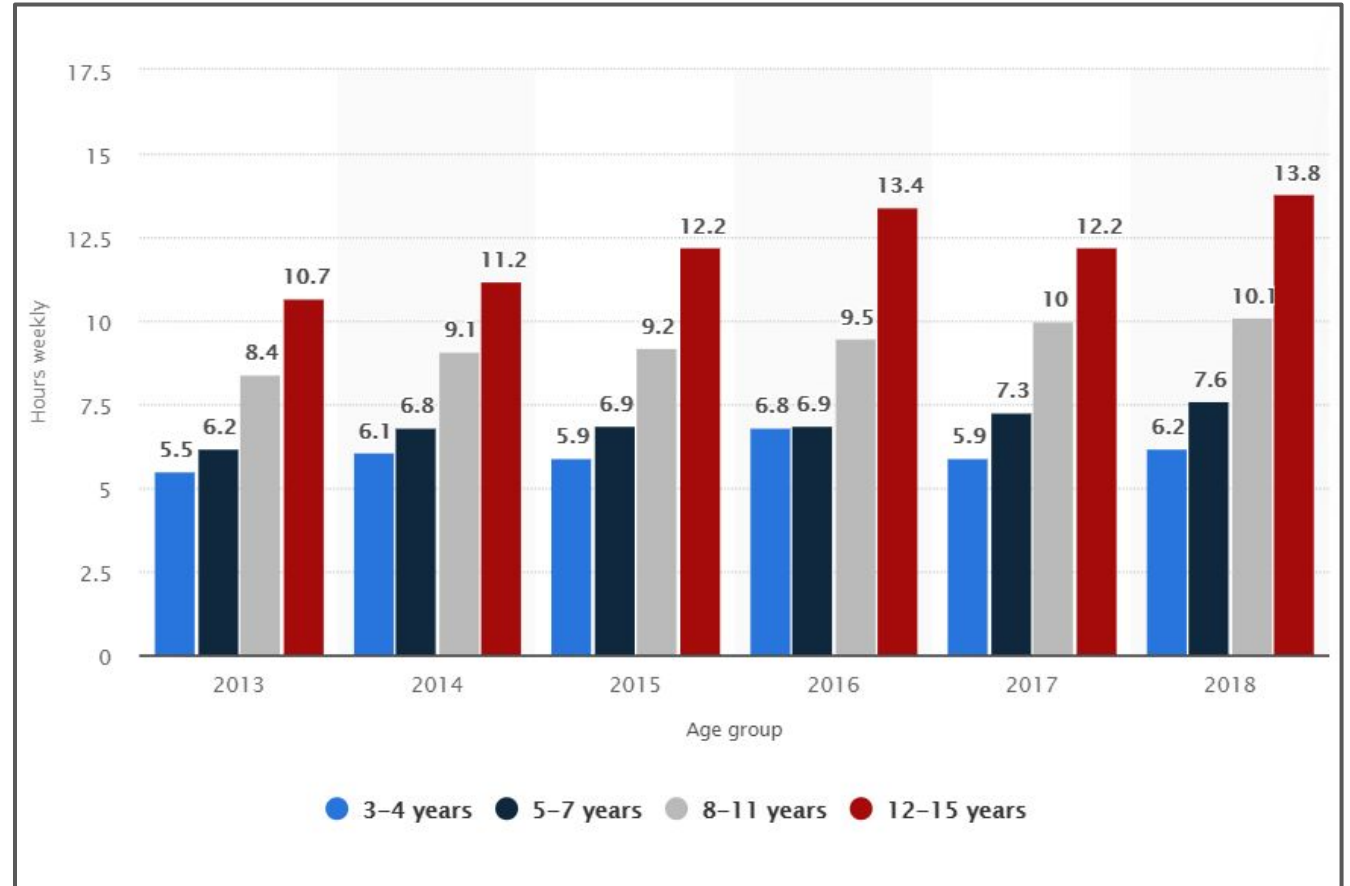
Video Games

- The \$175bn video games ecosystem is vast and constantly evolving
- Serving 2.8bn gamers across the world



93% of Children Play Video Games

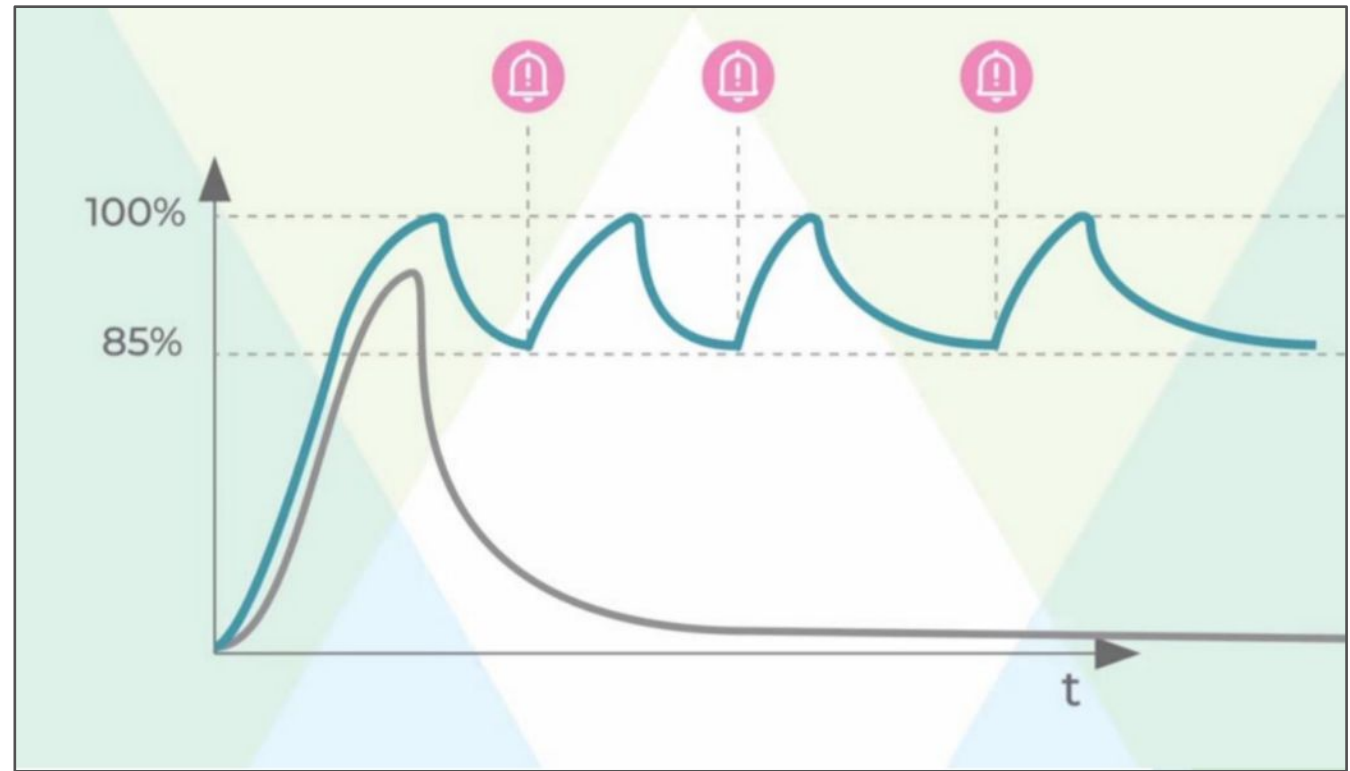
Children's Commissioner for England (2019)



COVID-19 Digital Acceleration



Skill Fade



Tip of the Spear Innovation



Combat Recce
@CombatRecce



WngO 2 for our Virtual Distributed Training event. Detail via our DC page and H Hr is 1900 on Wed 27 May 20 [#online](#) [#training](#) [#skills](#) [#distancelearning](#)



12:45 PM · May 26, 2020 from Tullibody, Scotland



45



See Combat Recce's other Tweets

THE SCOTTISH AND NORTH IRISH YEOMANRY



Training Systems Trends

Enduring Training Requirements

Faster



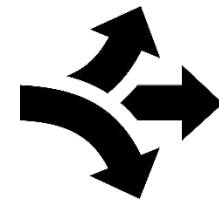
Cheaper



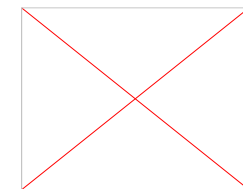
Better



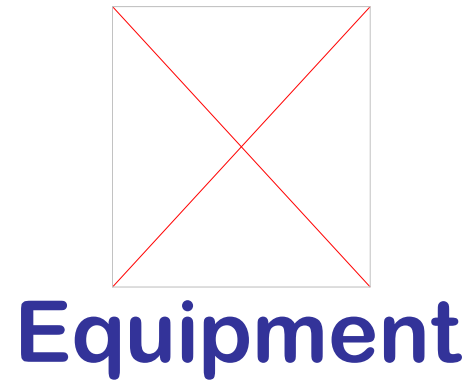
Flexible



Interoperable



Simulation Categories (LVC)



Real
Simulated

Real

Simulated



Live Training



Times Photographer
Richard Pohle

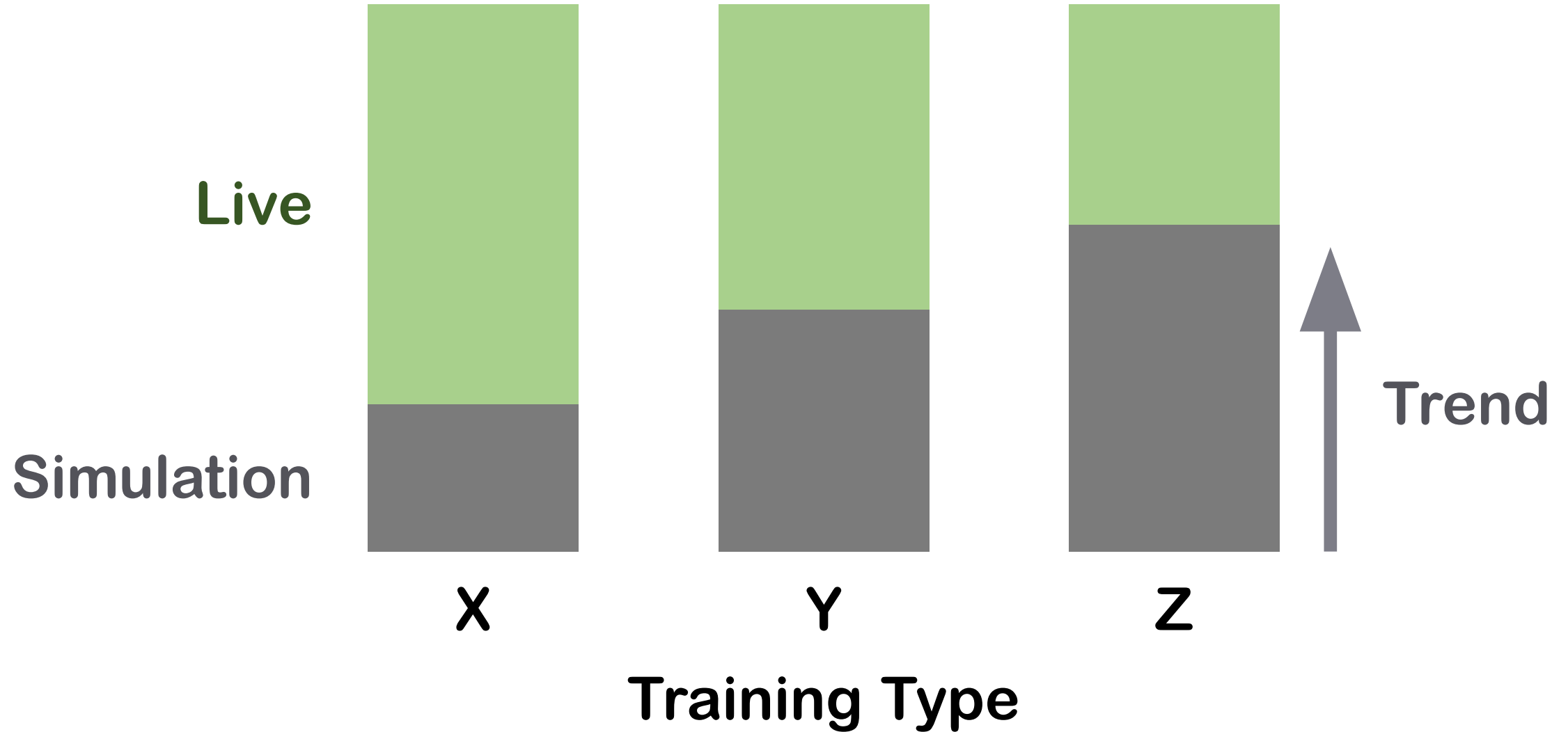
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Training & Simulation Technology Drivers

- Computing
- Games
- Networking
- Graphics
- Audio
- Human Interfaces
- Sensors
- Data
- AI
- 5G



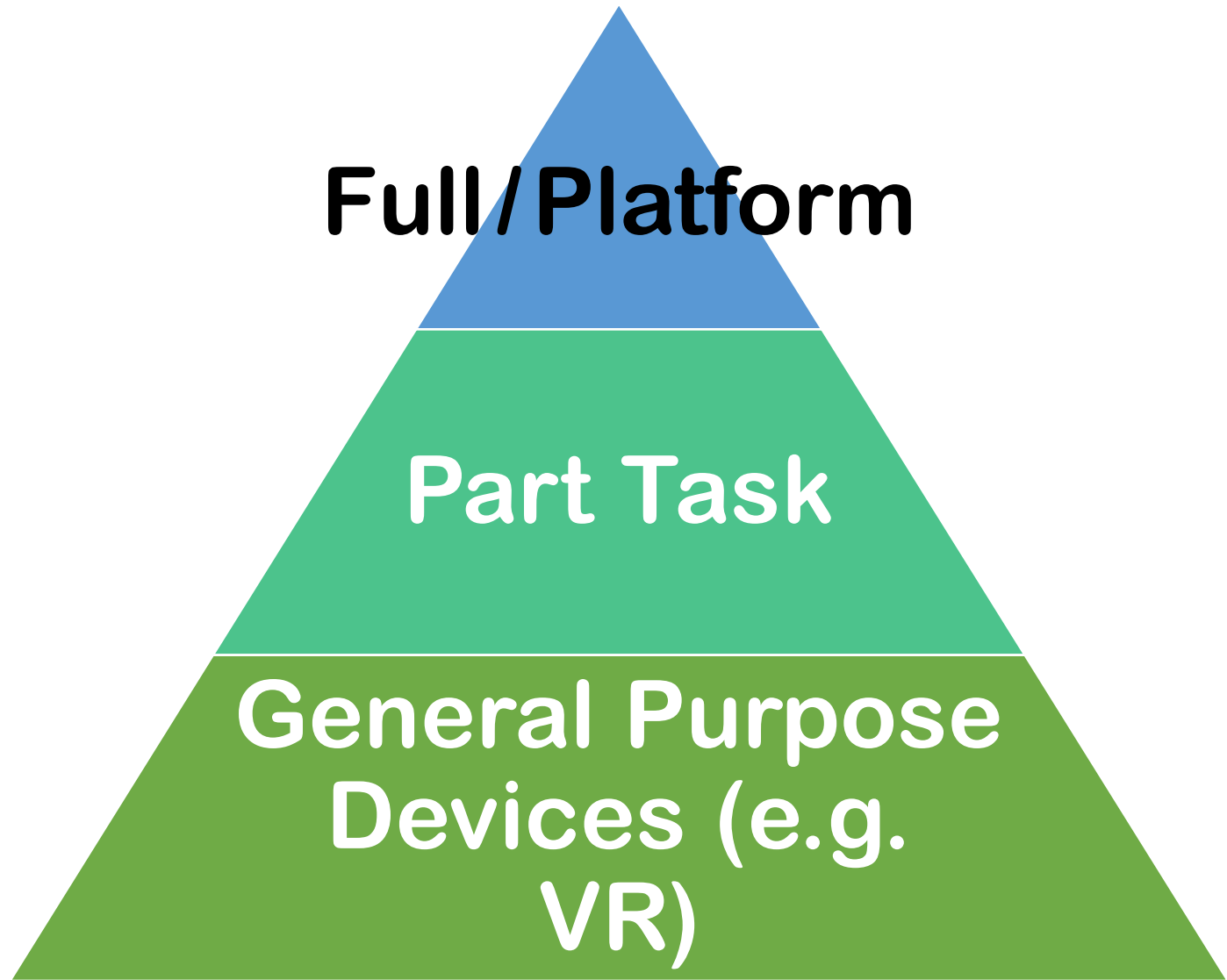
Live & Simulation Based Training



Why Use Simulation in Training?



**Training
System
Availability**



Embedded Training



Bradley AFV
Credit - Oasis Advanced Engineering

UK Combined Arms Tactical Trainer (CATT)



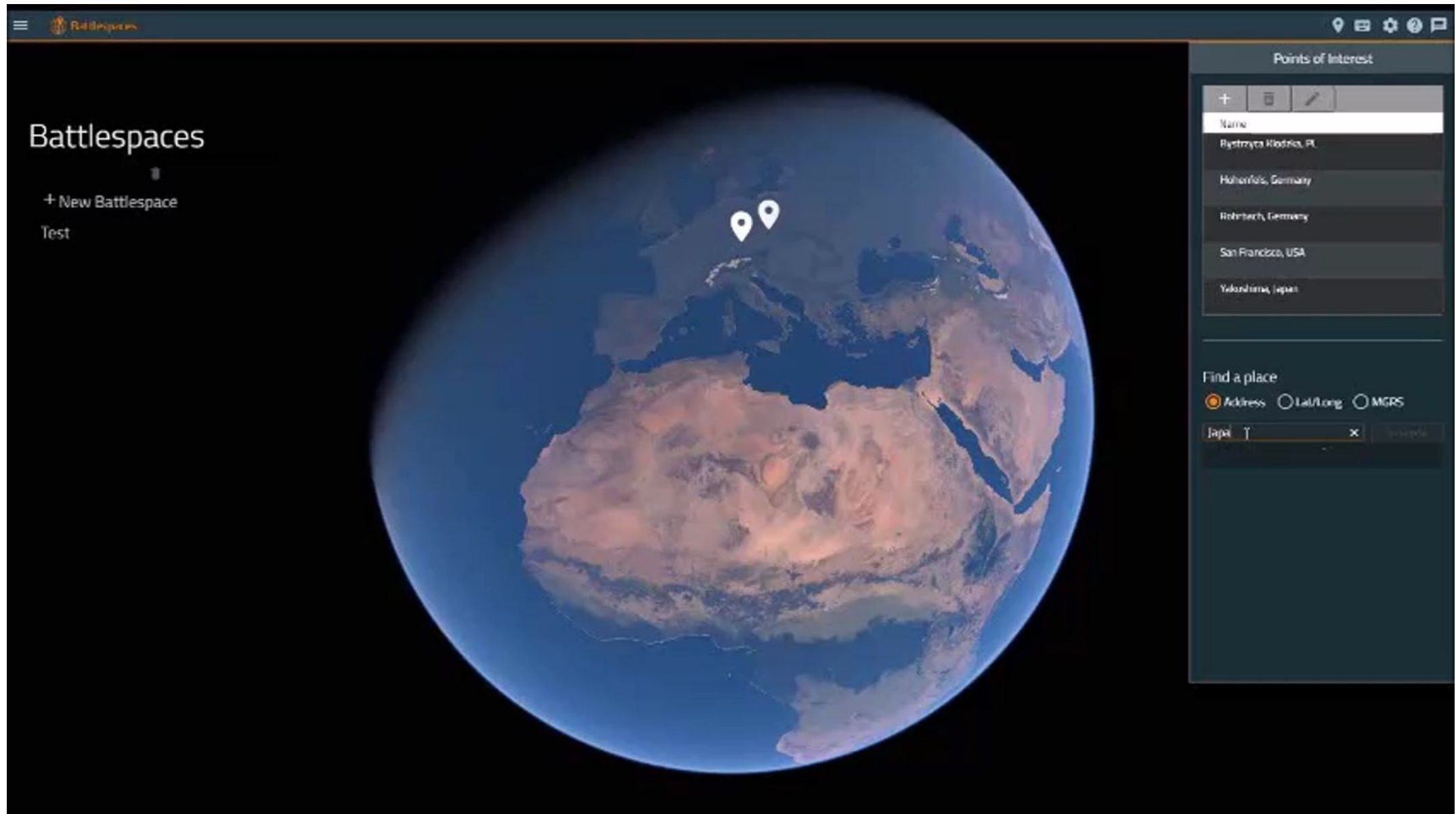
Simulation Everywhere



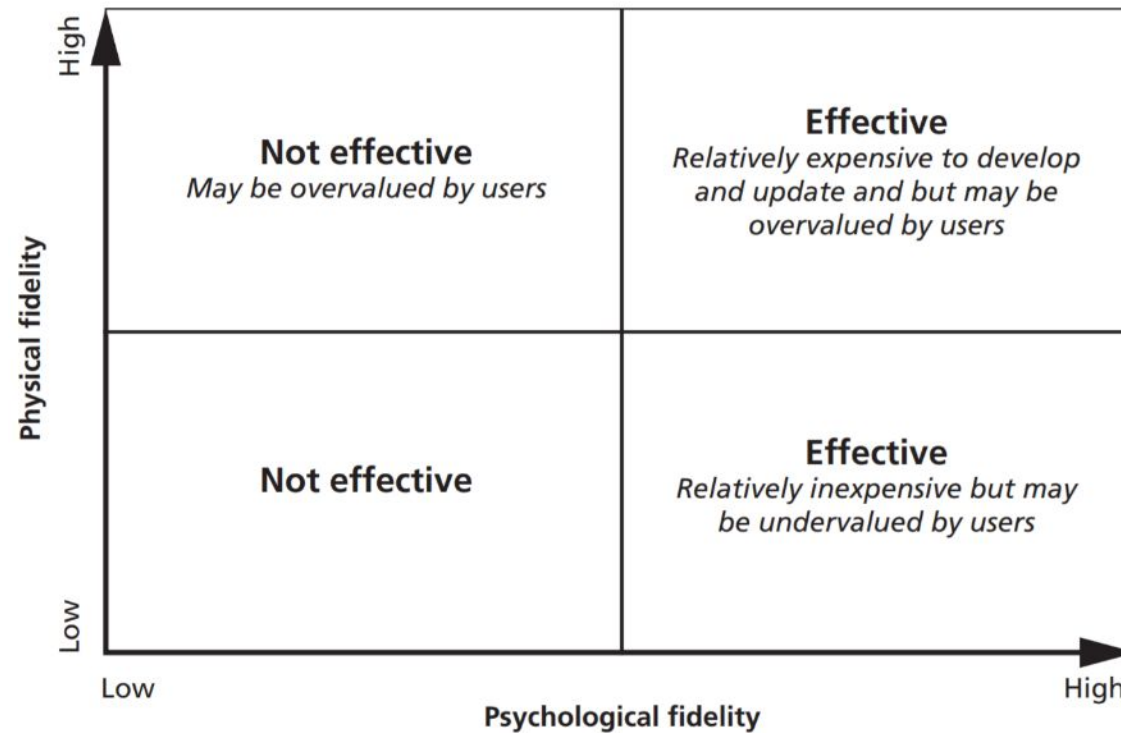
Simulation Now - Land, Sea, Air, Anywhere



Whole Earth Simulation



Do You Need High Physical Fidelity?



Collective Simulation-Based Training in the U.S. Army

User Interface Fidelity, Costs, and Training Effectiveness

Susan G. Straus, Matthew W. Lewis, Kathryn Connor, Rick Eden, Matthew E. Boyer, Timothy Marler, Christopher M. Carson, Geoffrey E. Grimm, Heather Smigowski

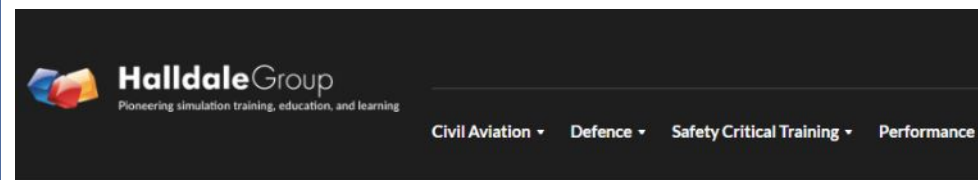


2019

Combat Support – Training & Ops?



Credit – Kognitiv Spark



RAAF Test Microsoft HoloLens



Image credit: RAAF.

MIKE RAJKUMAR

SEPTEMBER 4, 2020

The Royal Australian Air Force (RAAF) recently commenced a trial initiative for maintenance of its C-17A Globemaster III transport aircraft using Microsoft HoloLens mixed-reality devices with software developed by Boeing. The trials commenced in July with aircraft technicians from No. 36 Squadron at RAAF Base Amberley, the service announced in a statement.

Decision
Support

UK MoD
“Single
Synthetic
Environment”



Gen Sir Richard Barrons
Former Commander
UK Joint Forces Command



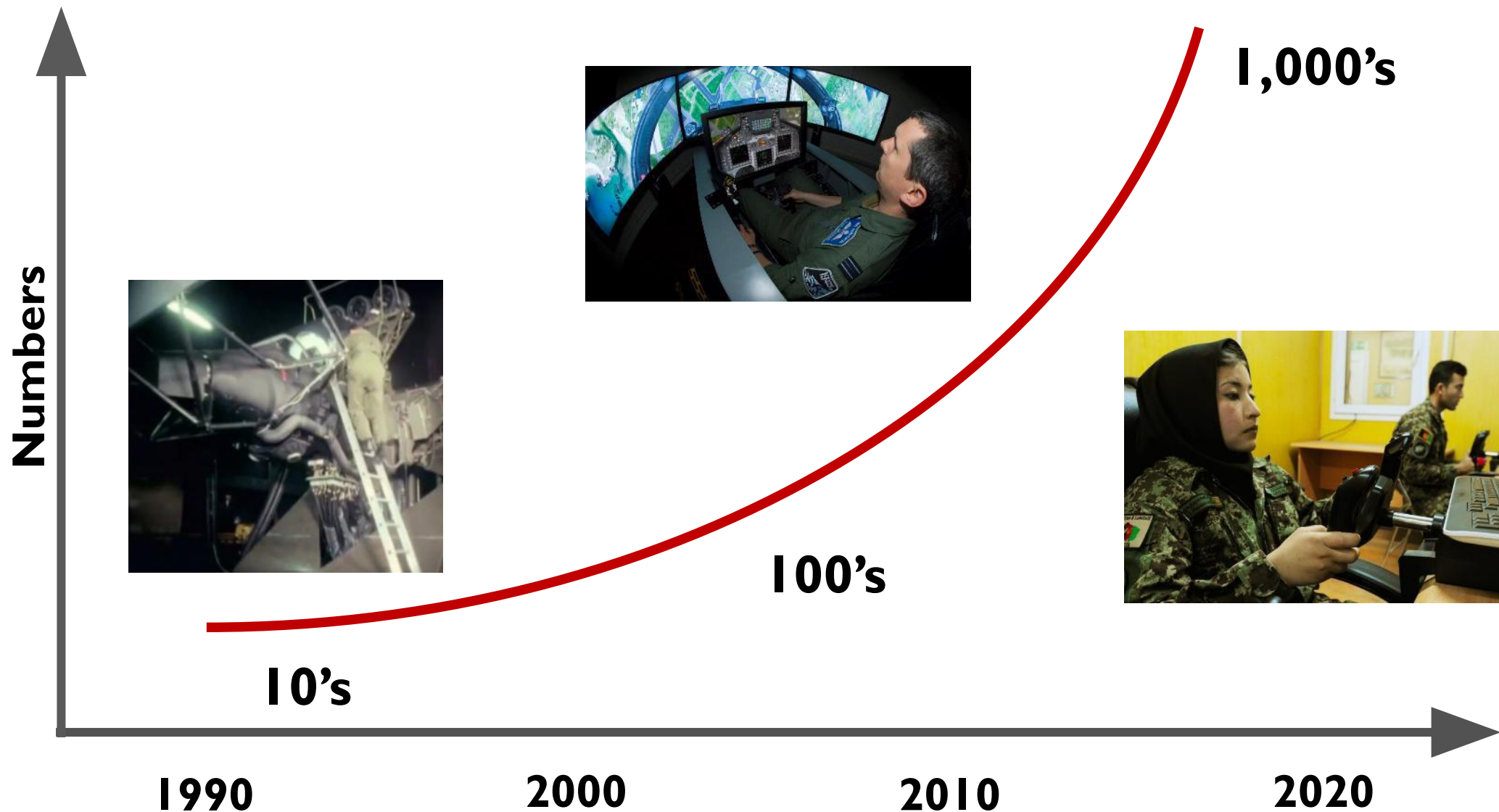
Simulation
(VBS3)

Experimentation

APS
+
Autonomous
Systems

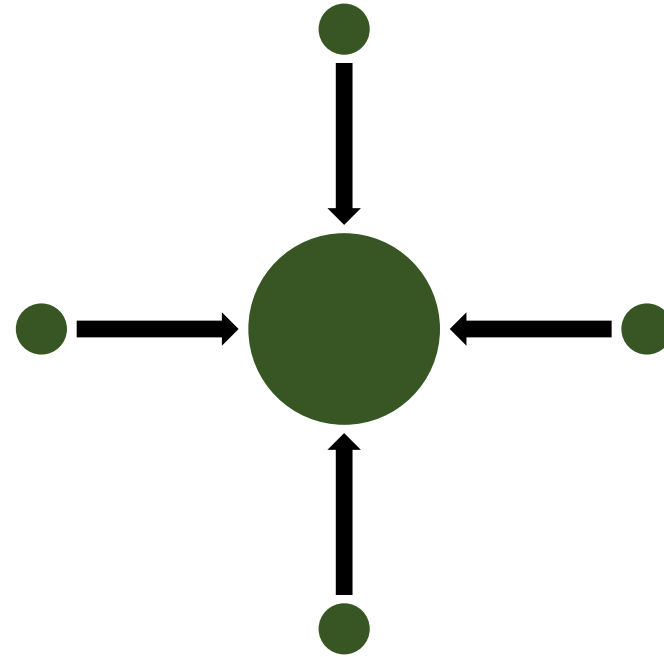


Military Access to Simulation



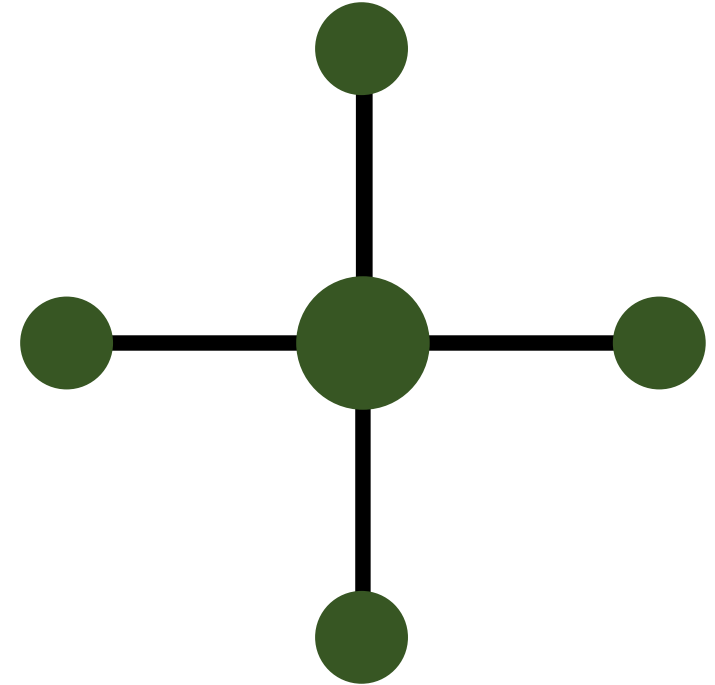
Future
Emphasis?

Now



Training Centres

Future



Training Hubs

XR

XR

eXtended Reality (XR)

Reality	Augmented Reality	Mixed Reality	Virtual Reality
The real world	Information layered over vision	Blend of real & digital information to enhance reality	Fully virtual world
			

VR-Based Training at Scale (2019)



- 18,500 Lufthansa cabin crew practice safety-related training required by the authorities in 18 VR cabins located in Frankfurt and Munich
- Trainees receive a short introduction from the digital assistant, and during the entire exercise a single panel operator can monitor multiple cabins

Safety Critical VR-Based Training



EASA Qualifies World's First VR Flight Training Device



EASA calls the VRM Switzerland Virtual Reality FSTD qualification "a further step towards Agency and industry objectives to improve overall rotorcraft safety by 50% by 2028." Image credit: VRM Switzerland.

RICK ADAMS

APRIL 26, 2021

VRM Switzerland has received approval from the European Union Aviation Safety Agency (EASA) for pilot training credits in a type-specific Robinson R22 virtual reality flight simulation training device, the world's first VR-driven FSTD to receive approval from an aviation regulatory authority.

Mixed Reality in Operations

Microsoft is supplying 120,000 HoloLens-based headsets to the US Army

The contract could be worth up to \$21.88 billion over 10 years

By Tom Warren and Sean Hollister | Mar 31, 2021, 4:11pm EDT



Image: US Army

Microsoft has won a contract to supply the US Army with HoloLens-based headsets. The contract could be worth up to \$21.88 billion over 10 years, and [CNBC reports](#) that it will involve Microsoft supplying 120,000 headsets. The software maker has been working closely with the Army since 2018, and soldiers have been testing the Integrated Visual Augmentation System (IVAS) headsets over the past two years. These devices combine high-resolution night, thermal, and soldier-borne sensors into a heads-up display.

Decision Support



RAAF Trials AR for Virtual Operations Room



Image credit: RAAF.

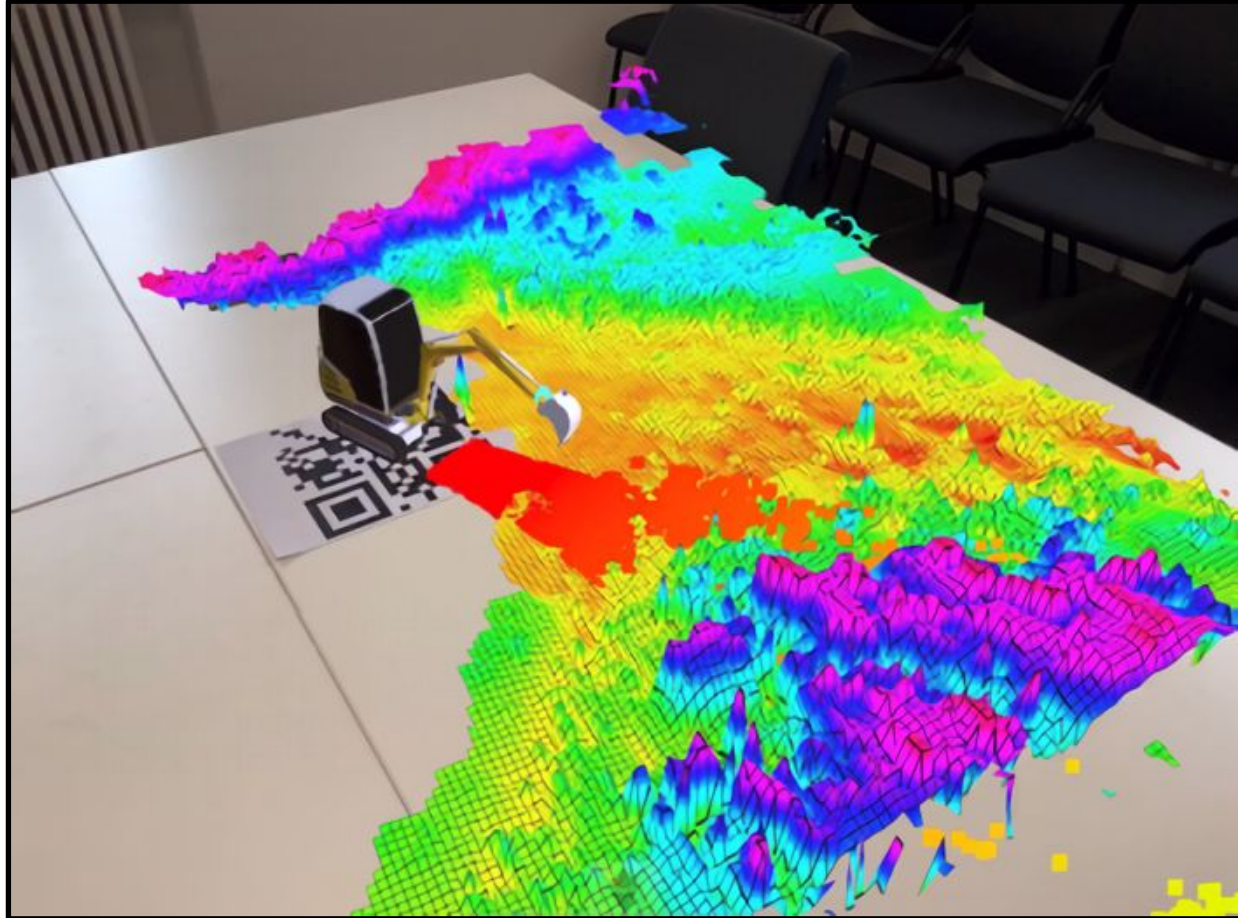
ATUL CHANDRA

APRIL 23, 2021

The Royal Australian Air Force (RAAF) is experimenting with Augmented Reality (AR) technology under its Plan Jericho innovation programme, resulting in the creation of a virtual operations room of the future.

Under Plan Jericho which aims to deliver rapid disruptive capability to the RAAF, its Disruptive Innovation team has been working towards a hybrid reality operations centre.

See What the Machine Sees Through AR (Augmented Reality)



UK VRLT

Battlesbury Barracks, Warminster UK

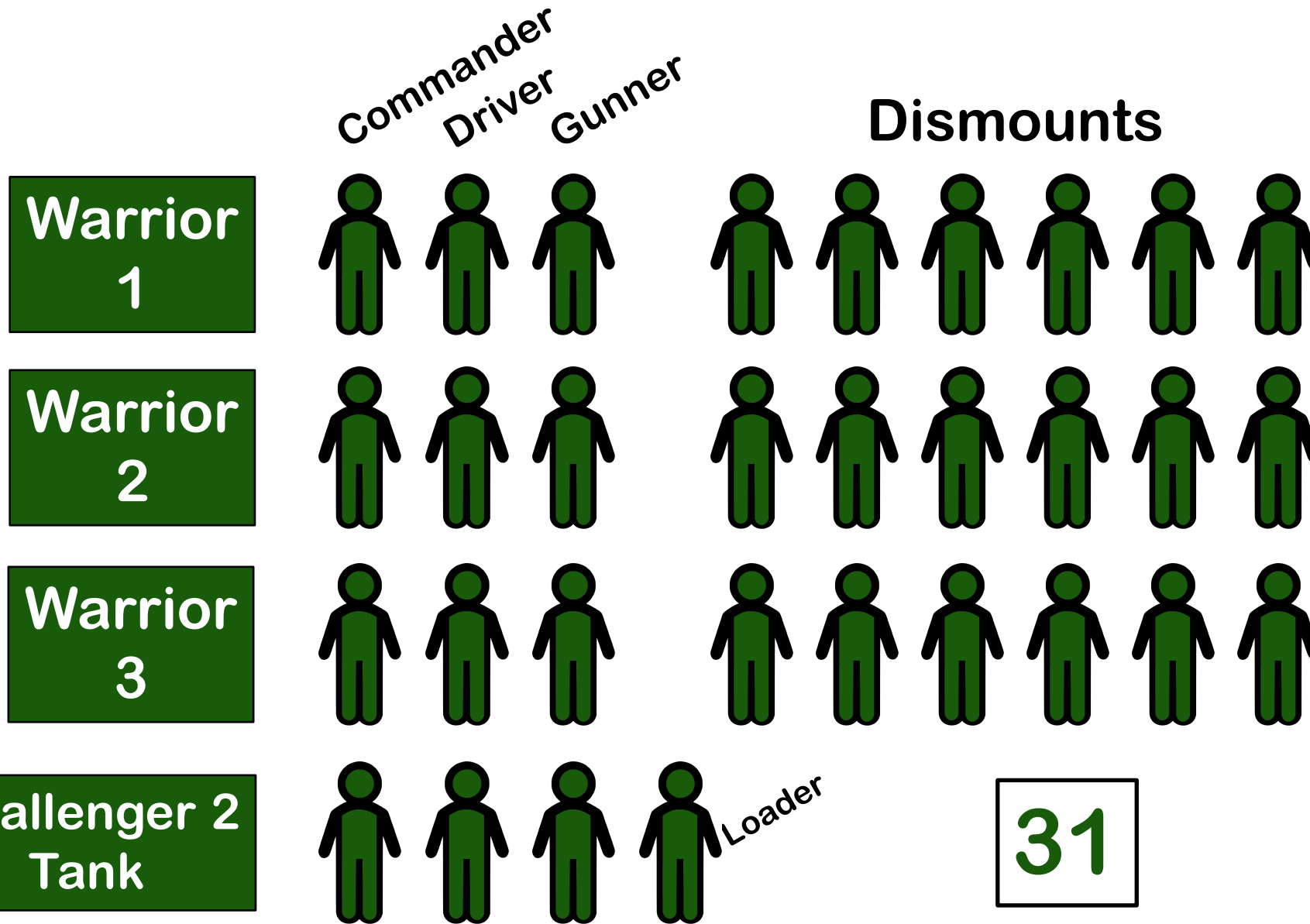


The aim of the VRLT pilot was to identify the opportunities that Virtual Reality technology offers the Future Collective Training System

UK Virtual Reality in Land Training (VRLT) Pilot - 2019



VRLT's Principal Training Audience



VRLT ORBAT



Collective Training Teamwork Taxonomy

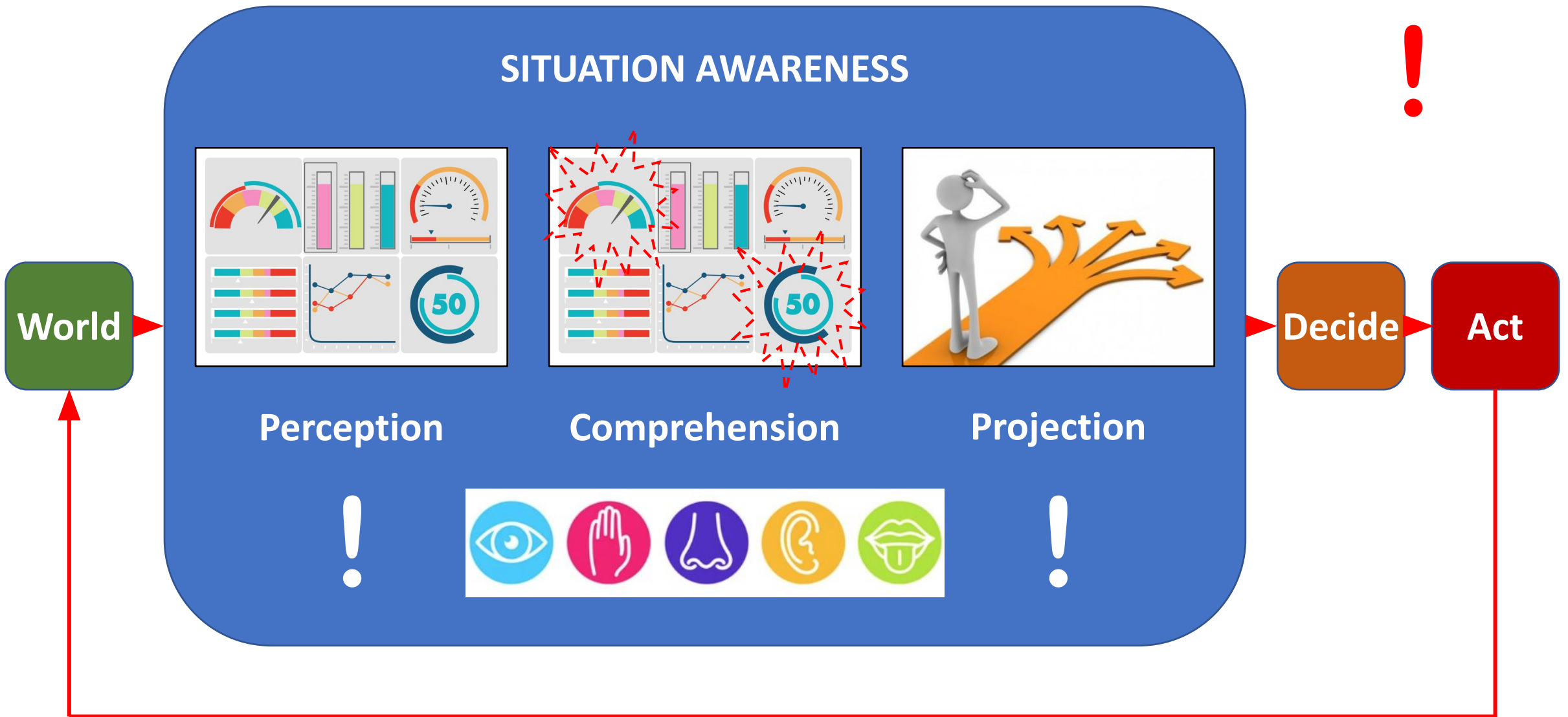
- Leadership – character, knowledge and action that inspires
- Situation Awareness – shared mental model of team situation
- Decision Making – team collectively makes a choice
- Communication – right information, right people, right time
- Co-operation – team goals over individual's

Why VR for Collective Training?

- Immersive environment creates a challenging environment
- Can rapidly rehearse and repeatedly practice in a variety of scenarios
- Flexible, scalable, deployable and cost effective
- “in desktop simulation you look at the virtual world, in VR, you are in it”



Based on Endsley's SA Three Level Model



Practice, Practice, Practice!
Individually and in Teams

VRLT1

The Video



VRLT1

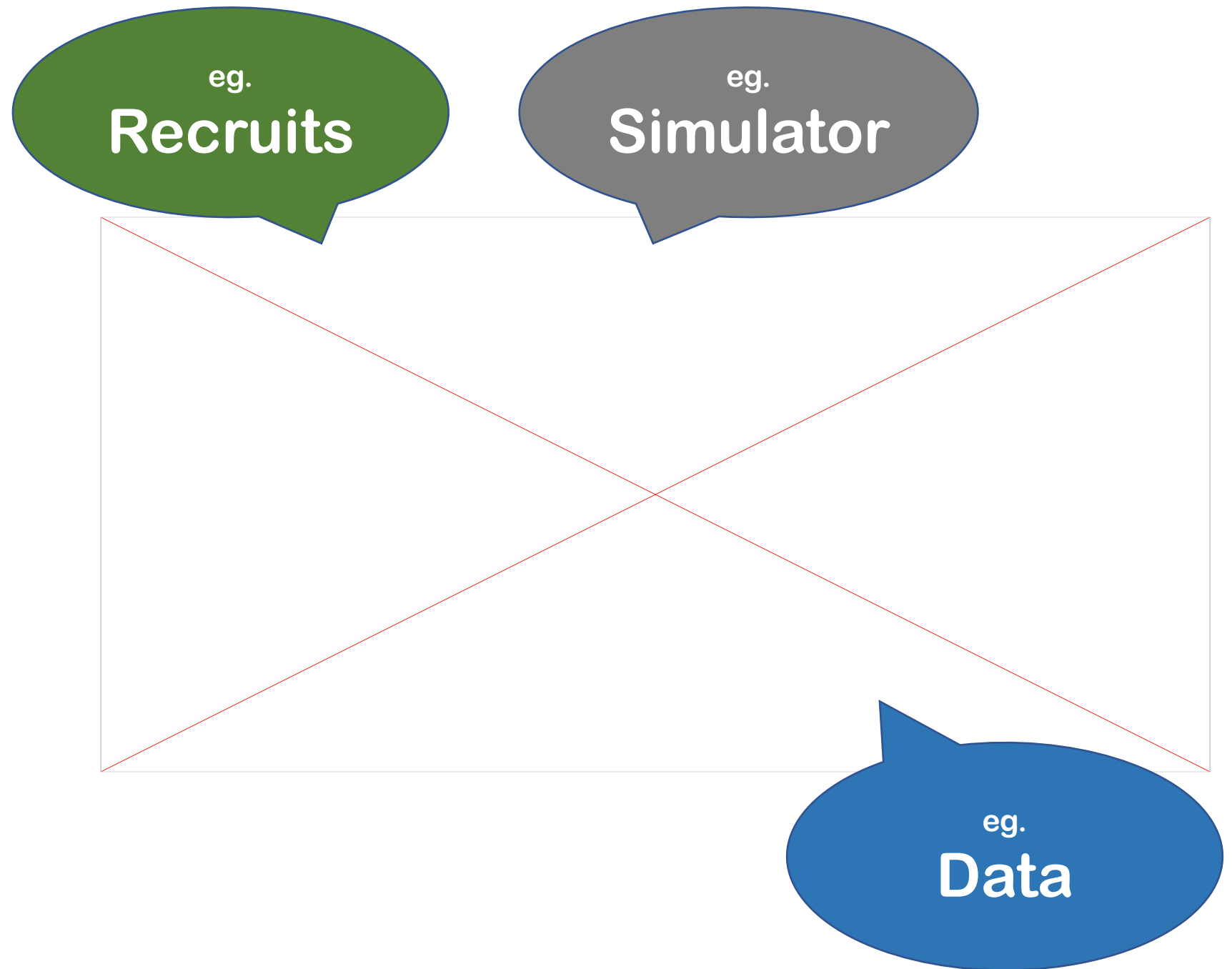
The Video





Some Other Technologies...

Training as a Process...



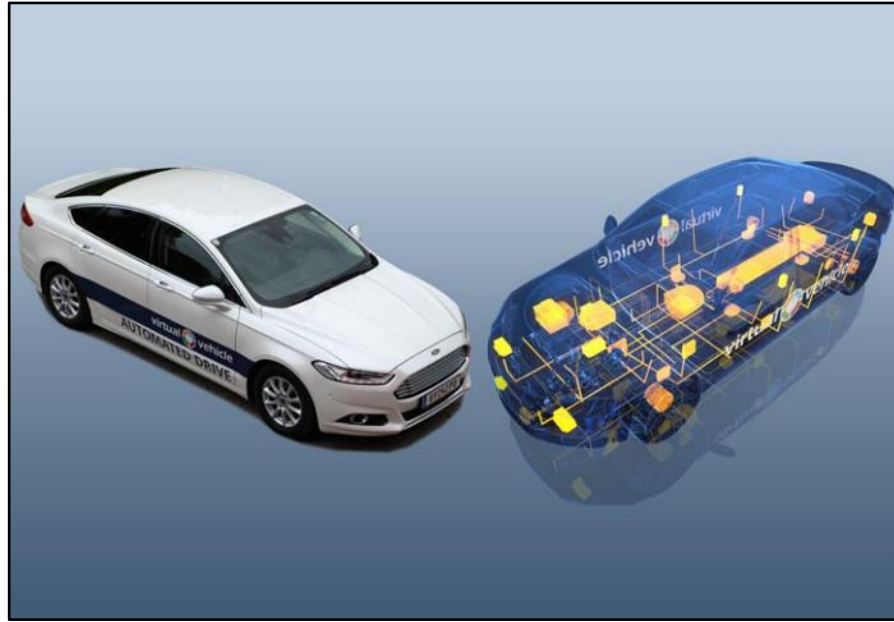
Wearables



Eye Tracking

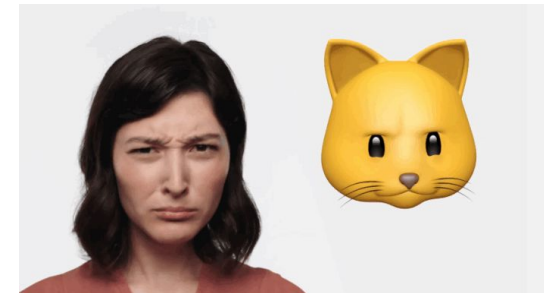
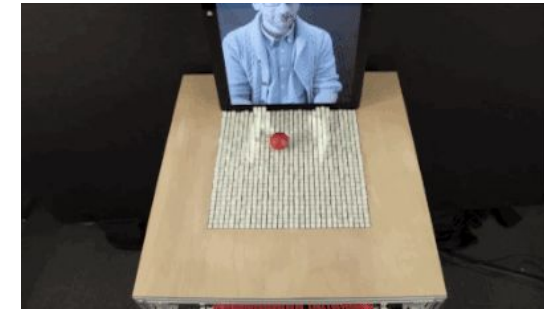


Digital Twins & the Temporal Use of Data



Next-Generation User Interfaces

- Gesture Interfaces
- Tangible User Interface
- Emotion Sensing
- Brain-Computer Interface





Towards the “Metaverse”



Metaverse is a term for the concept of a virtual shared space that converges with actual reality

The convergence of virtually enhanced physical reality and physically persistent virtual space, including the sum of all virtual worlds, augmented reality, and the Internet

The Challenge

- **Innovation and Agility**

Vs?

- **Long Term Support**

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Questions?

Andy Fawkes



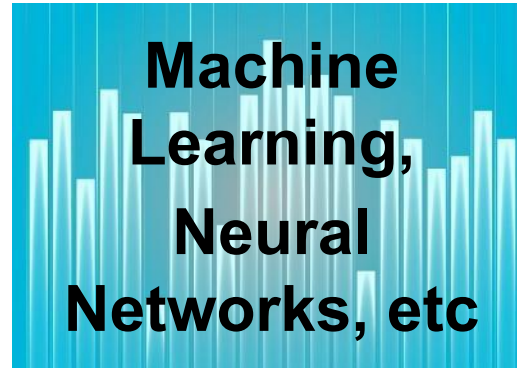
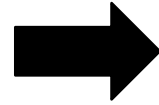
Credit - BISim

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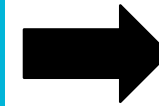
Exploiting Data



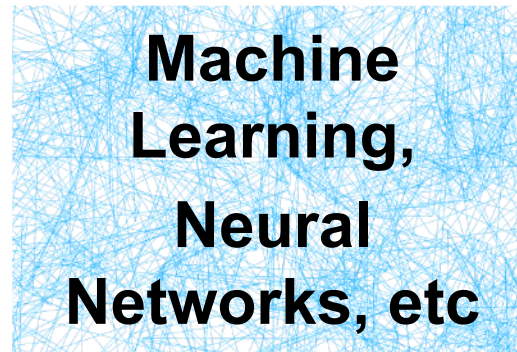
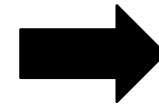
Big Data



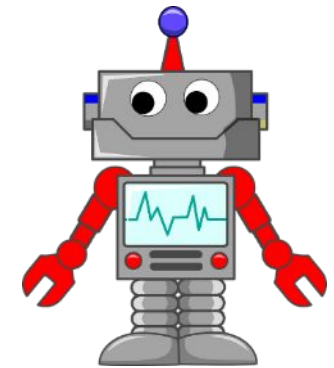
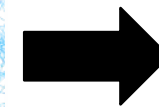
Analysis



Human Decisions



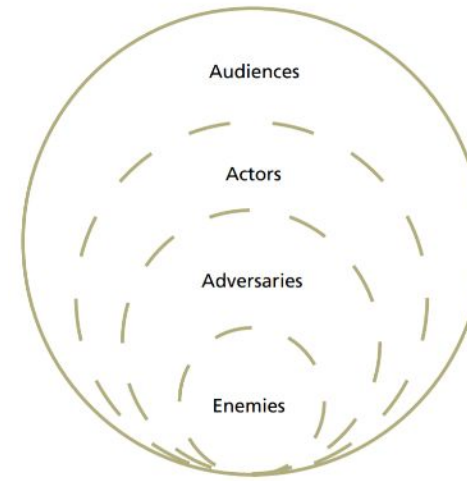
“Training”



Automation

Some Trends

- Integrated Action
- Increasingly 3-Dimensional

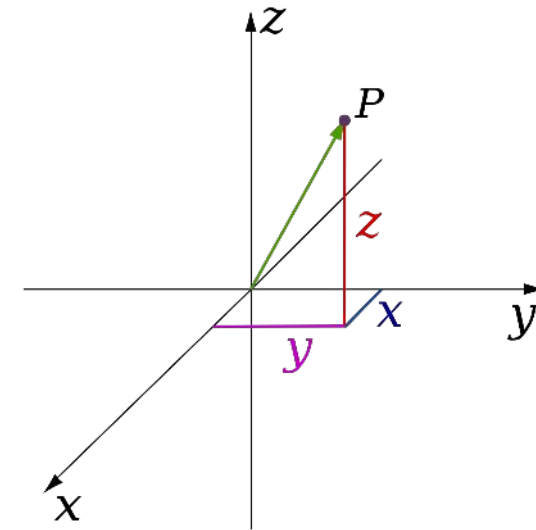


Audience. All the groups and individual people whose perception and interpretation of events and subsequent behaviour contribute to the success or otherwise of military action

Actors. A group or person that takes action or directly exerts influence

Adversary. A group or person that seeks to prevent us from achieving our objectives

Enemy. A group or person that seeks to defeat us through armed lethal means



Human Factors and Training Always Last?

