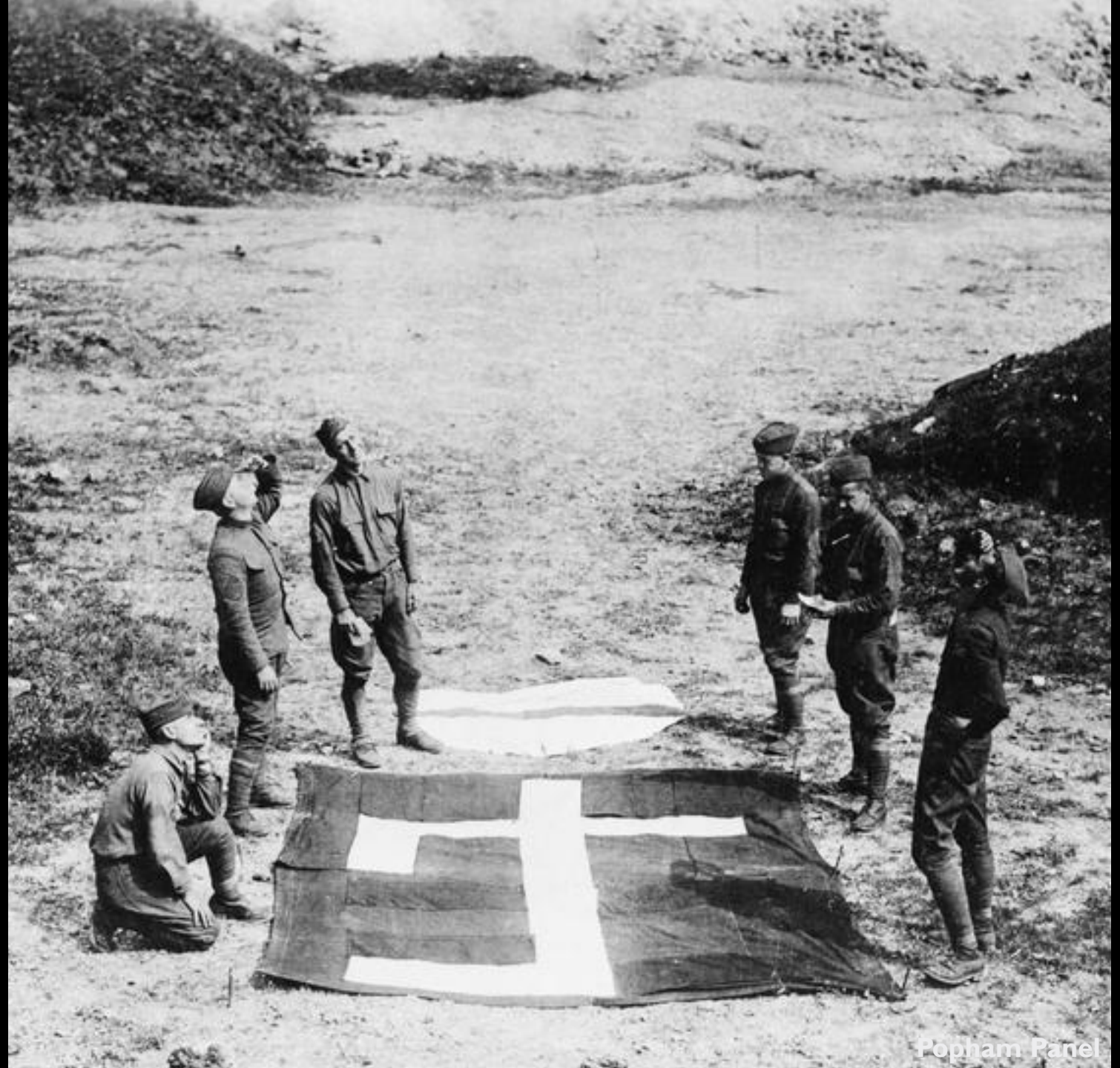


5th Annual SMi

Close Air Support Conference

London - 5 June 2019

The Human Dimension

Andy Fawkes

THINKe

Presentation Overview

- Lessons Learnt?
- Simulation Overview
- Current Training Systems
- Future Training Systems
- Thinking about Recruits
- The Future?

THINKe

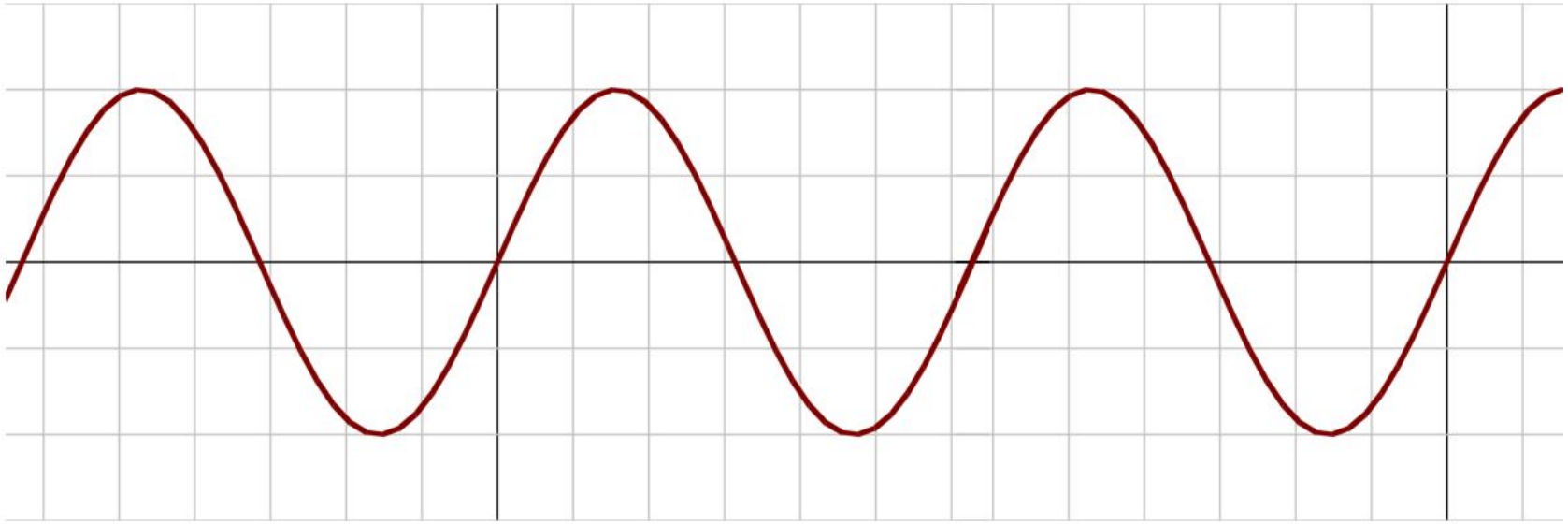
Lessons Learnt?

Georg Wilhelm Friedrich Hegel (1770-1831)
(Born Stuttgart)

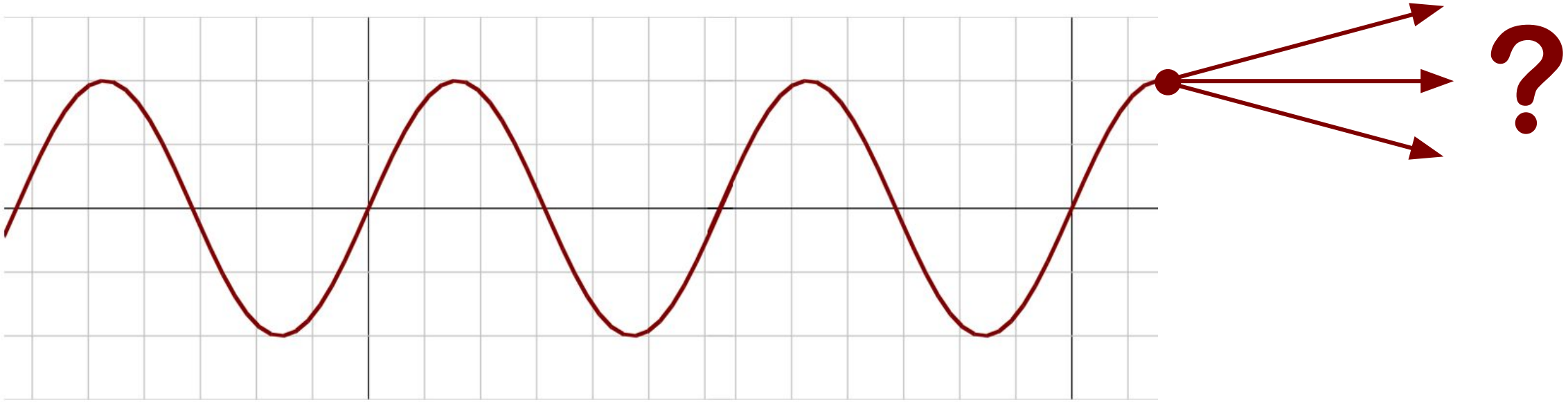
“we learn from history that we do not learn from history”

THINKe

Historic Lessons Learned?



Historic Lessons Learned?



SPECIAL STUDIES

Case Studies in the Development of Close Air Support

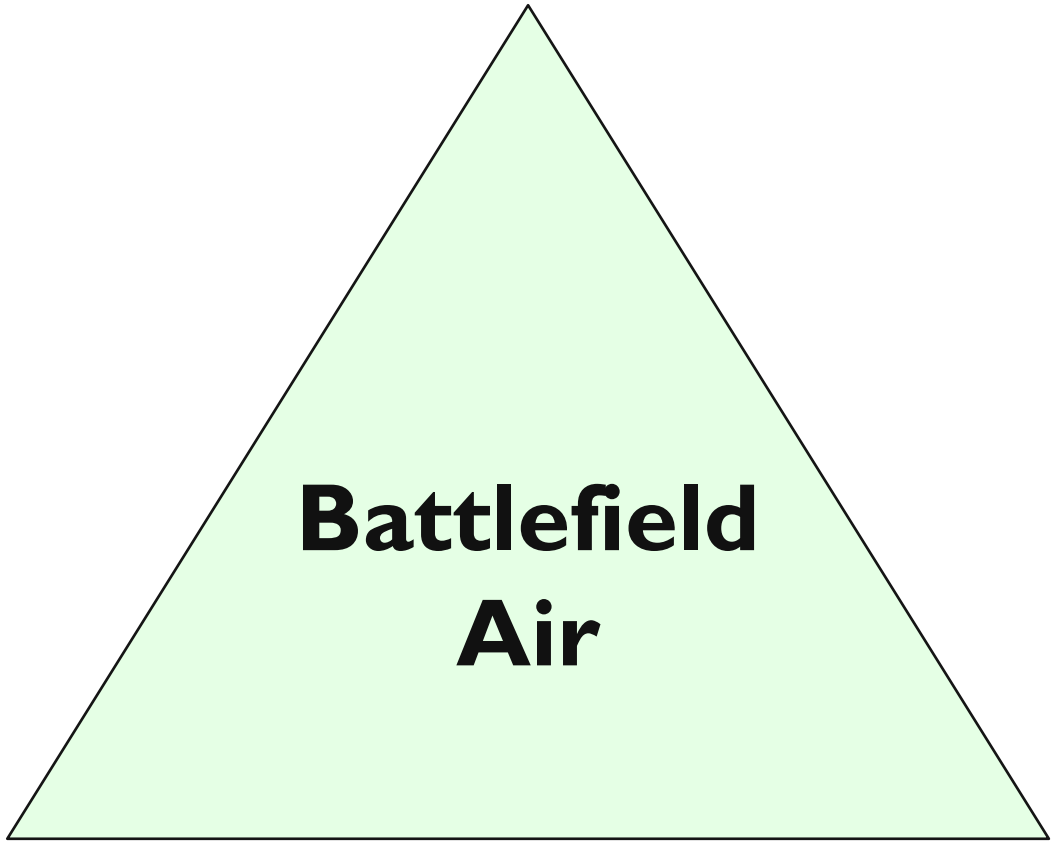
Edited by

Benjamin Franklin Cooling

OFFICE OF AIR FORCE HISTORY
UNITED STATES AIR FORCE
WASHINGTON, DC 1990

Contents

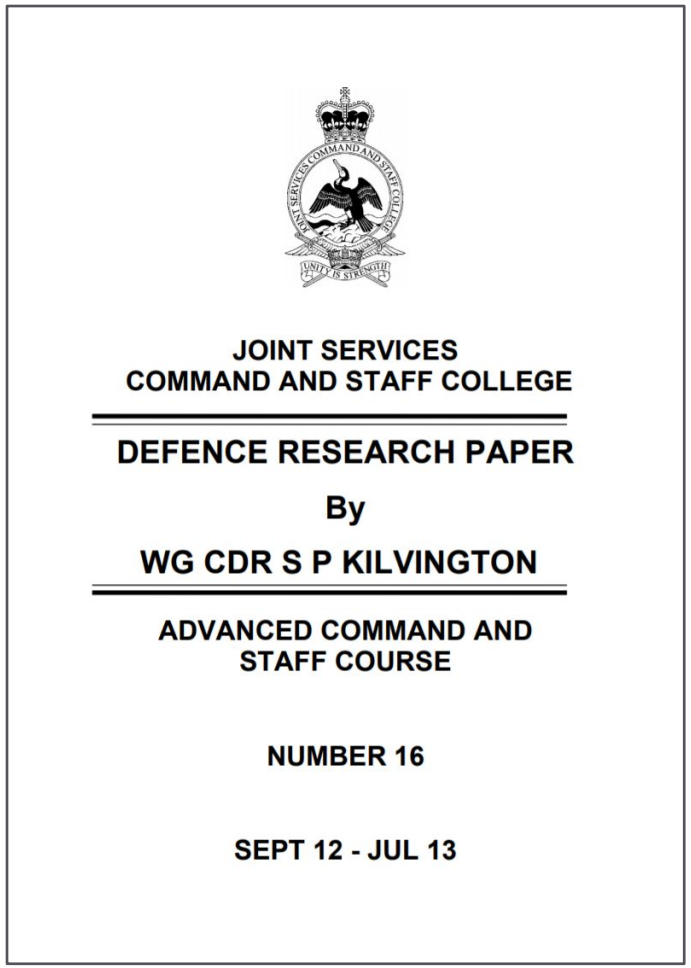
The Role of Battlefield Air?



Some Insights

- Importance of Centralised Control of Air Assets – to See the Bigger Picture
  - But effective organisational structure, processes and culture required, which is often forgotten after the conflict
- In Vietnam, the Joint Task Force Commander, with air and ground commanders, would decide each day what proportion of the available air assets would be deployed to close support, interdiction, and to air superiority
- Communication Interoperability
  - *Luftwaffe* radios operated on different frequencies from those of the German army. German Fighters had voice radios but *Luftwaffe* bombers relied on code transmissions
- The essence of the forward air controller lay in their ability to meld the point of view of the ground troops with a sure knowledge of the capabilities and limitations of airplanes
  - In WW2, Pilots acted as FACs

UK Joint Services Command and Staff College
Defence Research Paper 2013
Delivering effective Air-Land Integration (ALI) in the Next War



JOINT SERVICES
COMMAND AND STAFF COLLEGE

DEFENCE RESEARCH PAPER

By

WG CDR S P KILVINGTON

ADVANCED COMMAND AND
STAFF COURSE

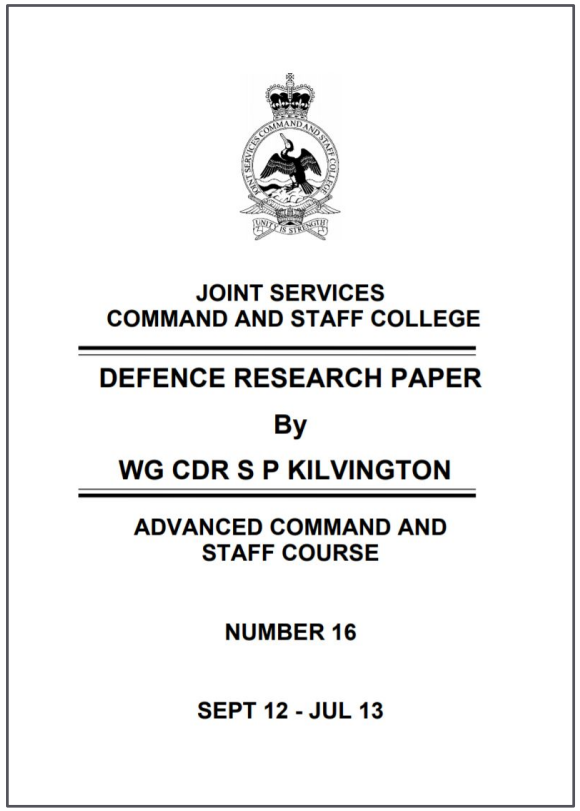
NUMBER 16

SEPT 12 - JUL 13

- Reviewed 100 years of UK ALI Operations
- "UK air and land forces have continually struggled to prepare for joint operations before conflict."
- "history suggests that air and land's consolidated gains from prolonged conflict often become lost skills in the period afterwards; this is particularly true when resources are tight and each service is fighting to retain and sustain its individual capabilities."

THINK

3 Pillars of Effective ALI



JOINT SERVICES
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NUMBER 16

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Effective Air-Land Integration

Capability

Appropriate equipment

Trained personnel

Effective tactics, techniques & procedures

Coordination

Joint planning

Benefits from colocation

Reinforced by effective C2

Common Understanding

Shared doctrine, education & recent, relevant experience

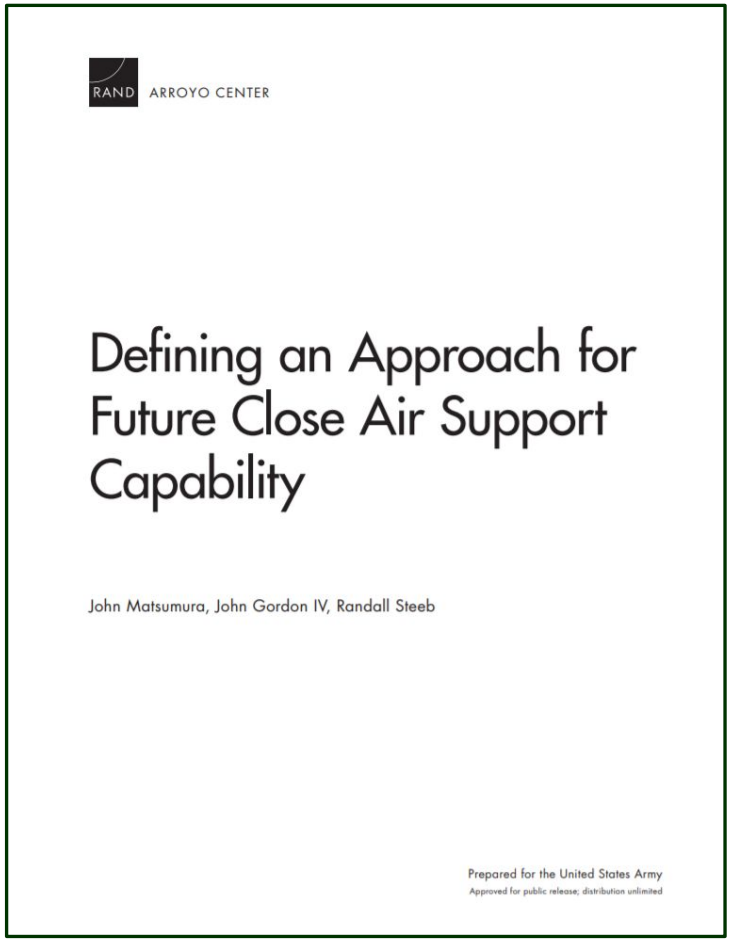
THINK

2000s - UK

- Iraq 2003 – Weak links between the operational and tactical levels
  - ‘the number of Air C2 trained augmentees that we need to make our headquarters work in operational environments is very significant. We do not currently have enough’
    - Commander of British Forces in Iraq, Air Chief Marshal Sir Brian Burridge
- 2003 - Project Coningham-Keyes (PC-K) was set up to develop air integration from a tri-service perspective
- 2003 - Joint Air Land Organisation (JALO) established to coordinate training, to disseminate lessons and to address the shortfalls in technical capability, interoperability and C2
- UK Joint Forward Air Control Training and Standards Unit (JFACTSU) at RAF Leeming ran more courses with both RAF and Army units
- HERRICK Urgent Operational Requirements (UORs) delivered equipment improvements such as advanced targeting pods, datalinks and the FIRESTORM FAC system

The A-10 Debate - 2017

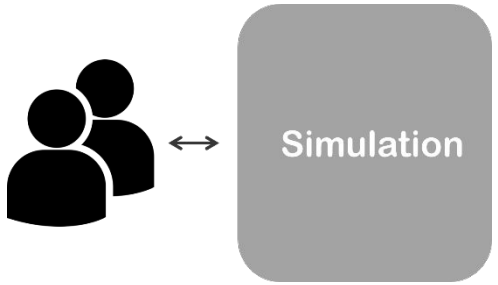
- Given the importance of CAS to joint operations, future CAS requirements should be carefully reexamined
- This reexamination should be similar to the process the Army and Air Force undertook in the late 1960s in which the Army took on a significant role in defining key capabilities
- The assessment should address the needs of the affected services and their visions for future CAS directly
- The analysis should compare near-, mid-, and far-term CAS alternatives to the A-10, including fixed- and rotary-wing aircraft, both manned and unmanned, and also consider potential nonaircraft alternatives, such as ground-launched and loitering precision munitions

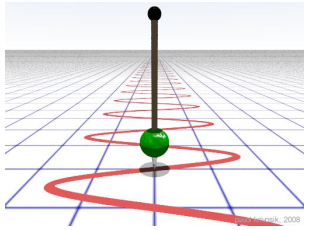


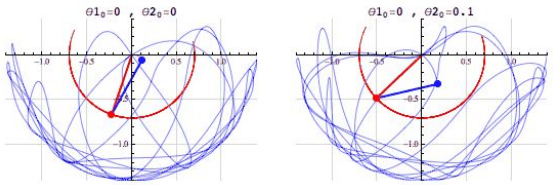
Simulation Overview

What is Simulation?

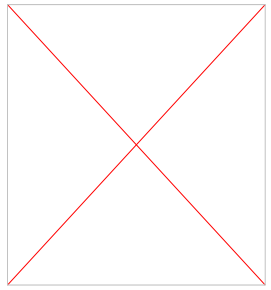
- Humans Inside or Outside
- Runs in Real or Non-Real Time
- Some Systems have Order
- Some Systems are Chaotic
- Some are Random





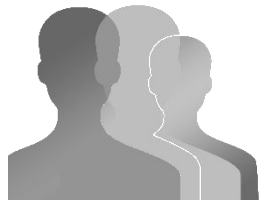


Simulation Categories (LVC)



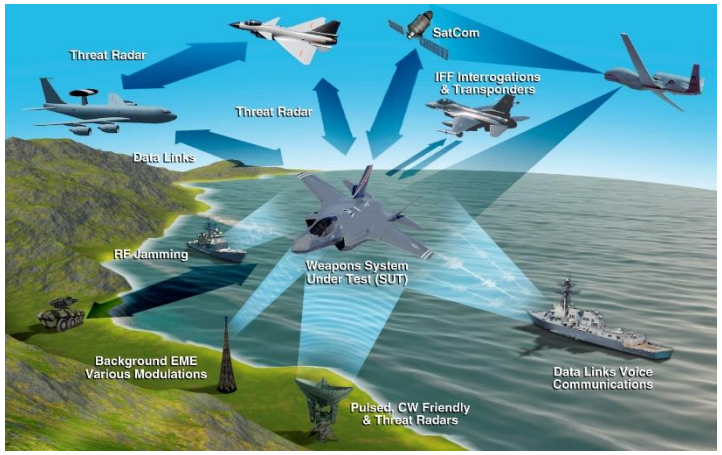
Equipment

	Real	Simulated
Real	Live	
Simulated	Virtual	Constructive



People

Why Use Simulation in Training?

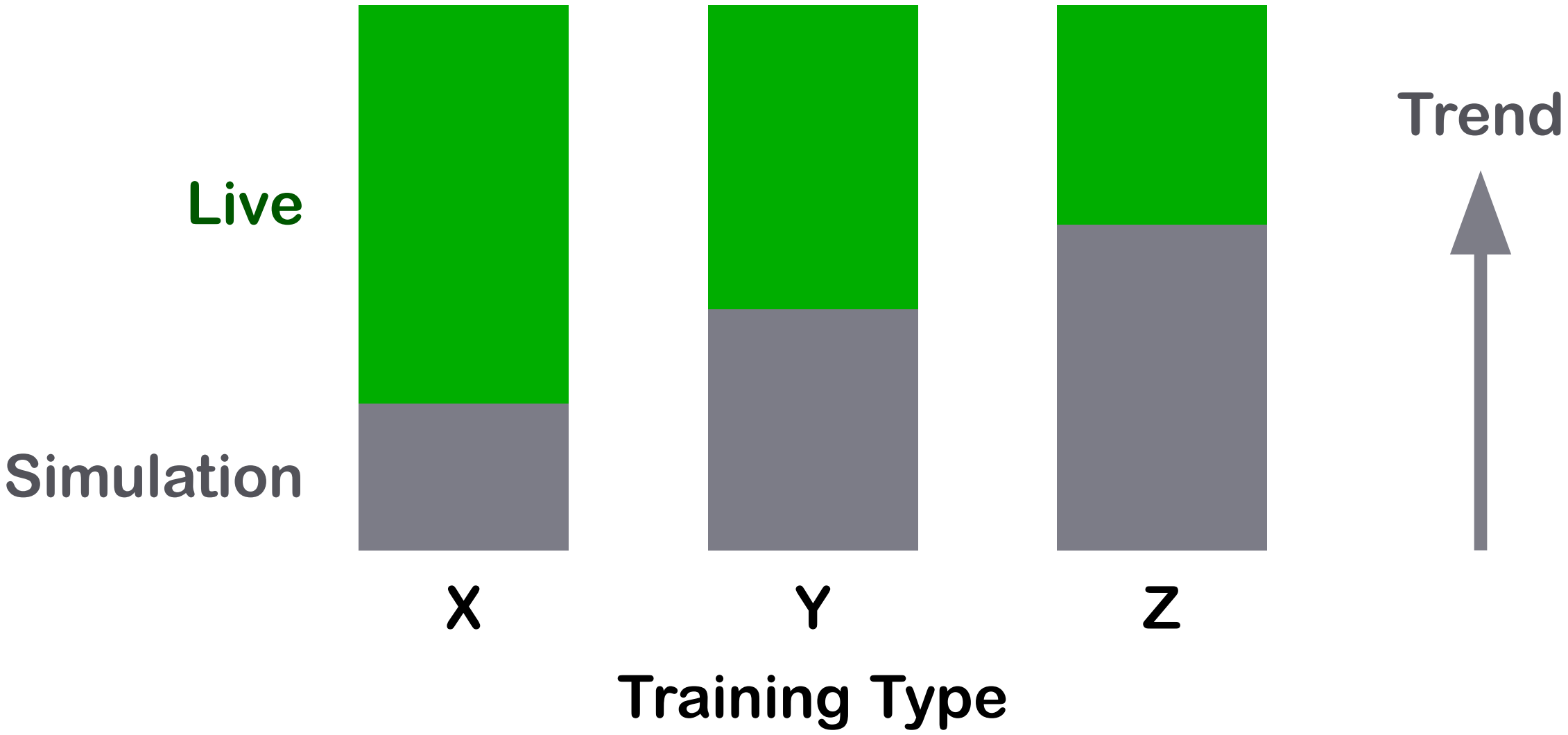


Simulation Now - Land, Sea, Air, Anywhere

US Army STE (Synthetic Training Environment)

One World Simulation, AI-Driven Entities

Live & Simulation Based Training



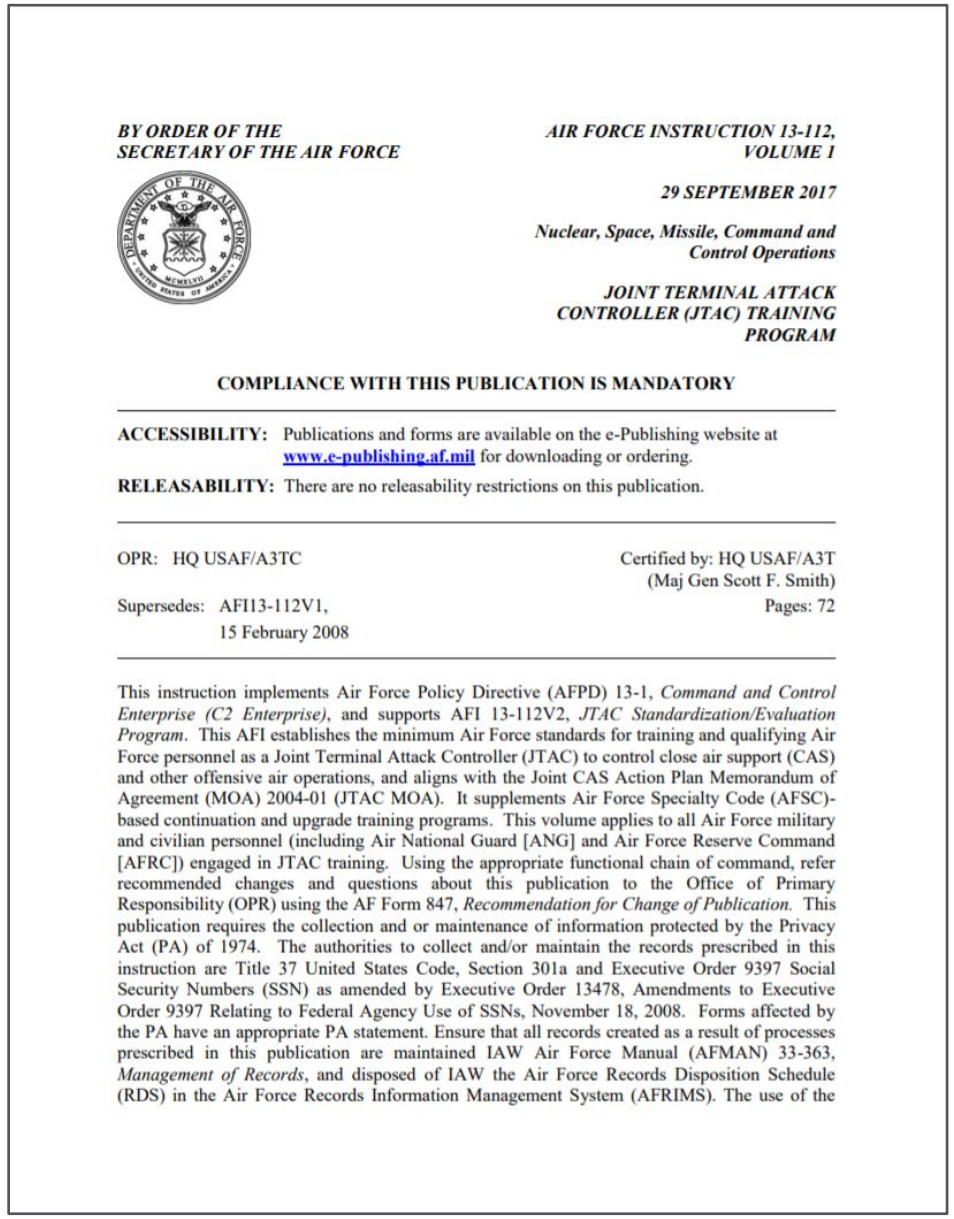
SISO/US Army – ENGTAM Group

(Exploration of Next Generation Technology Applications to Modeling and Simulation)

- **Gaming Technology**
  - The games-derivative simulation software is already used in many areas of training and is extending into the image generator and mission rehearsal spaces.
- **Virtual Reality**
  - VR may find its way into a number of new applications in the military training space where immersion and physical space are significant or limiting factors.
- **Augmented Reality**
  - AR may become increasingly more prevalent in training as the technology becomes more robust and most probably making its way into the operational space too.
- **Cloud and Streaming**
  - Future simulation and other training and education services may be streamed across the enterprise over a private secure cloud and network.
- **Wearables/IoT**
  - In the military domain it will be possible to monitor and interact with all military people and equipment with value in both training and operations.
- **Big Data and Data Analytics**
  - The ability to monitor, record and learn from training data will be enhanced.
- **Artificial Intelligence**
  - AI will impact on operations but also training through improved AI in simulations and intelligent tutoring.

Current Training Systems

Training Requirements – Initial and Continuation



BY ORDER OF THE SECRETARY OF THE AIR FORCE

AIR FORCE INSTRUCTION 13-112, VOLUME 1

29 SEPTEMBER 2017

Nuclear, Space, Missile, Command and Control Operations

JOINT TERMINAL ATTACK CONTROLLER (JTAC) TRAINING PROGRAM

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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OPR: HQ USAF/A3TC

Certified by: HQ USAF/A3T (Maj Gen Scott F. Smith)

Supersedes: AFI13-112V1, 15 February 2008

Pages: 72

This instruction implements Air Force Policy Directive (AFPD) 13-1, *Command and Control Enterprise (C2 Enterprise)*, and supports AFI 13-112V2, *JTAC Standardization/Evaluation Program*. This AFI establishes the minimum Air Force standards for training and qualifying Air Force personnel as a Joint Terminal Attack Controller (JTAC) to control close air support (CAS) and other offensive air operations, and aligns with the Joint CAS Action Plan Memorandum of Agreement (MOA) 2004-01 (JTAC MOA). It supplements Air Force Specialty Code (AFSC)-based continuation and upgrade training programs. This volume applies to all Air Force military and civilian personnel (including Air National Guard [ANG] and Air Force Reserve Command [AFRC]) engaged in JTAC training. Using the appropriate functional chain of command, refer recommended changes and questions about this publication to the Office of Primary Responsibility (OPR) using the AF Form 847, *Recommendation for Change of Publication.* This publication requires the collection and or maintenance of information protected by the Privacy Act (PA) of 1974. The authorities to collect and/or maintain the records prescribed in this instruction are Title 37 United States Code, Section 301a and Executive Order 9397 Social Security Numbers (SSN) as amended by Executive Order 13478, Amendments to Executive Order 9397 Relating to Federal Agency Use of SSNs, November 18, 2008. Forms affected by the PA have an appropriate PA statement. Ensure that all records created as a result of processes prescribed in this publication are maintained IAW Air Force Manual (AFMAN) 33-363, *Management of Records*, and disposed of IAW the Air Force Records Disposition Schedule (RDS) in the Air Force Records Information Management System (AFRIMS). The use of the

NATO/PfP UNCLASSIFIED

NATO OTAN — NATO STANDARDIZATION AGENCY / AGENCE OTAN DE NORMALISATION — NSA

MILITARY COMMITTEE AIR STANDARDIZATION BOARD (MCASB)

27 April 2009

NSA(AIR)0477(2009)AO/3797

MCASB

STANAG 3797 AO (EDITION 4) - MINIMUM QUALIFICATIONS FOR FORWARD AIR CONTROLLERS & LASER OPERATORS IN SUPPORT OF FORWARD AIR CONTROLLERS

References:
A. NSA(AIR)0619(2006)AO/3797 dated 17 August 2006 (Edition 3)
B. NSA(AIR)0546(2008)-AO/3797 dated 3 June 2008
C. NSA(AIR)0698(2008)AO/3797 dated 2 July 2008

1. The enclosed NATO Standardization Agreement, which has been ratified by nations as reflected in the NATO Standardization Document Database (NSDD), is promulgated herewith.

2. The references listed above are to be destroyed in accordance with local document destruction procedures.

ACTION BY NATIONAL STAFFS

3. National staffs are requested to examine their ratification status of the STANAG and, if they have not already done so, advise the MCASB NSA, through their national delegation as appropriate of their intention regarding its ratification and implementation.

Juan A. MORENO
Vice Admiral, ESP(N)
Director, NATO Standardization Agency

Enclosure:
STANAG 3797 (Edition 4)

NATO Standardization Agency - Agence OTAN de normalisation
B-1110 Brussels, Belgium Internet site: http://nsa.nato.int
E-mail: air@nsa.nato.int - Tel 32.2.707.5591 - Fax 32.2.707.57.18

NATO/PfP UNCLASSIFIED

Distributed Synthetic Air Land Training (DSALT) - 2011

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Distributed Synthetic Air Land Training (DSALT) - 2011

Elektroniksystem- und Logistik-GmbH (ESG)
Joint Fires Training – 2018

THINKe

UK Immersive Close Air Support Simulator (iCASS)

- JFACTSU, RAF Leeming
- Only NATO and US Joint Services accredited UK facility, training approx 100 FACs/JTACs per year
- 3M Dome, full AAR

Images - MetaVR

USAF Joint Terminal Control Training & Rehearsal System (JTC TRS)

- 32 Systems to be installed
- Partial dome simulator
- Accredited to replace live fly CAS aircraft for:
  - type 1, 2, and 3 controls, day and night missions, controls requiring a ground-based laser target designator for terminal guidance operations/marking, utilizing an IR pointer for night target marking, video downlink for enhanced target description, and surface to surface and air to surface fires integration/deconfliction

Images - MetaVR

Advanced Joint Terminal Attack Controller Training System (AAJTS / AJTS) Dome Simulators

- Installed across US & Europe
- 5-meter, 270 degree FOV training dome system
- US Accredited for types 1, 2, 3 controls for both day and night, and for laser target designation with a simulated military laser device and meets or exceeds current NATO STANAG standards

Images - MetaVR

THINKe

UK Joint Fires Mobile Trainer (JFMT) – 2019
Procured for 1st Artillery Brigade

THINKe

Future Training Systems

UK Joint Fires Synthetic Trainer (JFST)

- Army's Single Statement of User Need (SSUN) which Joint Fires Synthetic Trainer (JFST) will deliver against is:
  - 'The user requires an intuitive, accessible and immersive training capability to assist in the delivery of Joint Fires training for contemporary operations at Individual and Collective levels, in both the mounted and dismounted roles.'
- JFST seeks to improve the training capability delivered to the Army
  - It will replace existing training capabilities currently provided by Distributed Synthetic Air Land Training 2 (DSALT2) and the immersive Close Air Support Simulator (iCASS) at Joint Forward Air Controller Training and Standards Unit (JFACTSU), as well as other obsolete and unsupported capabilities.
- JFST will provide an immersive Joint Fires (JF) training capability, able to train JF integrators in both mounted and dismounted roles, across Land, Littoral and Air domains and at individual and collective levels.
- The simulated training environment will enable realistic and complex training that cannot be conducted live on the UK training estate, thus maintaining operational effectiveness.
- TSSP Project Team

UK Defence Operational Training Capability (Air)

- The DOTC(A) Programme (Pg) will establish a series of networked synthetic mission training facilities (a system of systems) to fill the long-standing gaps in Air Force Elements (FE) Team and Collective postgraduate mission training.
- FE simulators at Main Operating Bases (MOBs) will connect to a Core Systems & Services (CS&S) located at RAF Waddington.
- The CS&S will provide Team and Collective training that can be tailored to the prevailing Operational environment and the Training Objectives (TOs) of the FE.
- Initial capabilities
  - Integration with Typhoon, Sentry E-3D Rear Crew Training system, Joint Fires Synthetic Trainer (JFST) and the UK F-35B Lightning mission simulators
- Subsequent capabilities
  - Focus on remaining Air force elements, and other Land/Maritime synthetic capabilities once their requirements and associated benefits have been articulated, to meet Jt collective training requirements
- Later capabilities
  - Distributed links to NATO, other coalition partners and potentially component level organisations.
- FSAST Project Team

THINK

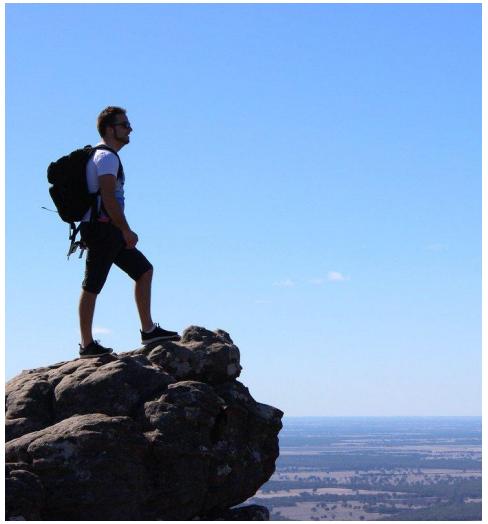
UK Air Support to Defence Operational Training (ASDOT)

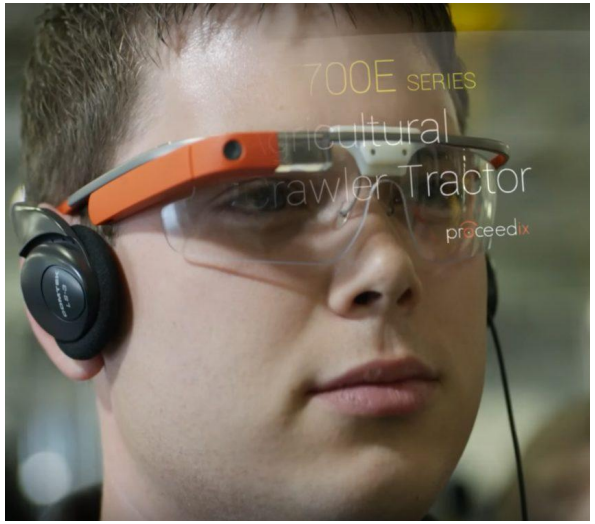
- Announced June 2016; Cancelled March 2019
- A proposed programme whereby training in defence for aircrew in the armed forces of the United Kingdom would be devolved to a civilian contractor, including:
  - Air to air combat training
  - Air to surface training
  - Joint terminal attack controller / forward air controller training (JTAC/FAC)
  - Electronic Warfare (EW)
  - Air Traffic Control (ATC)
  - Aerospace Battle Management (ABM)
  - Ground Based Air Defence (GBAD)
  - Live Gunnery
- MFTS Project Team

Wikipedia

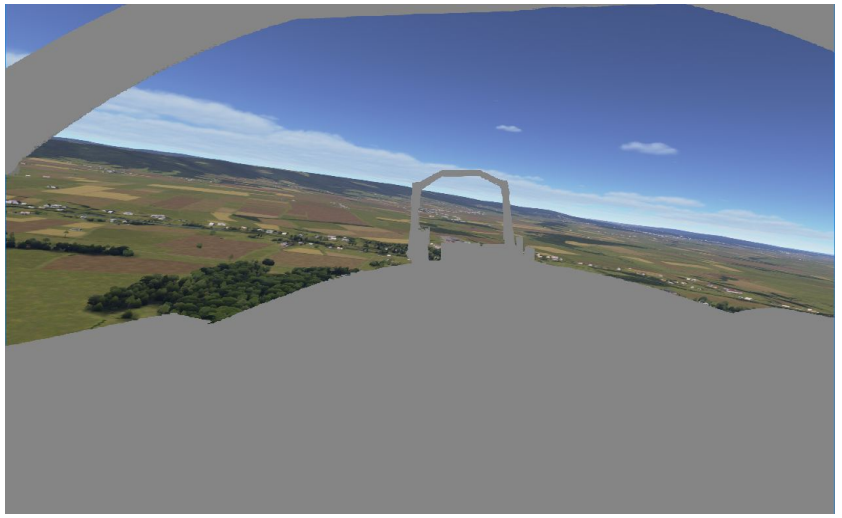
Additional Realities

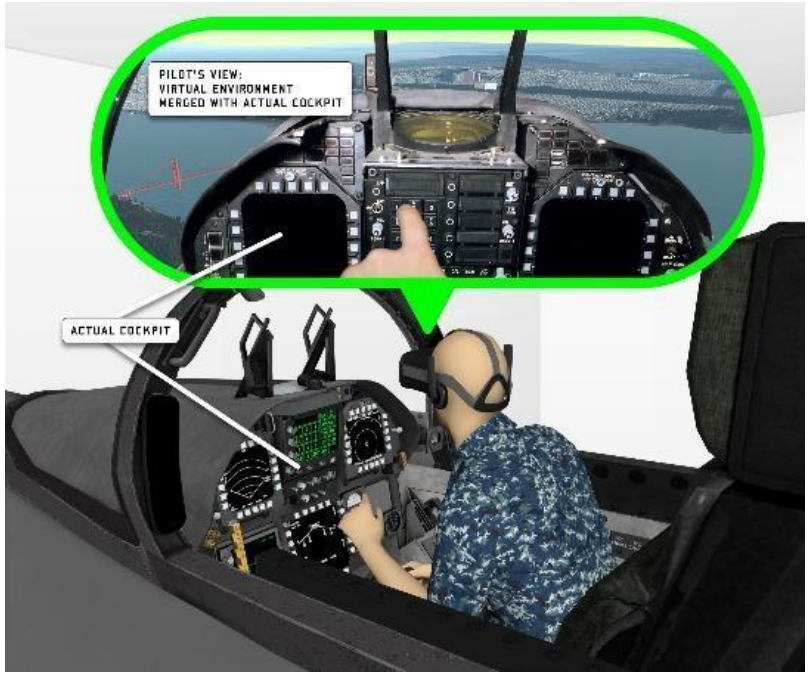
Reality	Augmented Reality	Mixed Reality	Virtual Reality
The real world	Information layered over vision	Blend of real & digital information to enhance reality	Fully virtual world





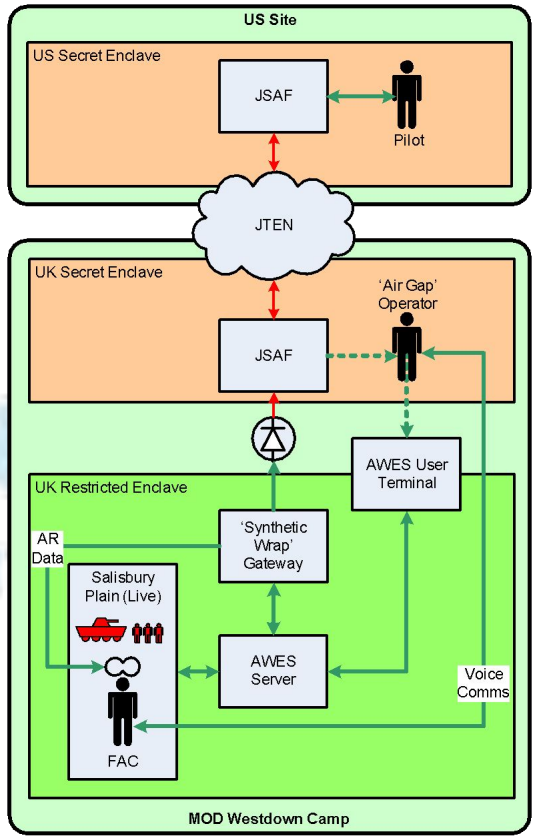
Mixed Reality Visual System (MRVS)





Augmented Reality – 2008

- US Pilot in US-Based Flight Simulator
- Transatlantic Connection
- UK Soldier on Salisbury Plain with Augmented Reality Sight
- Virtual Bombs landing on Real Terrain



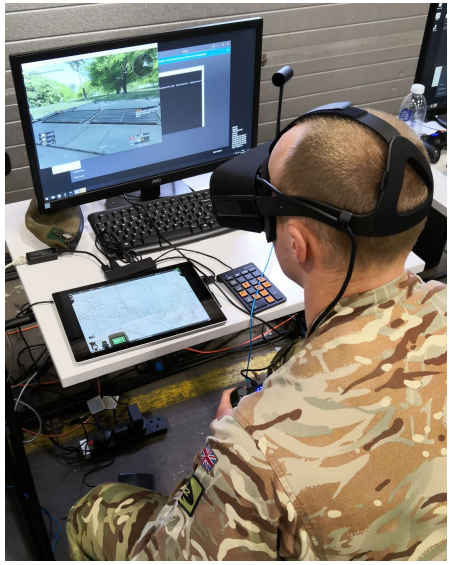
Source: JTEN use case latest Final(1) - SISO Discussion Forums (Internet)

Close Air Solutions (UK)
Real + Virtual - Hyper Real Immersion – 2018

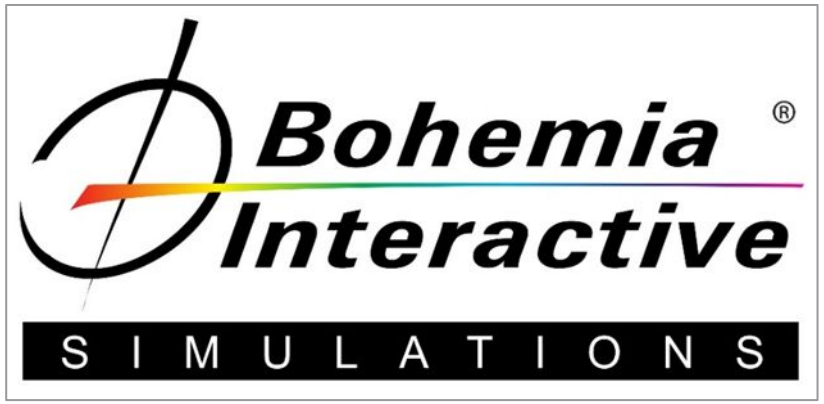
THINKe

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

- “The aim of the VRLT pilot is to identify the opportunities that Virtual Reality technology offers the UK Army Future Collective Training System”
- Up to 37 Trainees in VR + MR
- Mounted/Dismounted/Indirect Fire



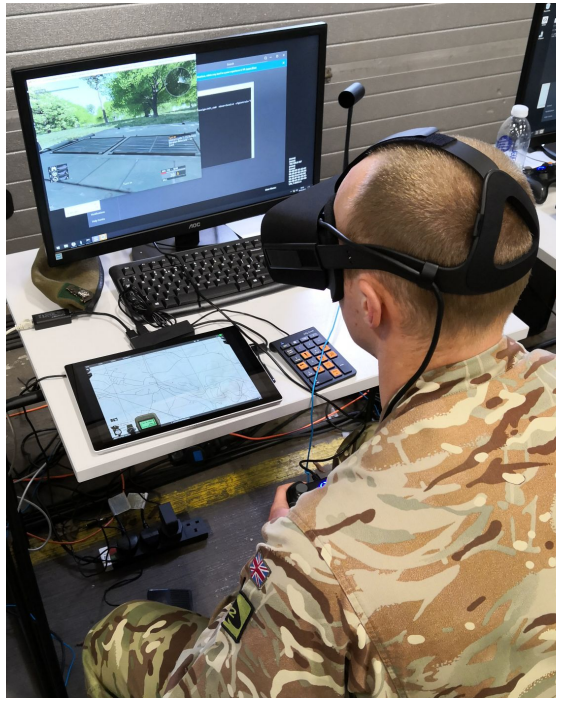
VRLT Contractor Team



VRLT Pilot Insights

- Deployability
  - to point of need and low physical footprint with COTS Software & Hardware
- Flexibility
  - to inject complexity and switch between configurations and scenarios and support individual and collective training
- Scale and Time
  - with ~40 users and ~100 deemed readily achievable for around 1 hour
- Combined arms teamworking
  - with dismounts alongside vehicles and other combined arms capabilities
- Communication and coordination skills
  - under pressure created through an immersive environment
- Decision making and judgements
  - in a high-intensity ‘safe to fail’ immersive 3D environment
- Integration
  - of federated simulations and training measurement and evaluation techniques
- Wider utility
  - through pre-briefing, rehearsal of concepts, briefing the plan, in-action review and after-action review

In Virtual Simulation you look at the Virtual World, in VR you are in it



Maintaining Proficiency

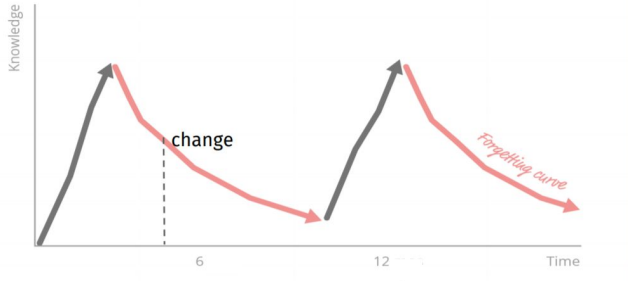
How do we stay proficient?

repetitive tasks?

↓

on the job

How do we stay proficient?

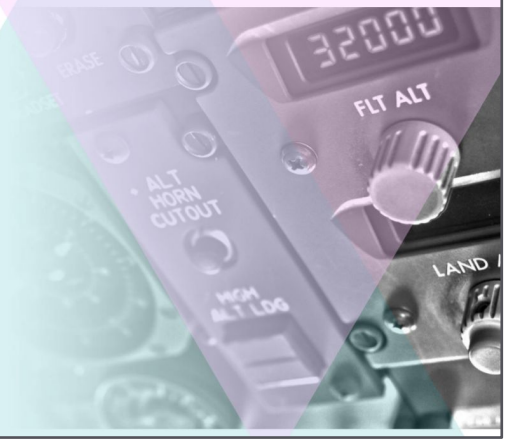


How do we stay proficient?

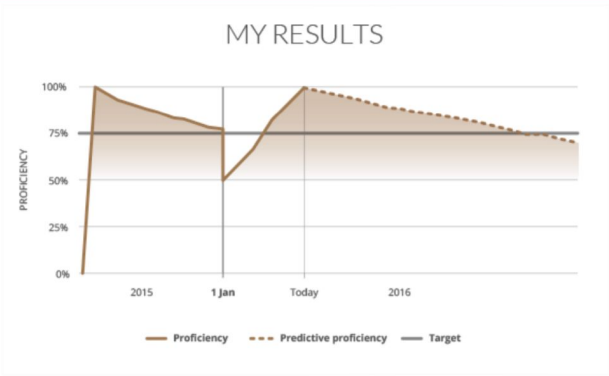
non-repetitive tasks?

↓

yearly recurrent exam
simulator
....



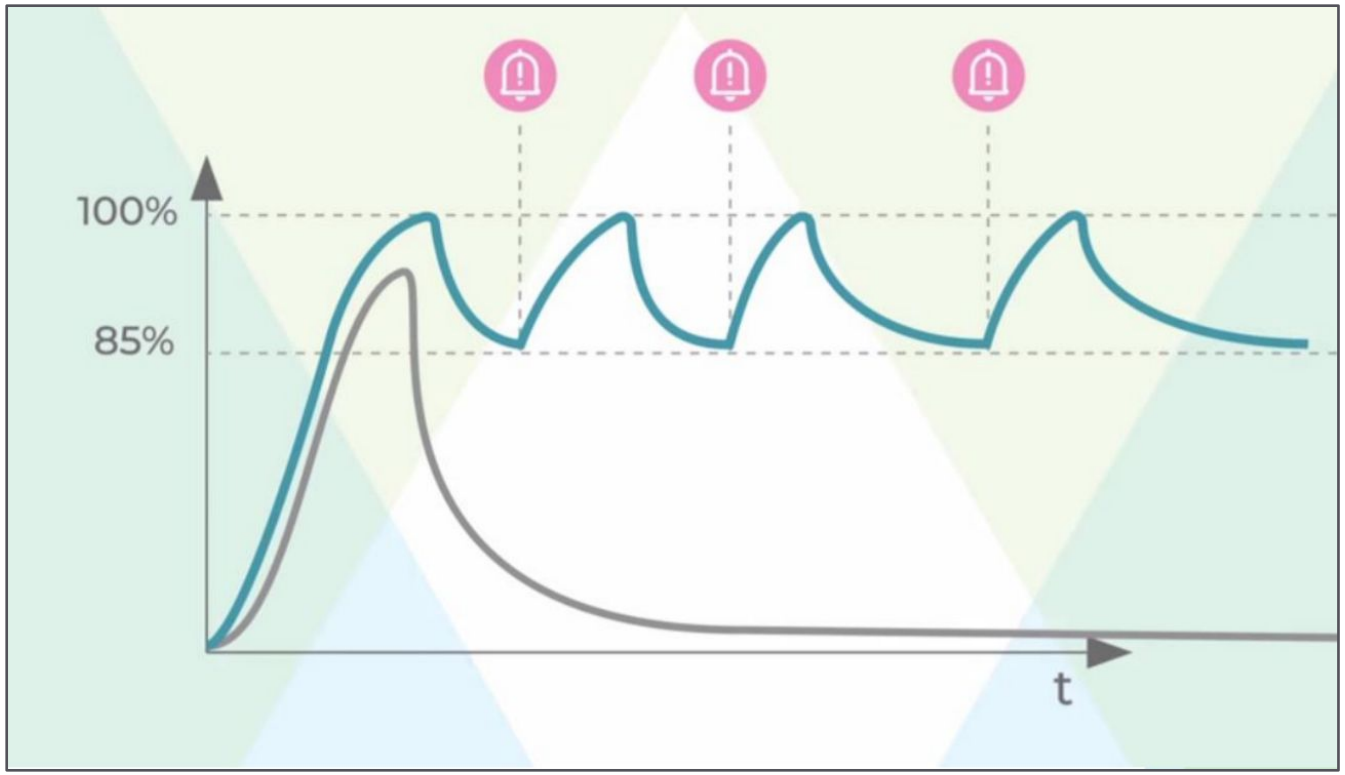
Manage change



drillster *learning with you*

THINKe

Maintaining Proficiency



Each employee:

- The right knowledge
- At the right time
- For the right tasks

Always prepared for the job!

Thinking about Recruits

FAC/JTAC of the Future?

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

UK Military Age Distribution - 2019

47% ≤ 29 years old

and

82% ≤ 39

UK REGULAR FORCES BY AGE

Full-time trained and untrained personnel, at 1 April 2018

	Army Service	Naval Service	RAF Service	All services
Under 18-24	**21,720**	**7,440**	**5,530**	**34,710**
Under 18	1,630	230	160	2,030
18-24	20,090	7,210	5,370	32,680
25-34	**34,770**	**13,550**	**13,220**	**61,530**
25-29	19,250	7,540	6,830	33,610
30-34	15,520	6,010	6,390	27,920
35-44	**19,640**	**7,490**	**9,330**	**36,470**
35-39	12,760	4,650	5,790	23,210
40-44	6,880	2,840	3,540	13,260
45 and over	**4,970**	**4,010**	**4,860**	**13,850**
45-49	3,270	2,360	2,790	8,420
50-54	1,510	1,390	1,740	4,640
55-59	190	250	330	770
60 and over	~	10	~	20

UK Defence Personnel Statistics - CBP7930, 12 June 2018

“Digital Native”

generally considered a person born in the 1980s and after growing up in the digital age with day to day access to computers, games, Internet, etc.

Broadly, 2/3^{rds} of the Military are now Digital Natives and 90% by 2030

THINKe

Oxford Dictionary – Flikr/cwasteson

What's Next?

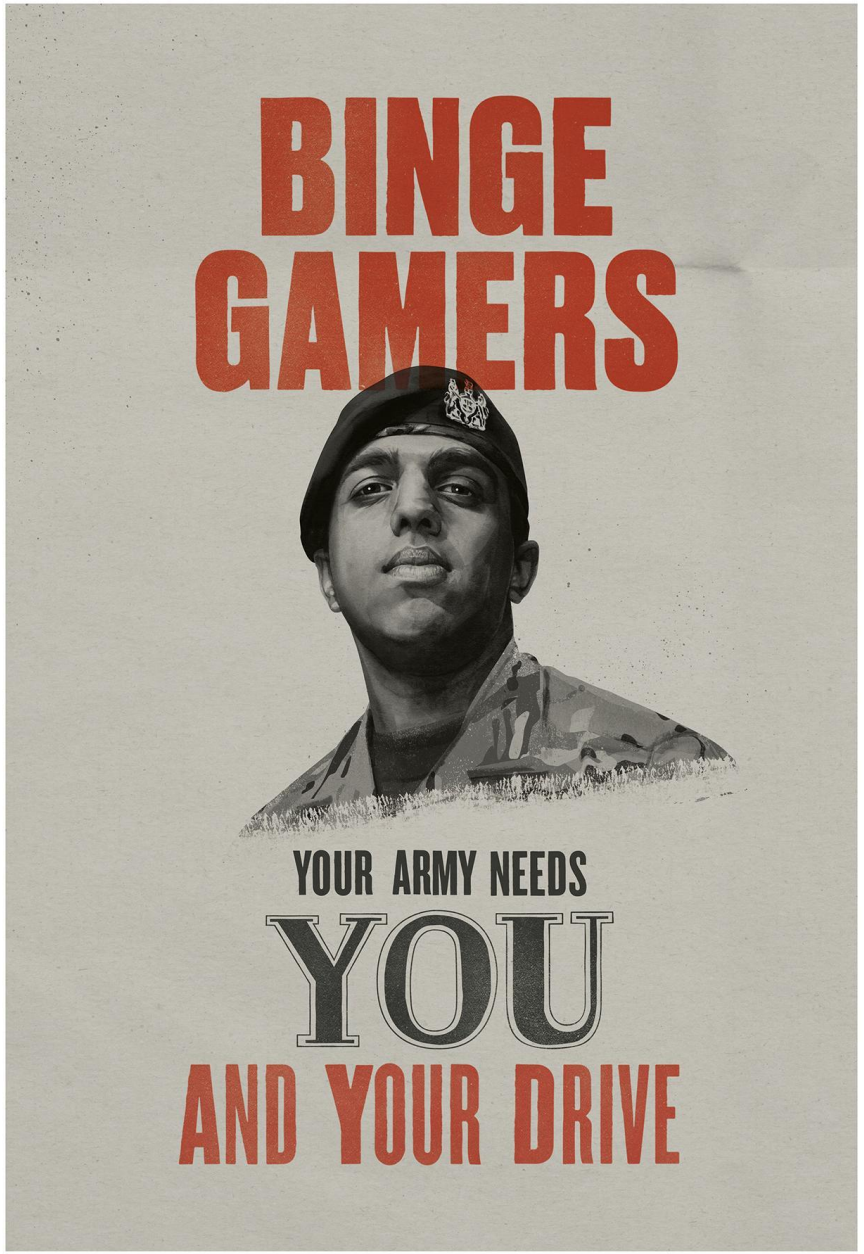
Digital Native

AI Native?

Pixabay/YouTube

UK Children aged 12 to 15 spend 12.2 hours a week gaming in 2017

and 11 to 64 year-olds 8.9 hours



Air Chief Marshal Sir Stephen Hillier Jan 18

“teenagers playing on their Xbox at home should take their gaming to the next level and join the RAF to operate real drones”

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Join the RAF for the real thing, Xbox teenagers are told: Head of the air force says young gamers should take it to the next level by operating drones

- Air Chief Marshal Sir Stephen Hillier wants more young people to join the RAF
- The service will be celebrating their 100th anniversary with events this year
- Among the major events planned is a flypast along the Mall before the Queen
- RAF chiefs hope a display of military might could provide a boost to recruitment

By LARISA BROWN FOR THE DAILY MAIL
PUBLISHED: 00:32, 12 January 2018 | **UPDATED:** 00:53, 12 January 2018

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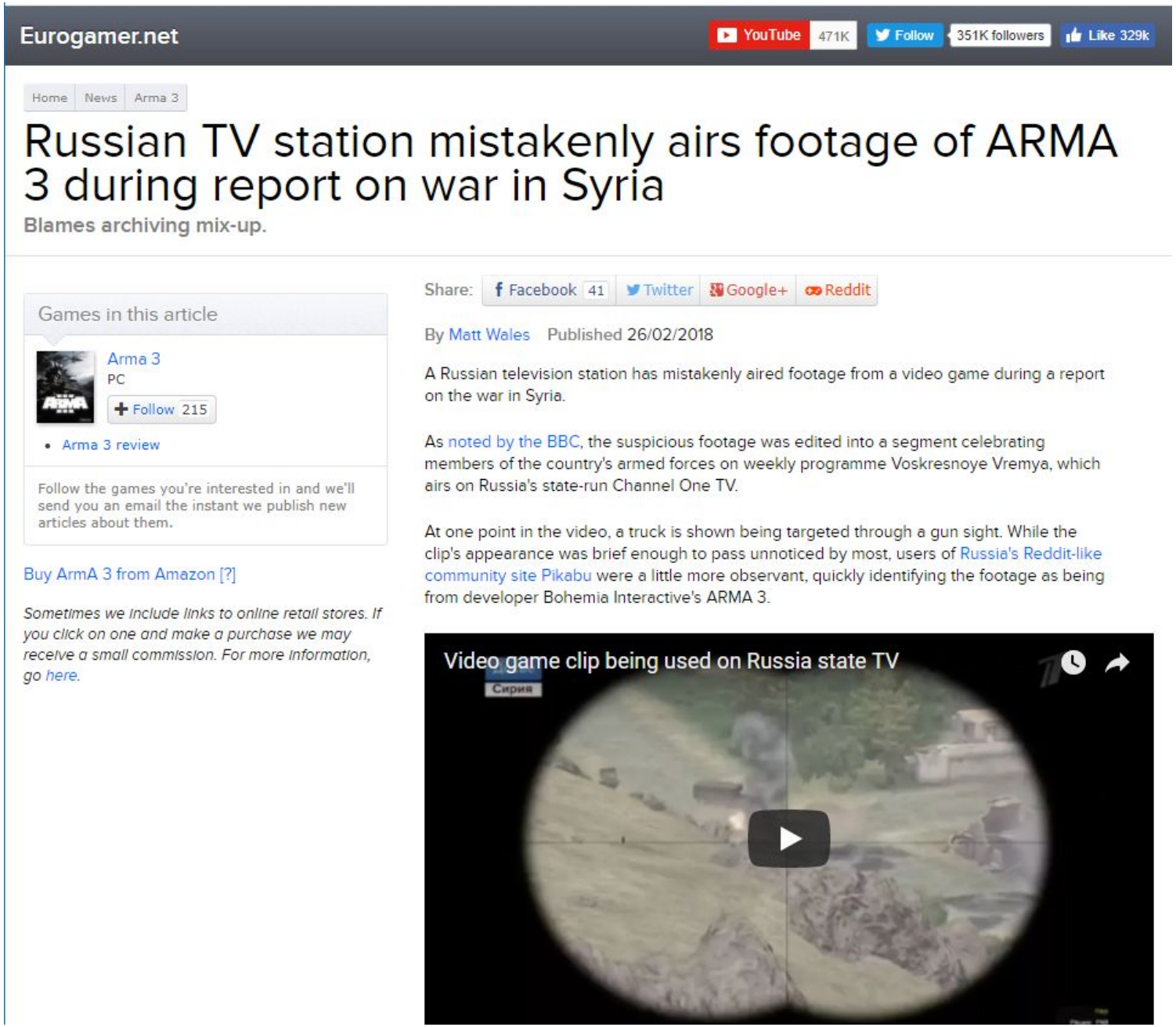
Teenagers playing on their Xbox at home should take their gaming to the next level and join the RAF to operate real drones, the head of the air force said yesterday.

Air Chief Marshal Sir Stephen Hillier said the RAF’s next 100 years will see a huge shift towards unmanned flying machines as he outlined plans for centenary celebrations.

Realism…



Eurogamer.net

YouTube 471K Follow 351K followers Like 329k

Home News Arma 3

Russian TV station mistakenly airs footage of ARMA 3 during report on war in Syria

Blames archiving mix-up.

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By Matt Wales Published 26/02/2018

A Russian television station has mistakenly aired footage from a video game during a report on the war in Syria.

As noted by the BBC, the suspicious footage was edited into a segment celebrating members of the country's armed forces on weekly programme Voskresnoye Vremya, which airs on Russia's state-run Channel One TV.

At one point in the video, a truck is shown being targeted through a gun sight. While the clip's appearance was brief enough to pass unnoticed by most, users of Russia's Reddit-like community site Pikabu were a little more observant, quickly identifying the footage as being from developer Bohemia Interactive's ARMA 3.

Speak to the Young

The Future?

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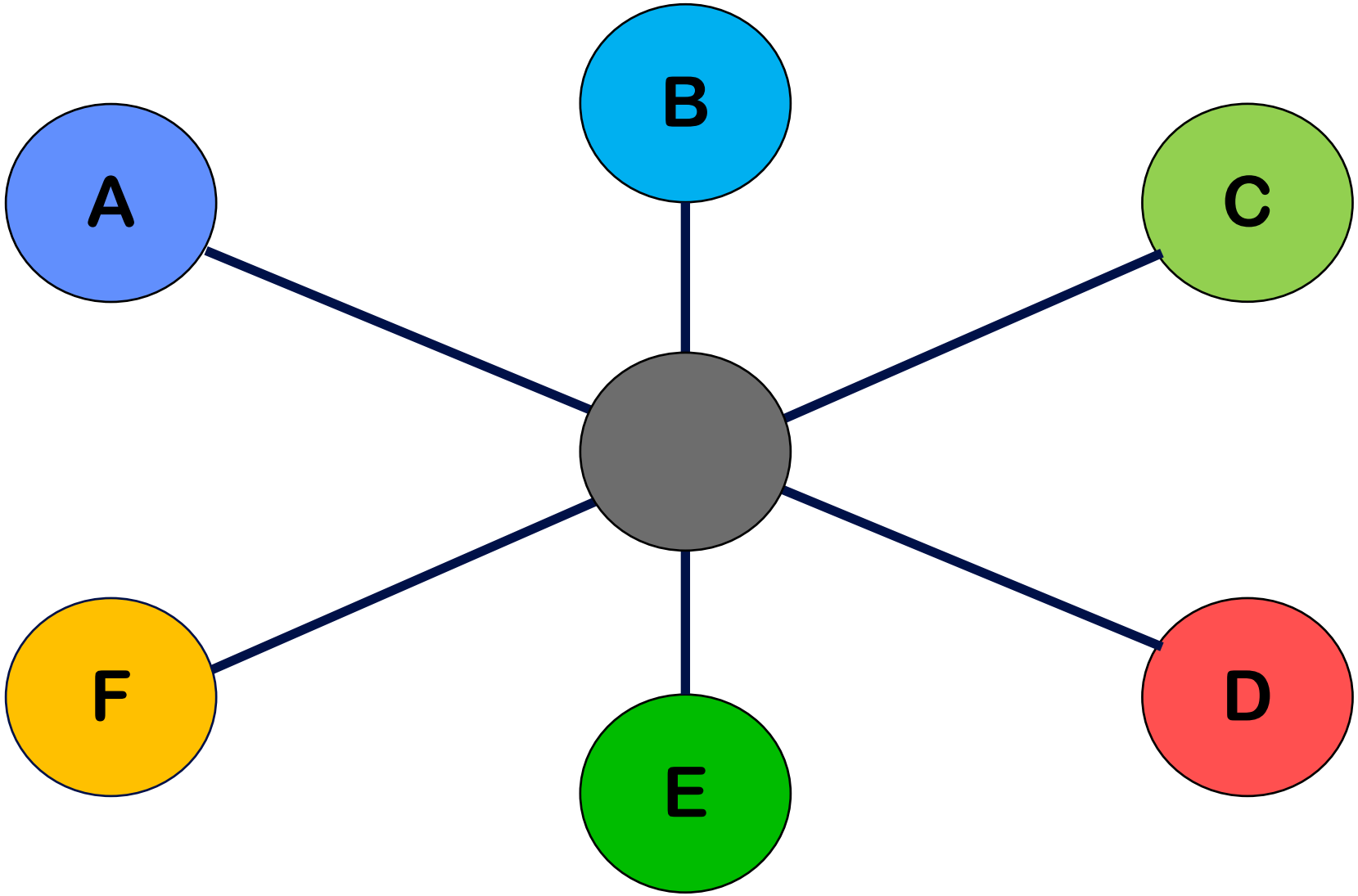
Will Geographically Distributed Networked HQ - Pilot - CAS/JTAC Training be Routine?



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Potential Peer+ Threat Environment

S-400

S-500?

THINKe

Dedicated Air/Maritime-Land Battlelabs?

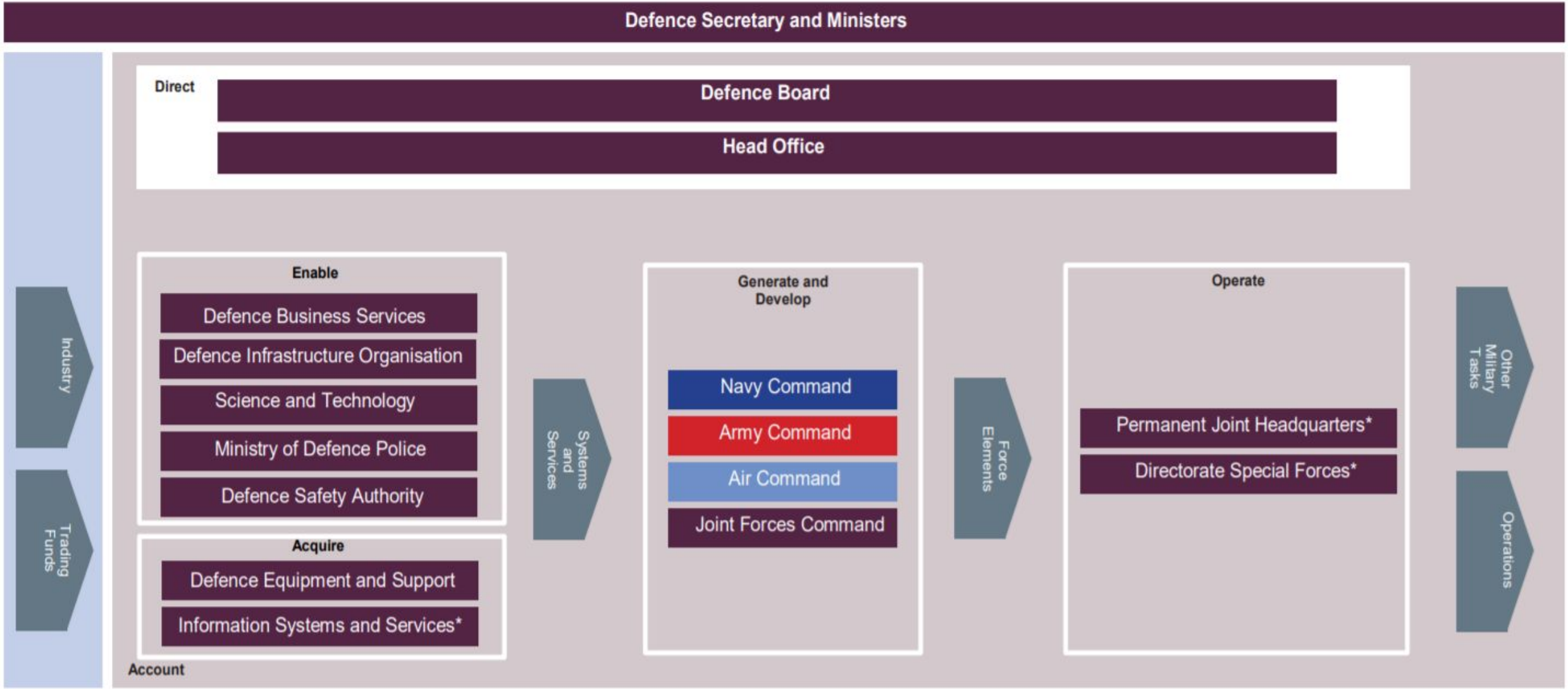
- Analyse changes in the military realm, such as technology and threats, bringing together operational end-users for the development of operational concepts and procedures and/or operator training

- Capture historic lessons learnt and derive insights for the future, strategic through to tactical

Wikipedia

THINKe

Air/Maritime-Land Integration - An Enterprise Effort!



THINK

Questions?

1911 – US Army Lt. Myron S. Crissy drops a bomb from a Wright Brothers airplane flown by Philip O. Parmalee, the first-ever deployment of a live bomb from an airplane