

Simulation

Are We There Yet?



Presentation Themes

- **Where do we want to be?**
- **Where have we come from?**
- **Get there faster?**

Presentation Influences

Training Context

- **Asymmetrical & Symmetrical Ops**
- **Joint/Coalition Operations**
- **New C4ISTAR and Network Capabilities**
- **Growing Cyber Threat**
- **More Remote and Autonomous Systems**
- **Pressure on Funding**
- **Technology not Waiting for the Military**
- **Recruit Expectations**

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.

US Army Synthetic Training Environment (STE)

- IOC of 2023 and FOC 2029
- Building a single synthetic environment that can handle virtual/gaming and constructive.
- Incorporate the US Army's one-world terrain project which maps the entire globe, both geographically and socio-politically.
- Deliver training to the point of need.
- Create artificial intelligence to reduce the need for human role players in exercises and offer intelligent enemy forces.
- Intelligent tutors for computer-based training.
- Utilize big data for analytics and visualization.

Can We Learn from Massively Multiplayer Online Games? (MMOGs)

- A MoD/Dstl Funded Research Project



Typical MMOG Characteristics

- Persistent interactive world that can be accessed 24/7
- Millions of Concurrent Users
- Player data that tracks and rewards performance
- In game communication and interaction with other players
- Online Communities and Support
- Supports thin client approach
- Secure login
- Ranked/Unranked Worlds

Medium Support Helicopter Aircrew Training Facility - RAF Benson

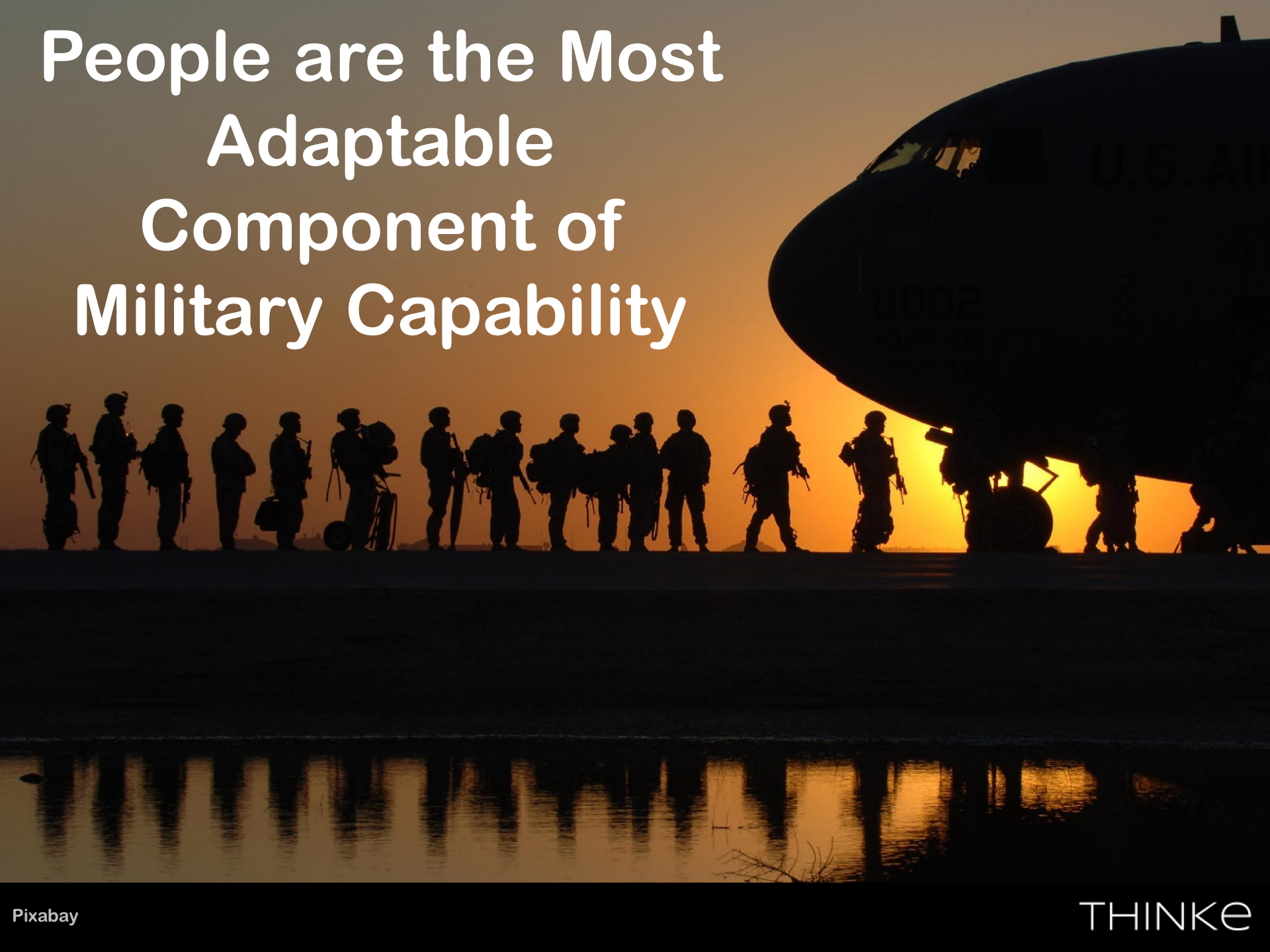
- Computer-based training and computer aided instruction
- Six full-mission simulators (stand-alone or networked)
- Tactical Control Centre



Training of Fast Jet Pilots



People are the Most Adaptable Component of Military Capability



Where do we want to be?

The Destination?



THINKE

A Training and Simulation Recipe

- **Learning Focused - Analytics Drawing on Both Live and Simulated Training**
- **Quantified Human**
- **Training at the Point of Need**
- **Range of Devices to Consume and Interact with Media**
- **Individual Collective Training Boundary Blurred**
- **Fewer but More Empowered Instructors**
- **Sharable and Discoverable Content**
- **Persistent Networked Training Environment Instantly Scalable from Individual, through Team, Collective, Joint and Coalition**
- **Seamless Live-Virtual-Constructive Infrastructure**
- **Rapidly Reconfigurable and Full Support of Mission Preparation**
- **Supports Training of and with Autonomous Systems**
- **Affordable**

Learning Focused - Analytics Drawing on Both Live and Simulated Training



- **Descriptive**
 - What happened?
- **Diagnostic**
 - Why?
- **Predictive**
 - What will happen?
- **Prescriptive**
 - Make it happen

Quantified Human



THINKE

Training at the Point of Need

Time is Money and has an Opportunity Cost



Range of Devices to Consume and Interact with Media



Individual Collective Training Boundary Blurred



Fewer but More Empowered Instructors

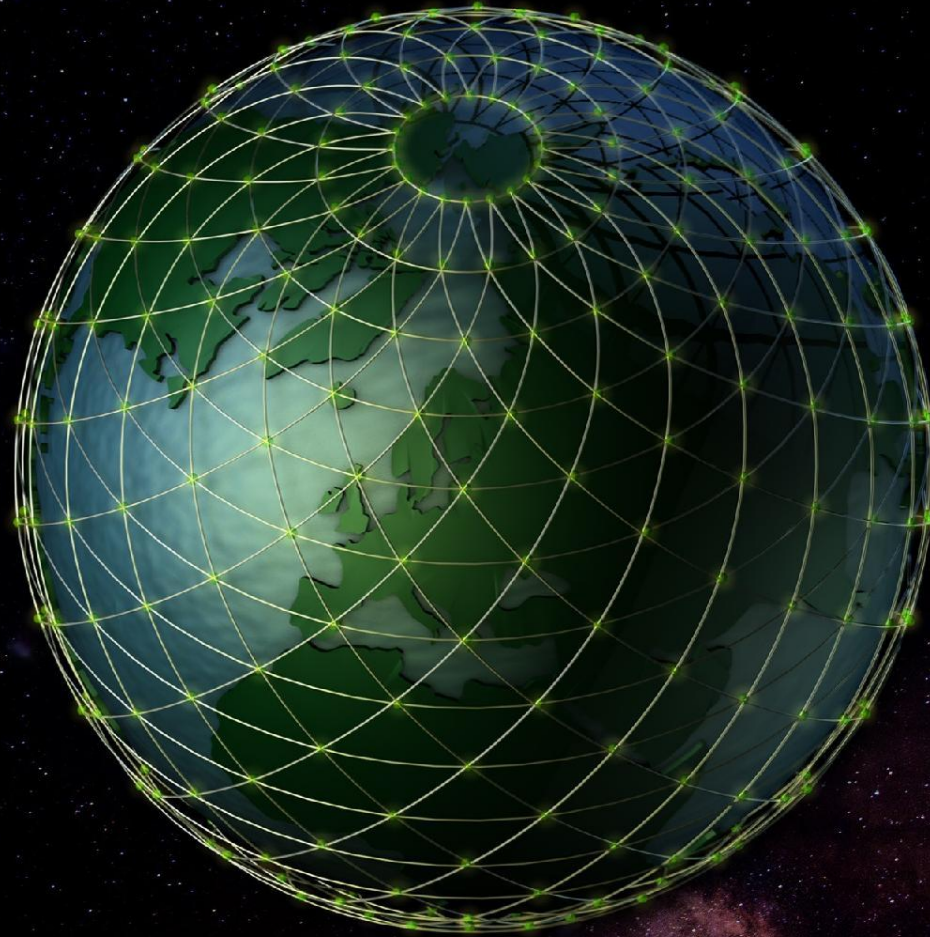


Sharable and Discoverable Content



Persistent Networked Training Environment

Instantly Scalable from Individual, through Team, Collective, Joint and Coalition



Seamless Live-Virtual-Constructive Infrastructure



Rapidly Reconfigurable Simulation and Full Support of Mission Preparation



Simulation Supports Training of and with Autonomous Systems



THINKE

Affordable

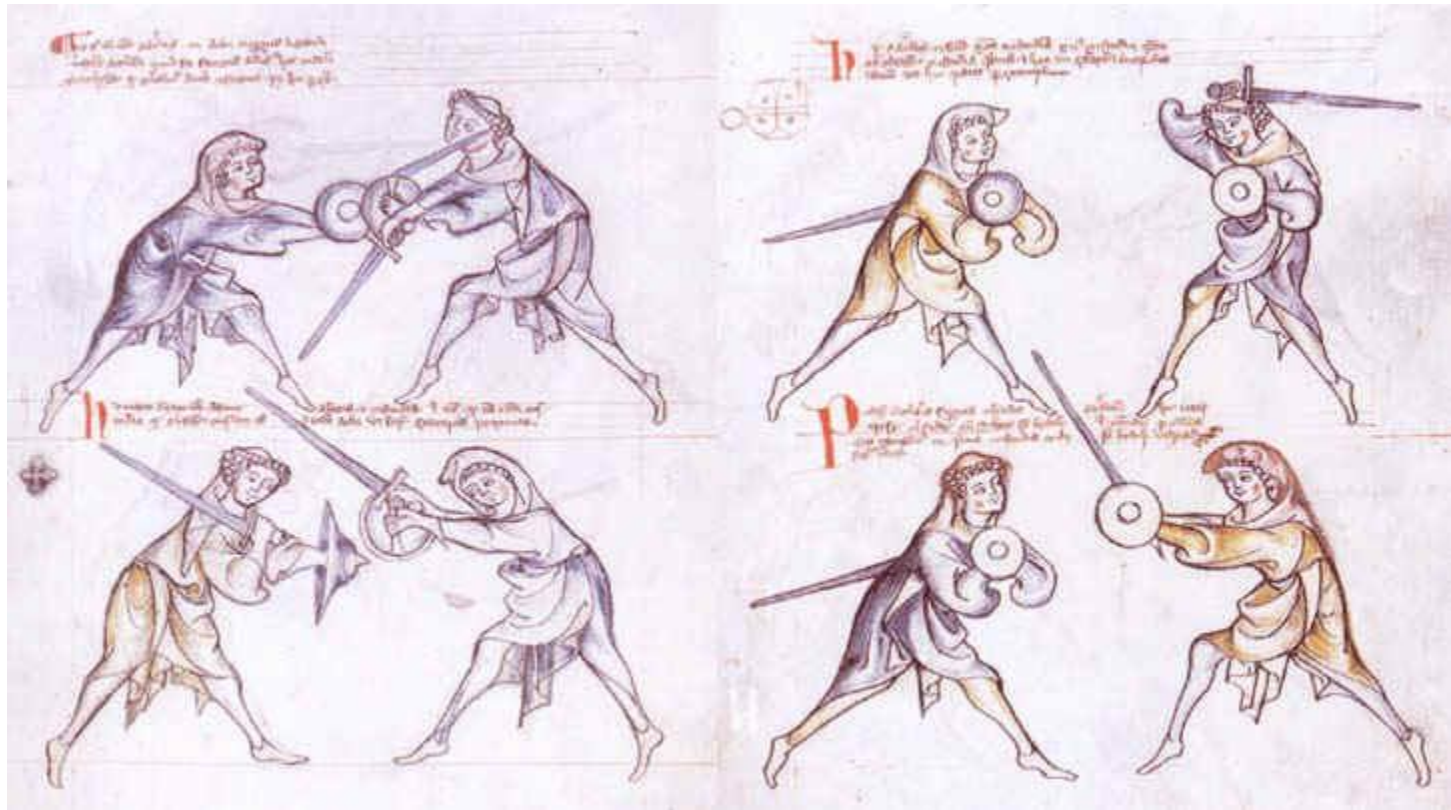


A Little History

Where Have We Come From?

Oldest Surviving Training Media

13th Century German Sword & Buckler Manual



1812 - Kriegsspiel ("war play")

- Key features: map grid; different terrain types; gaming pieces; dice; fog of war and communication difficulties; impartial third party referee



THE AUTUMN MANOEUVRES—OFFICERS PLAYING AT KRIEGSSPIEL, OR THE "GAME OF WAR"

Link Trainer (WW2)



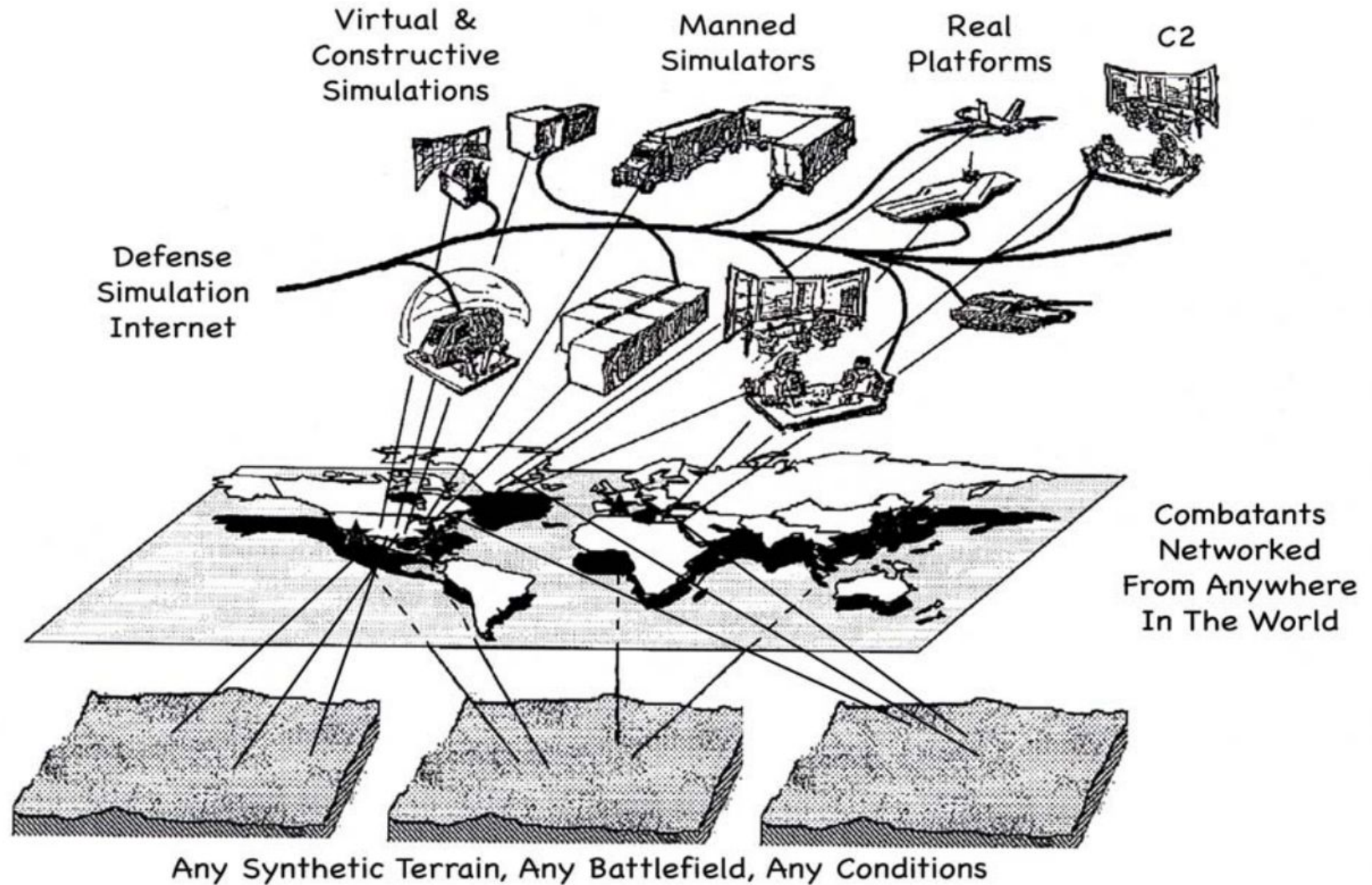
Link Trainer (WW2)



UK Naval Flight Simulation (1970s)



1980s SIMNET Distributed Simulation Concept



SIMNET Tank Engagement (late 80s)



SIMNET Tank Engagement (late 80s)



US Navy Battle Force Inport Training (BFIT)



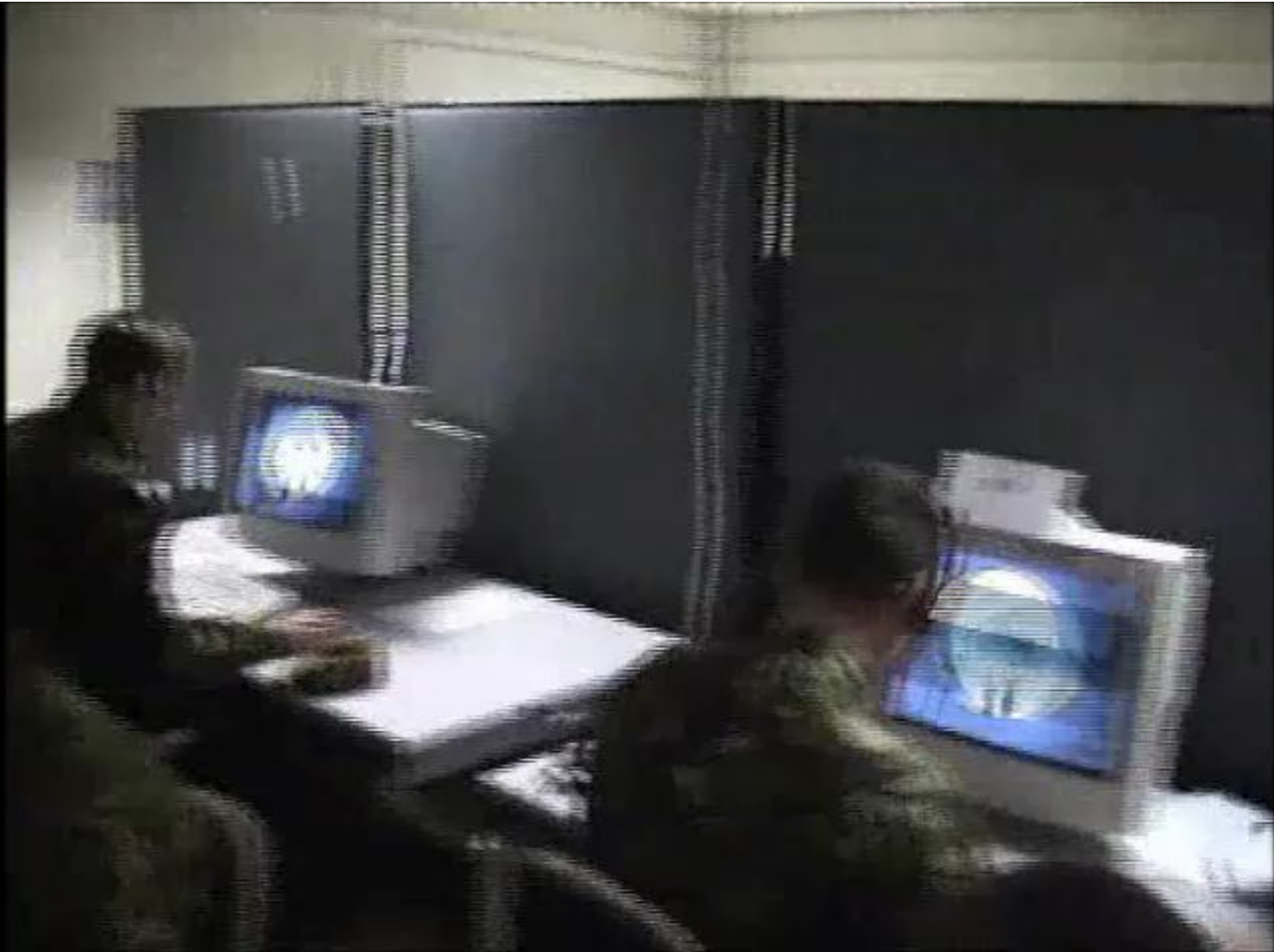
US Navy Battle Force Inport Training (BFIT)



Dismounted Infantry Virtual Environment (DIVE) (2002)

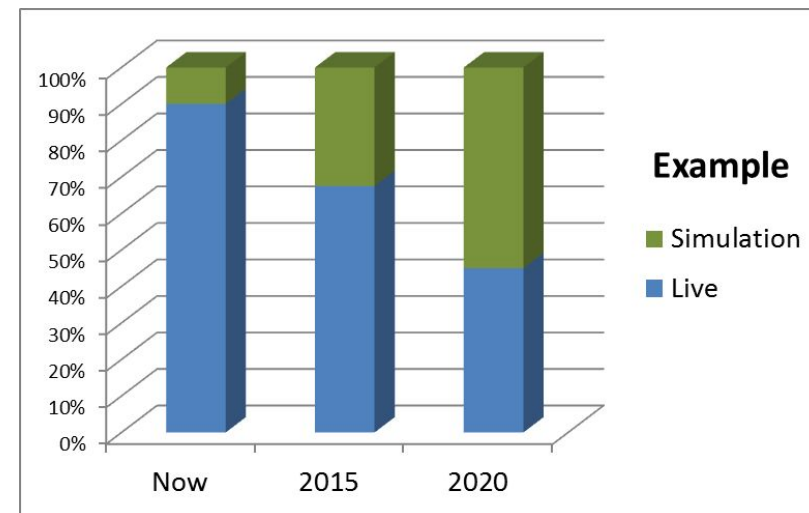


Dismounted Infantry Virtual Environment (DIVE) (2002)



UK SDSR Simulation Targets - 2010

- Step Change in Exploitation of Simulation for More Cost Effective Training
- 25% Transfer Current Live Training to Simulation by 2015
- Further 25% Current Live Training to Simulation by 2020
- 5% Change per Annum



30 Years of Game Graphics



Simulation Now - Land, Sea, Air, Anywhere

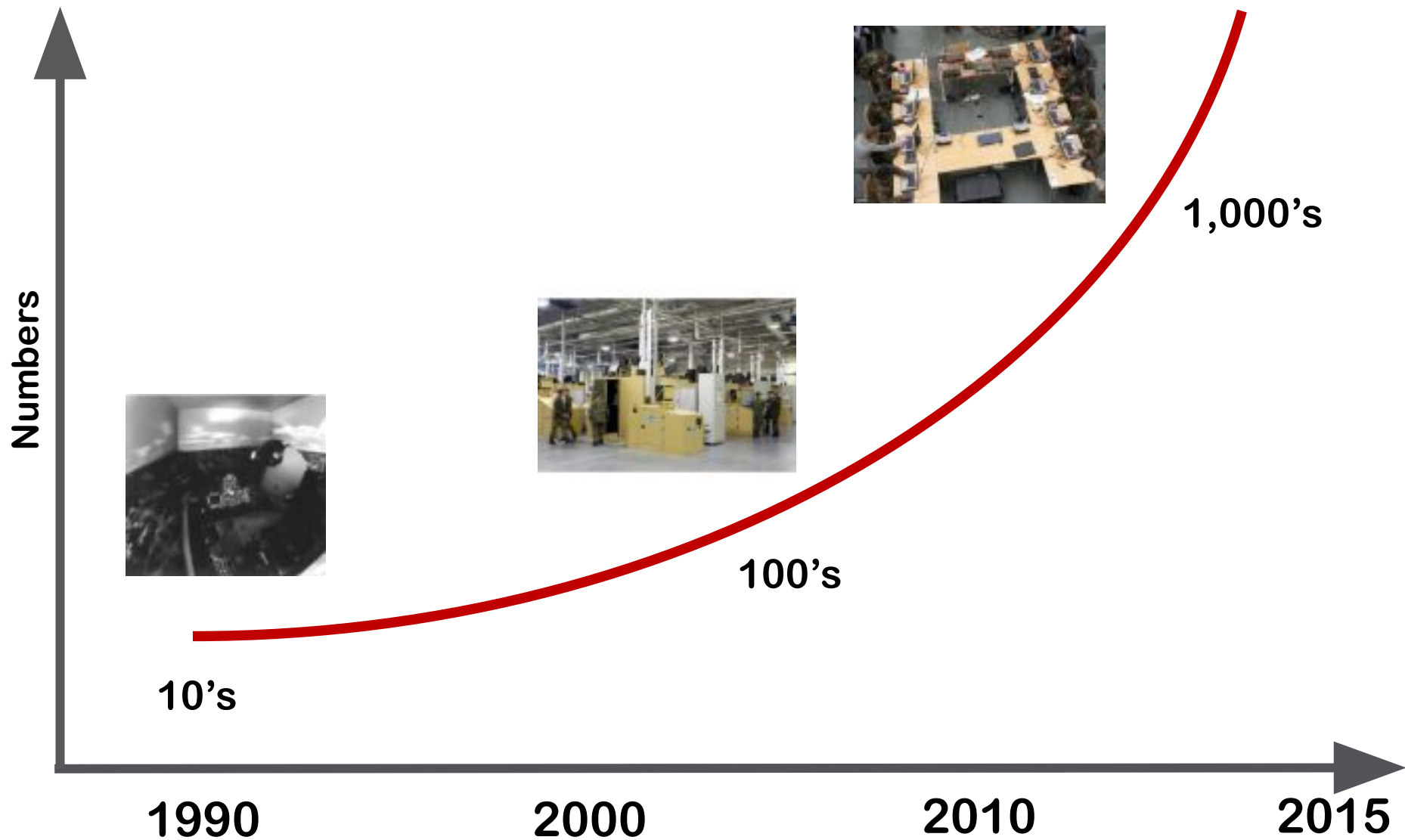


Get There Faster?

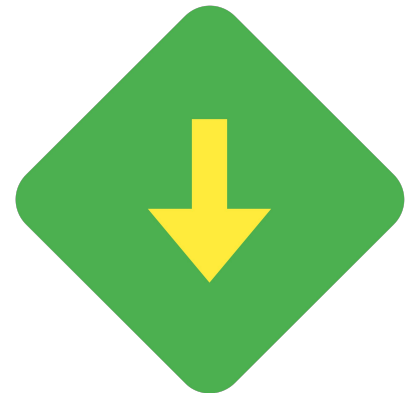
**Glass Half Full?
or
Glass Half Empty?**



Military Access to Simulation



Human Factors and Training often the Last Among Equals in Defence Procurement



UK Land Training Systems

	Lead Contractor
Collective Training Sustainment Programme	tbd
<u>Main Collective Land Training Systems</u>	
Combined Arms Tactical Trainer	Lockheed
Area Weapons Effect Simulator	Cubic
Direct Fire Weapon Effects Simulator	SAAB
Command and Staff Trainer	Raytheon
<u>Other Collective Land Training Systems</u>	
Battlegroup Command & Control Trainer	Lockheed
Synthetic Wrap	QinetiQ/Cubic
Dismounted Close Combat Trainer	Meggitt
Small Arms Range Targetry System	Lockheed
Low Level Urban Skills Trainer	Cubic
Unit Based Virtual Trainer	NSC
C-IED Collective Trainer	SAAB
Urban Battle Tactics Trainer (Contact)	NSC
Defence Virtual Simulation	Bohemia
Training and Education Architecture (Land)	?

Value for Money? - US GAO Aug 16 Report

- Eight (US Army) virtual training devices are used on average for 21% of their total availability and four of the low-use systems cost more than \$70 million to procure and \$15 million to operate in FY2015:
 - Engagement Skills Trainer II (EST II) at 38%
 - Call for Fire Trainer II at 37.8%
 - Games for Training VBS coming at 30.8%
 - Dismounted Soldier Training System (DSTS) at 15.4%
 - Stryker Mobile Gun System Advanced Gunnery Training System (MGS AGTS) at 8.6%
 - Intelligence and EW Tactical Proficiency Trainer (IEWTPT) at 8.4%
 - Common Driver Trainer (CDT) Mine Resistant Ambush Protected (MRAP) vehicle device at 1.3%.
- Gaps in Governance:
 - Front-end analysis
 - Effectiveness analysis
 - Linkage with training strategies

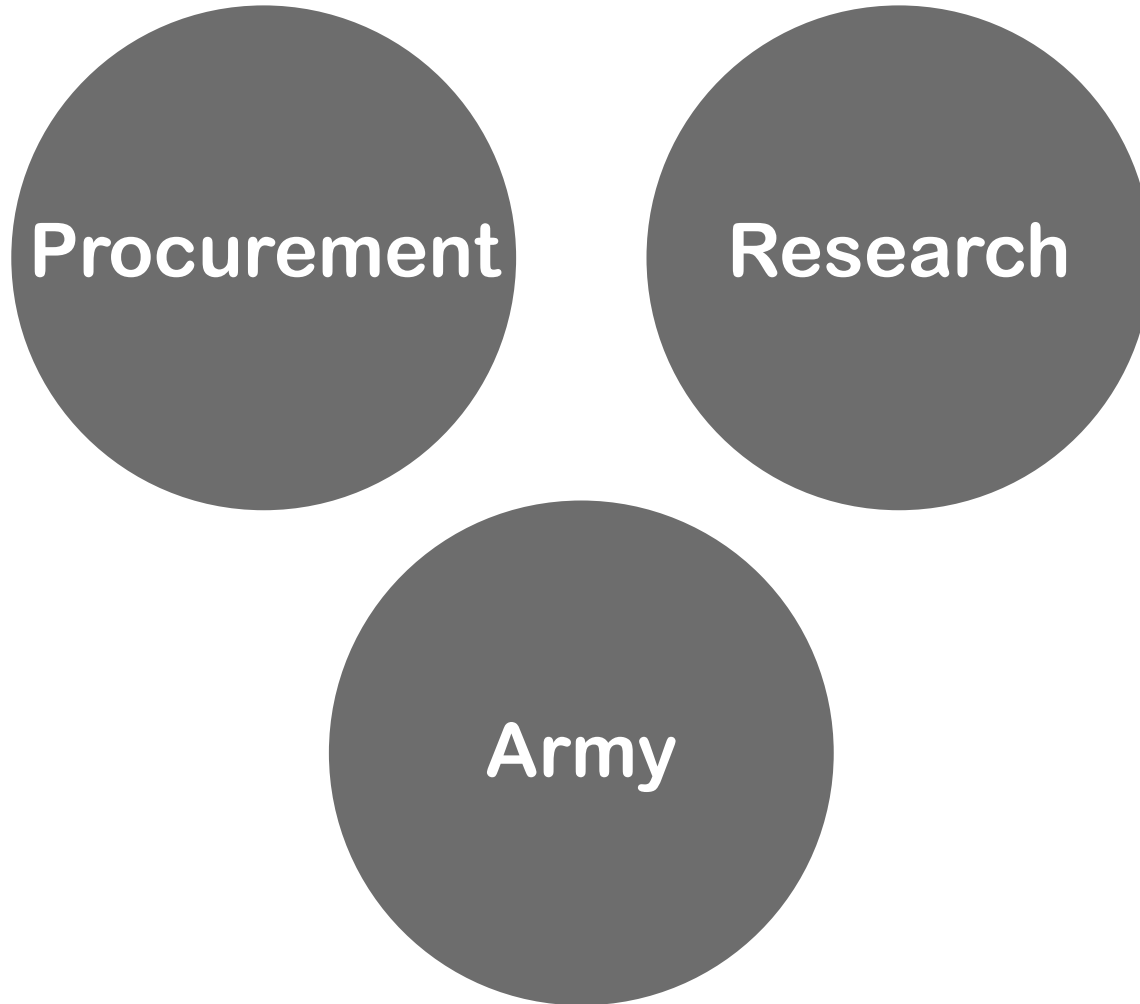
Value for Money? - US GAO Aug 16 Report

- Seven (US Army) virtual training devices are used on average for 21% of their total availability
- Four of the low-use systems cost more than \$70 million to procure and \$15 million to operate in FY2015

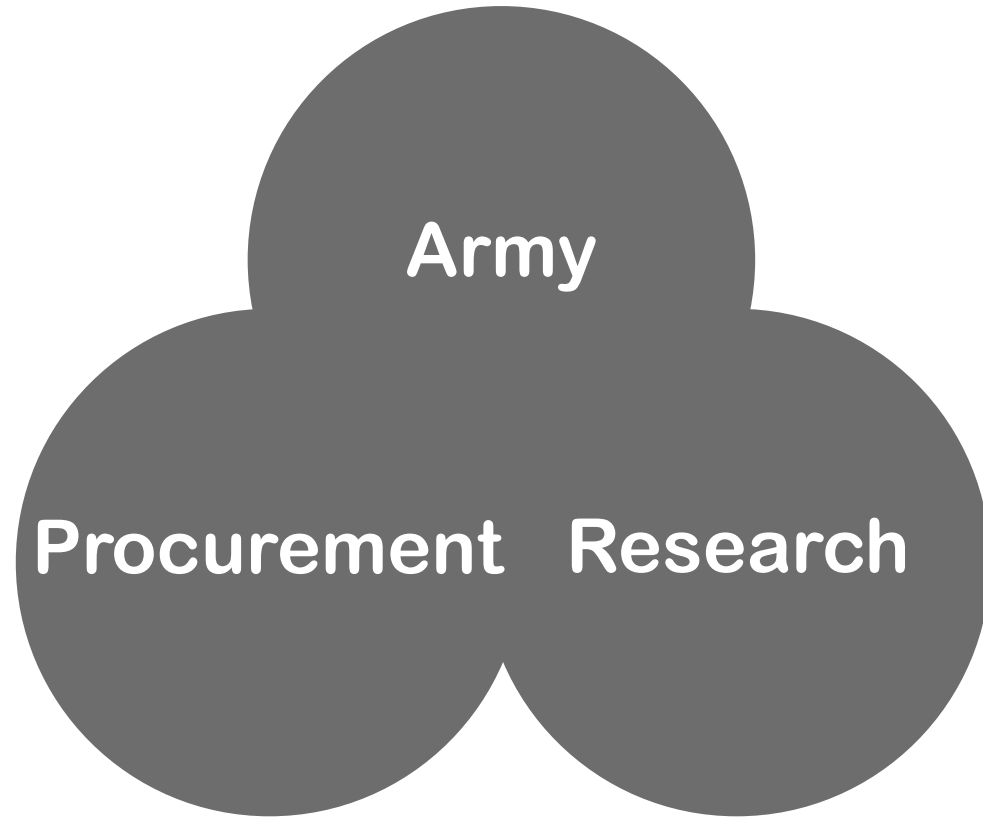
	Utilisation
Engagement Skills Trainer II (EST II)	38%
Call for Fire Trainer II	37.8%
Games for Training VBS coming	30.8%
Dismounted Soldier Training System (DSTS)	15.4%
Stryker Mobile Gun System Advanced Gunnery Training System (MGS AGTS)	8.6%
Intelligence and EW Tactical Proficiency Trainer (IEWTPT)	8.4%
Common Driver Trainer (CDT) Mine Resistant Ambush Protected (MRAP) vehicle device	1.3%

- **Gaps in Governance:**
 - Front-end analysis
 - Effectiveness analysis
 - Linkage with training strategies

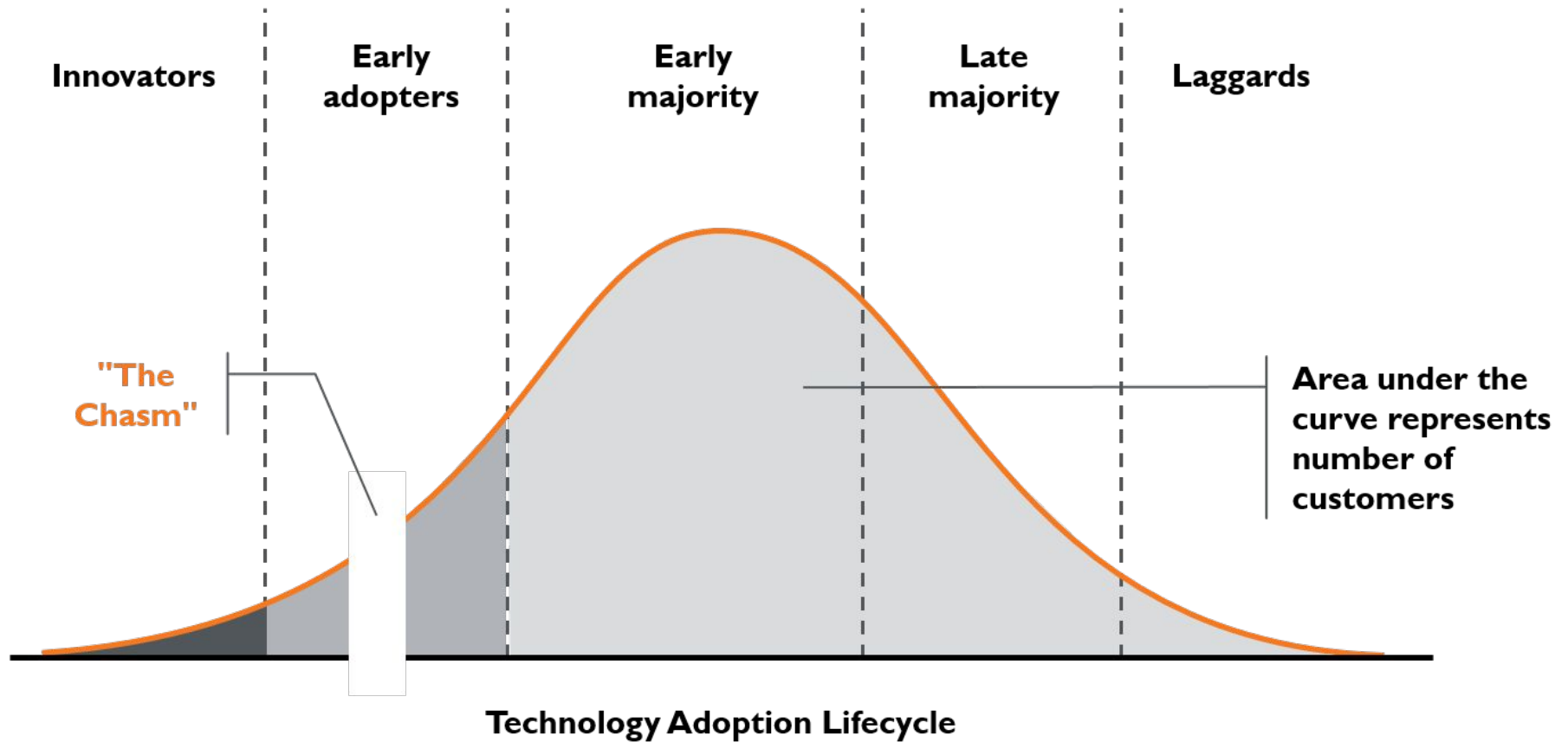
Integrated and Responsive?



Organisational Integration



Technology Adoption Cycle



Beyond the Hype – Exploiting Technology

- Minimise the need for behavioural change for the military customer
- Demonstrate and prove quantitatively the technology's cost effectiveness
- Marketing aimed at a pragmatic customer not a technology enthusiast or laggard

Questions?



THINKE

UK Army Training Costs

MoD FOI letter FOI2015/06627 dated 21 Aug 15

- 1 week's Battlegroup training at CAST is £79k**
- 1 week's Battlegroup training at CATT is £199k**
- 1 week's Battlegroup training using AWES/DFWES (SPTA) is £150k**

- One Infantry Battalion Exercise at BATUK is £9.4m**
- One Battle Group Exercise at BATUS is £24.3m**