

IQPC - Armoured Vehicles Africa – London UK
4 July 2013

Training and Simulation and Beyond



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What is this about?

- The impact of Digital Technologies on:
 - Preparing your People
 - Ability of the Threat to Prepare



My Background



Overview

- Military Training and Education
- Training and Education Technology
- Simulation
- Beyond Simulation
- A Buyer's Guide

Military Training and Education

Military Training and Education (UK)

- Scale - 257,160 Military/Civilian (2011)
- Depth – eg. Fighter Pilot, Reactor Operator
- Breadth – Apache Pilot through to Cook
- Flexibility – Current Operations

Global Defence Training and Simulation Market

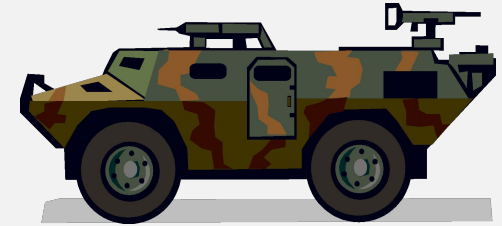
- Exceeds US\$6.6 billion per year.
- Although defence budgets are being cut, the simulation and training market is stable.

Cost of Training and Education in Defence

- Manpower
 - Platforms and Equipment
 - Fuel and Maintenance
 - Training Estate and Establishments
 - Training Systems and Simulators
-
- Approximately 20% of Defence Budget

Armoured Vehicle Training and Education

- Individual
- Crew
- Collective
- Joint
- Combined
- Support and Maintenance
- *OA, Experimentation and Acquisition*



Military Capability

Defence Lines of Development (UK)

- Training
- Equipment
- Personnel
- Information
- Doctrine and Concepts
- Organisation
- Infrastructure
- Logistics

Importance of Military Training and Education

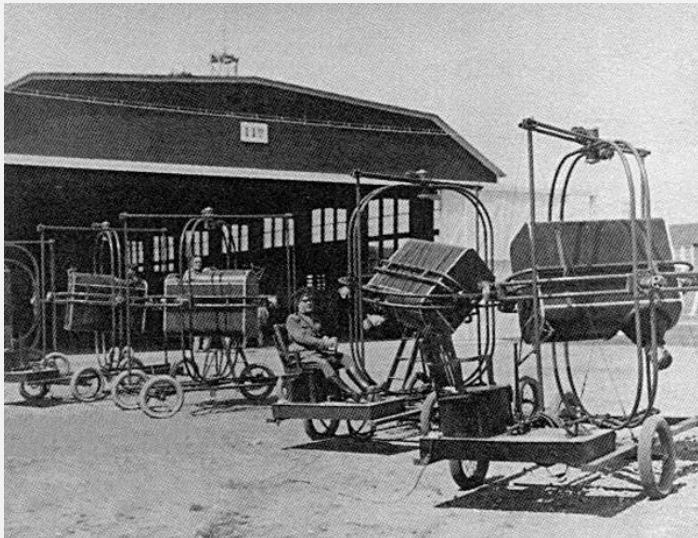
- The Military understands that training and education is fundamental to their endeavour
- People are assessed by how well they do in Training
- Career progression depends on training and education
- Much of military life is spent training and exercising
- Lessons learnt are fed back

Training and Education Technology

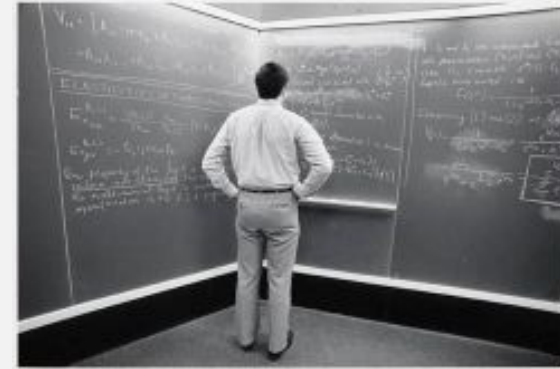
Nothing New



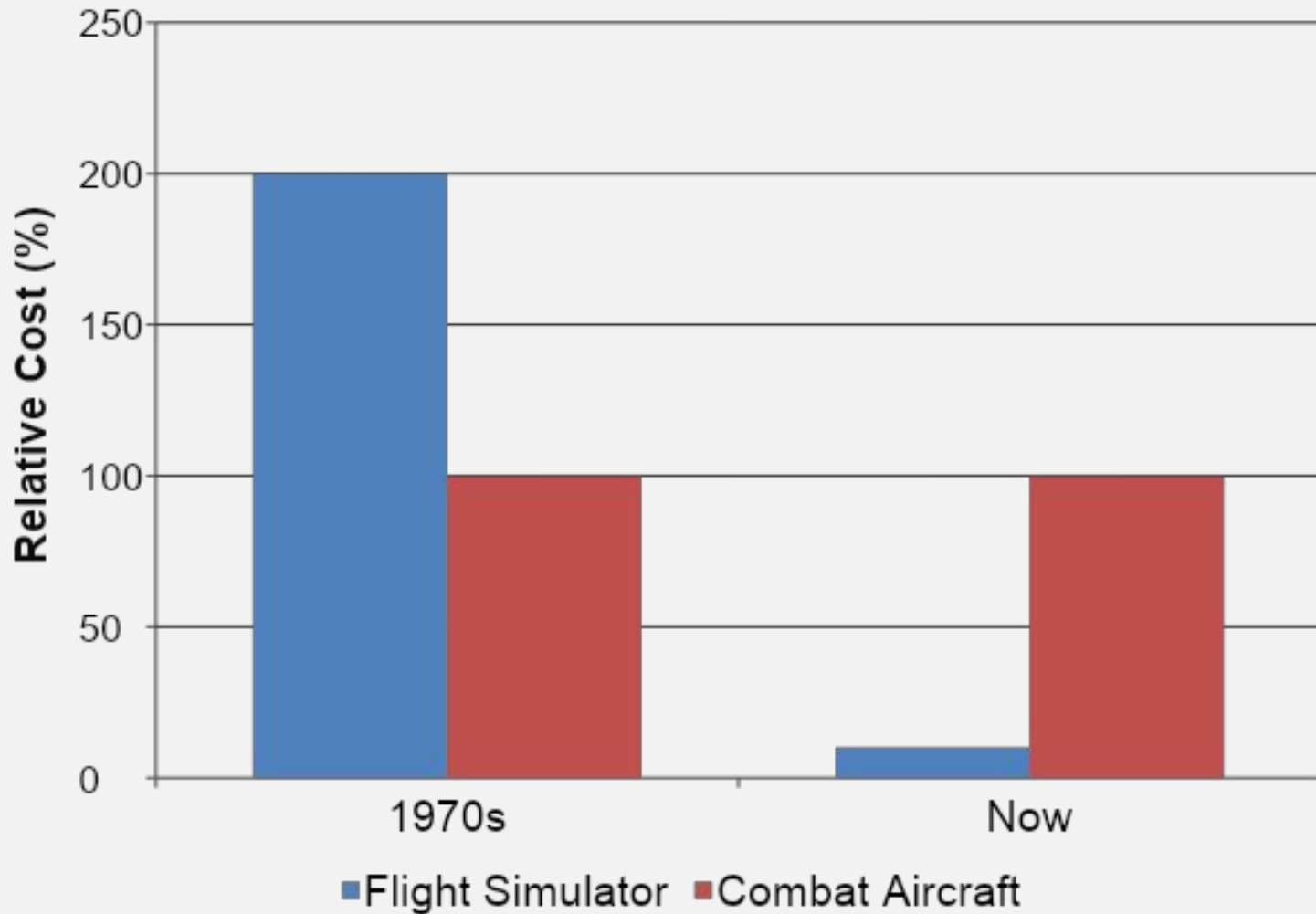
Nothing New



Nothing New



Falling Simulator Costs



Simulation

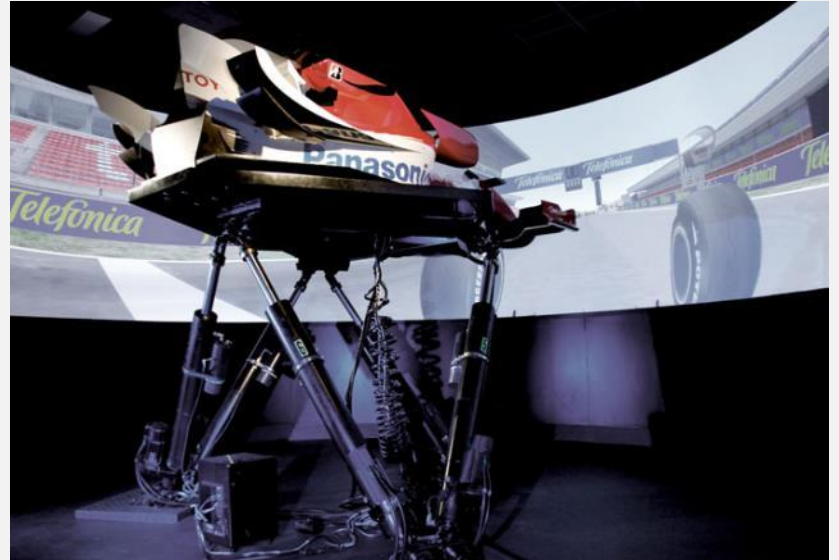
What is Simulation?

Typically a military training simulation is interactive, with a “human in the loop”

eg. a flight simulator or driving simulator



What is Simulation?



Live Virtual Constructive Simulation

Live Simulation

A simulation involving real people operating real systems.



Virtual Simulation

A simulation involving real people operating simulated systems.



Constructive Simulation

Models and simulations that involve simulated people operating simulated systems. Real people stimulate such simulations, but are not involved in determining the outcomes.



Why Use Simulation?



Improve Training



Reduce Time to Train



Reduce Costs



Reduce Environmental Impact



Safety

Benefits of Simulation

- A Canadian Study looked at the influence VBS had on their Armour School's Troop Warrant Officer's course.
- A blended approach (Serial 0702) cost about 33% less through reductions in fuel etc and drove the pass rate up from 72% to 100% compared to purely live training.
- Only one day of VBS took the pass rate to 30%.
- The new blended live/simulation mix reduced the cost to train (and qualify) each trainee by about a half.

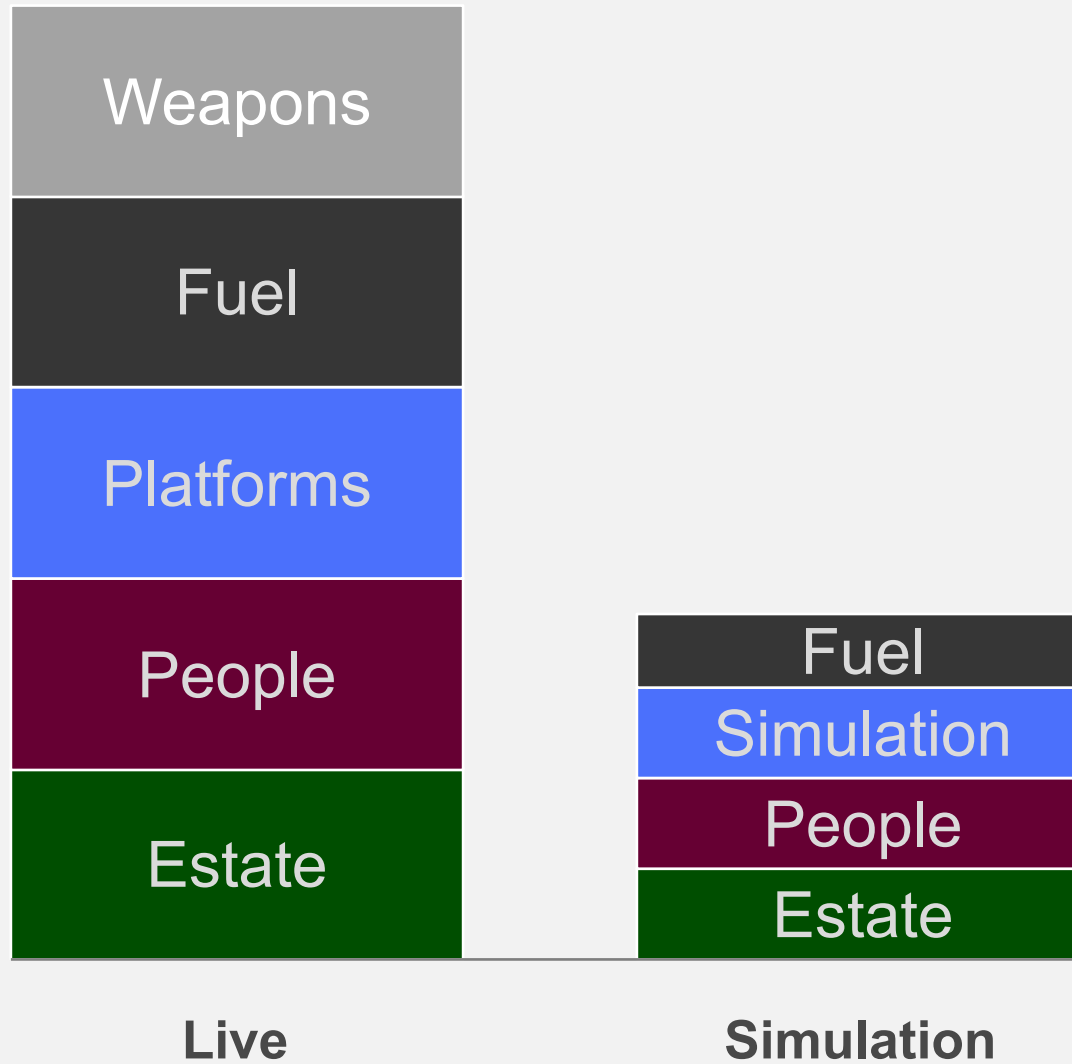
	Serial 0602 (No VBS [®])	Serial 0701 (1 day VBS [®])	Serial 0702 (2.5 weeks VBS [®])
% pass on 1 st trace	0	30%	67%
% pass by ½ of traces	61%	72%	100%
% pass by end of course	72%	83%	100%



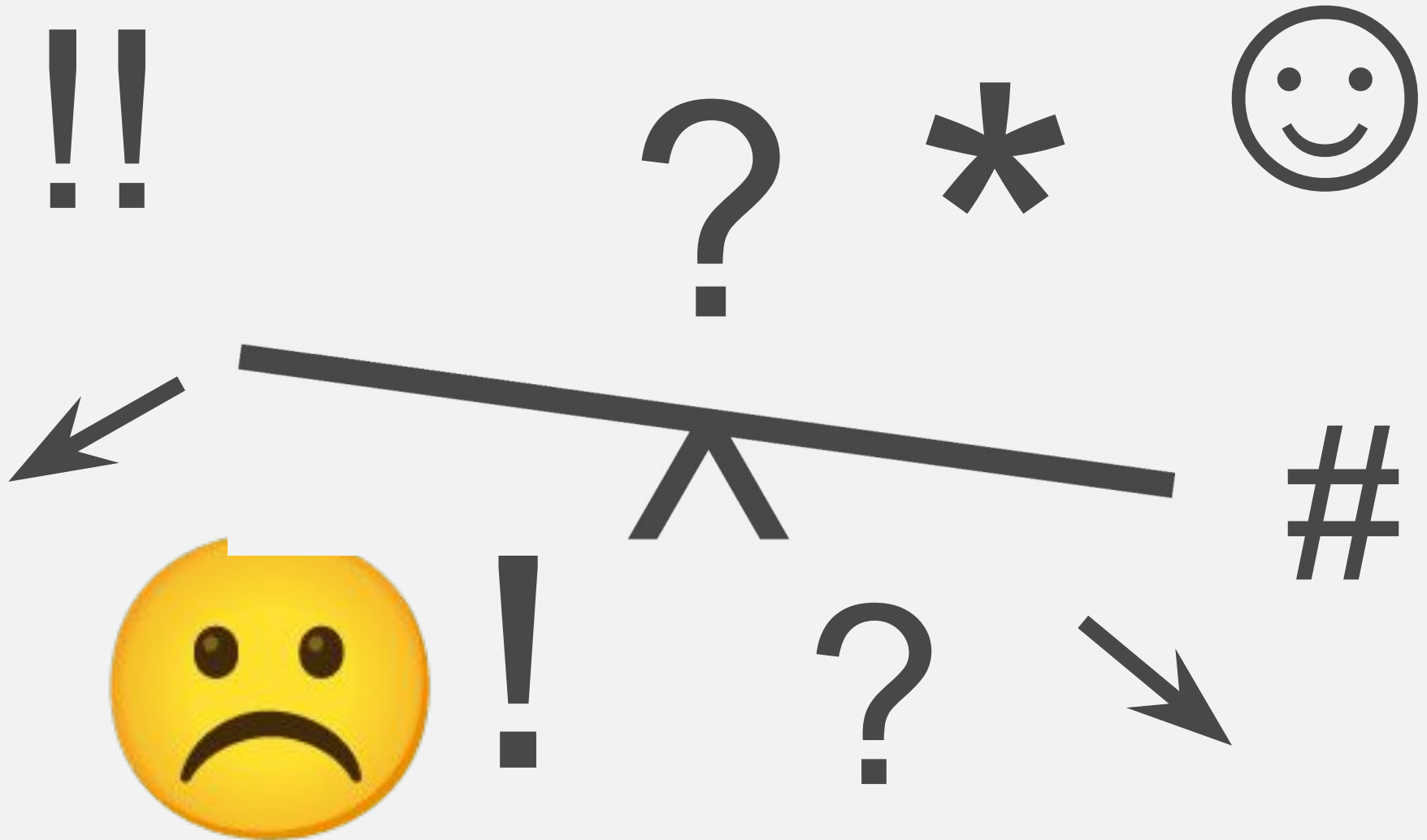
Figure 5: VBS 2[®] Workstations in the Armour School Battle Lab (Hill 2008)

Games – Just How Serious Are They?
Dr. Paul A. Roman Mr. Doug Brown

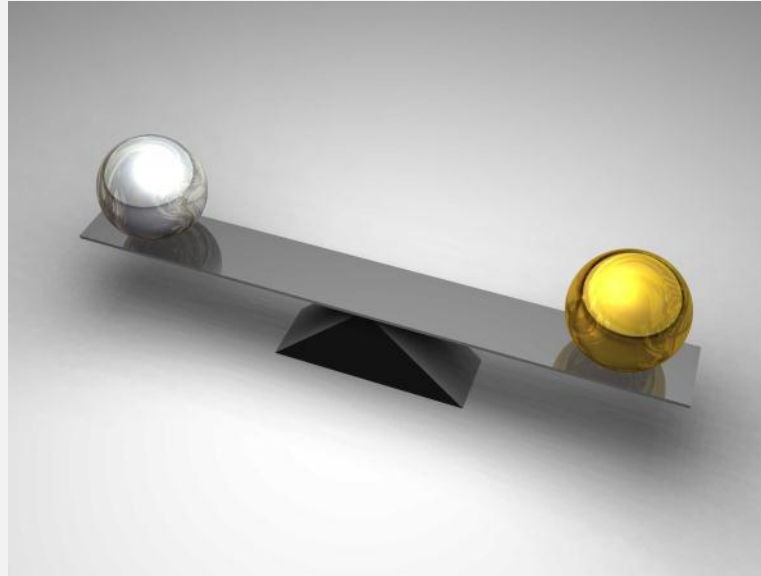
Cost of Training?



Live-Synthetic Balance

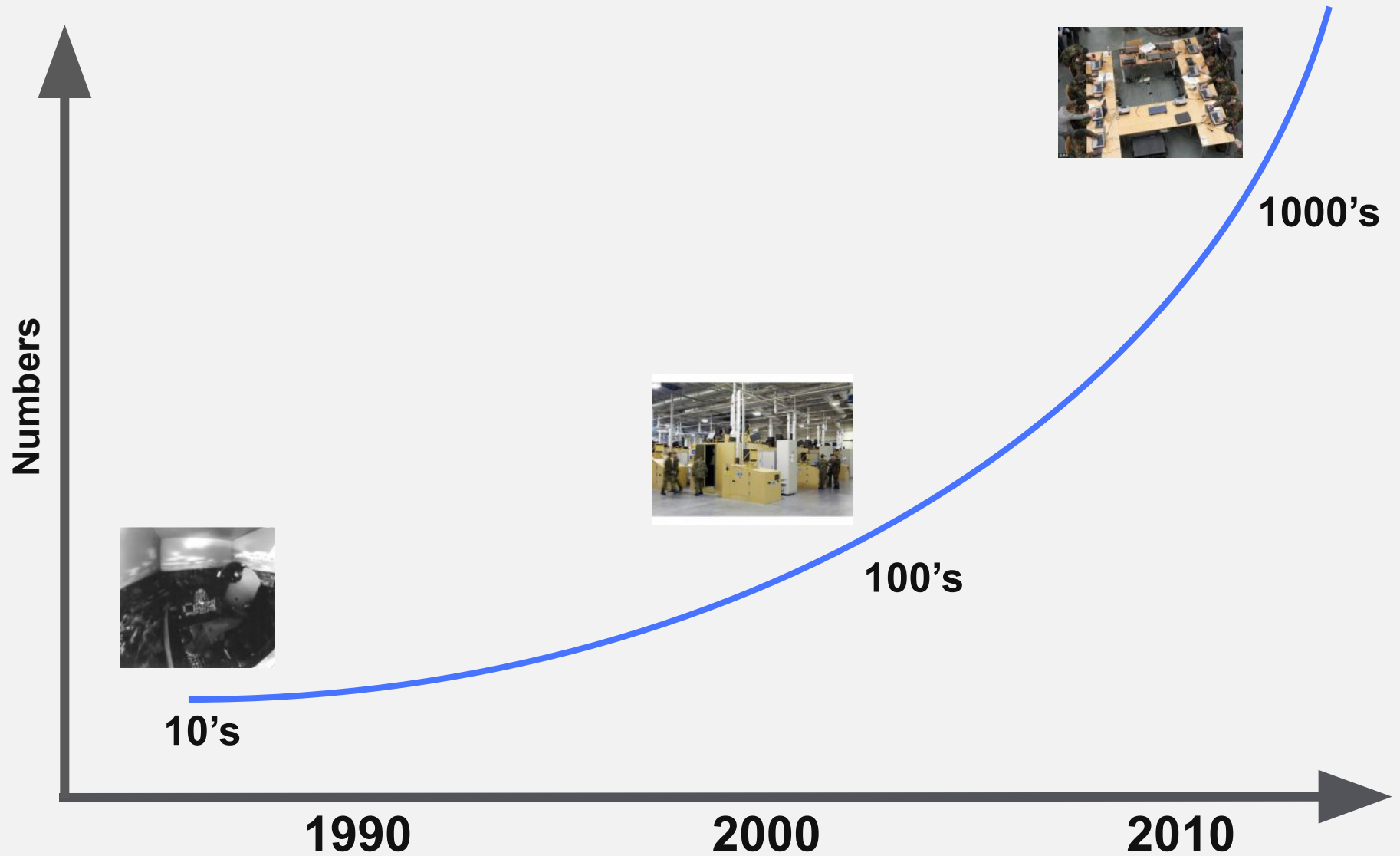


The Live Synthetic Balance



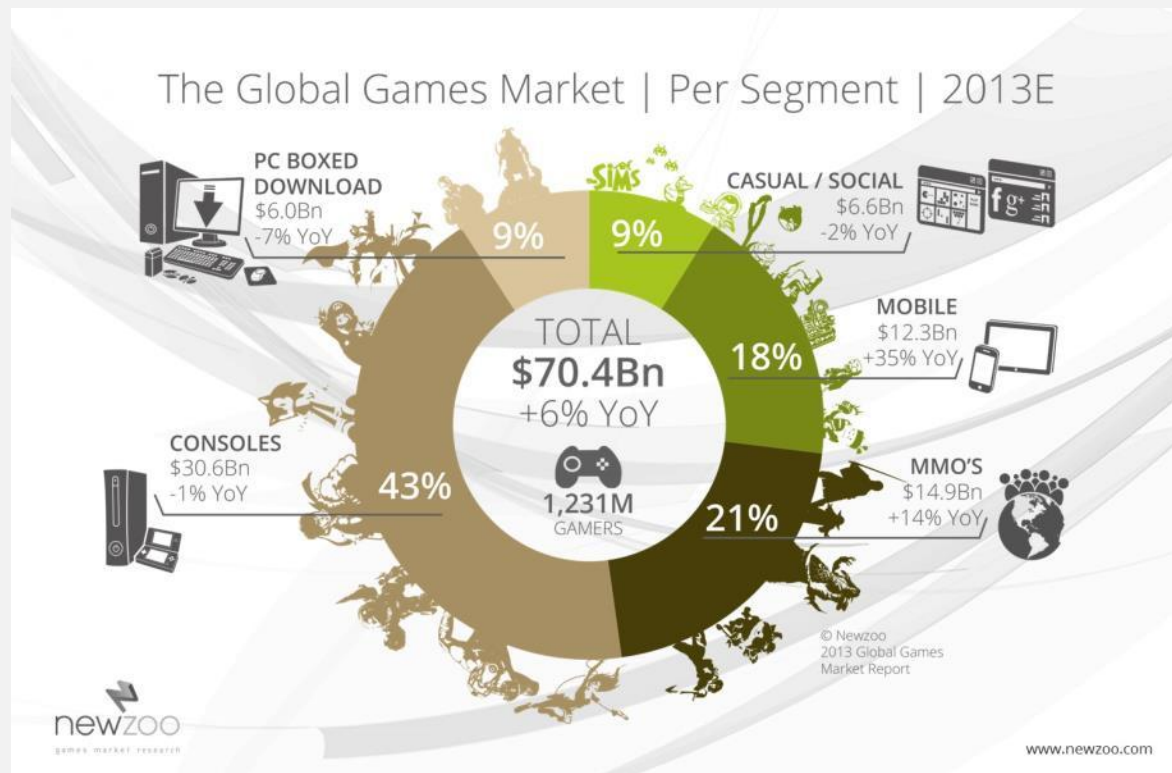
- Language – What does the word “Synthetic” Convey?
- Culture - “Live will never be replaced”
- Assessing Training Cost Effectiveness is Difficult
- The simulation needs to be in place first
- Technology is Changing and so do Operations
- How often do we change the Way we Manage?

2010s - Access to Simulation



What is Driving the Advances in Simulation?

- Computing/Internet/Multimedia/Games
- The UK has an internet economy 8.3% of GDP (2012) (defence 2.5%)



Simulation for Operations: More than just training?

- Exploiting the simulation facility
- Collating, filtering, displaying the information
- Through-mission simulation



"All But War Is Simulation"

Credit:- US Army's Program Executive Office for
Simulation, Training, & Instrumentation (PEOSTRI)

Beyond Simulation

Are things changing?



Mobile (2013)

On average, multinational companies have each produced

24 branded apps

In 2013



mobile devices will become the most common way to access the web



Of the 7 billion people in the world,

4 billion

use a mobile phone while **3.5 billion** own a toothbrush



51%

of mobile subscribers in the UK own a smartphone and 74% of them use it when shopping

There was an

89%

increase in mobile data usage between 2010 and 2011



86%

of mobile internet users go online while they're watching TV



91%

of people have their mobile phone within arm's reach 24/7



Internet Usage 2012

WORLD INTERNET USAGE AND POPULATION STATISTICS June 30, 2012						
World Regions	Population (2012 Est.)	Internet Users Dec. 31, 2000	Internet Users Latest Data	Penetration (% Population)	Growth 2000-2012	Users % of Table
Africa	1,073,380,925	4,514,400	167,335,676	15.6 %	3,606.7 %	7.0 %
Asia	3,922,066,987	114,304,000	1,076,681,059	27.5 %	841.9 %	44.8 %
Europe	820,918,446	105,096,093	518,512,109	63.2 %	393.4 %	21.5 %
Middle East	223,608,203	3,284,800	90,000,455	40.2 %	2,639.9 %	3.7 %
North America	348,280,154	108,096,800	273,785,413	78.6 %	153.3 %	11.4 %
Latin America / Caribbean	593,688,638	18,068,919	254,915,745	42.9 %	1,310.8 %	10.6 %
Oceania / Australia	35,903,569	7,620,480	24,287,919	67.6 %	218.7 %	1.0 %
WORLD TOTAL	7,017,846,922	360,985,492	2,405,518,376	34.3 %	566.4 %	100.0 %

What Happens in an Internet Minute?



And Future Growth is Staggering



Putting Technology in Perspective



Your age

0

5

10

15

20

25

30

35

40

45

50

55

60

2013

2008

2003

1998

1993

1988

1983

1978

1973

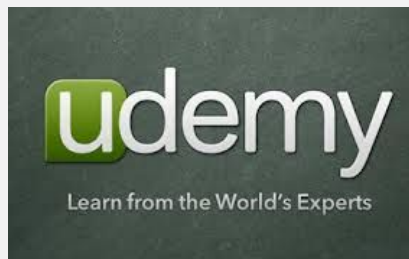
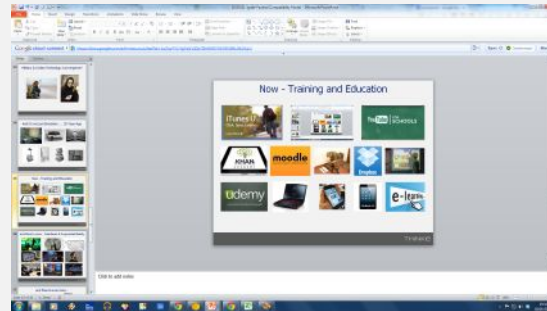
1968

1963

1958

1953

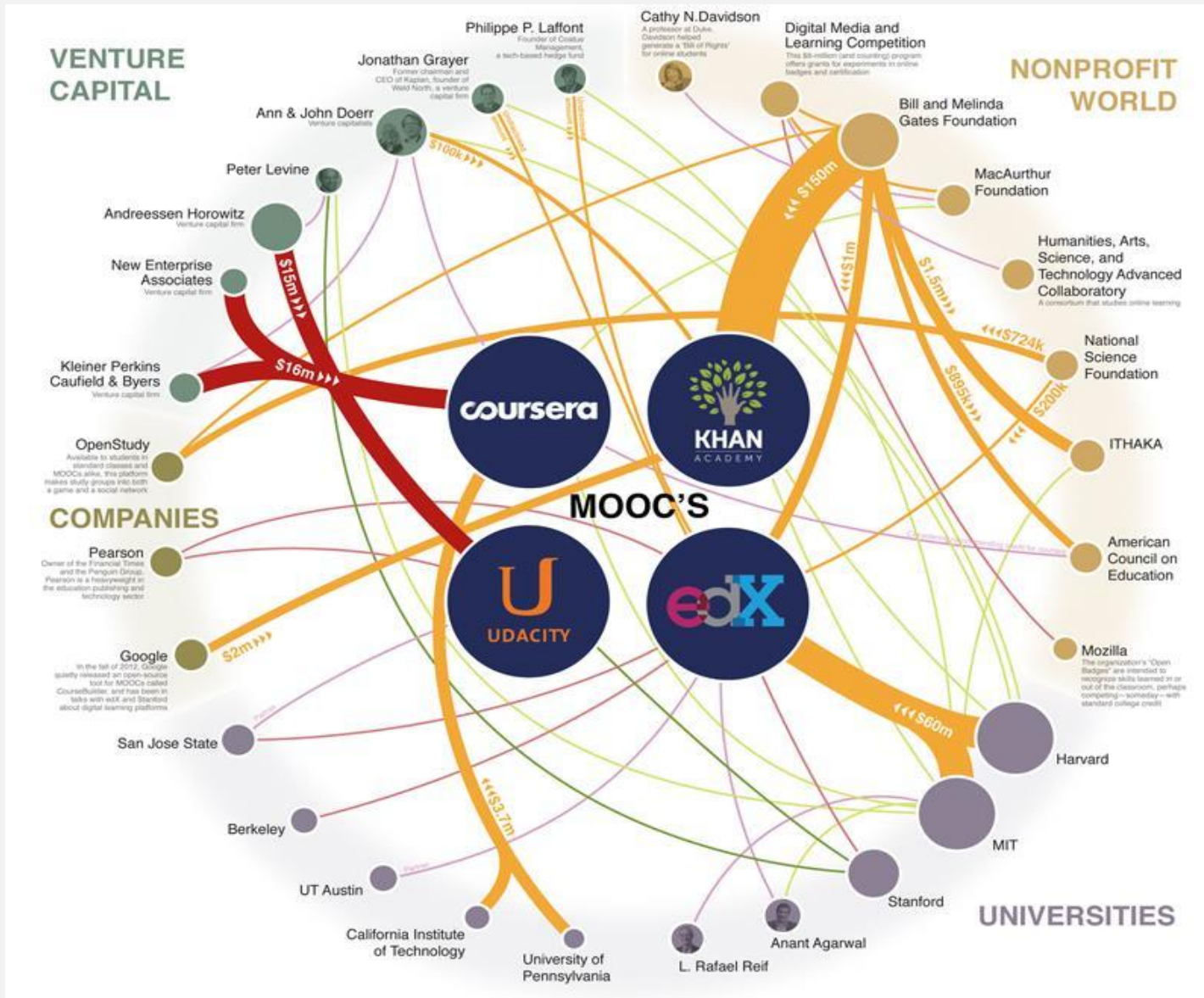
Training and Education Technology



Knowledge in Your Hands



Major Players in the MOOC Universe



MOOC
massive
open
online
course

Digital and Online Classrooms

South Korea 2015



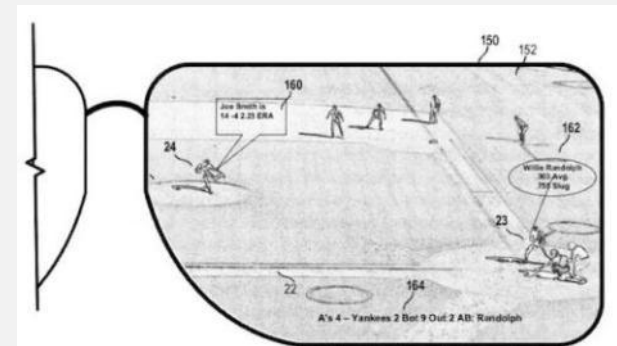
Florida 2015

Stanford University



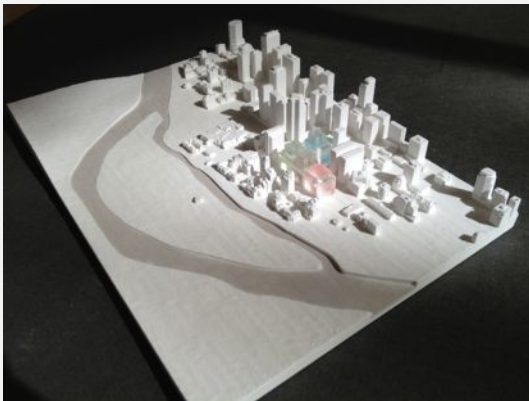
2012 - 23,000 Graduates

Interfaces & Augmented Reality



Looking Ahead?

- Robots/AI
- Internet of Things/"Connected Life"
- Wearable Computers
- Sensors
- Augmented Reality
- 3D Printing/3D Scanning
- "Generation C"



Internet of Things/Connected Life - Vehicles

- By 2020 it is expected that 90% of new passenger cars sold will be connected to the Internet
 - Position/Speed Monitoring
 - Continuous Testing/Evaluation
 - Just in time repair
- 75% of cars on the road by 2040 will be autonomous IEEE (Sep 12)



The Future of Knowledge and Skills?



Larry Page - 2004

"Search will be included in people's brains.... Eventually, you'll have the implant, where if you think about a fact, it will just tell you the answer."



Sergey Brin – 2012

"You'll ride in robot cars within 5 years"



Train Less.. Train at All?

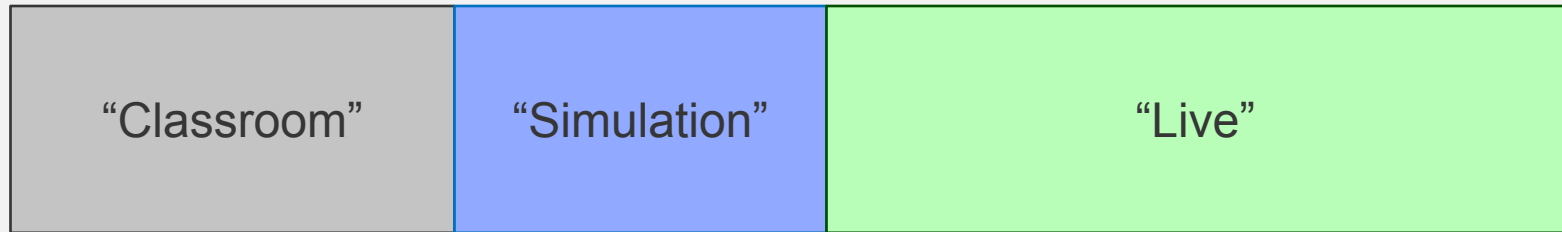


Military & Civilian Technology Convergence?

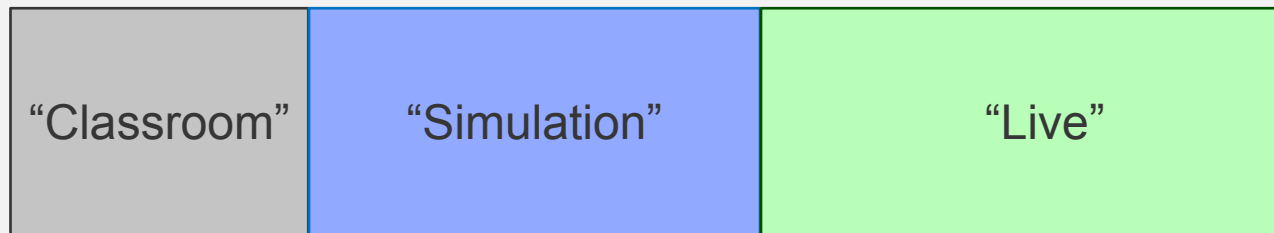


Time Spent in Training and Education?

Now



Future?

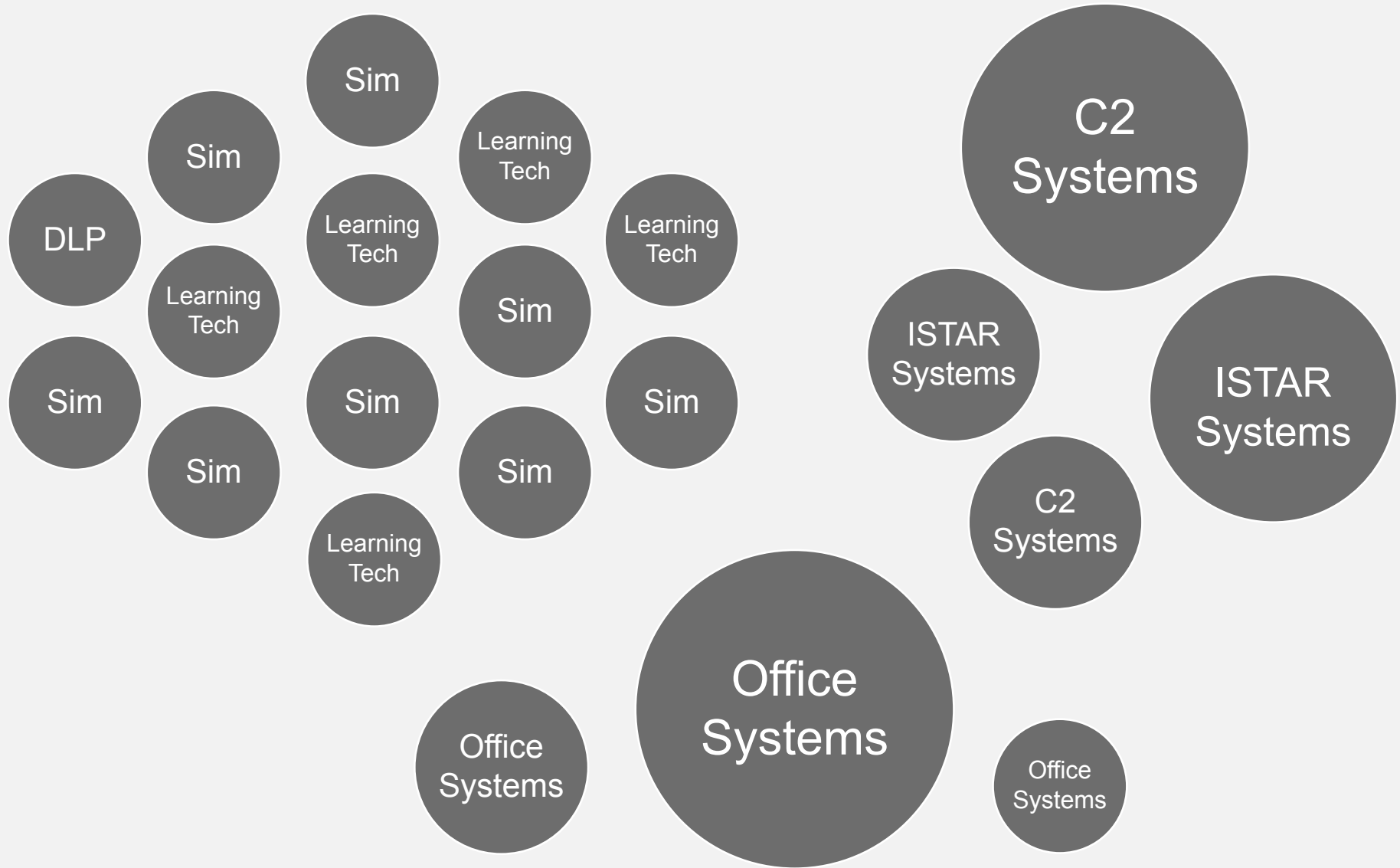


A Buyer's Guide

Who/What is the Technology Benefitting?

- The Organisation
 - eg. improved cost effectiveness
- The Trainee
 - eg. 24/7 access to knowledge
- The Trainer
 - eg. audio/visual aids
- All of the Above

Organisational Boundaries



The Mysteries of Simulation

SOAP CGF VV&A LVC SEDRIS DIS
MSHTF TENA Agent-based
DTEC RTI Federate Architectures ASP HLA
SISO DLP AI SCORM CBML CORBA
MCTS SEBA CATT AR DTED Serious Gaming
VR Monte Carlo Distributed M&S AVCATT
NMSG Human-in-the-loop FOM DoDAF
synthetic environment BOM DSALT Latency ITEC
Constructive Accreditation I/ITSEC Emulation

How much?

?

- “Cost Simulation 20% of Live Training”

\$

£

- “Save £100m’s”

- “Cost Simulation 5% of Live Training”

- “Training 20% of Defence Budget”

€

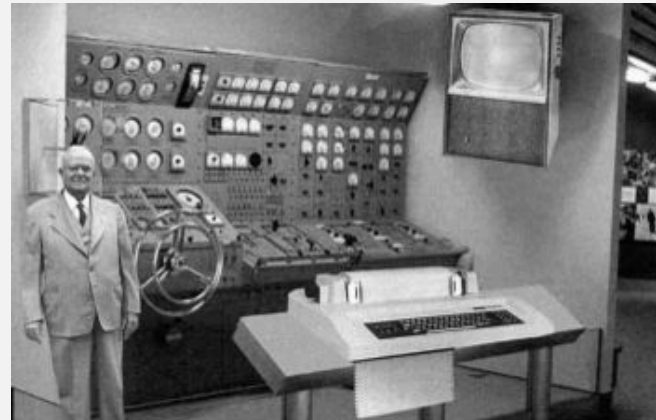
Provision of Training and Simulation

- Training or Simulation or Both?
- Equipment or Service
- As Part of Overall Vehicle Procurement Contract?
- As Separate Training/Simulation Procurement Contract?
- Army provided
 - Central
 - Local

Getting it Wrong



Photograph: Alamy

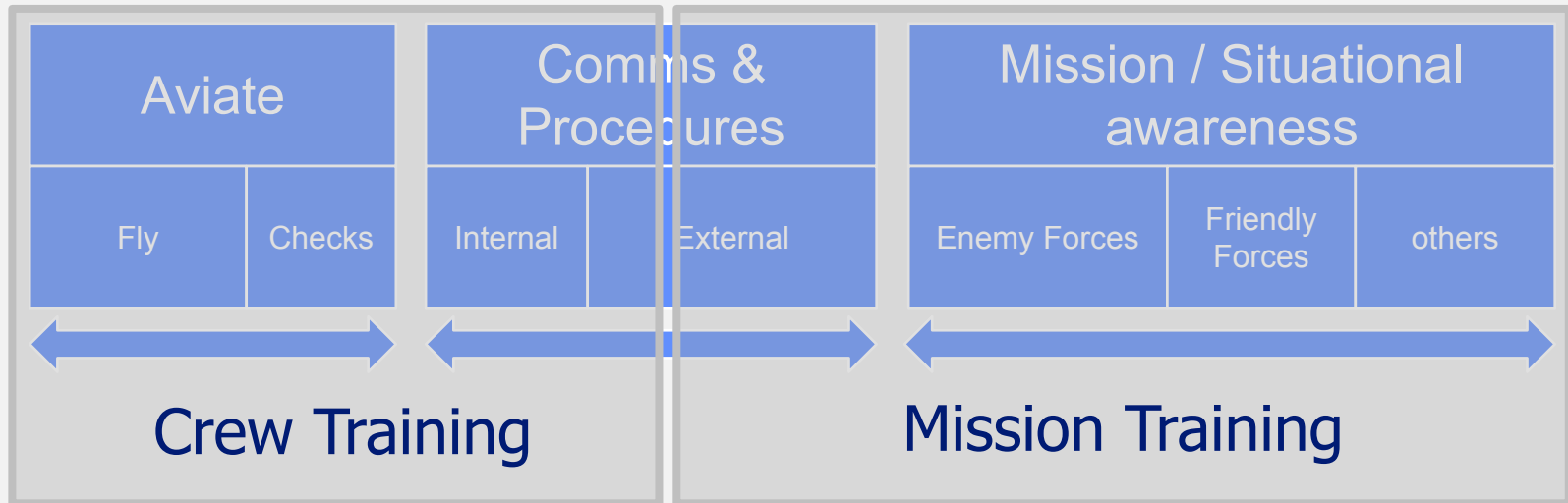


Level of Fidelity

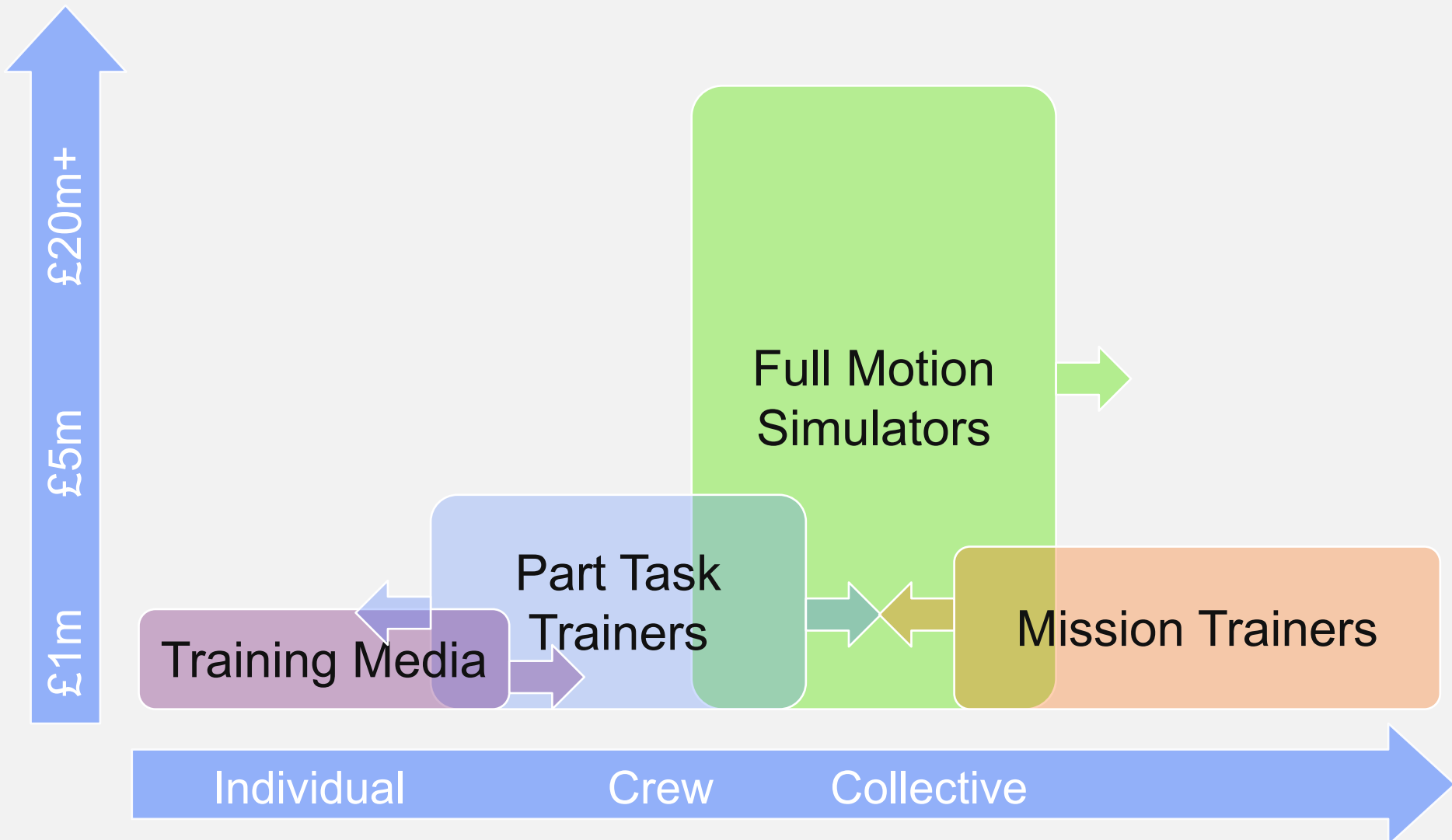
- Visual
 - Degrees of view
 - Resolution
 - Frame rate
- Audio
- Motion
 - Motion Cues
 - Physical challenge
- Human Machine Interface
 - “Switchology”
 - Constraint
- Data



Mental Capacity Demands of a Mission



Simulation Cost/Capability Spectrum



Combined Arms Tactical Trainer (UK)

- CATT supports foundation and mission-specific training in Warminster (UK) and Sennelager (Germany).
- Links 140 manned simulators and up to 450 participants – so all elements of the battlegroup can practise individual and collective skills.
- Allows training crews to operate simulated vehicles and aircraft – and interact with computer-generated civilians as well as friendly/enemy forces.
- Has 70 vehicle-specific simulators and 70 generic vehicle simulators that replicate surface and air vehicles.
- Offers full after-action review so that participants get the full learning experience.



Operational Joint Combat Operations Virtual Environment (Op JCOVE)

- Procured as a Service
- Mobile and deployable capability
- Virtual Mission Specific Training
- Improves response and awareness to threats
- Provides tactical command and control training
- Uses VBS2
- Scenarios including:
 - CIED drills
 - Mounted/Dismounted operations
 - Combat Logistic Patrols



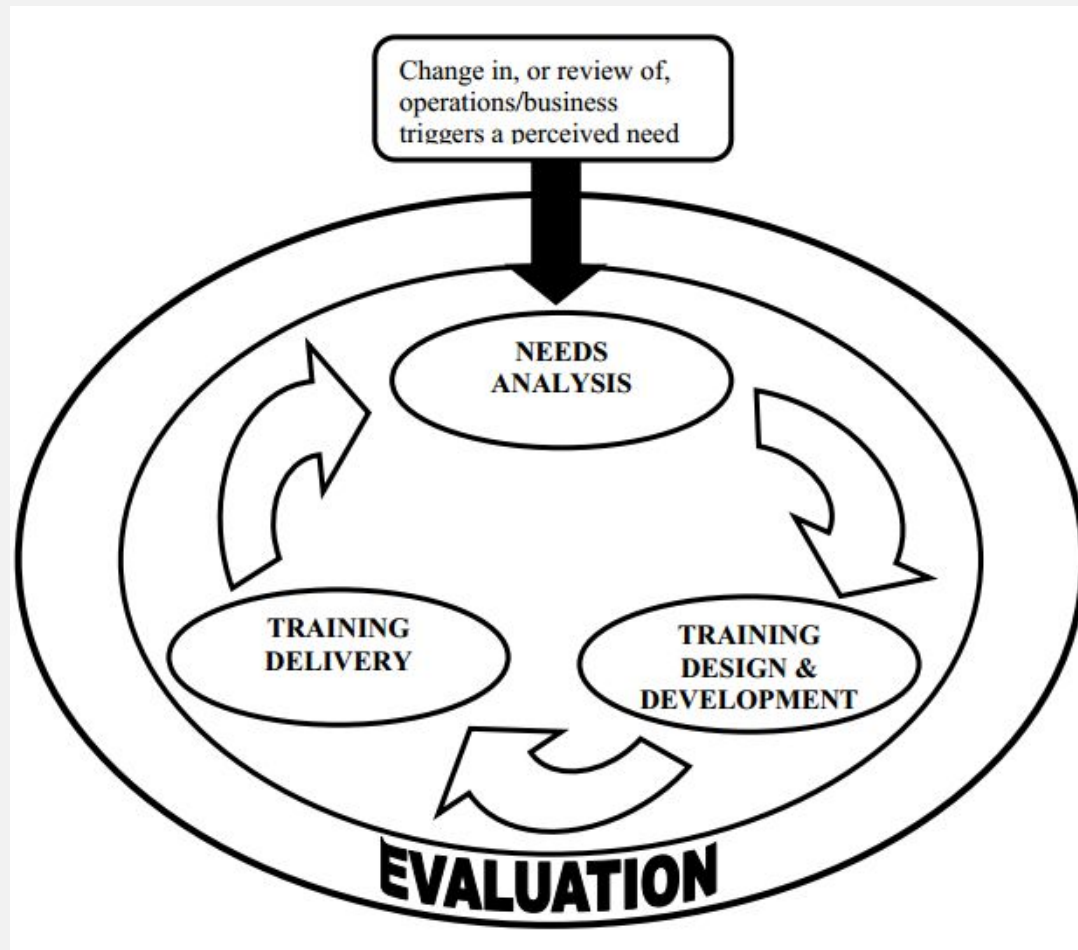
Modern Computer Games Based Simulation Software

Bohemia's VBS2

- Land Convoy Collective Training
- IED Training & Situational Awareness
- Aviation Tactics Training
- Gunnery and Crew Training
- Close Weapon Gunnery Training
- Anti-Piracy & Boarding Operations Training
- Fixed Wing Aviation Mission Training
- Maritime Submarine Training Capability
- Cultural Awareness & Language Training
- Engineer Training
- Army Recruiting
- E-Learning



Defence Systems Approach to Training



Training & Education Technology Operating Model

Organisation Integration	<u>Co-ordination</u> • Diverse Software, Shared Data & Network	<u>Unification</u> • Single Infrastructure and Services
	<u>Diversification</u> • Diverse Software, no Data Sharing & Network	<u>Replication</u> • Similar Software, no Data Sharing & Network
Organisation Standardisation		

Enduring Principle

- Focus on the Human Element of Warfare and Decision Making



Questions

