



Program Executive Office for Simulation, Training & Instrumentation

The Digital Long Tail of Military Simulation Systems

Roger Smith
US Army PEO STRI
roger.smith14@us.army.mil

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Digital Long Tail Abstract

The high power and low cost of computer games has the potential to enable the emergence of a “Long Tail” in military simulation systems. They will allow us to create and deploy hundreds of different training systems, rather than focusing all of our energy and funding on a few systems that represent combat vehicle operations and command and staff activities.

The concept of the Long Tail was introduced by Chris Anderson in his 2004 *Wired* magazine article and expanded in his 2006 book of the same name. Anderson describes how the Internet changed the market forces for delivering information products like music, movies, and software. Once the cost barriers of creating, delivering, stocking, and selling physical products was broken by digital delivery, it became very profitable to sell digital songs that fall far below the “Top 40” titles. His research indicates that there is a very robust market for songs all the way down to the 100,00th most popular song – the long tail of the curve of popularity and consumption. Digital storage and delivery makes it profitable to “stock” and sell all of these titles through services like iTunes, Rhapsody, and Napster.

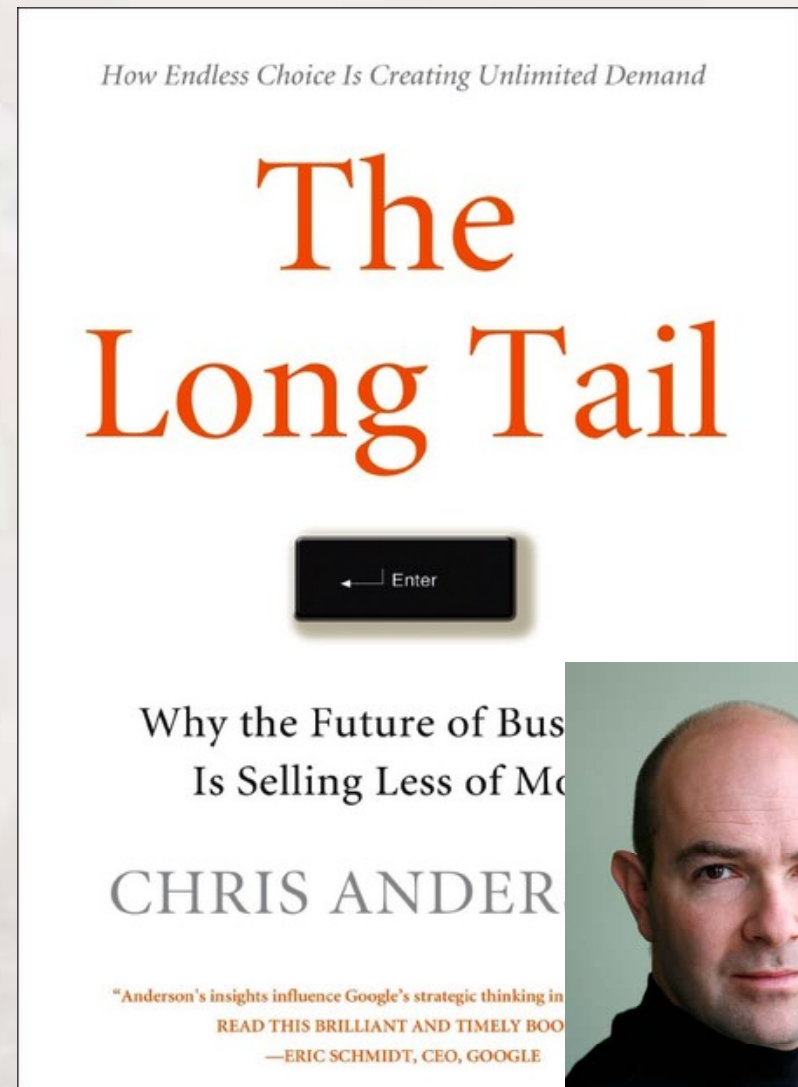
Computer games enable the same transformation in military training systems. The relatively low cost and high quality of commercial game engines and tools can make it possible to create custom simulations that focus on niche operations and do so at significantly lower costs by comparison with traditional training simulation projects. Rather than a simulation project costing \$100 million to create a system, game technologies may allow us to create training environments at various scales from \$10 million to \$10 thousand.

Potentially, the future of games in simulations is the creation of several hundred niche training systems to serve hundreds of military occupational specialties (MOS's), rather than just cost reductions and visual enhancements to established simulation training applications. This is a potential future that is being explored by technology and management leaders at Army PEO-STRI.

The Long Tail

- Local Markets
- Physical products, delivery, and stocking
- Requires concentration into the “Top 100” products.

- Global Markets
- Digital products, instant delivery, and free stocking
- Allows diversification into the “Top 100,000” products.





The Long Tail of Digital Music

ANATOMY OF THE LONG TAIL

Online services carry far more inventory than traditional retailers. Rhapsody, for example, offers 19 times as many songs as Wal-Mart's stock of 39,000 tunes. The appetite for Rhapsody's more obscure tunes (charted below in yellow) makes up the so-called Long Tail. Meanwhile, even as consumers flock to mainstream books, music, and films (right), there is real demand for niche fare found only online.

RHAPSODY

TOTAL INVENTORY:
735,000 songs



AMAZON.COM

TOTAL INVENTORY:
2.3 million books



NETFLIX

TOTAL INVENTORY:
25,000 DVDs



THE NEW GROWTH MARKET: OBSCURE PRODUCTS YOU CAN'T GET ANYWHERE BUT ONLINE





The Long Tail in Internet Search

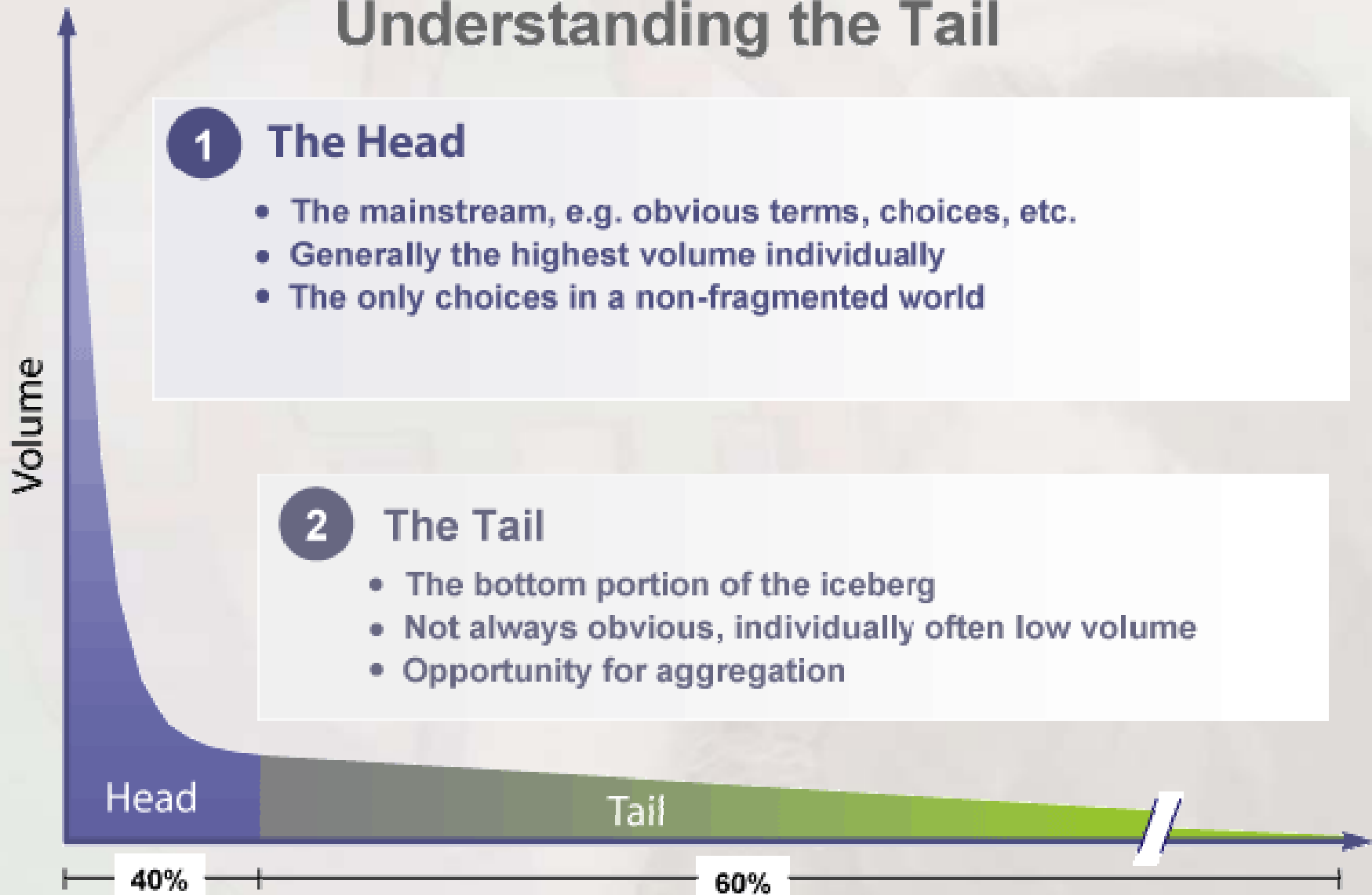
Understanding the Tail

1 The Head

- The mainstream, e.g. obvious terms, choices, etc.
- Generally the highest volume individually
- The only choices in a non-fragmented world

2 The Tail

- The bottom portion of the iceberg
- Not always obvious, individually often low volume
- Opportunity for aggregation





iTunes Long Tail of Sales

In 2004 Apple iTunes contained about 1 million songs.

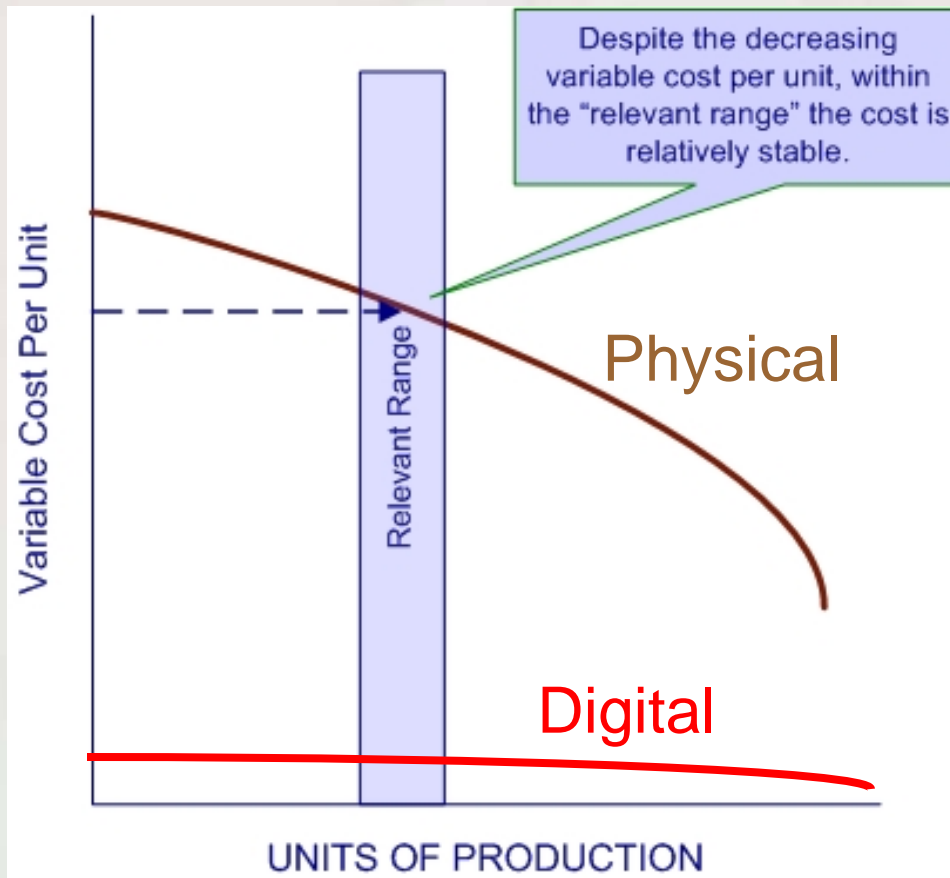


Question:
What percentage of those sold at least 1 copy per business quarter?

Answer: 100%



Important Cost Enabler



- Product Development = \$\$\$ (fixed)
- Duplication Costs = ~ \$0 (variable)
- Stocking Costs = ~ \$0 (variable)
- Delivery Costs = ~ \$0 (variable)

- Product Cost = Fixed Costs + Variable Costs
- Since variable costs are almost zero, a product must only return a one-time fixed cost to be profitable



Simulation's Short Tail

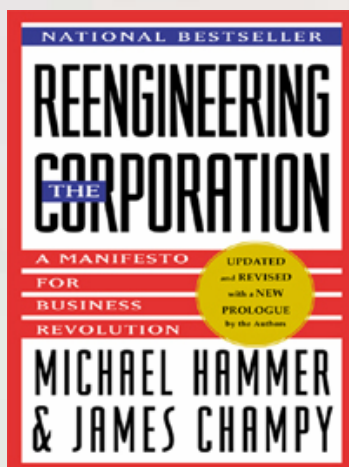




The Enabling Role of IT



“The power of the Xerox copier did not lie in its capability to replace carbon paper and other existing copying technologies, but in its ability to perform services beyond the reach of these technologies. The 914 [copier] created a market for convenience copies that had previously not existed.”



(Hammer & Champy, 1993)

This is the power of game technologies. They create or enable a new need and then satisfy it.



Simulation's Long Tail

Trigger Pullers
Combat Missions
Life Threatening

\$50M project



Medical
Logistics
Intelligence

\$1M project



Signal/IT
Linguist
Interrogation

\$100K project



Ethics
Culture
Engine Repair

\$10K project





Simulation Long Tail Enablers

IT Infrastructure

- Computer for Every Soldier
- Decent Network to Every Unit

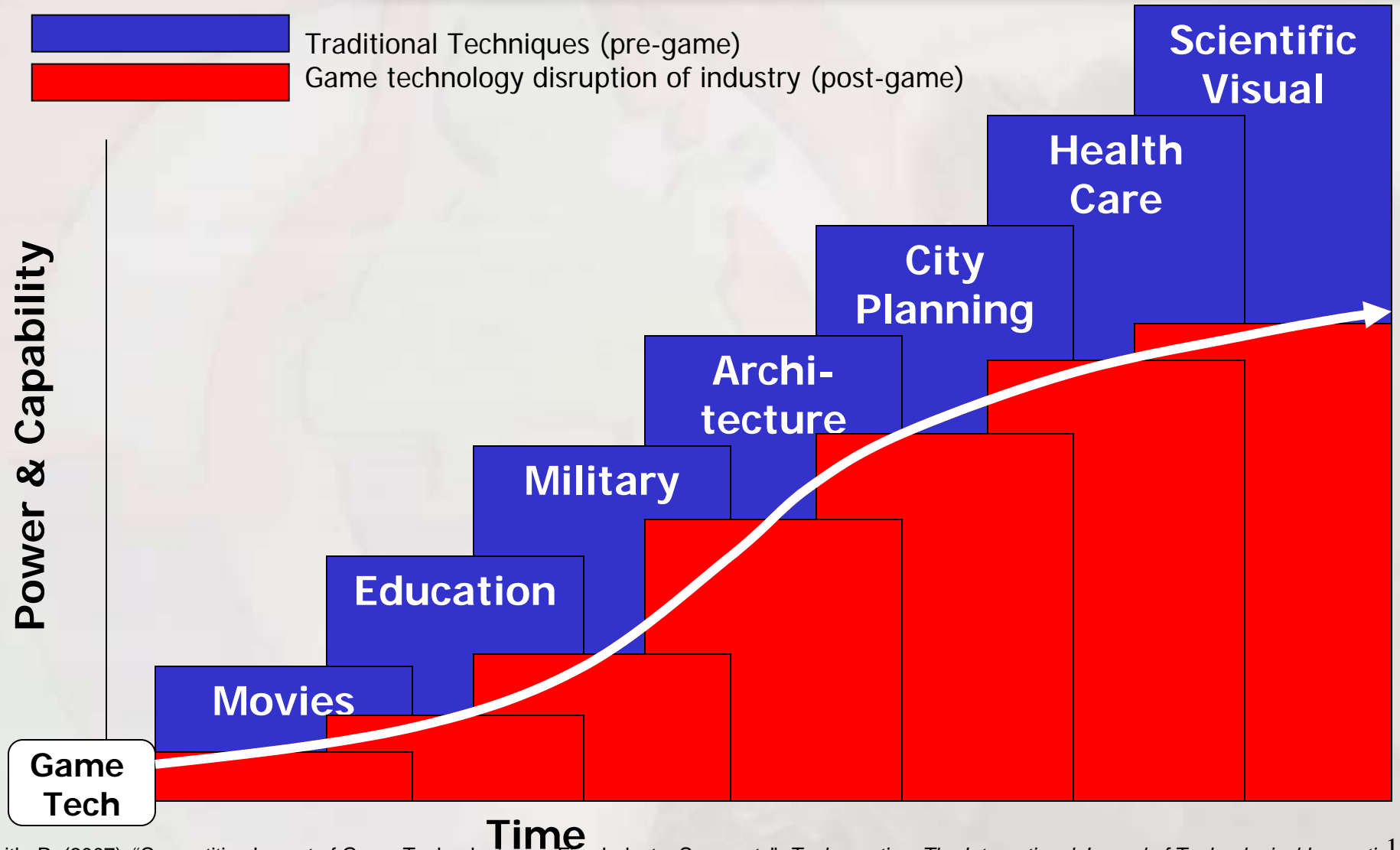
- 24/7 Simulation Server Farms
- Downloadable Simulation Clients

- Scenario Building Tools and Services
- Self Explanatory User Interface

Game Technology



Entering Multiple Industries





U.S. Army Military Occupational Specialties

Enlisted MOS

Infantry Branch

11B Infantryman
11C Indirect Fire Infantryman
11X Infantryman (ambiguous; turns into 11B, 11C, or 11M)
11Z Infantry Senior Sergeant
11H Infantry Anti-Armor Specialist
11M Mechanized Infantryman

Field Artillery Branch

13B Cannon Crewmember
13C TAC Fire Operations Specialist
13D Field Artillery Tactical Data Systems Specialist
13E Cannon Fire Direction Specialist
13F Fire Support Specialist
13M Multiple Launch Rocket System Crewmember
13P MLRS/LANCE Operations Fire Directions Specialist
13R Field Artillery Firefinder Radar Operator
13S Field Artillery Surveyor
13W Field Artillery Meteorological Crewmember
13X Field Artillery Enlistment Option
13Z Field Artillery Senior Sergeant

Air Defense Artillery Branch

14E Patriot Fire Control Enhanced Operator/Maintainer
14J Early Warning System Operator
14M Man Portable Air Defense System Crewmember
14R Bradley Linebacker Crewmember
14S Avenger Crewmember
14T PATRIOT Launching Station Enhanced Operator/Maintainer

14Z Air Defense Artillery (ADA) Senior Sergeant

Aviation Branch

15B Aircraft Powerplant Repairer
15D Aircraft Powertrain Repairer
15F Aircraft Electrician
15G Aircraft Structural Repairer
15H Aircraft Pneumatic Repairer
15J OH-58D Armament/Electrical/Avionics Systems Repairer
15K Aircraft Components Repair Supervisor
15M UH-1 Helicopter Repairer
15N Avionics Mechanic
15P Aviation Operations Specialist
15Q Air Traffic Control Operator
15R AH-64 Attack Helicopter Repairer
15S OH-58D Helicopter Repairer
15T UH-60 Helicopter Repairer
15U Medium Helicopter Repairer
15V Observation/Scout Helicopter Repairer
15X AH-64 Armament/Electrical Systems Repairer
15Y AH-64D Armament/ Electrical Systems Repairer
15Z Aircraft Maintenance Senior Sergeant

Special Forces Branch

18B Special Forces Weapons Sergeant
18C Special Forces Engineer Sergeant
18D Special Forces Medical Sergeant
18E Special Forces Communications Sergeant
18F Special Forces Assistant Operations & Intelligence Sergeant
18X Special Forces Candidate
18Z Special Forces Operations Sergeant

Armor Branch

19D Cavalry Scout
19K Armor Crewmember
19Z Armor Senior Sergeant

Corps of Engineers Branch

21B Combat Engineer (Formally 12B)
21C Bridge Crewmember
21D Diver
21E Heavy Construction Equipment Operator
21G Quarrying Specialist
21H Construction Engineer
21J General Construction Equipment Operator
21K Plumber
21L Lithographer
21M Firefighter
21N Construction Equipment Supervisor
21P Prime Power Production Specialist
21Q Transmission and Distribution Specialist
21R Interior Electrician
21S Topographic Surveyor
21T Technical Engineering Specialist
21U Topographic Analyst
21V Concrete and Asphalt Equipment Operator
21W Carpentry and Masonry Specialist
21X General Engineering Supervisor
21Y Topographic Engineering Supervisor
21Z Combat Engineering Senior Sergeant

Signal Corps Branch

25B Information Systems Operator Analyst *(to be renamed Information Technology Specialist in Oct'07)*
25C Radio Operator Maintainer
25D Telecommunications Operator/Maintainer *(to be deleted in Oct'07)*
25F Network Switching Systems Operator/Maintainer
25L Wire Systems Installer
25M Multimedia Illustrator
25N Nodal Network Systems Operator/Maintainer
25P Microwave Systems Operator/Maintainer
25Q Multichannel Transmission Systems Operator
25R Visual Information/Audio Equipment Repairer
25S Satellite Communication Systems Operator/Maintainer
25T Satellite/Microwave Systems Chief
25U Signal Support Systems Specialist
25V Combat Documentation & Production Specialist
25W Telecommunications Operations Chief
25X Senior Signal Sergeant
25Y Information Systems Chief *(to be deleted in Oct'07)*
25Z Visual Information Operations Chief

Judge Advocate General Branch

27D Paralegal Specialist

Military Police Corps Branch

31B Military Police
31D CID Special Agent
31E Internment/Resettlement Specialist

Military Intelligence Branch

33W (35T) MI Systems Maintainer/Integrator
96B (35F) Intelligence Analyst
96D (35G) Imagery Analyst
96H (35H) Imagery Ground Station Operator
96R (35H) Ground Surveillance Systems Operator
96U (35K) Unmanned Aerial Vehicle Operator
96Z (35X) Intelligence Senior Sergeant
97B (35L) Counterintelligence Agent
97E (35M) Human Intelligence Collector
97L (35Q) Translator/Interpreter
97Z (35Y) Counterintelligence/Human Intelligence Senior Sergeant
98C (35N) Signal Intelligence Analyst (Linguist)
98G (35P) Cryptologic Linguist
98P (35U) Multi-Sensor Operator
98Y (35K) Signals Collector/Analyst
98Z (35Z) Signals Intelligence Senior Sergeant
09L (35V) Translator Aide
05h EW/SIGINT Morse Intercept Operator

Psychological Operations Corps Branch

21J Psychological Operations Specialist

Civil Affairs Branch

38B Civil Affairs Specialist
Adjutant General Branch
42A Human Resource Specialist
42F Human Resource Systems Information Specialist
42L Administration Specialist *(to be deleted)*
42R9B Trumpet Player
42R9C Baritone or Euphonium Player
42R9D French Horn Player
42R9E Trombone Player
42R9F Tuba Player
42R9G Flute or Piccolo Player
42R9H Oboe Player
42R9J Clarinet Player
42R9K Bassoon Player
42R9L Saxophone Player
42R9M Percussion Player
42R9N Piano Player
42R9T Guitar Player
42R9U Electric Bass Guitar Player
42S Special Band member

Finance Branch

44C Finance Specialist/Accounting Specialist

Public Affairs Branch

46Q Public Affairs Specialist
46R Broadcast Journalist
46Z Public Affairs Chief

Chaplain Branch

56M Chaplain Assistant

CMF 63 - Mechanical Maintenance

44B Metal Worker
44E Machinist
45B Small Arms/Artillery Repairer
45G Fire Control Repairer
45K Armament Repairer
52C Utilities Equipment Repairer
52D Power Generation Equipment Repairer
62B Construction Equipment Repairer
63A M1 Abrams Tank Turret Mechanic/M1 Abrams Tank System Mechanic
63B Light-Wheel Vehicle Mechanic/Heavy Wheel Vehicle Mechanic/Wheel Vehicle Repairer
63D Artillery Mechanic
63H Fuel and Electrical Repairer/Track Vehicle Mechanic
63J Quartermaster and Chemical Equipment Repairer
63M M2-3 Bradley Fighting Vehicle System Mechanic/Bradley Fighting Vehicle Systems Turret Mechanic
63X Track Vehicle Repairer
63W All Wheel Vehicle Repairer
63Z Mechanical Maintenance Supervisor

Medical Department Branches

68A Medical Equipment Repairer
68D Operating Room Specialist
68E Dental Specialist
68G Patient Administration Specialist
68H Optical Laboratory Specialist
68J Medical Logistic Specialist
68K Medical Laboratory Specialist
68M Hospital Food Specialist
68P Radiology Specialist
68Q Pharmacy Specialist
68R Veterinary Food Inspection Specialist
68S Preventive Medicine Specialist
68T Animal Care Specialist
68V Respiratory Specialist
68W Health Care Specialist (aka Combat Medic)
68X Mental Health Specialist
68Z Chief Medical NCO

Chemical Branch

74D Chemical Operations Specialist (formerly 54B)

CMF 79 - Recruiting and Retention

79R Recruiter Noncommissioned Officer
79S Career Counselor
79T Recruiting and Retention NCO
79V Retention and Transition Noncommissioned Officer

Transportation Branch

88H Cargo Specialist
88K Watercraft Operator
88L Watercraft Engineer
88M Motor Transport Operator
88N Traffic Management Coordinator
88P Railway Equipment Repairer
88T Railway Section Repairer
88U Railway Operations Crewmember
88Z Transportation Senior Sergeant

Ordnance Branch

89B Ammunition Specialist
89D Explosive Ordnance Disposal Specialist

Quartermaster Corps Branch

92A Automated Logistical Specialist
92F Petroleum Supply Specialist
92G Food Service Specialist
92L Petroleum Laboratory Specialist
92M Mortuary Affairs Specialist
92R Parachute Rigger
92S Shower/Laundry and Clothing Repair Specialist
92W Water Treatment Specialist
92Y Unit Supply Specialist
92Z Senior Noncommissioned Logistician

CMF 94 - Electronic Maintenance

94A Land Combat Electronic Missile System Repairer
94D Air Traffic Control Equipment Repairer
94E Radio and Communications Security Repairer
94F Special Electronics Devices Repairer
94H Test, Measurement & Diagnostic Equipment Support Specialist
94K Automatic Test Equipment Operator/Maintainer
94L Avionics Communications Equipment Repairer
94M Radar Repairer
94P Multiple Launch Rocket System Repairer
94R Avionics System Repairer
94S Patriot System Repairer
94T Avenger System Repairer
94W Electronic Maintenance Chief
94Y Integrated Family of Test Equipment
94Z Senior Electronic Maintenance Chief

Branch Immaterial (not oriented to a branch)

00Z Command Sergeant Major
Commissioned Officer & Warrant Officer MOS
Officer MOS's are usually two numerical digits plus a letter (most of the time "alpha"). Letterless MOS's are ambiguous and have several specific MOS's within the E.g. 62 contains 62A (Emergency Physician) and 62B (Field Surgeon).
Warrant Officer MOS's (known as WOMOS) are three numerical digits plus a letter, except 09W who is not y WO.
Officer Candidates
09R Cadet
09S Officer Candidate
09W Warrant Officer Candidate

Infantry Branch

11A Infantry Officer
Field Artillery Branch
13A Field Artillery Officer
131A Field Artillery Targeting Technician
Air Defense Artillery Branch
14 Air Defense Artillery Officer
140A Command and Control Systems Technician
140E Air and Missile Defense (AMD)
Tactician/Technician (Patriot Systems Technician)
140X Air Defense Artillery (ADA) Immaterial



U.S. Army Military Occupational Specialties

Aviation Branch

15 Aviation Officer
150A Air Traffic and Air Space Management Technician
150U Tactical Unmanned Aerial Vehicle (TUAV) Operations Technician (still classified at 350K until official transfer to Aviation Branch)
151A Aviation Maintenance Technician
152C OH-6 Pilot
152B OH-58A/C Pilot
152D OH-58D Pilot
152F AH-64A Pilot
152H AH-64D Pilot
153A Rotary Wing Aviator (Aircraft Nonspecific)
153B UH-1 Pilot
153D UH-60 Pilot
153DD UH-60 MEDEVAC Pilot
153E MH-60 Pilot
154C CH-47D Pilot
154E MH-47 Pilot
155A Fixed Wing Aviator (Aircraft Nonspecific)
155E C-12 Pilot
155F Jet Aircraft Pilot
155G O-5A/EO-5B/RC-7 Pilot

Special Forces Branch

18A Special Forces Officer
180A Special Forces Warrant Officer

Armor Branch

19A Armor, General
19B Armor
19C Cavalry

Corps of Engineers Branch

21A Engineer Officer
210A Utilities Operation and Maintenance Technician
215D Geospatial Information Technician (Old - Terrain Analysis Technician)

Signal Corps Branch

25A Signal Officer
250N Network Management Technician
251A Information Systems Technician
254A Signal Systems Support Technician
255Z Senior Signal Systems Technician

Judge Advocate General Branch

27A JAG Corps Attorney
27B Military Judge
270A Legal Administrator

Military Police Corps Branch

31A Military Police Officer
311A CID Special Agent

Military Intelligence Branch

35D Military Intelligence Officer
350F All Source Intelligence Technician
350G Imagery Intelligence Technician
350Z Attaché Technician
350K (150U) Tactical Unmanned Aerial Vehicle Operations (*transferring to Aviation Branch in Summer 07*)
351L Counterintelligence Technician
351M Human Intelligence Collection Technician
351Y Area Intelligence Technician
352N Traffic Analysis Technician
352P Voice Intercept Technician
352Q Morse Intercept Technician
352R Emanations Analysis Technician
352S Non Morse Intercept Technician
353T Intelligence and Electronic Warfare Technician

Psychological Operations Corps Branch

37A Psychological Operations Officer
37X Psychological Operations Officer, Designated

Civil Affairs Branch

38A Civil Affairs Officer
38X Civil Affairs Officer, Designated

Adjutant General Branch

42B Personnel Systems Management Officer
42C Band Officer
420A Military Personnel Technician
420C Bandmaster

Finance Branch

44A Finance Officer

Chaplain Branch

56 Chaplain
56A Command and Unit Chaplain
56D Clinical Pastoral Educator

Medical Department Branches

60A OPERATIONAL MEDICINE
60B NUCLEAR MEDICINE OFFICER
60C PREVENTIVE MEDICINE OFFICER
60D OCCUPATIONAL MEDICINE OFFICER
60F PULMONARY DISEASE/CRITICAL CARE OFFICER
60G GASTROENTEROLOGIST
60H CARDIOLOGIST
60J OBSTETRICIAN AND GYNECOLOGIST
60K UROLOGIST
60L DERMATOLOGIST
60M ALLERGIST, CLINICAL IMMUNOLOGIST
60N ANESTHESIOLOGIST
60P PEDIATRICIAN
60Q PEDIATRIC SUB-SPECIALIST
60R CHILD NEUROLOGIST
60S OPHTHALMOLOGIST
60T OTOLARYNGOLOGIST
60U CHILD PSYCHIATRIST
60V NEUROLOGIST
60W PSYCHIATRIST

61A NEPHROLOGIST

61B MEDICAL ONCOLOGIST/HEMATOLOGIST

61C ENDOCRINOLOGIST

61D RHEUMATOLOGIST

61E CLINICAL PHARMACOLOGIST

61F INTERNIST

61G INFECTIOUS DISEASE OFFICER

61H FAMILY MEDICINE

61J GENERAL SURGEON

61K THORACIC SURGEON

61L PLASTIC SURGEON

61M ORTHOPEDIC SURGEON

61N FLIGHT SURGEON

61P PHYSIATRIST

61Q RADIATION ONCOLOGIST

61R DIAGNOSTIC RADIOLOGIST

61U PATHOLOGIST

61W PERIPHERAL VASCULAR SURGEON

61Z NEUROSURGEON

62 Medical Corps Officer

62A Emergency Physician

62B Field Surgeon

63 Dental Corps Officer

63A General Dentist

63B Comprehensive Dentist

63D Periodontist

63E Endodontist

63F Prosthodontist

63H Public Health Dentist

63K Pediatric Dentist

63M Orthodontist

63N Oral and Maxillofacial Surgeon

63P Oral Pathologist

63R Executive Dentist

64A Veterinary Corps Officer

640A Veterinary Services Food Safety Technician

65 Medical Specialist Corps Officer

65A Occupational Therapy

65B Physical Therapy

65C Dietitian

65D Physician Assistant

65X Specialist Allied Operations

66 Nurse Corps Officer

66B Community Health Nurse

66C Psychiatric/Mental Health Nurse

66E Perioperative Nurse

66F Nurse Anesthetist

66G Obstetrics and Gyneco

66H Medical-Surgical Nurse

66N Generalist Nurse

66P Family Nurse Practitioner

67 Medical Service Corps Officer

67A Health Services

67B Laboratory Sciences

67C Preventive Medicine Sciences

67D Behavioral Sciences

67E Pharmacy

67F Optometry

67G Podiatry

67J Aeromedical Evacuation

670A Health Services Maintenance Technician

70A Healthcare Administrator

70B Health Services Officer

70C Comptroller

70D Information Systems Manager

70E Patient Administrator

70F Human Resources Manager

70H Plans, Operations, Intelligence Training, and Security

70K Medical Logistics

70K9I Health Facilities Management

Chemical Branch

74A Chemical, General

74B Chemical Operations and Training

74C Chemical Munitions and Materiel Management

Transportation Branch

88A Transportation Officer

88D Transportation Officer - Motor/Rail

880A Marine Deck Officer

881A Marine Engineering Officer

882A Mobility Officer

Ordnance Branch

91A Ordnance Officer

890A Ammunition Technician

913A Armament Systems Maintenance Technician

914A Allied Trades Technician

915A Automotive Maintenance Technician

915E Senior Automotive Maintenance/Senior Ordnance

Logistics Officer

919A Engineer Equipment Maintenance Technician

Quartermaster Corps Branch

92A Quartermaster Officer

920A Property Accounting Technician

920B Supply Systems Technician

921A Airdrop Systems Technician

922A Food Service Technician

923A Petroleum Systems Technician

CME 94 - Electronic Maintenance

948B Electronic Systems Maintenance Technician

948D Electronic Missile Systems Maintenance Technician

948E Senior Electronics Maintenance Technician



A Simulation for Every MOS?

- 316 unique MOS' listed
- For how many of these might a simulation/game be an effective training tool?
- Previously cost per simulator has limited the number of MOS' that the simulation community could serve.
- Digital product delivery may remove this limitation and allow us to serve all MOS' for which simulation products can be effective.



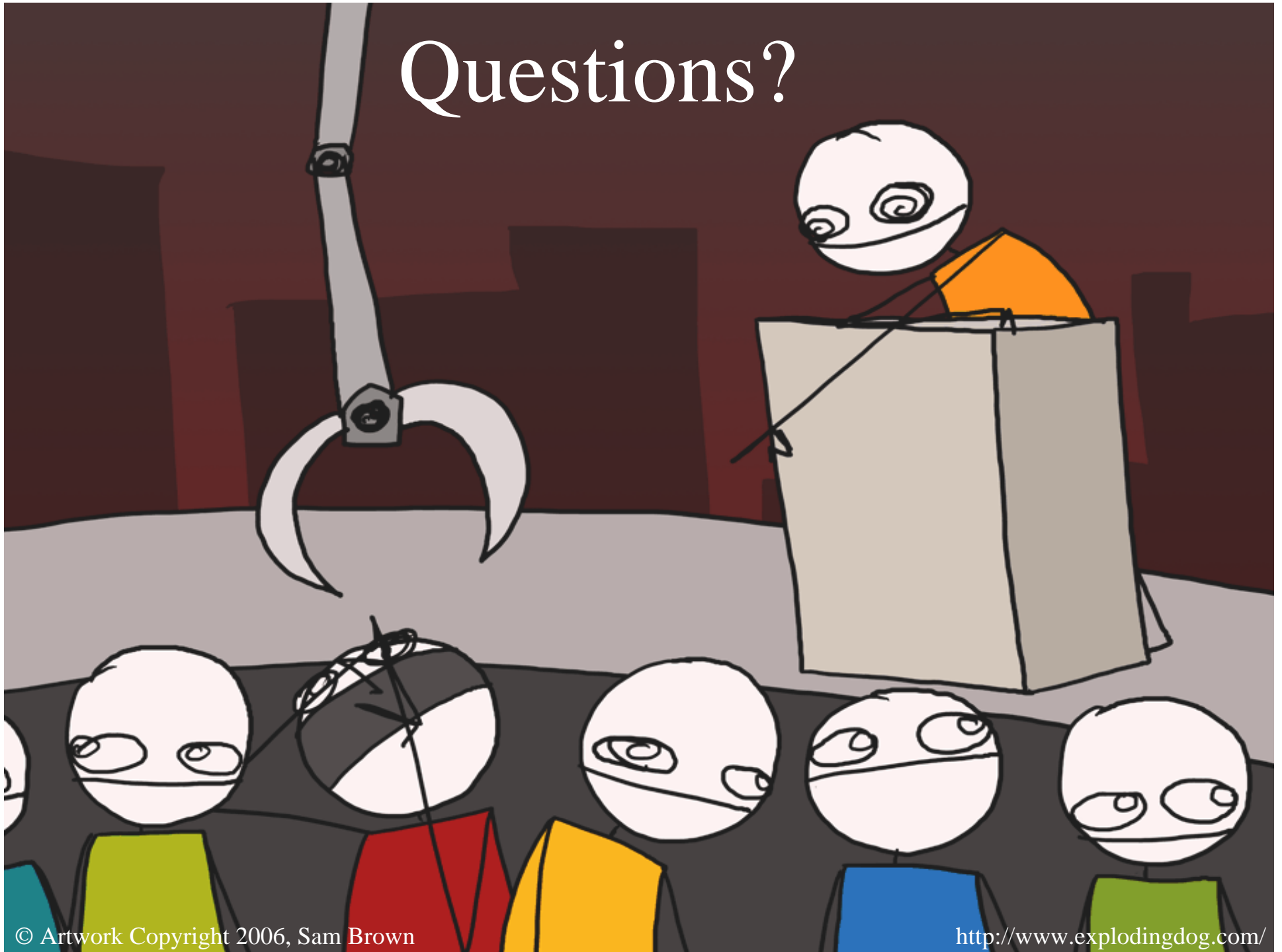


Simulation's Long Tail

The future of simulation is creating unique trainers for smaller niches of users.

Small is Beautiful ... Projects, Systems, Communities

Questions?





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