PROGRAM EXECUTIVE OFFICE FOR
SIMULATION, TRAINING & INSTRUMENTATION

Science & Technology Management:
Incorporating New Technology into PEO Programs

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Science and Technology Management Course
Defense Acquisition University
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➢ "The reasonable man adapts himself to the world; the unreasonable one persists in trying to adapt the world to himself. Therefore all progress depends on the unreasonable man."

   ❖ *Man and Superman*, 1903, George Bernard Shaw

➢ "Where there is no vision the people perish."

   ❖ Proverbs 29:18
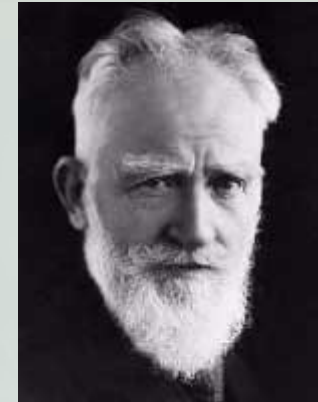
Simulation Ages

Stone	Paper	Metal	Electronic	Silicon	Wired	Soldier
Sand-tables, Live Events	Board-games, Wargame	Mechan-ical Aircraft	Analog Devices, Motion Platforms, Light Projection	High Comput-ation, Graphics, AI	Dist Ops, Interop-erability	Customer-focused, Customer-initiated
						Personal
					Network	
				Software		
			Hardware			
		Machine				
	Modeling					
Materials						

Driving Technologies

3

➢ Technology Exchange and Strategy Meeting

➢ Cross-membership in SBIR Reviews

➢ Personal Relationships

➢ Common Interests

➢ STRI Technology Challenges List

- ➢ Funding for Core Operations
- ➢ Access to All Research
- ➢ Annual Review of Research Proposals
- ➢ Collaborative Projects
- ➢ Inclusion in Congressional Funded Projects

ICT

INSTITUTE FOR CREATIVE TECHNOLOGIES

ICT
INSTITUTE FOR CREATIVE TECHNOLOGIES

- ➢ JFETS is a suite of state-of-the-art immersive virtual reality environments designed to help soldiers make critical decisions under stress and provide collective team training and cultural awareness lessons. Tasks not only focus on the technical application of skills, but also on the thought processes involved in employing those skills.

- ➢ By leveraging the ICT's mixed reality technology, JFETS recreates life-like environments that place soldiers in real world settings. Stressors include heat, wind, explosions, human distress noise, and snipers. JFETS also provides added artificial intelligence behaviors to insurgent forces and realistic, reactive behaviors to civilians. Using JFETS, soldiers interact with both the physical and virtual worlds seamlessly without the costs associated with live exercises.

- ➢ Installed at Fort Sill, Oklahoma, JFETS has trained over 16,000 soldiers since 2004 and is currently being used by members of United States Army and Marine Corps for training prior to deployments to Afghanistan and Iraq. The success of JFETS serves as an example of the application of cutting edge virtual simulation technologies and research in a real-world training setting.

- ➤ 3D Interactive environment
- ➤ Soldier interacts with virtual humans to sustain HUMINT Skills.
- ➤ Utilizes translator and foreign languages
- ➤ Avatar knowledge derived from constructive simulation.
- ➤ The HUMINT Collector gathers intelligence information from the Virtual Human, while a HUMINT Instructor monitors the student's performance. At the end of the tactical questioning, the HUMINT Collector reviews After Action Review Statistics as well as HUMINT Instructor comments.

> The U2MG tool uses a few basic inputs such as regional information, a basic building footprint, construction material, and building type to create an appropriate furnished interior along with a reasonably accurate structural design. U2MG databases are detailed in both form and function -- interior layouts are detailed enough for game-like first person walk-throughs and the structural representation is sufficient to allow detailed weapons effects calculations. The finished database can be exported to a variety of simulation file formats for both constructive and virtual training applications.

> U2MG is available as a stand-alone tool, a plug-in for TERREX Terra Vista, and as a separate development API. These various implementations of the underlying logic enable current and future systems to integrate with U2MG and allow the tool itself to adapt to changing needs and modified database formats.


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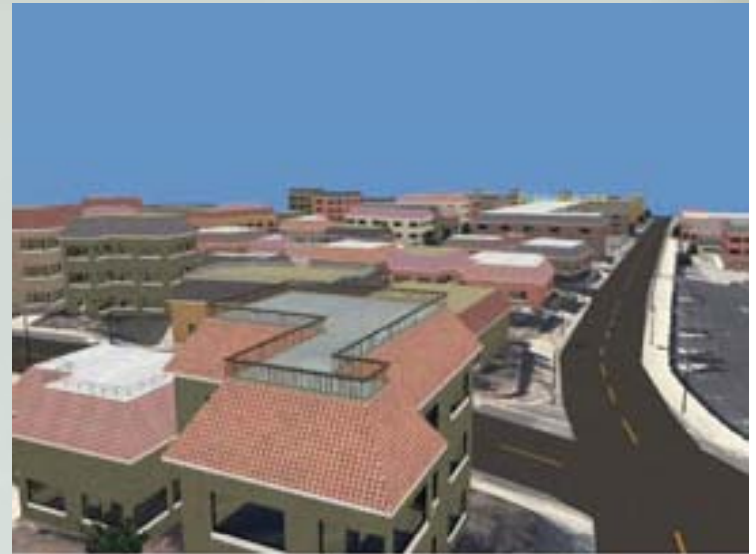
Rapid Unified Generation of Urban Databases (RUGUD)

> Funded by the U.S. Army Research, Development, and Engineering Command (RDECOM) Simulation and Training Technology Center (STTC), RUGUD is a sophisticated, data-driven framework that supports configurable terrain generation.

> Its application is for both wide-area databases and high-resolution urban environments. Our goal is to support better, cheaper, faster database production through flexibility, automation, and reuse. RUGUD's architecture continues to evolve as we incorporate additional import, export, and data manipulation capabilities. RUGUD is poised to address urban terrain generation challenges of today and the future.

Plugin Framework Concept
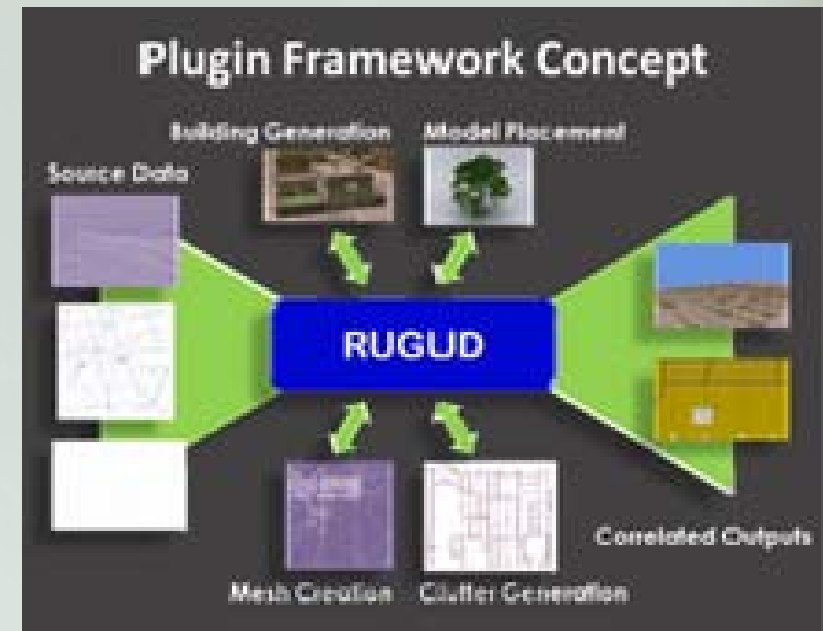
PEO STRI Technology Challenges

1. Terrain Changes and Correlation On-The-Fly
2. Voice Recognition Over Cluttered Radio Frequencies
3. Immersive Technologies
4. Processing Unstructured Human Language in a Tactical Environment
5. Highly scalable and mobile wireless Mesh/MANET networks and waveforms
6. Accurate and Affordable Geo-location/Situational Awareness capabilities for indoor and GPS-denied environments
7. Software Defined Radios (SDR)/Cognitive Radios/Dynamic Spectrum Assess (DSA)
8. Testing, Training and Tactical Communications on one network infrastructure
9. Training, Test, and Joint Range end to end application interoperability
10. Miniaturization of PU H/W, battery life, and weight reduction
11. Virtualization Strategies
12. Reduce Role-Player/Operator Overhead and Footprint
13. Fuel Cells/Batteries – Lighter, smaller, low cost
14. Low cost sophisticated remote target control
15. Cognitive Evaluation - Advanced sensors and algorithms for EEG, ECG, EMG, EG, CBT. Etc.

CTO
PEO STRI Chief Technology Officer

1. Cloud Computing

2. Mobile Computing and Apps

3. High Performance Computing

4. Game Technologies

5. Medical Simulation
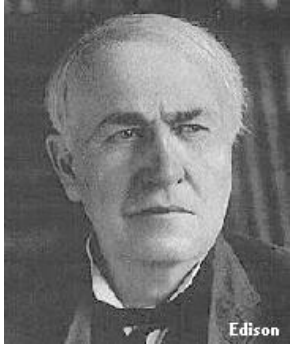
6. Web 2.0 Collaborative Tech

Consideration of Use?

	No	Yes

Quest for Fundamental Understanding?

	No	Yes
Yes	Pure Basic Research (Bohr)	Use-inspired Basic Research (Pasteur)
No		Pure Applied Research (Edison)

Stokes, D. (1997). *Pasteur's Quadrant: Basic Science and Technological Innovation.* Brookings Institute.

Pasteur's & Edison's Quadrant

Consideration of Use?

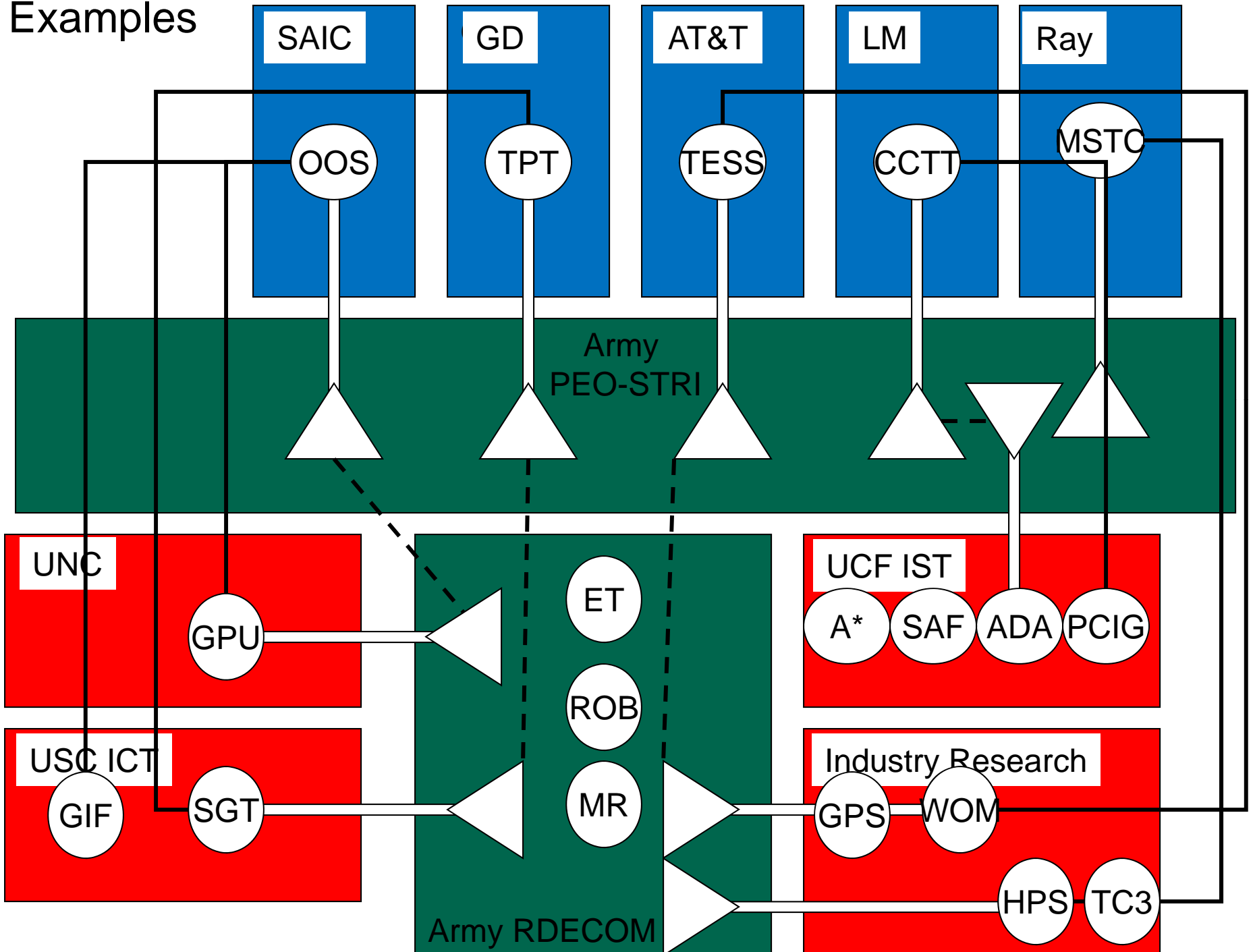|	No	Yes
Yes	Pure Basic Research (Bohr)	Use-inspired Basic Research (Pasteur)
	Unified Theory of Modeling	**Weapon Orientation Sensors GPU Processing**
No		Pure Applied Research (Edison)
		Game Technology (Military & Commercial)

Quest for Fundamental Understanding?

Stokes, D. (1997). *Pasteur's Quadrant: Basic Science and Technological Innovation*. Brookings Institute.

Model of Technology Transfer

Industry Production

Government Acquisition

Govt Capabilities Requirements

P

Production Contract

C

System Specification

IP & Tech Transfer

Shared Knowledge Space

Government Research Policy & Practice

R

Research Contract

C

Research Direction

Govt R&D Focus

University Labs

Industry Labs

Government R&D

Examples

SAIC
GD
AT&T
LM
Ray
MSTC

OOS
TPT
TESS
CCTT

Army
PEO-STRI

UNC

ET

UCF IST

GPU

A* SAF ADA PCIG

ROB

USC ICT

Industry Research
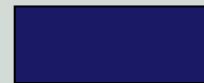
GIF SGT

MR

GPS WOM

HPS TC3

Army RDECOM

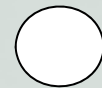# Technology Transfer Diagram Key

Government Office

Production Organization (Industry)

Research Organization (University or Industry)

Project Contract

Deliverable Product/Research

Financial & Contractual Relationship

Government Policy Relationship

IP & Technology Transfer Relationship

Government Requirements

➢ Training for every soldier, any time, any place, using any compute device, connected to every simulation we have.

➢ Take simulation out of the simulation center. Put it in the cloud.

➢ Open access between all DoD devices, networks, and applications.
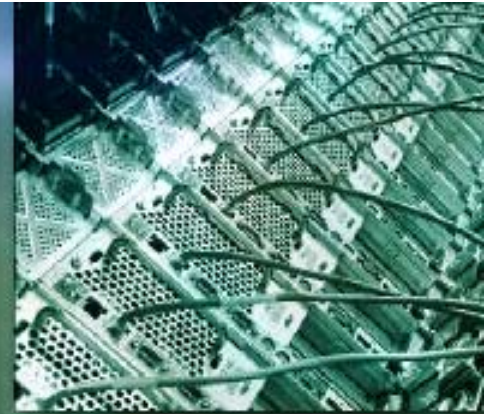
Simulation in the Cloud

NEW WORLD
- Soldier-centric
- Desktop Equipment
- Universal Access

EMBEDDED

CONSTRUCTIVE

GAME

TEAM

INDIVIDUAL

IMMERSIVE

C4I

Service & Soldier Centric
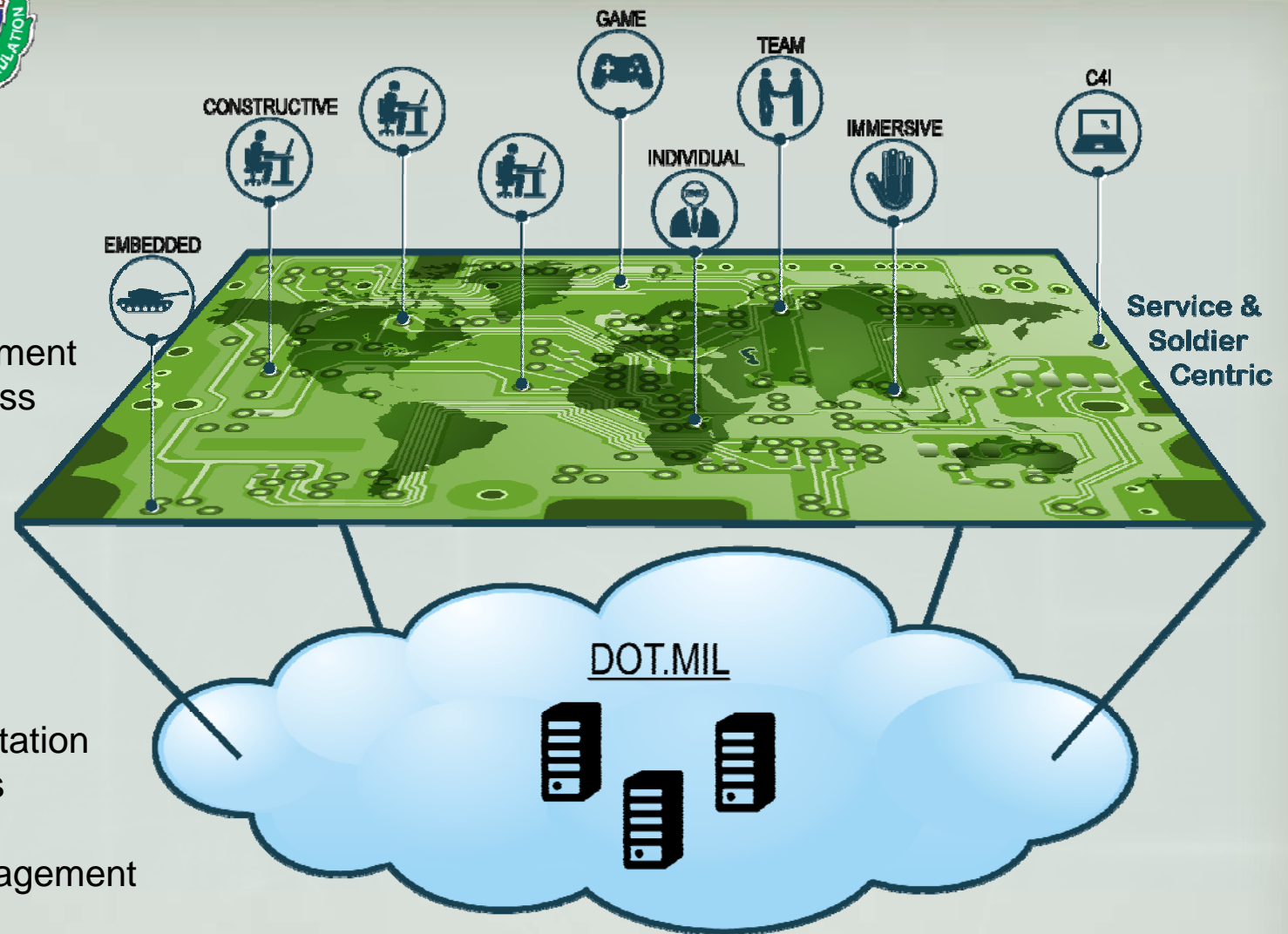
ENABLERS
- Massive Computation
- Global Networks
- Cloud Services
- Distributed Management

DOT.MIL

GAME TECHNOLOGY

MEDICAL

HIGH PERFORMANCE COMPUTING

CTO
CHIEF TECHNOLOGY OFFICER

WEB 2.0

SIMULATION AS A SERVICE

TRAINING SYSTEM EFFICIENCY