



# U.S. ARMY COMBAT CAPABILITIES DEVELOPMENT COMMAND – SOLDIER CENTER

ITEC 2020 - Constructive Digital Twins Coming Alive



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# SIMULATION AND TRAINING TECHNOLOGY CENTER



## MISSION

STTC conducts simulation & training technology research and development (R&D) to enhance Warfighter Readiness



## WHO WE ARE

STTC is a Directorate within AFC /CCDC-SC and the primary S&T organization supporting the Synthetic Training Environment (STE).



## WHAT WE DO

STTC develops and transitions innovative simulation and training technology products to assist the Army produce the best training aides, devices, simulators and simulations in the world.





# WHERE WE ARE



## Soldier Center STTC

### NSA ORLANDO

- Secured Boundary DOD
- Unsecured Property

### UNSECURED BOUNDARY

- State/UCF
- Commercial Lease

### DE FLOREZ

NAWCTSD  
PEO STRI  
NSA ORLANDO  
ACC-ORL

### ANNEX

PEO STRI

### TECH POINT I, II

AFAMS  
PEO STRI

### RESEARCH COMMONS

PEO STRI

### PARTNERSHIP I, II, III

FLETC  
NCS  
NAWCTSD  
PEO STRI  
PM TRASYS  
UCF IST  
ACC-ORL

### PARTNERSHIP IV

UCF IST  
Future Expansion  
ADL Initiative

### PARTNERSHIP V

PEO STRI  
JTIEC

STTC

PARTNERSHIP I

PARTNERSHIP II

PARTNERSHIP III

ANNEX

DE FLOREZ

PEO STRI

TECH POINT I

TECH POINT II

SCIENCE GATE (ACP)

RESEARCH COMMONS

Orlando TIF

PARTNERSHIP IV

STE CFT





# ARMY PRIORITIES



## HIP-POCKET GUIDE ARMY'S SIX MODERNIZATION PRIORITIES



A U.S. ARMY  
LOGISTICS, G-4  
PRODUCT

**1 LONG-RANGE PRECISION FIRES:**  
They provide the Army with long-range and deep-strike capability. They are the Army's number one modernization priority and critical to winning in a fight against a peer adversary.

**2 NEXT GENERATION OF COMBAT VEHICLES:**  
Manned, unmanned, and optionally-manned vehicles will ensure our combat formations can fight and win against any foe. They will deliver the most modern firepower, protection, mobility, and power generation capabilities.

**3 FUTURE VERTICAL LIFT PLATFORMS:**  
The Army is leading a multi-service initiative focused on enhancing vertical lift dominance with manned, unmanned, and optionally-manned variants that can survive the modern and future battlefield.

**4 ARMY NETWORK:**  
The Army is building a network with hardware, software, and infrastructure – sufficiently mobile and expeditionary – that can be used to fight cohesively in any environment where the electromagnetic spectrum is denied or degraded.

**5 AIR AND MISSILE DEFENSE CAPABILITIES:**  
These systems will defeat missile threats against the U.S., and ensure our future combat formations are protected from advanced air and missile delivered fires, including drones. They are critical to winning a fight against a near-peer adversary.

**6 SOLDIER LETHALITY:**  
Soldier lethality spans all fundamentals – shooting, moving, communicating, protecting, and sustaining. The Army will field individual and combat weapons, as well as improved body armor, sensors, radios, and load-bearing exoskeletons.

**Eight Cross-Functional Teams were created to address the six modernization priorities.**

The Army's Cross-Functional Teams:

- Long-Range Precision Fires • Future Vertical Lift • Assured Positioning, Navigation, and Timing • Next Generation Combat Vehicles
- Army Network • Air and Missile Defense Capabilities • Soldier Lethality • Synthetic Training Environment



# STE CAPABILITY OVERVIEW



Global Terrain /  
One World Terrain



- A terrain capability that provides a fully accessible representation of the globe
- Reduces 57 terrain formats to 1
- Accessible over the Army Network (Accessible at the Point of Training)

Training  
Simulation  
Software



- Single training environment accessible over the cloud distributed network
- Leverages current gaming technology to deliver realistic military simulations
- Scalable-enables training from squad through ASCC.

Training  
Management  
Tools



- Intuitive and easy to use tools that enhance Training Management
- Network accessible training scenarios and simulation training base
- Captures and builds upon each repetition

Virtual Trainers  
(RVCT/SSVT)



- Squad Air and Ground Virtual training capabilities that allow formations to train MDO
- Allows units to train as the fight
- Replaces current facility based, high personnel and hardware based platforms

Live Training  
Environment



- Modernizes current live training environment
- Integrates the Live/Mixed Reality into a single synthetic training environment
- Allows fair fight engagements across all training environments and training devices.

Point of Need /  
Network / Cloud  
Based



- Delivers training to the point of need across all Army component formations and locations
- Leverages Army and commercial cloud and network capabilities.
- Transports information from data centers to the end user training devices.

Big Data / AI



- Provides intelligent tutor capabilities and methodologies to assess training effectiveness.
- AI will generate enhanced training scenarios based on unit performance
- Establishes Army training content repository

Next Generation  
Constructive



- Trains Commanders and Staffs on MDO
- Modernizes current JLCTTC Federation
- provides a digital representation of the dynamic operational environment.
- Scalable from BN TF-ASCC





# CONSTRUCTIVE DIGITAL TWINS COMING ALIVE

## PART 1 - BONES



- In the dark ages... well maybe not so dark.
  - Physical maps, physical units, experience-based adjudication
    - ...well, maybe dice-based.
- NOTE – more common at lower levels





# CONSTRUCTIVE DIGITAL TWINS COMING ALIVE

## PART 2 - SKELTON



- In the brighter ages...
  - Digital maps, Digital units, algorithm-based adjudication
- NOTE – more common at higher levels (brigade+, 2000-5000 Soldiers, COL)







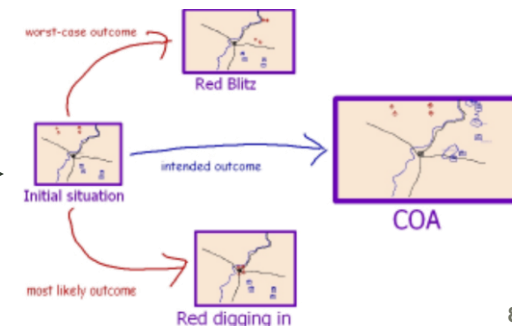
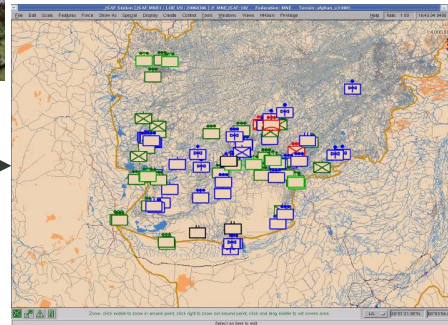
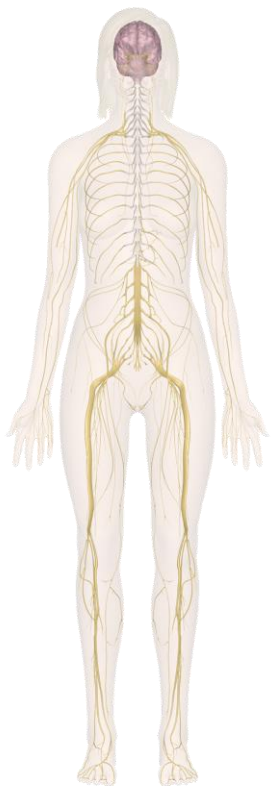
# CONSTRUCTIVE DIGITAL TWINS COMING ALIVE

## PART 3 - BRAINS



- Coming Alive
  - Digital maps
    - From OWT
  - Digital units
    - From TSS/TMT
  - Algorithm-based adjudication
    - From AI model Training (TSS)

NOTE Not common







# AI WINS, YOU LOSE



- AI algorithms are beating the best human experts at... well... everything.

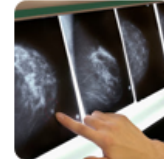
## The Poker-Playing AI That Beat the World's Best Players

Singularity Hub · Jul 15



## Google Health's AI Beats Human Experts in Predicting Breast Cancer in Early Stages

Digital Information World · 3 days ago



## DeepMind AI beats humans at deciphering damaged ancient Greek tablets

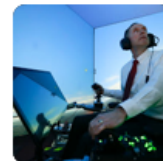
New Scientist News · Oct 18



## Beyond Video Games: New Artificial Intelligence Beats Tactical Experts in Combat Simulation

University of Cincinnati

# 2016





## WELL... ABOUT THAT...



AlphaGo (GO)

AlphaStar (StarCraft)

OpenAIFive (Dota2)

Limitations:

\$25M	\$35M	\$2M/month
6 weeks	2 weeks	10 months
---	One terrain	---
---	One starting position	---
---	Single Policy, not explained	---
---	Simulated environment	---
---	Roughly evenly matched	---

Information perfect

limited # of characters

Turn based

## What kind of battle are you fighting?



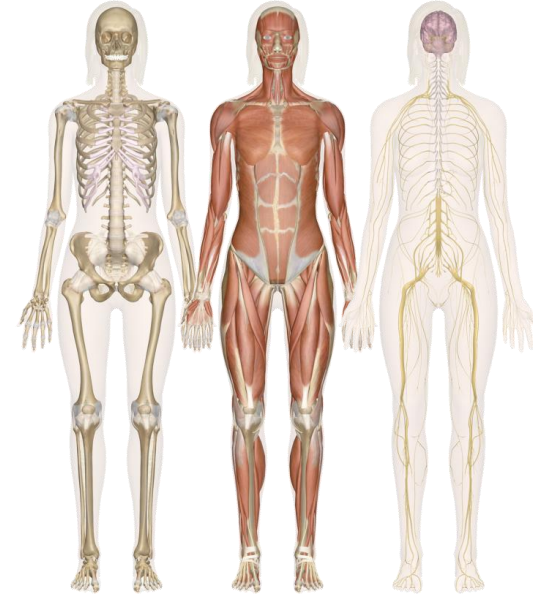


# DIGITAL TWINS COMING ALIVE



- Algorithms (+training +environment)
- Models (+multiple runs)
- Metrics (+interpretation)
- Analysis
- Applications
  - Training: COA training
  - On-the-ground operational
  - Planning operational

<https://youtu.be/5T28jZlwHnU?t=229>





# QUESTIONS

