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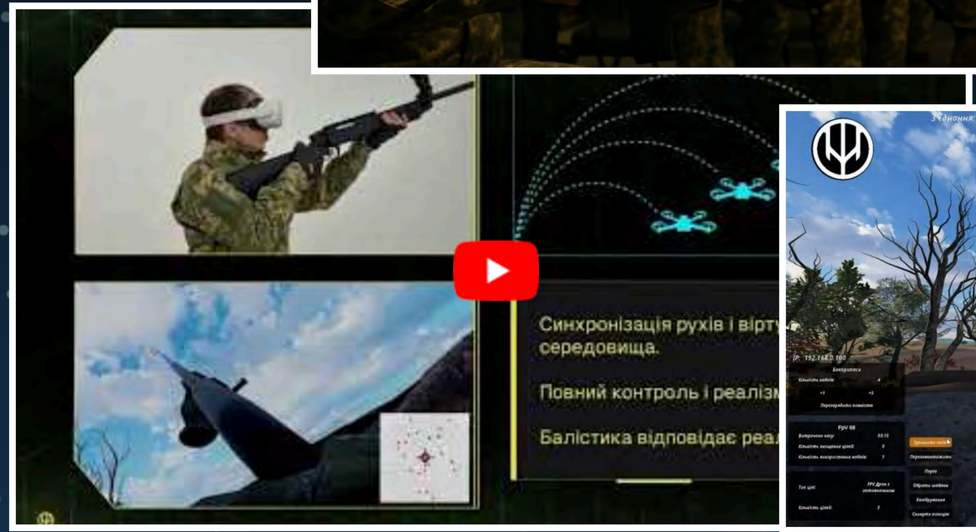
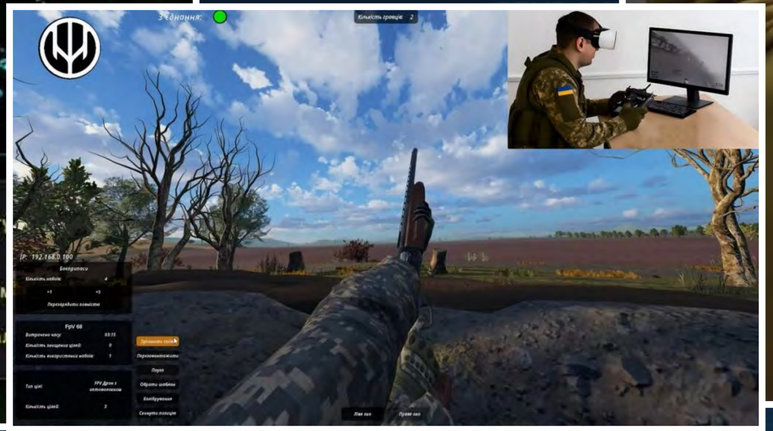
DR. KOVÁCS GERGELY Ph.D
HEAD OF XR CENTRE OF EXCELLENCE, EDA MARS Chairman
VIKI - DEFENSE INNOVATION RESEARCH INSTITUTE _ HUN MOD

Digital Twin and XR-Based Adaptive Training Ecosystems for Mass Military Training

13:12
79
Te
1 napja
VR JUST ISN'T FOR EVERYONE 😂
Válasz saját magadnak...


Синхронізація рухів і вірт
середовища.
Повний контроль і реаліз
Балістика відповідає реа



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COMMON CHALLENGES

1. LIMITED TRAINING TIME / RAPIDLY CHANGING TRAINING CONTENT
2. LIMITED RESOURCES: BUDGET, TRAINERS, TRAINING FACILITIES
3. TIME PRESSURE

4 SKILLS

Running, swimming, climbing, survival techniques, first aid, drone operation, radio communication, satellite communication, map reading, GPS navigation, weapon knowledge, firearms handling, close combat, self-defense, basic cybersecurity, operation of robotic systems, AI-assisted decision-making, driving (off-road vehicles, armored vehicles), basic knowledge of aerial platforms, diving, explosive recognition, engineering rescue, firefighting techniques, urban and building combat knowledge, camouflage, surveillance, intelligence data analysis, counter-drone systems operation, night vision and thermal imaging equipment use, basic knowledge of air defense systems, foreign language proficiency, psychological resilience, teamwork, leadership skills, strategic thinking, stress management, rapid decision-making, precision shooting, communication protocols, logistics knowledge, operation of energy supply systems, sensor data interpretation, basic medical care, support of humanitarian operations, environmental protection knowledge, drone swarm control, data security, remote sensing, chemical and biological protection, training in artificial environments (VR/MR), tolerance to cold and heat, endurance, accuracy, self-discipline.

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CANDIDATES

LIMITED SOURCES (BUDGET, FACILITY AND HR)

Quality vs. Quantity

PRO - HIGH TECH

PILOT - SPECIAL FORCES etc..

SST - SIMPLE SMART TECH (MOTS, COTS)

TERITORIAL FORCES, HOME D. FORCES, SOCIAL FORCES

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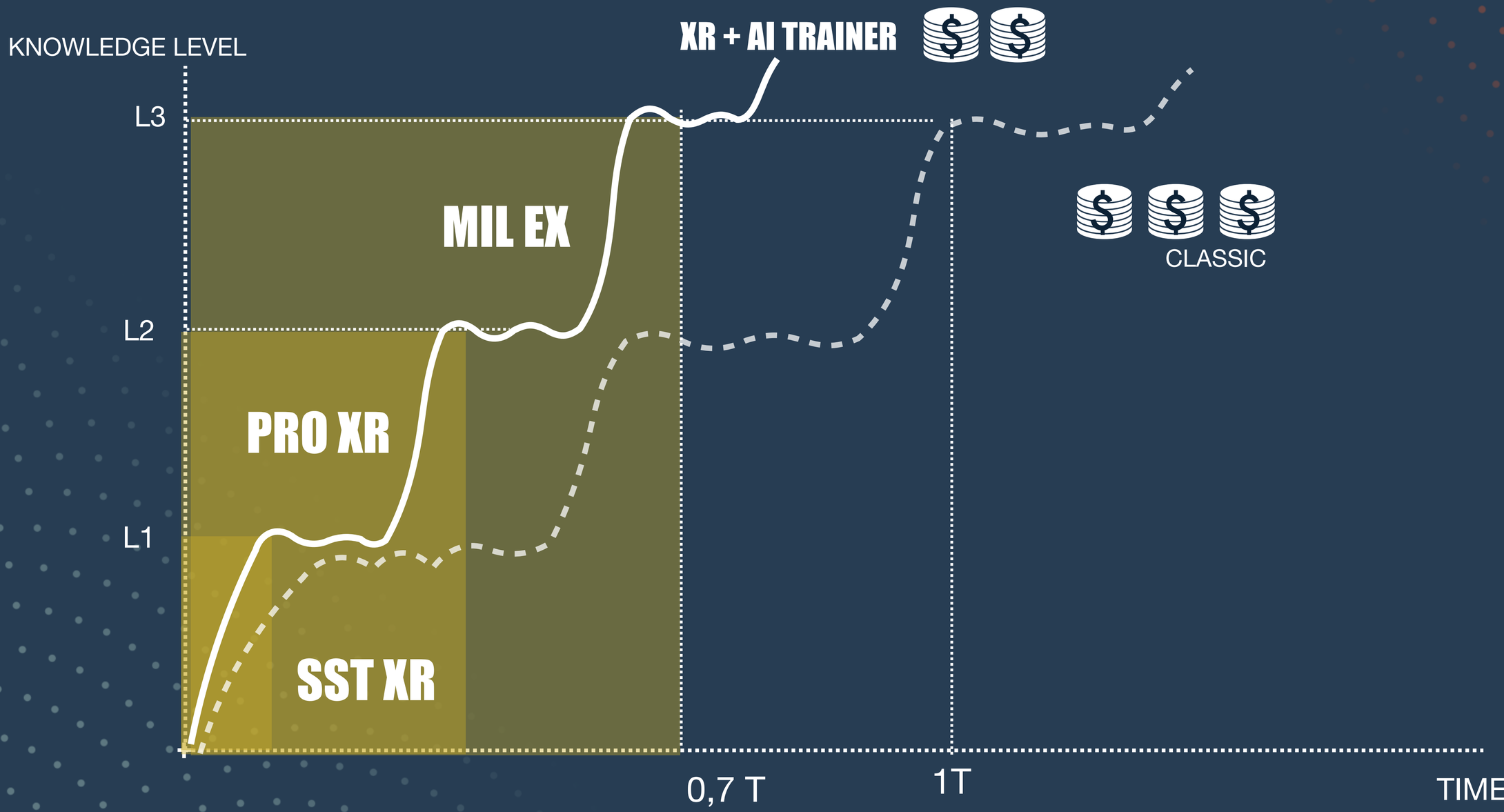
V-LEARNING


KNOWLEDGE LEVEL
L3
L2
L1
XR + AI TRAINER
MIL EX
PRO XR
SST XR
CLASSIC
0,7 T
1T
TIME

SST XR SIM

DECENTRALIZED TRAINING BOX – Self-training
for Auxiliary and SOCIAL FORCE units

SNIPER

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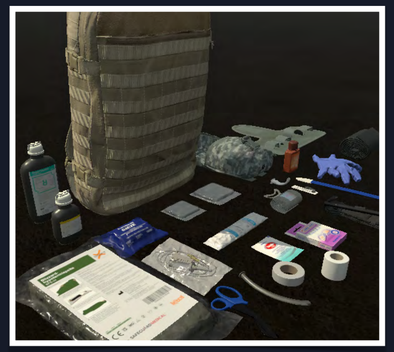
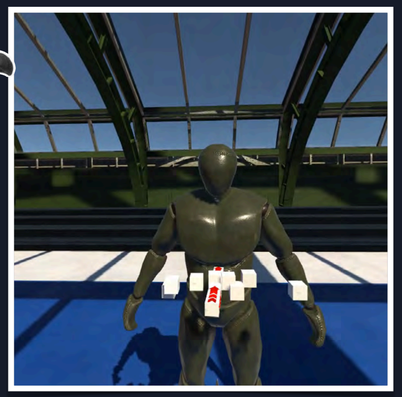
"COMBAT MEDIC"

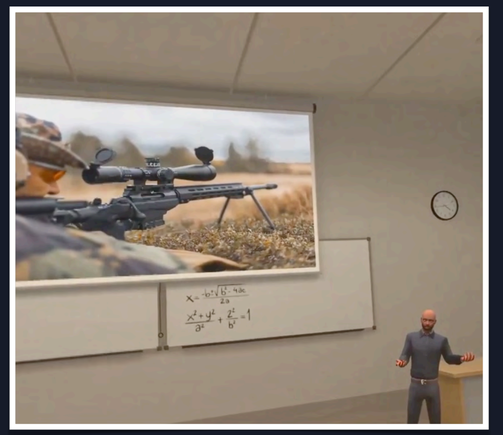


TACTICAL OPERATIONS

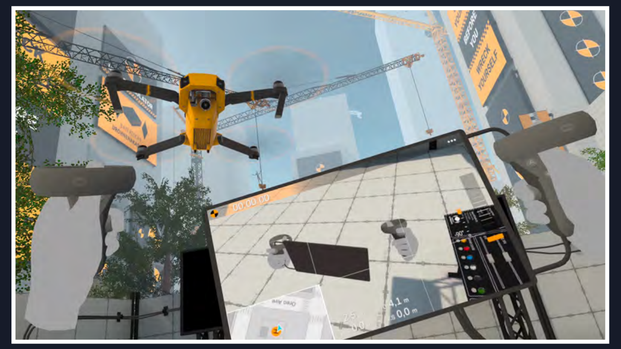
CLOSE COMBAT KNIFE FIGHT



AI CLASSROOM



UAV



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OUR RECIPE

1. RAPID VR CONTENT WORKFLOW - ADAPTIVITY
2. AI SUPPORTED XR TRAINING
3. 5-10 MIN = SOLDIER DIGITAL TWIN

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RAPID VR CONTENT WORKFLOW

24–48h target

Field lesson learned

SME notes

No-code authoring

Validation/ Approval

Published VR module

23%

Adaptive VR scenario– The Key to Motivation and Self Efficiency

Ma, T., Du, W., & Zhang, Q. (2024)© VIKI

RAPID VR CONTENT WORKFLOW

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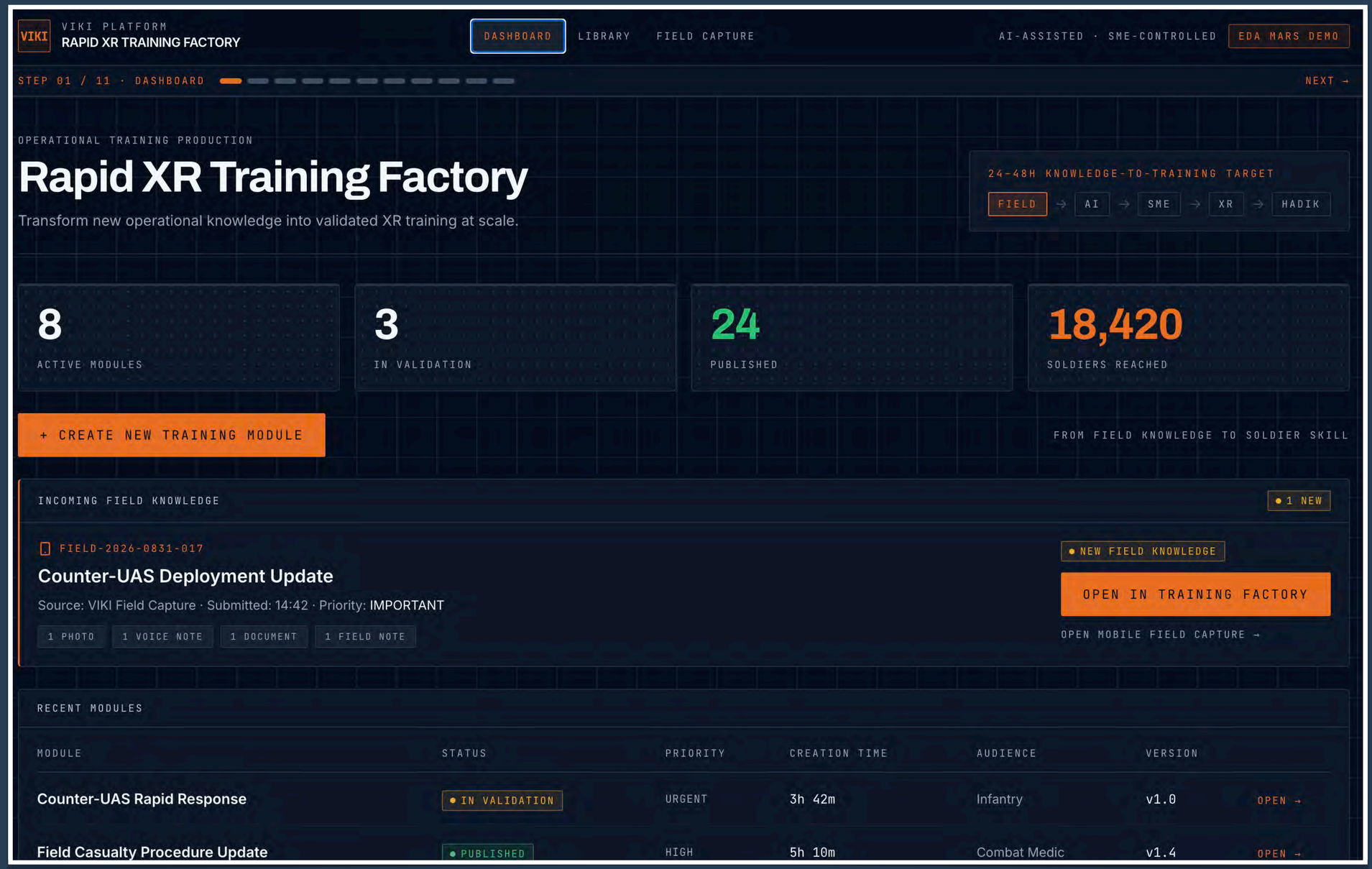

RAPID VR CONTENT WORKFLOW

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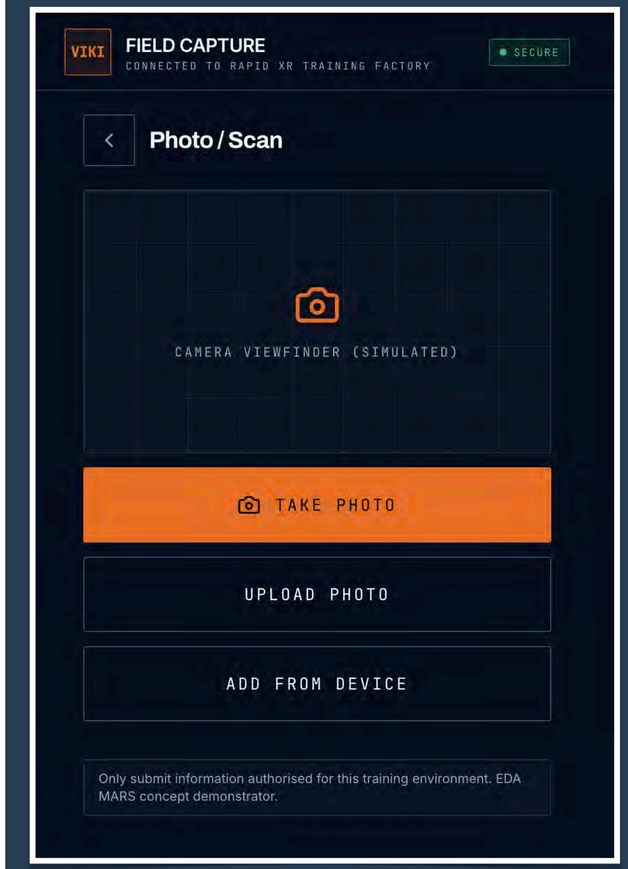

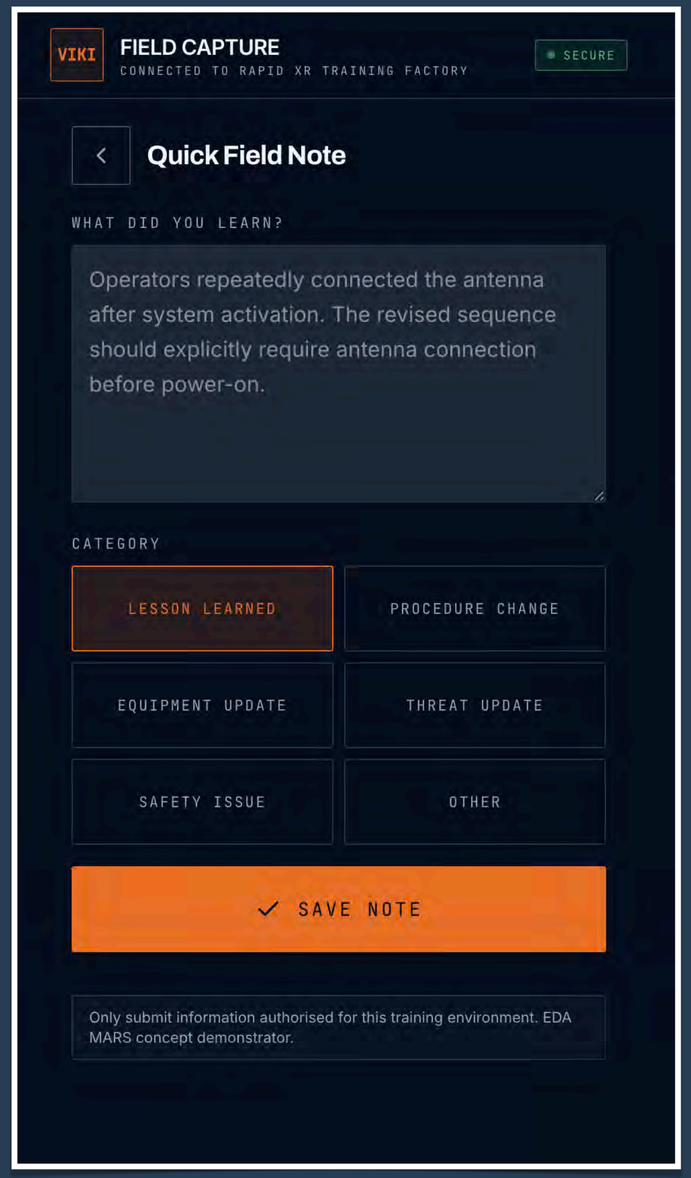

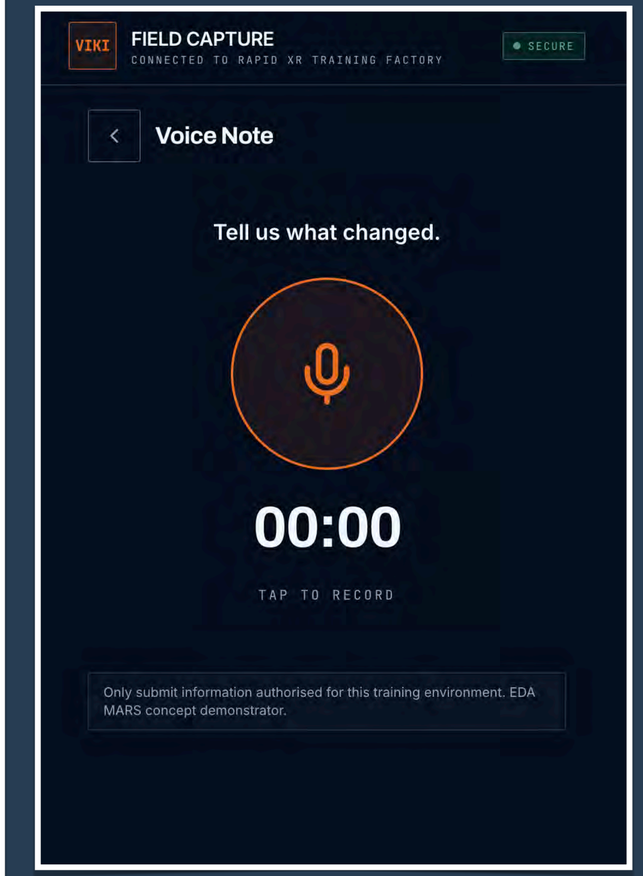

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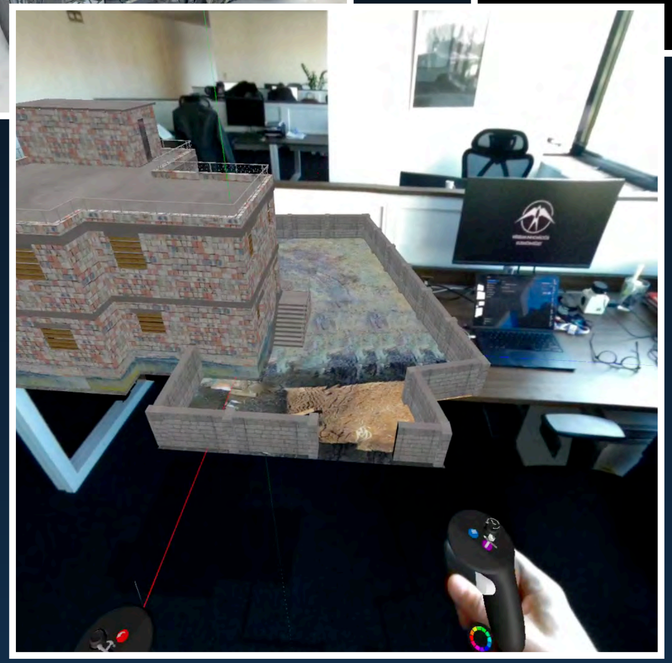
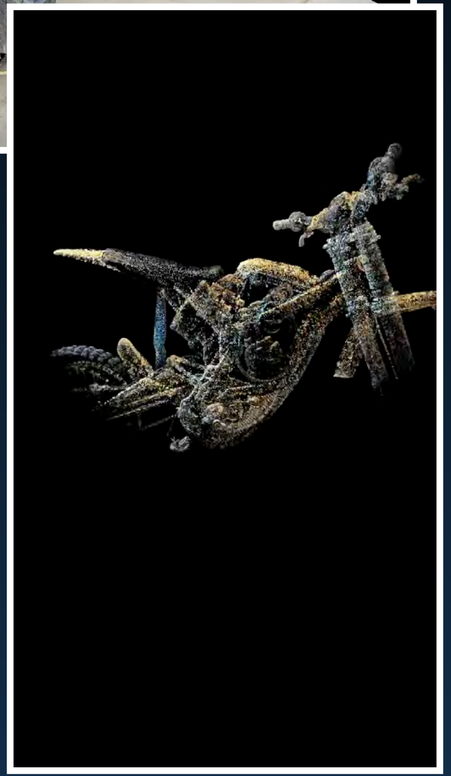
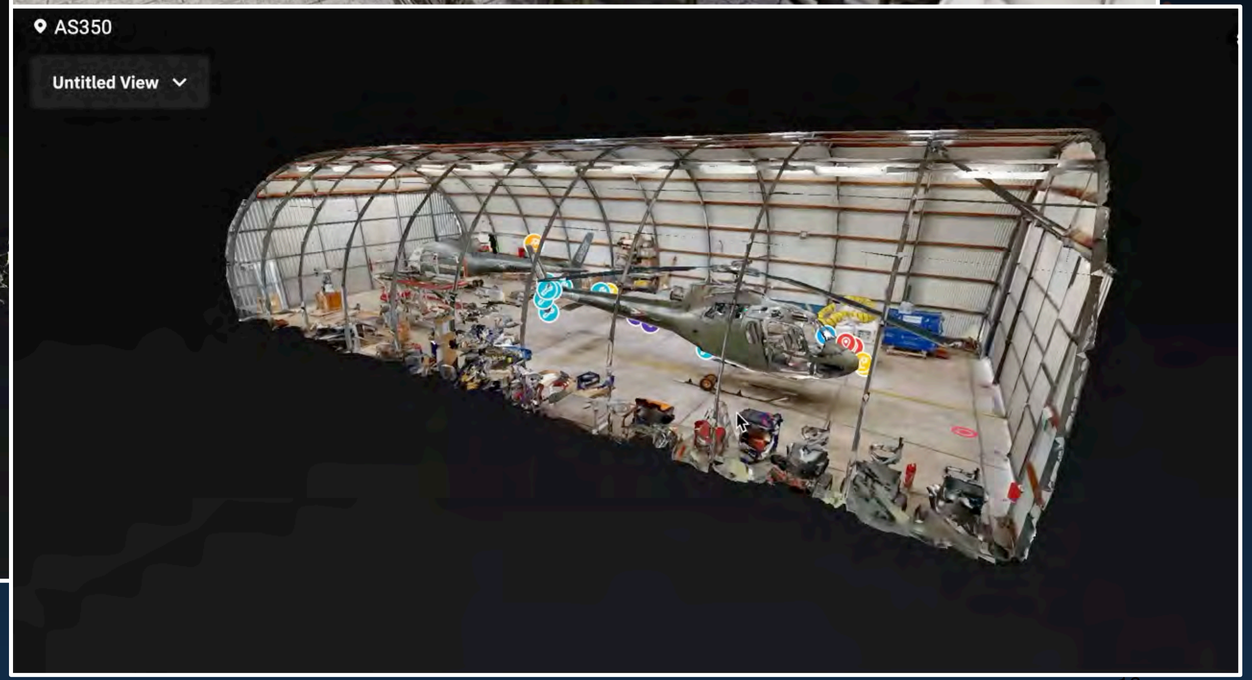


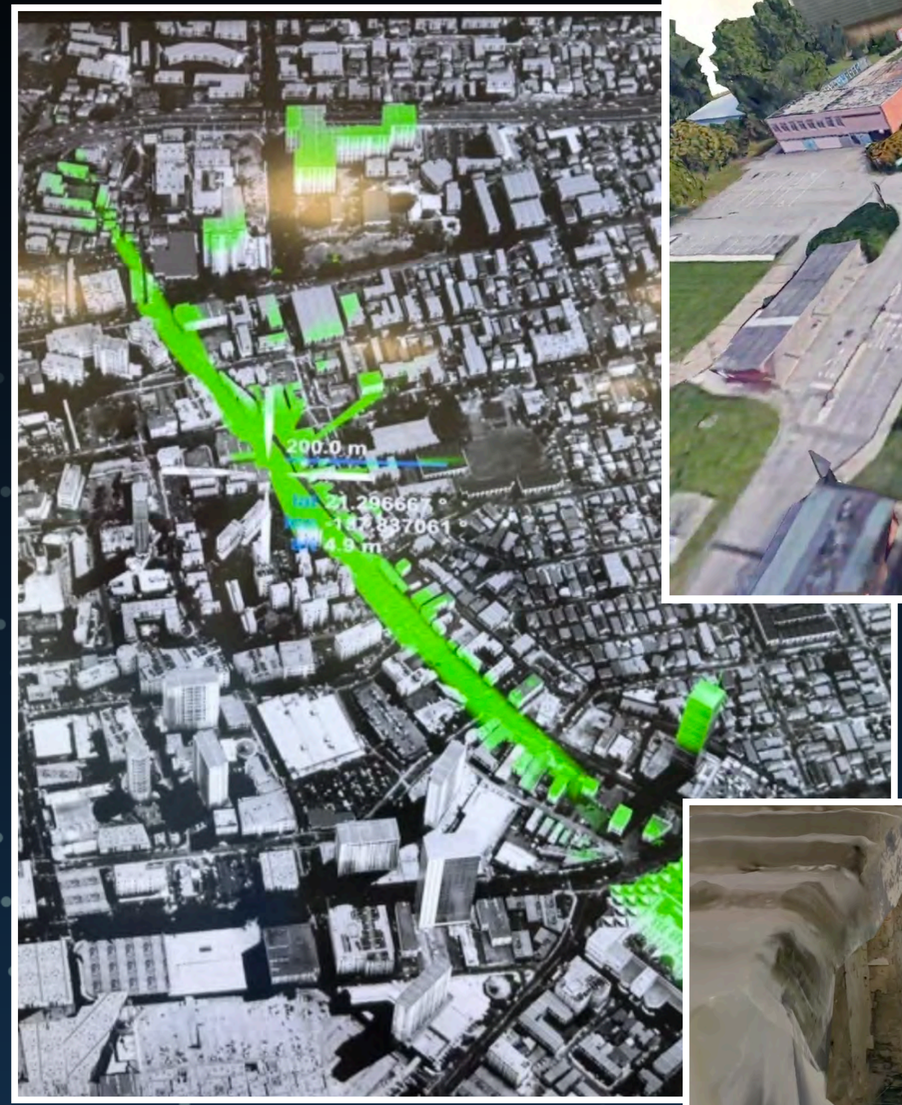


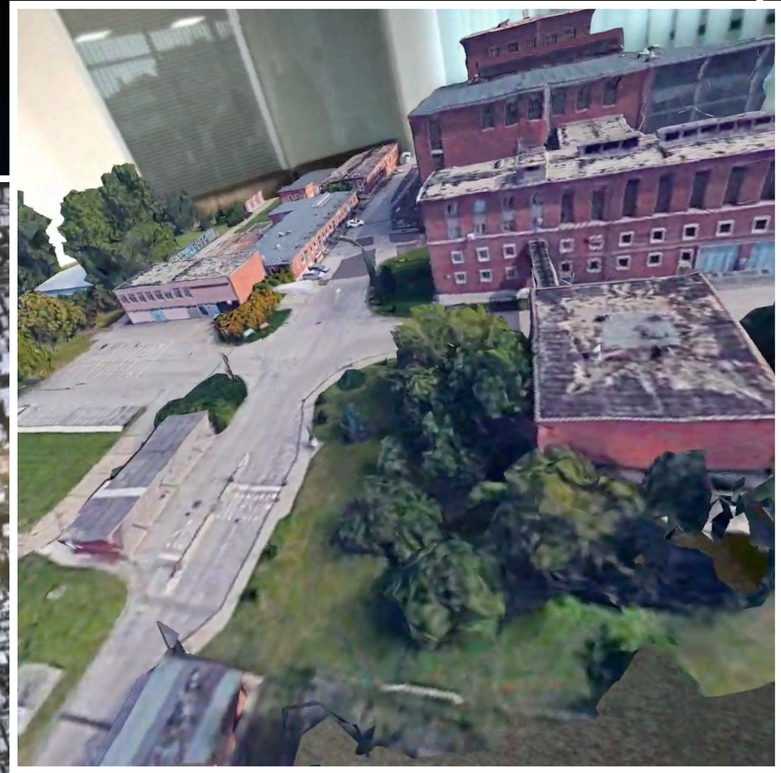
TEST 01.231

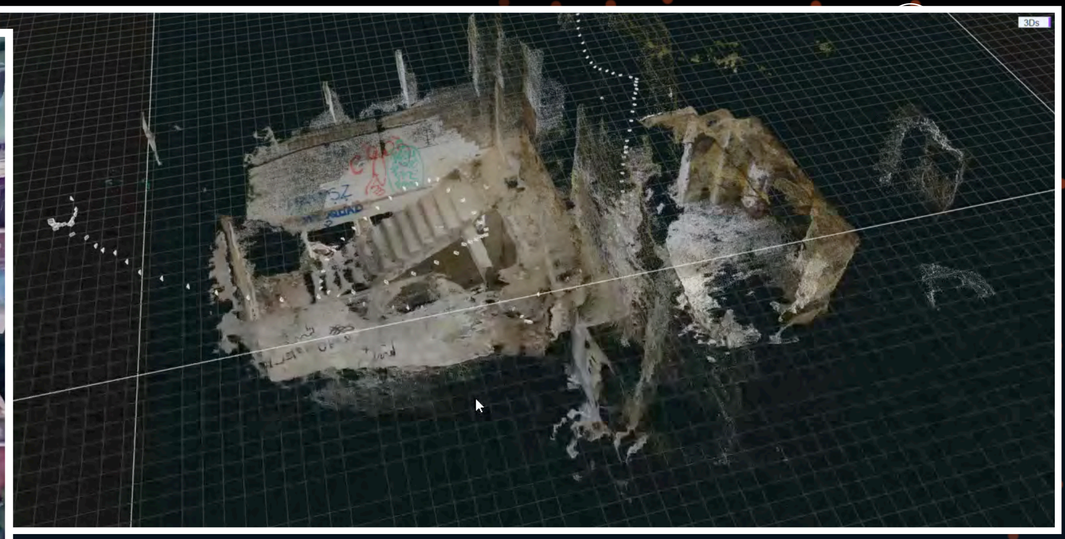
VIBECODING CMS

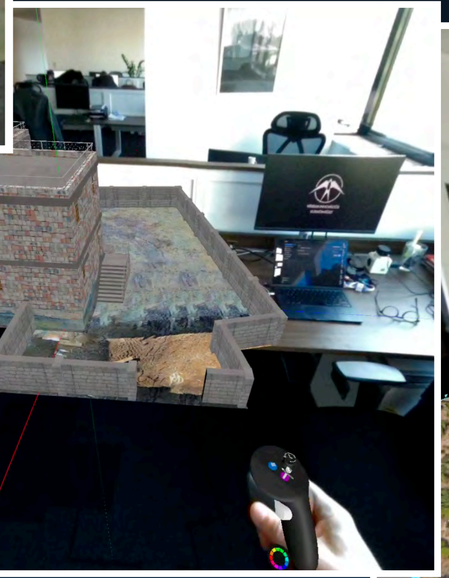


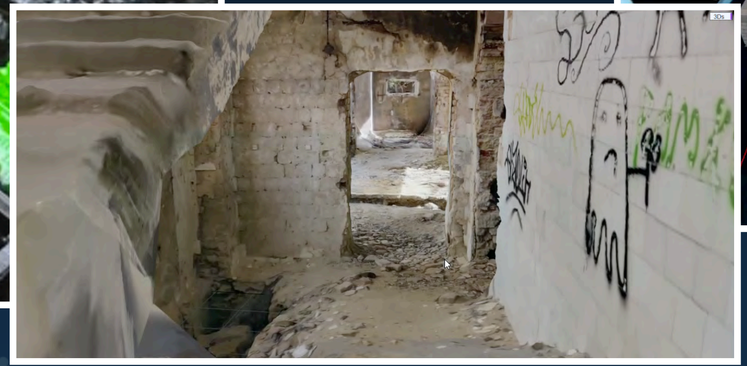
TEST 01.231

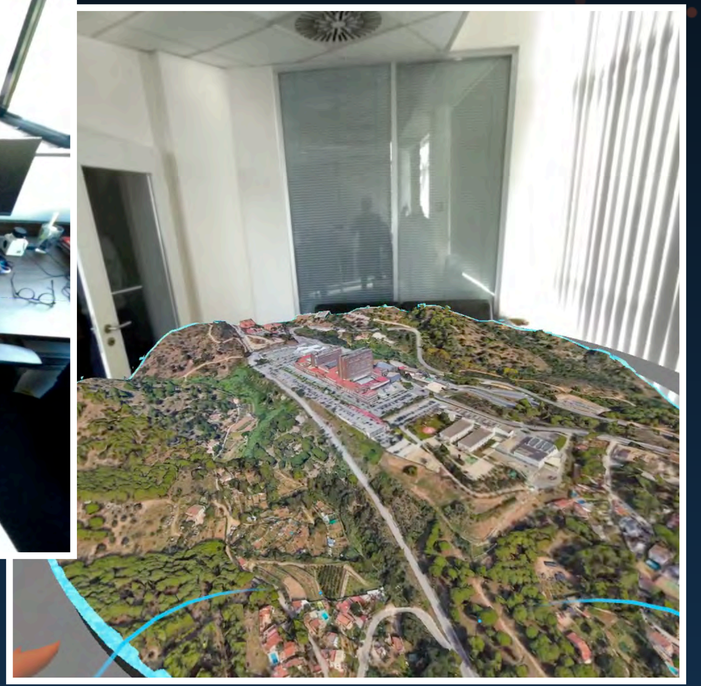












TEST 01.327

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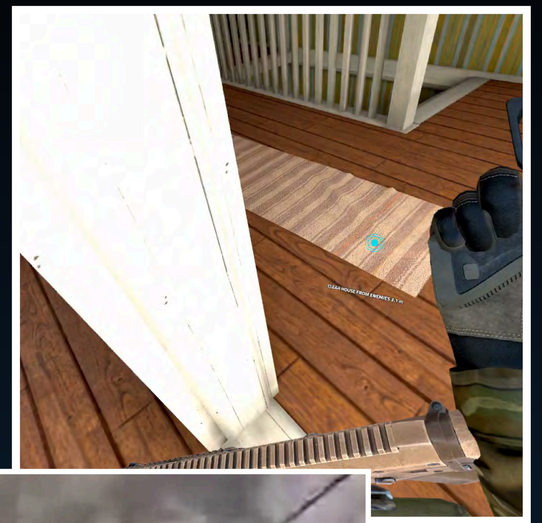
TEST 01.231 VIBECODING CMS HADIK GTS LITE



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AI SUPPORTED XR TRAINING

Coach

Guided practice
& feedback

Buddy

Supportive
teammate/wingman

Ghost

Simulated high-skill
opponent

Examiner

Objective performance
assessment

AI INSTRUCTOR/BUDDY/TRAINER

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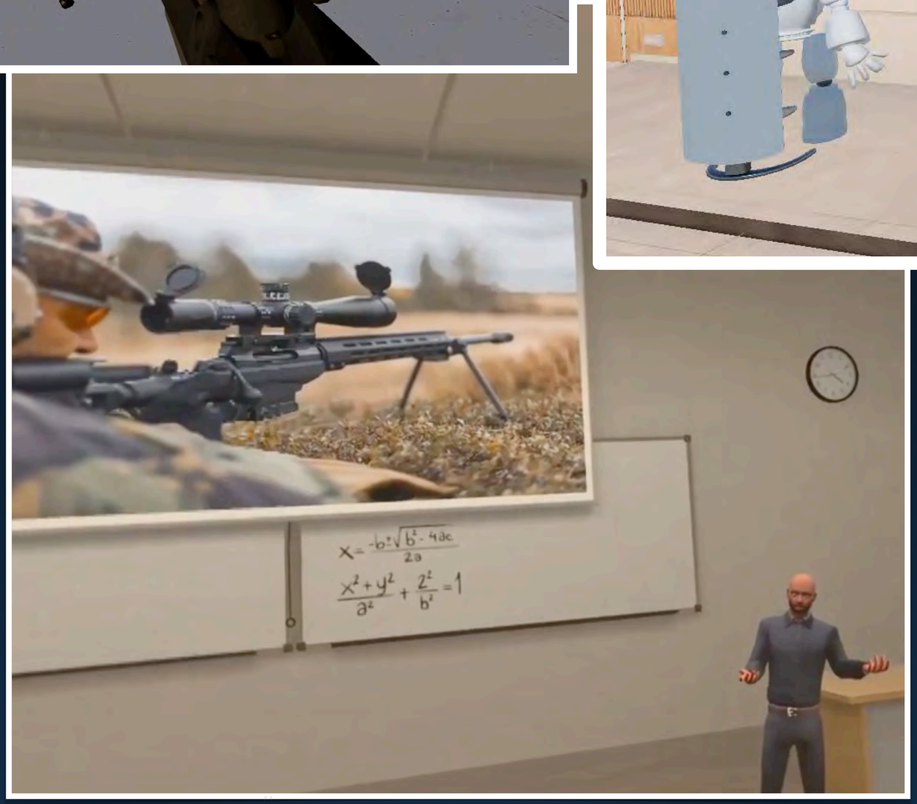

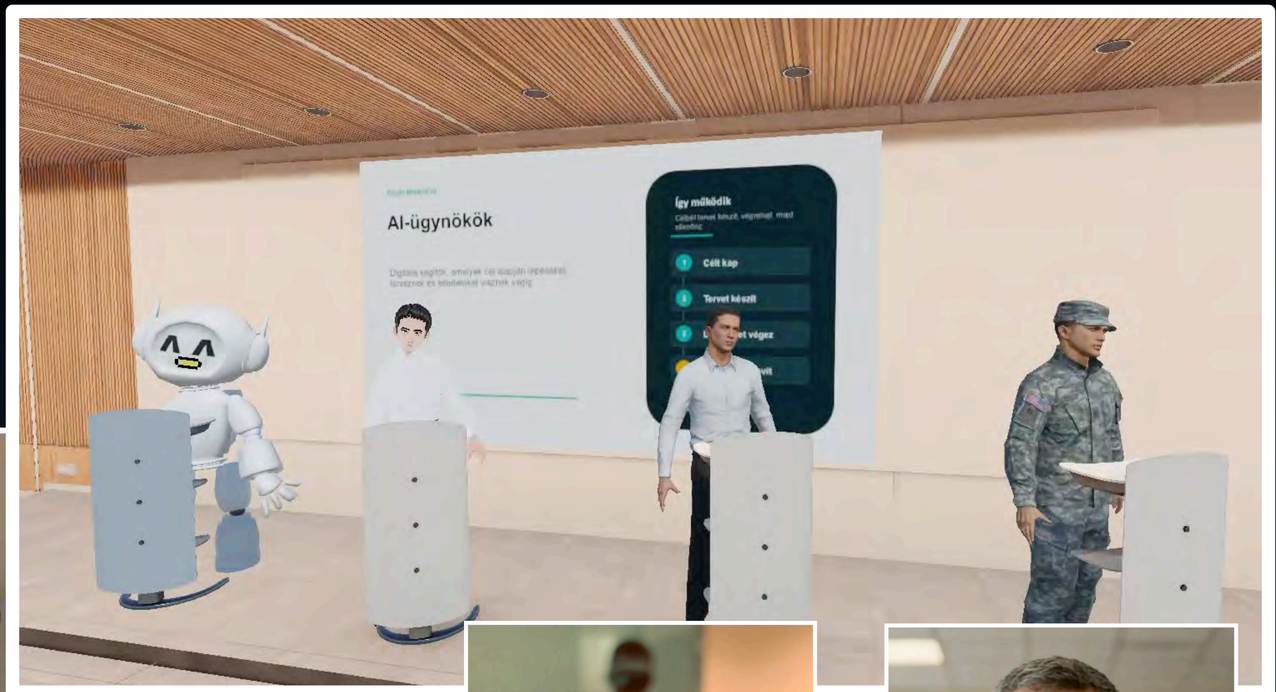

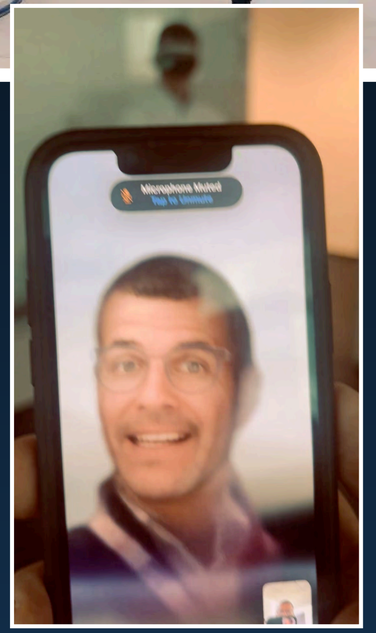

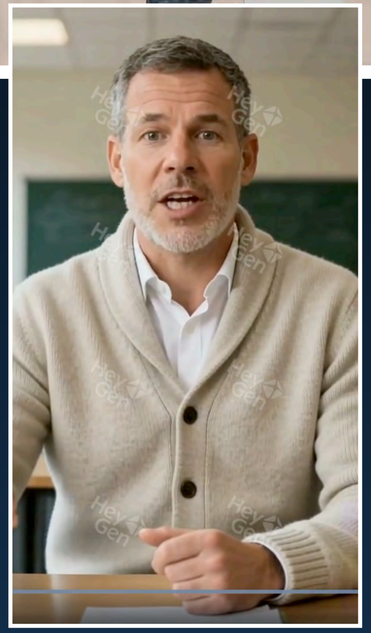

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EASY TASKS = COMPETITIVE BUDDY

DIFF. TASKS = BUDDY “IN NEED”

IMPROVES THE SOLDIER’S PERFORMANCE BY

+16%

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2X

Teamwork - GHOST/BUDDY

Spatial Knowledge – Location, Structure
Conceptual Knowledge – Relationships
Factual Knowledge – Facts, Data

Avatar Exchange

Deeper Understanding of the Partner's Work, Shared Goals

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3 ADVANTEGES OF SDT

1. GO NO GO - BASED ON 5 MIN FAST CHECK
2. ADAPTIVE TRAINING
3. PRESELECTION

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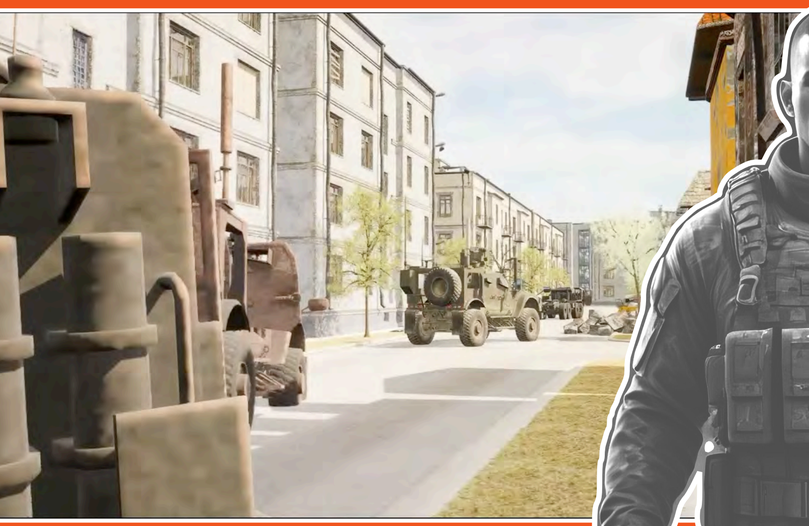
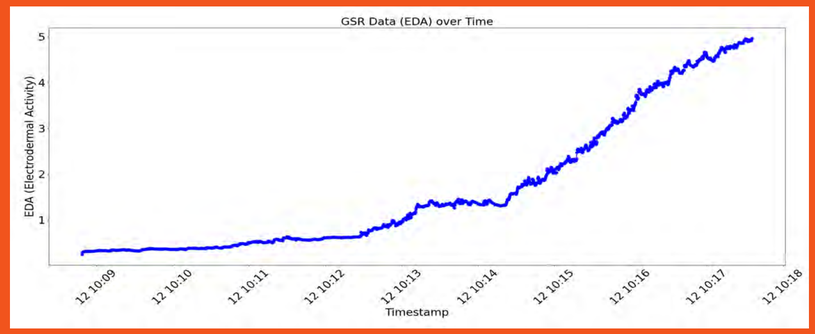
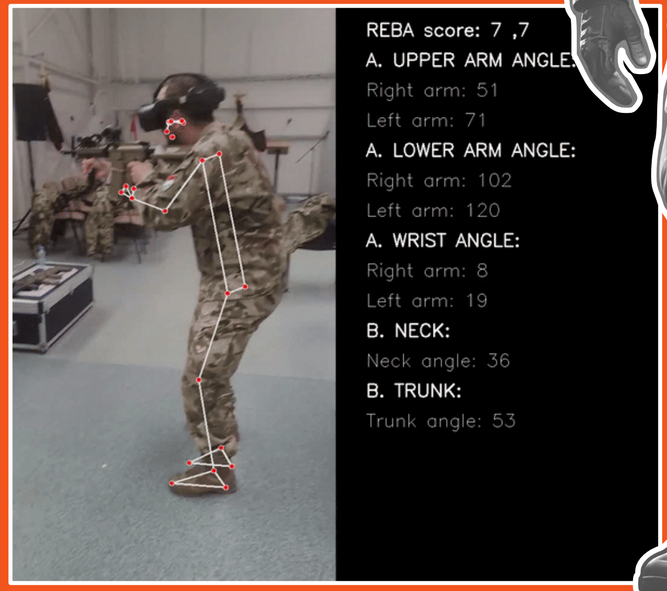
5-10 MIN = SOLDIER DIGITAL TWIN

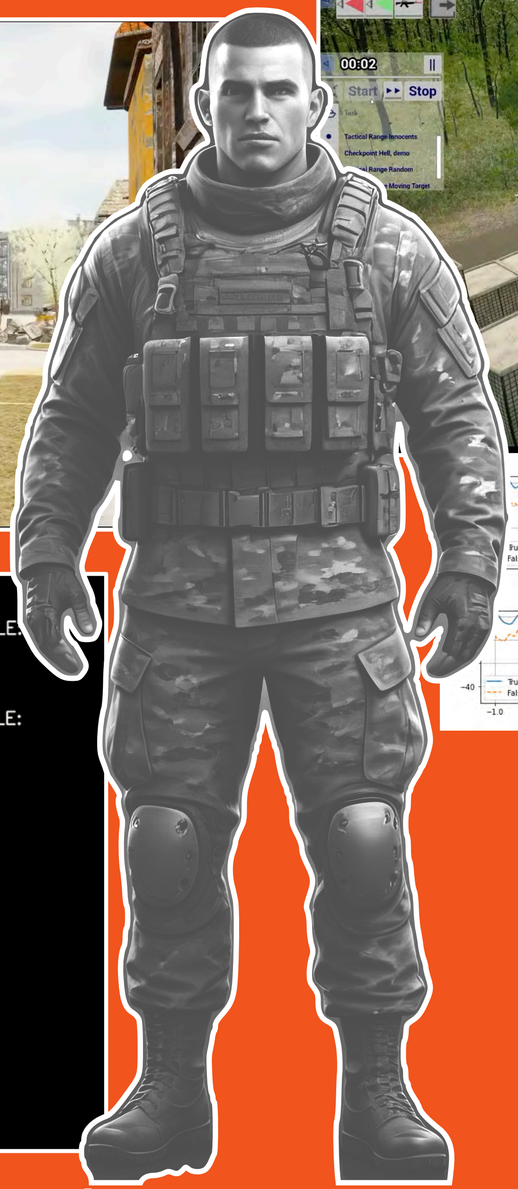
SOLDIER DIGITAL TWIN PRESELECTION - ADAPTIVE PERSONAL TRAINING

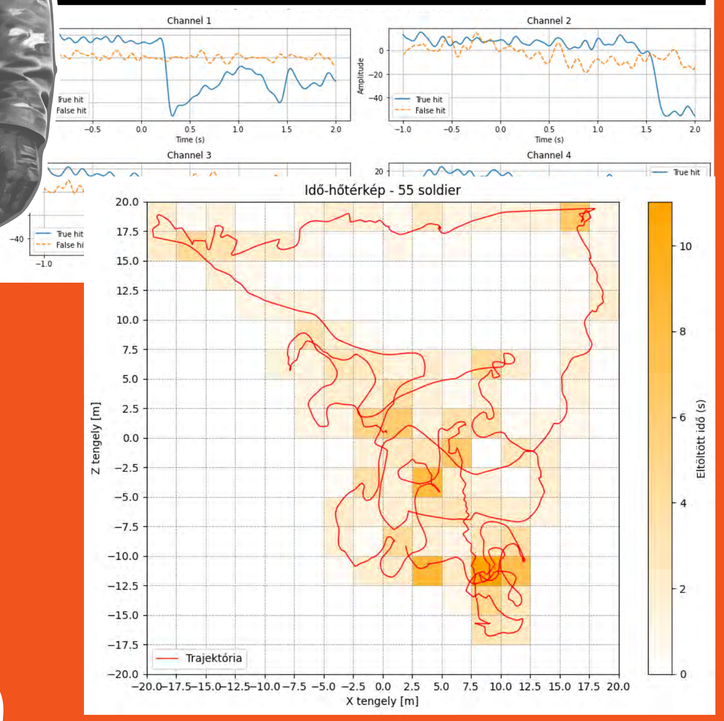


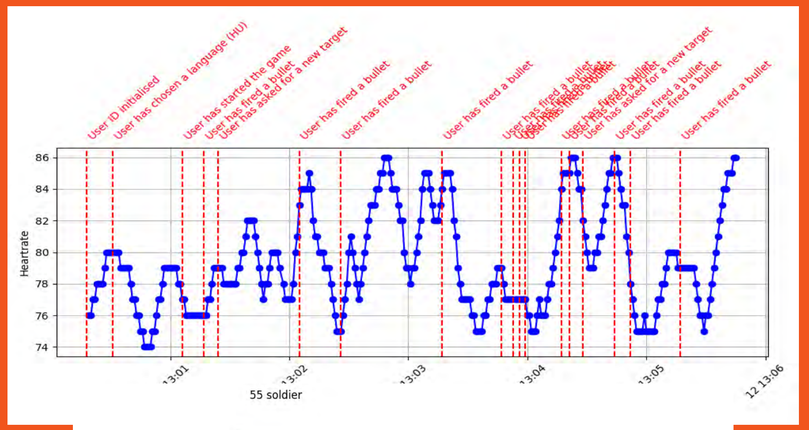


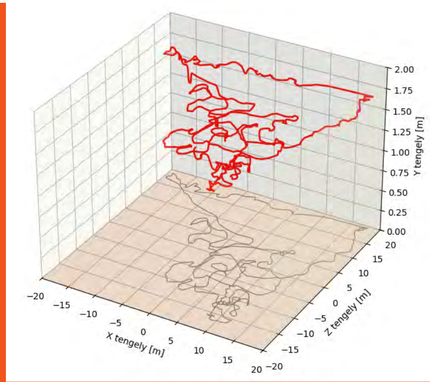


REBA score: 7 ,7
A. UPPER ARM ANGLE:
Right arm: 51
Left arm: 71
A. LOWER ARM ANGLE:
Right arm: 102
Left arm: 120
A. WRIST ANGLE:
Right arm: 8
Left arm: 19
B. NECK:
Neck angle: 36
B. TRUNK:
Trunk angle: 53







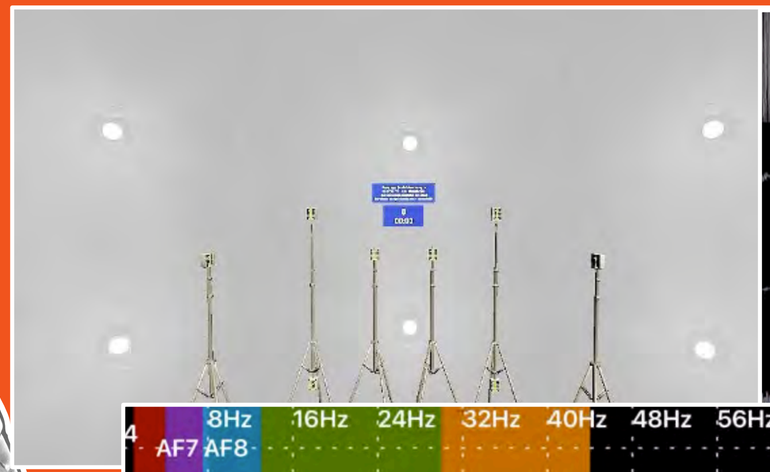


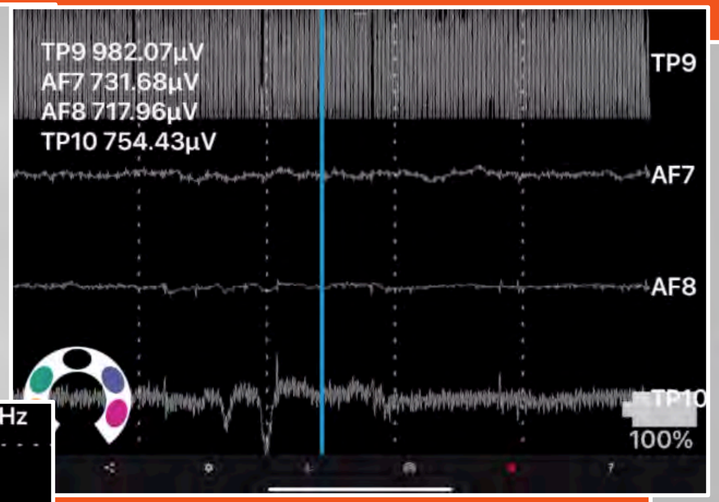
Activity Ratio (AR) = 93.69 %
Cumulative Movement (CM) = 365.11 m
Time to 80% CM (T(80%)) = 184.85 sec

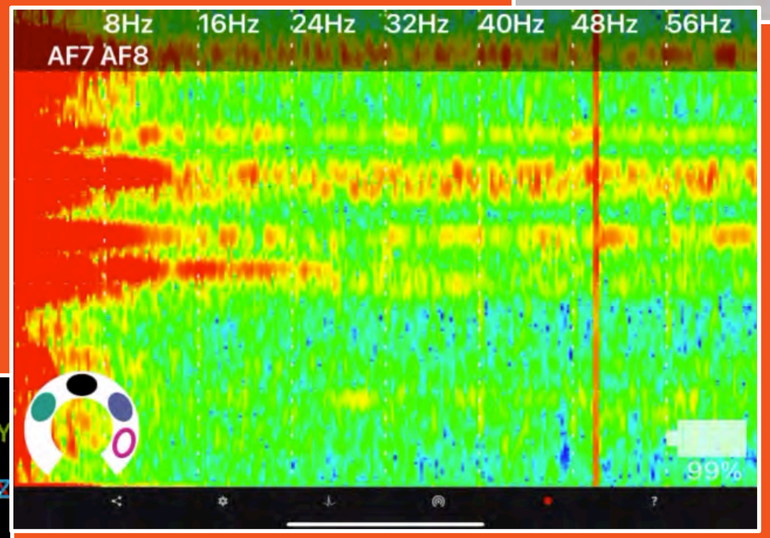
Biometry (Eye Tracking EEG,EMG, HRV)

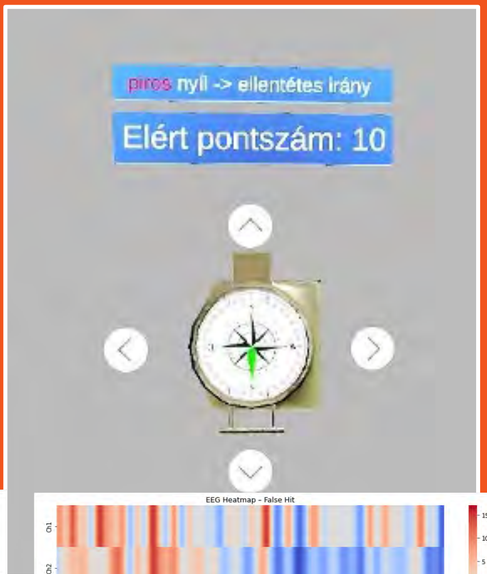
(TELEMETRY) Skills

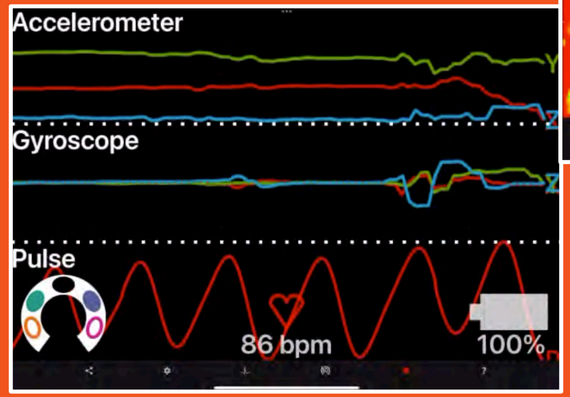
SOLDIER DIGITAL TWIN PRESELECTION - ADAPTIVE PERSONAL TRAINING

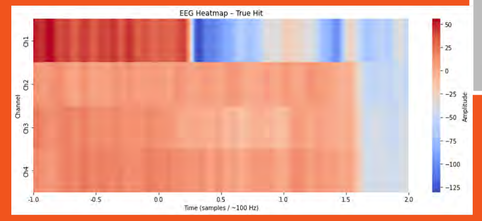


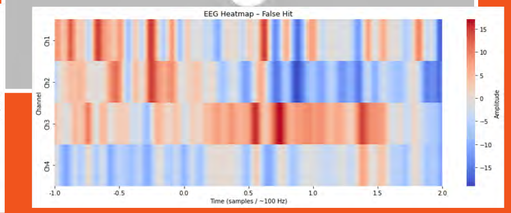












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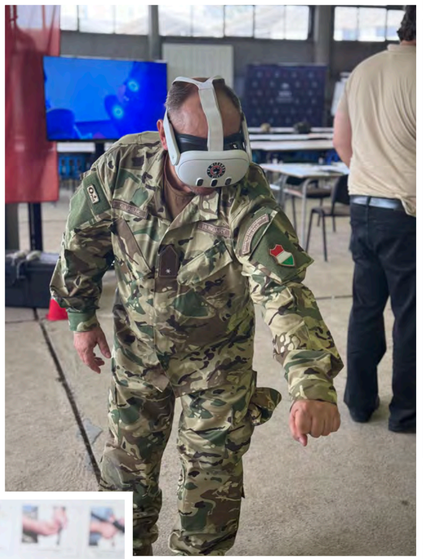
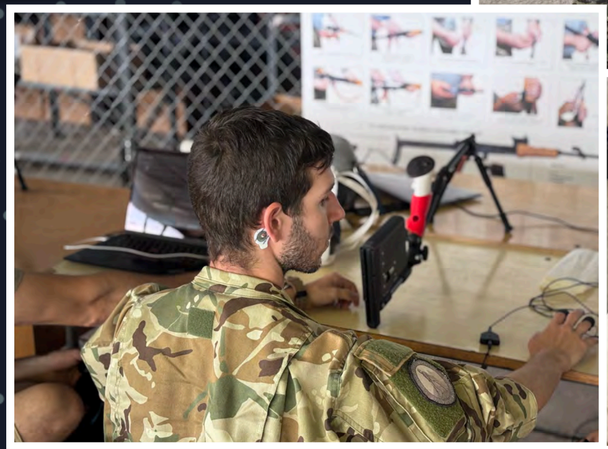
3 ADVANTEGES OF SDT

1. GO NO GO - BASED ON 5 MIN FAST CHECK
2. ADAPTIVE TRAINING
3. PRESELECTION

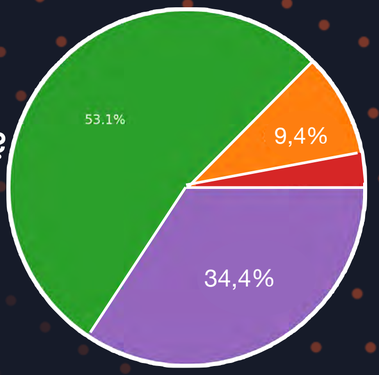
Tested 482 in 2025 and ‘ll 1200 in 2026/27





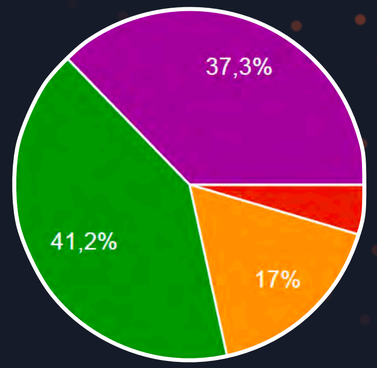
In your opinion, how usable is the SST VR simulator for training/education purposes?

- I believe it is already usableIg
- Yes, with minor improvements
- It still needs significant development
- Not usable at all



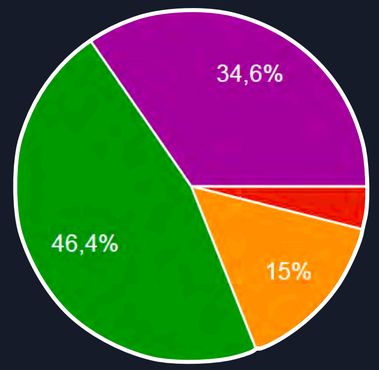
How quickly were you able to learn the basic functions of the platform?

- Very quickly
- Quickly
- At an average pace
- Slower than expected



How would you rate the visual appearance of the SST VR Platform?

- Very appealing
- Rather appealing
- Neutral
- Rather unappealing
- Not appealing at all



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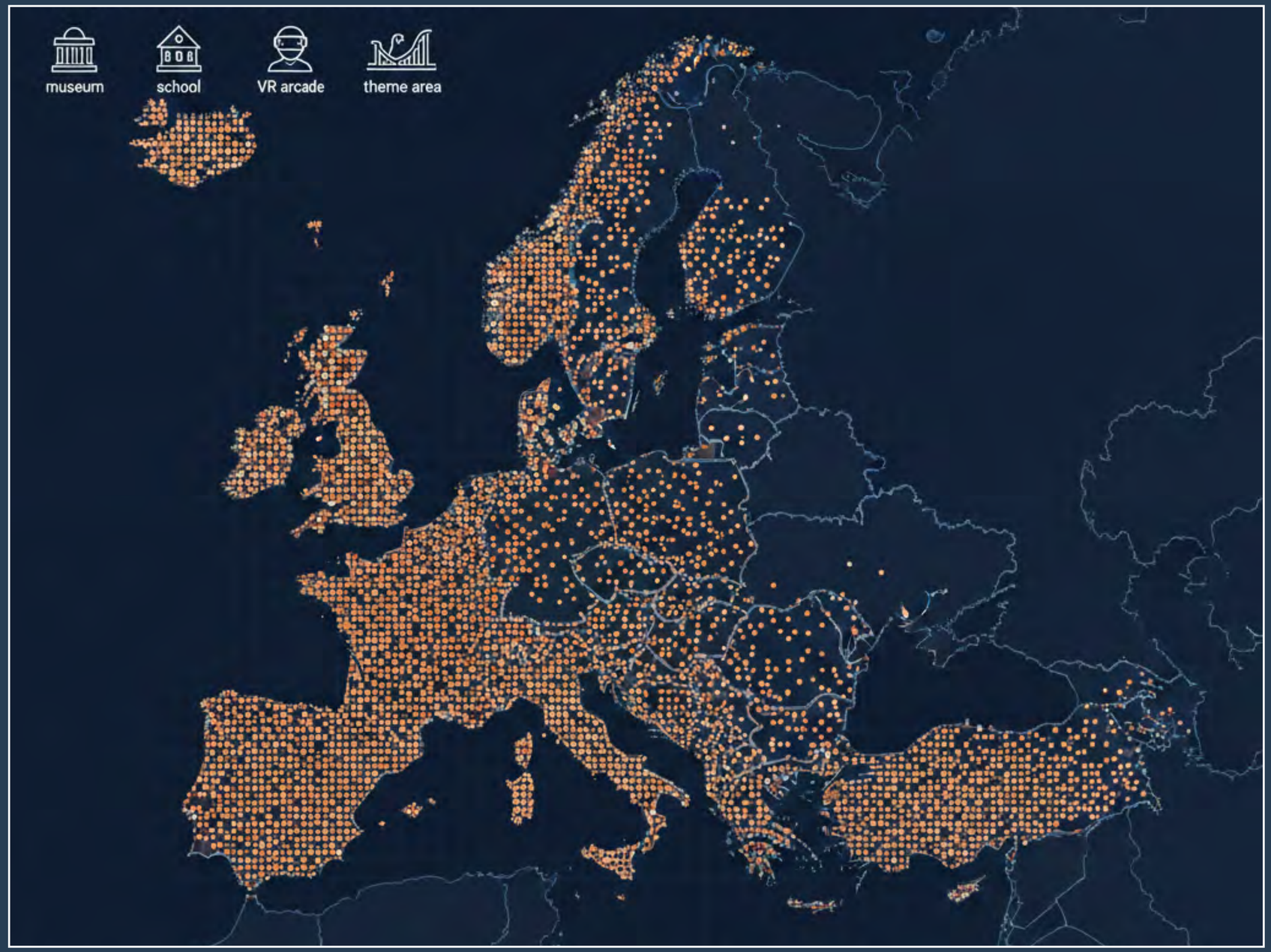

SF

SOCIAL FORCE

SOCIAL FORCE XR

Hunter and VR owner

HUNTER VR

MUSEUM + SCHOOL VR

FPS ZERO CALIBER

VIKI

NATO - EU
XR APP POOL

EUROPEAN DEFENCE AGENCY - MARS AHWG

Support the implementation of the Priority Implementation Roadmap (PIR) Future Soldier Systems by leveraging modern simulation technologies (VR/AR, AI, Digital Twins, gaming-based training) to prepare and initiate concrete multinational capability development projects.

1 MAP EXISTING NATIONAL SIMULATION CAPABILITIES CONCEPT FOR XR-BASED MASS TRAINING OF SOLDIERS

Develop a common concept for using XR and simulation technologies to rapidly train large numbers of soldiers in basic combat skills.

2 ESTABLISH A SHARED SIMULATION CONTENT LIBRARY

Create a common digital repository for simulation-based training content, scenarios, best practices and lessons learned.

3 PREPARE A JOINT EU SIMULATION TRAINING PLATFORM

Develop a business case and roadmap for a future multinational simulation training platform and joint procurement initiative.

4 CONNECT WITH ONGOING EU AND NATO PROGRAMS

Leverage synergies with EU stakeholders and ensure cooperation with Third Parties and NATO.

EUROPEAN DEFENCE AGENCY

TO INFINITY AND BEYOND!

DR. KOVÁCS GERGELY Ph.D
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THANK YOU!