Revolutionizing Readiness Under the Sea:
Inside the Navy's Immersive Learning Breakthrough

Dan Beran
Lead Systems Engineer, E-6B/E-130J, NAWCTSD
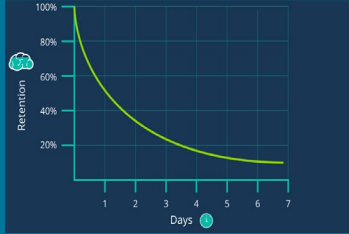**Todd Estes**
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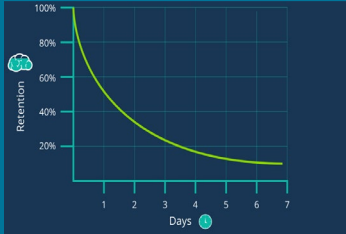
The problem

	Classroom training
	One-and-done, steep skill decay
Frequency	
Cost	Classroom congestion costs the Navy $400 million annually

$1B invested in "Ready, Relevant Learning" still no shipboard training

The vision: Self-paced virtual reality training at Sea

	Classroom computer lab	**Onboard VR training**
Frequency	One-and-done, steep skill decay 	Spaced, unlimited practice opportunities
Cost	Classroom congestion costs the Navy $400 million annually	Low cost using affordable consumer devices with minimal work interruptions

The challenge: If it works on a submarine, it will work anywhere

First visit November 2022, which led to a Cooperative Research and Development Agreement (CRADA) to convert Multipurpose Reconfigurable Training System (MRTS) 3D® of a submarine maintenance trainer into mobile VR.

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Validation: 100% of Sailors prefer VR

User test with 23 Sailors at the Trident Training Facility – Bangor, November 15, 2023

"You felt like you are actually working on the system and not just a screen."

Rate your overall impression of the VR approach to learning and practicing skills.

Excellent	Good	Neutral	Poor	Very Poor
74%	26%	0%	0%	0%

How would you compare your experience of this VR training program to 3D touch-screen training?

VR is much better	VR is better	VR is same	VR is worse	VR is much worse
64%	32%	5%	0%	0%

How easy did you find the VR simulation to use?

Very Easy	Easy	Neutral	Difficult	Very Difficult
48%	52%	0%	0%	0%

Would you be interested in using VR simulations for learning and practicing other hands-on skills?

Very interested	Interested	Neutral	Slightly interested	Not interested
78%	22%	0%	0%	0%

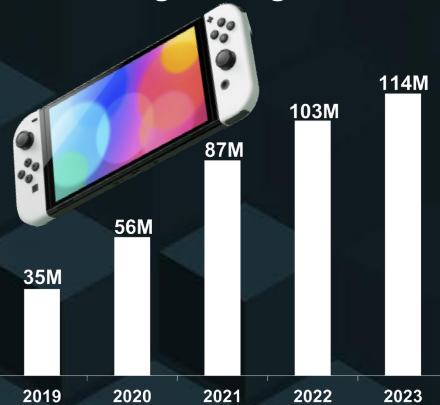GRONSTEDT GROUP

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Barriers to VR onboard submarines

- Limited physical space
- Cyber security

The Pivot:
Handheld gaming PC

- Accessible in confined spaces
- $800 Windows PC
- Catering to Sailors raised on handheld gaming
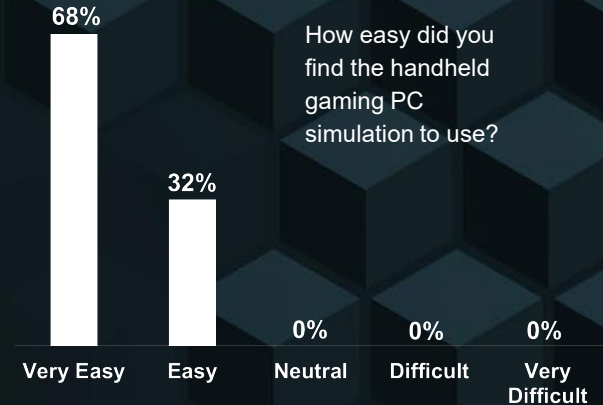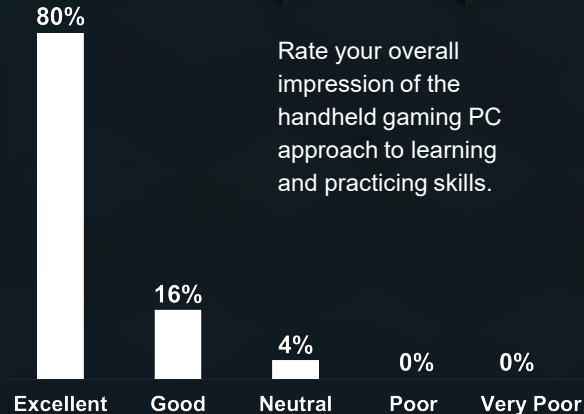
Nintendo Switch annual players

35M — 2019
56M — 2020
87M — 2021
103M — 2022
114M — 2023

NAWCTSD awarded an Other Transaction Authority (OTA) for the diesel maintenance trainer
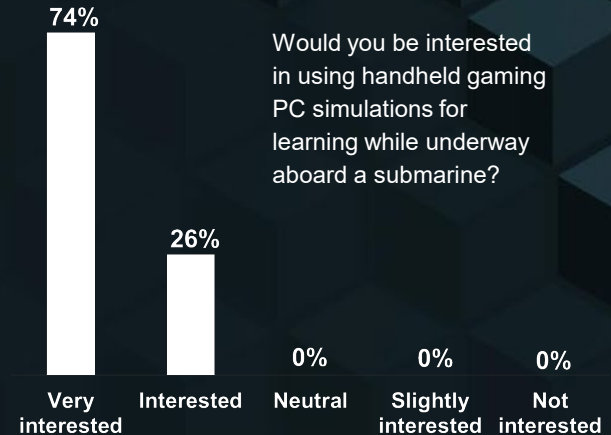
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Validation: Strong support for handhelds underway

25 Sailors at Naval Submarine Base Kings Bay,
March 13, 2025
15 students and 10 instructors.

Rate your overall impression of the handheld gaming PC approach to learning and practicing skills.

Excellent	Good	Neutral	Poor	Very Poor
80%	16%	4%	0%	0%

How easy did you find the handheld gaming PC simulation to use?

Very Easy	Easy	Neutral	Difficult	Very Difficult
68%	32%	0%	0%	0%

"This is the only feasible way to provide realistic simulation of all manner of casualties. In an effort to prepare our military for combat, they need this level of training. I recommend all physical trainers convert to this fidelity of training."
LCDR Jacob L. Christiansen,
TTF Kings Bay Engineering Director

Would you be interested in using handheld gaming PC simulations for learning while underway aboard a submarine?

Very interested	Interested	Neutral	Slightly interested	Not interested
74%	26%	0%	0%	0%

From pilot to program

MOBILE-
Naval: Designed for Navy training
Enhanced: Improved through interactive and portable technology
Simulation: Digital training capabilities
Training: Core focus on training Sailors in learning and refreshing their skills

MOBILE-NEST
U.S. NAVY

Embodied mobile VR where space allows

Handheld gaming PC mastery in tight quarters

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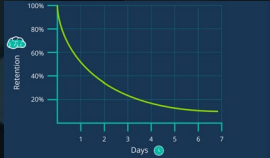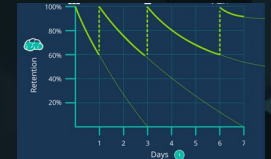
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The problem

- Peacetime complacency

- Preparing for the last war

- Tabletop wargames stuck in 1870

- Digital wargames stuck in 1970

- Don't scale beyond top leadership

- No system learning—data lost after each session

- Meanwhile, China invests in scalable, digital wargames

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Battleline: Taiwan Defense

- Designed for all experience levels
- Command carrier strike groups through contested waters
- Real-time decisions with immediate feedback
- Connecting individual Sailor roles to the broader strategic mission
- Validated by Naval Postgraduate School

Soon Available for free on Steam, the world's largest game distribution platform
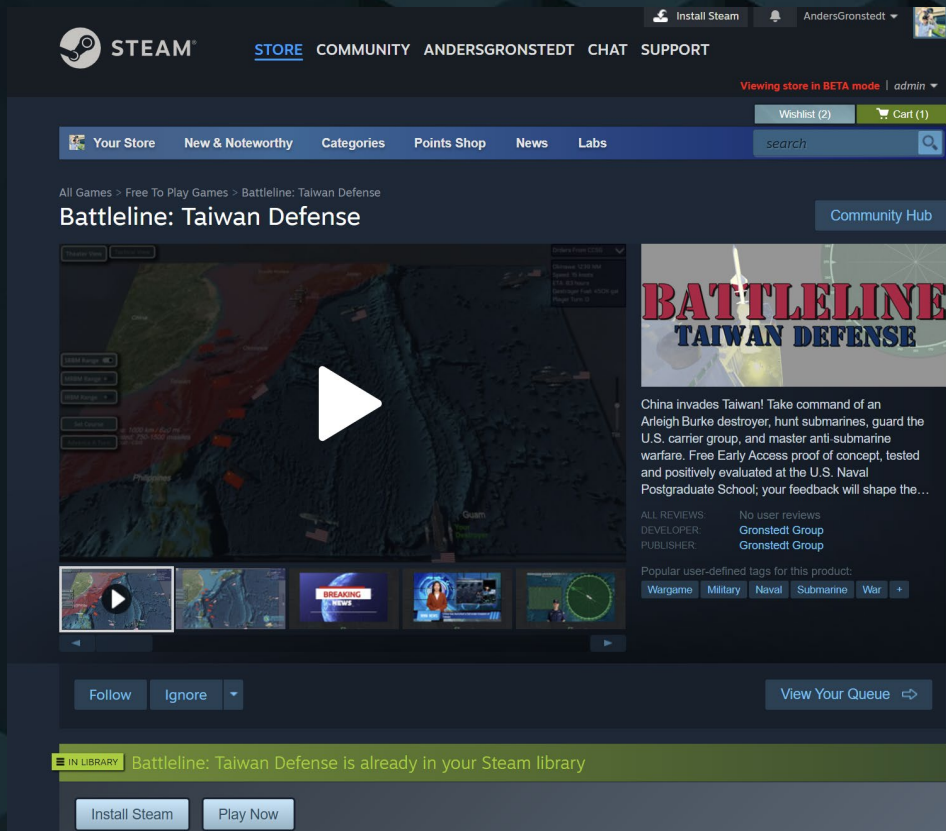
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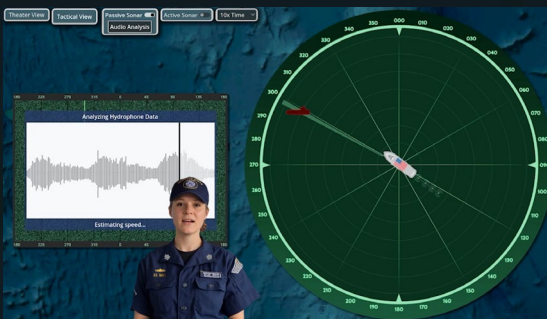TV-style newscasts provide theater-level context for a Taiwan invasion scenario

WNN NEWS — China has launched a full-scale invasion of Taiwan
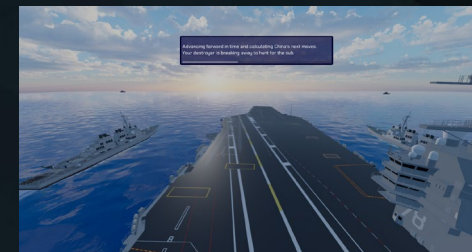
Multi-platform

AI engine provides players:

- Adaptive AI Opponent
- AI expert advisor
- AI-generated scenarios

Theater-view

Tactical-view with AI coach

MISSILE ATTACK
Aegis Combat System
Tracking Inbound DF-21D missiles
Orders: Intercept with SM-3s

3D battlefield visualization

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