

Team NeuroSmart

Optimal Tactical Performance Through Optimal Physiology

Original Problem Statement

Military officers need a way to regulate their stress while making high-stakes decisions in order to reduce critical mistakes and potential lasting trauma.

101

Interviews

Final Problem Statement

Special Operators going through fast-paced and stressful training sequences (e.g. Close Quarters Combat) need a way to measure and mediate their stress levels to optimize performance.



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Support Team

Sponsor: Army Research Labs (Dr. Garcia, Dr. Hoffing, and Dr. Ries)

Mentors: LTC Ed Cuevas (Defense mentor), Rafi Holtzman (Business mentor), and Dr. Danielle Cummings (Business mentor)

A Bit of A Reversed Journey...

NeuroSmart started as a wearable biofeedback technology helping police officers making better decisions under stress.



Melis putting sensors on a MVPD officer before simulation training



NeuroSmart can help anyone making critical decisions under stress.

We Interviewed 101 Resources Across the Military, Academia, and Industry

Users



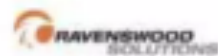
Buyers



Partners



DEFENSE INNOVATION
UNIT EXPERIMENTAL



Massive Problem Space: Blessing and a Curse

NEUROSART:
A wearable biosensor technology to detect mental red-zones and help users self-regulate to prevent critical mistakes or lasting trauma

PTSD and Suicide (prevention, monitoring)?

Cognitive Load Monitoring for pilots?

Chronic stress management for experienced leaders?

A tool to boost operator/ warfighter mental performance?

Family life adjustment after deployment?

Week 1

Week 2

Week 3

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Researchers and Warfighters Don't Communicate

"We don't currently have a pipeline from needs to research right now." - Army Researcher



Communication
Breakdown



Academia / Researchers



Warfighters

Stressed and Overwhelmed (We Need NeuroSmart!)



- Confusion about the problem statement
- Disconnect with researcher and end-user
- Inability to make decisions as a team and put a stake in the ground

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Difficult Decision: Our Tech Can't Solve Mental Health

- Stigma is the problem
"In my first deployment, we didn't talk about that stuff. There's stigma attached"
- LTC, 10th Mountain Division
- Culture change, not tech, is the solution
"Personal human connection is the strongest protection factor. I don't know how you'd replicate that with tech"
- MAJ, Army MEDCOM



Stake in the Ground: Decide or Die

We were utterly paralyzed by a lack of decision-making....



... and decided that it's better to make a guess and learn from it than do nothing.

Conventional Field Grade Officers Need To Regulate Their Stress Levels While Making High-Stakes Decisions

Why did we want to test this beneficiary? Things we heard from Conventional Field Grade Officers:

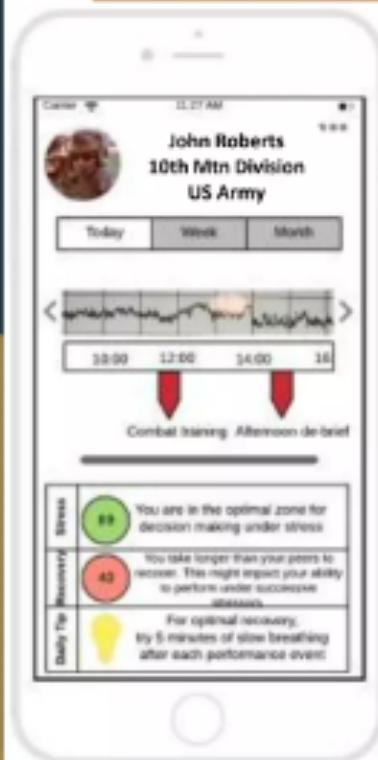
Field Grade Officers Conventional Forces



- ✓ "Decision-making is hindered by the impact from combat over time" - LTC, Marine Corps
- ✓ "Field commanders are making decisions that impact all of the units in the field" - COL, Marine Corps
- ✓ "We were making huge decisions under stress with very little information" - MAJ, US Army
- ✓ "Self-regulation could help this group make better decisions, process information quicker, and be more resilient in high stress situations" - COL, Marine Corps

Oops - Wrong Beneficiary! Time To Pivot

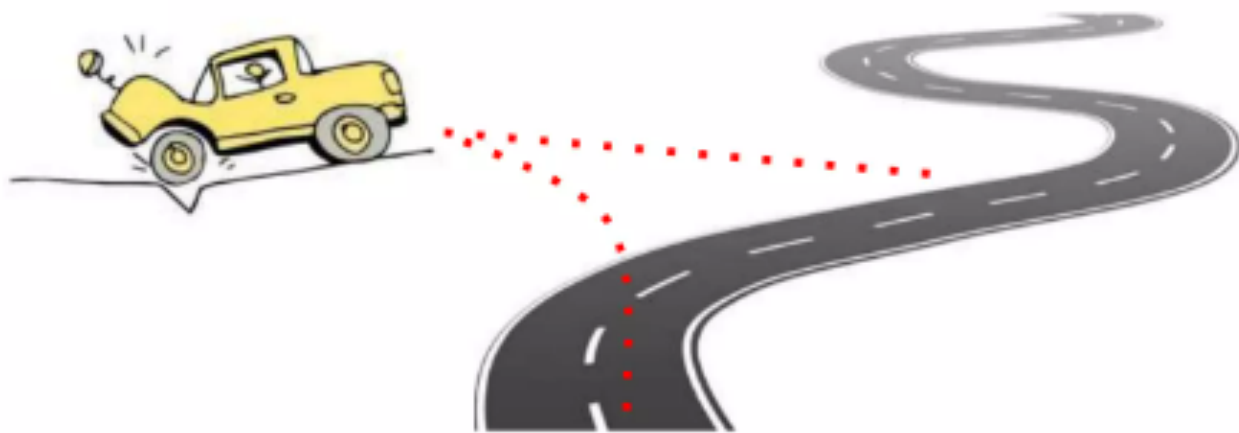
We learned that this technology would not be a priority for Conventional Field Grade Officers for a number of reasons:



- X **Funding Challenges:** *"We're just trying to buy bullets for soldiers - we don't have the money for monitors and analyzers"* - COL, 10th Mtn Div
- X **SOF Is A Better Entry Point:** *"You should look at SOF (Special Operations Forces). This group has great influence over the rest of the military and is good at spreading things. There is also significant funding."* - SMU (Special Mission Unit) Officer
- X **Scalability Challenges:** *"Tech (like wearables) is too expensive to scale in Big Army - this would not be a priority"* - COL, 10th Mtn Div

← Conventional Field Grade Minimum Viable Product (live, real-time stress tracking with recommended interventions based on current mental zone.

*Time to course correct! Back on the Beneficiary
Discovery road!*



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Moving on From Conventional Units to SOCOM



✘ Military Officer
Too Vague

**✘ Field Grade Officers
Conventional Units**
Still Too Vague;
uncertainty around
need, interest, funding,
and implementability



**✔ USSOCOM (US Special
Operations Command)**
Demonstrated need, high interest,
significant funding, ability to
implement, great influencer



- ✔ 75th Ranger Regiment**
- ✔ High willingness to experiment with tech
 - ✔ Testbed for tech that gets adopted to the broader military
 - ✔ Separate training pipeline
 - ✔ Public facing
 - ✔ Significant funding resources

With our initial target beneficiary circled, we set off to explore environments where we could provide value and help this beneficiary.



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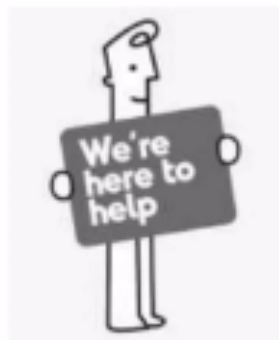
Big “AHa” Moment: Close Quarters Combat Training Can Be Optimized



- CQC training brings everything together → critical exercise
- CQC is a point of failure → big pain point
 - “Very common for guys to break down and not make the right decisions” - Fmr SMU Commander
 - “Special Ops CQC has a high attrition rate” - SMU Officer
 - “CQB without a doubt is the number one thing we drop people for in our program” - Director of R&D, USASOC
- CQC training can be improved → huge benefits

Note: CQC stands for Close Quarters Combat training. CQC is a signature course in the military. It is also referred to as CQB (Close Quarters Battle).

How does our technology that measures and improves decision making under stress provide value to the trainers and trainees of the 75th Ranger Regiment?



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Biometric Data = Solution?

It was common to initially hear about how getting biometric data would be "hugely helpful."

"Any biometric data
would be hugely
helpful"
-LTC, Army

"CQC training is
recorded in
facilities that are
hard wired for data
collection and
analysis"
-COL, Army

"If I can measure it, I
will do better at it"
- SMU Officer

The Interpretation of that Data is the Actual Pain Point!

"Biggest mistake companies in this space make is falling in love with the data and lose sight of what it means to the user"
CEO (Don Faul)

"The Army has too much data and doesn't know what to do with it" - COL, Army

"We spend a lot of time collecting data but don't know how to then use it effectively"
- SMU Officer

"There is a lot of data being collected but the need lies in technology that can interpret this data and put it all together"
- SMU Officer

"We tried Garmin and Oura ring but are having the 'so what?' problem of not knowing what to do with this data"
- Director of Innovation, 75th RR

"Being able to make the link between 'here's what we're seeing live' and 'here's what is showing up in the data would be amazing"
- Fmr SMU Officer

"If soldiers are just given data and didn't know how to interpret, they wouldn't wear the thing; data needs to be useful and actionable" - SOF Officer



"To the extent we can start explaining behavior through data, we can start saying 'this is why' and will then know where to start making tweaks to increase performance" - Fmr SMU Commanding Officer

"Data has to be analyzed and presented in an actionable way" - SOF Officer

"We need data that actually shows us something - something that takes values and creates a tool that can impact training"
- SMU Officer

"It's shocking and refreshing to hear you talk about this. Why for decades have we not used any data to drive this training?" - SOF Officer

"We have a lot of data but have not done work around what the data really means" - Director of Innovation, 75th RR

"The team is using biometric data but the application and immediate feedback is not good" - SMU Trainer

"The biggest hurdle with data is figuring out how to use it to improve operators' decision making processes and not just overwhelm them with it" - SOF Officer



NeuroSmart: Improving CQC Performance with Individualized Physiological Monitoring, Biofeedback and Interventions

We link the physiological responses to relevant performance metrics using state of the art neuroscience and machine



KEY Metrics for CQC:

- Shot Accuracy
- Threat identification speed
- Threat recovery speed

"Connecting the data to shot accuracy and threat responses is invaluable."
- Trainer at MVPD

Stress Meter: We are Feeling Good About Our Beneficiary and Value Proposition



We Started Investigating Key Partners, Activities and Resources

KEY PARTNERS

- MTEC (Medical Technology Enterprise Consortium)
- Flexible Electronics Manufacturers (NextFlex)
- Academic Collaborators Partners (e.g. Bao Lab)
- Mental Fitness Coaches
- Smartabase (Cloud API)
- Defense Innovation Unit (DIU)
- In-Q-Tel
- Athos
- Medical Research and Development Command

KEY ACTIVITIES

- Conduct pilots to build predictive algorithms
- Collect biosignals using existing hardware and sensors
- Leverage science to connect biosignals to stress-related performance events
- Interpret data and provide personalized training regimes

KEY RESOURCES

- Neuroscience/ biosignal expertise
- Hardware/electronics prototyping expertise
- Commercialization expertise
- Regulatory Expertise and approval needed (3216.02)

VALUE PROPOSITIONS

Operators

- Optimized performance through improvements in:
 - Shot precision
 - Threat identification and engagement
 - Threat recovery
 - Baseline physiological stress level

Trainers

- Reduce attrition / drop rates
- Increase training efficacy
- Reduction in repeated trainings (saving \$ and time)

Leadership

- Units are mission ready

BUY-IN & SUPPORT

- SOCOM POTFF (Preservation of the Force and Family)
- SOCOM Human Performance Program
- SOF-AT&L (Acquisitions)
- PED-Warrior (SOF Program Executive Office)
- DEVCOM (US Army Combat Capabilities Development Command)
- 75th RR Innovation Cells (1st & 2nd Battalion)

DEPLOYMENT

- SBIR Grants: open topic Phase I (likely NSF) followed by SOF AT&L Phase II
- eSOF and other SOCOM events
- Defense Innovation Unit (DIU)
- Various pilots (75th RR, Law Enforcement, etc.)

BENEFICIARIES

Initial:

- SOCOM
- 75th Ranger Regiment
- Training instructors
- Mental Fitness Coaches

Beyond:

- Broader military
- Law enforcement
- First responders
- Healthcare workers
- Athletes
- & More

MISSION BUDGET/COSTS

- Prototype build out (UI/UX + Cloud)
- Pilot operations & software development
- Build out of data processing pipeline
- Manufacturing

MISSION ACHIEVEMENT/IMPACT FACTORS

- Increase in the number of (lower attrition), and readiness & resiliency of, special operators
- Improvement in key SOF performance metrics and combat readiness
- Reductions in critical human error and poor decision making; lives saved
- Improve effectiveness of CQC training (saving \$ and time)



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Our Plan For Deployment



Week 9: We Have Our First Inbound Inquiry!



SMU Medic Course Director Wants to Talk About Potentially Using Our Technology



"Can you talk with the medic course director about potentially using your technology next Tuesday?"

- SMU medic we had previously interviewed

Introducing NeuroSmart

Shoot Better.
React Faster.
Think sharper.
Make better
decisions under
stress.

NEUROSMART

OPTIMAL TACTICAL PERFORMANCE THROUGH OPTIMAL PHYSIOLOGY.

GET IN TOUCH

Email: neurosmart@lists.stanford.edu

WHO WE ARE

We're a team of neuroscientists, engineers, and business students looking to help operators, pilots, and other high-tempo servicemembers increase their performance by optimizing their physiological response to stress. We are developing biosensory monitoring systems coupled with individualized training regimens to help our customers achieve their peak performance under stressful stress conditions.

WHAT WE OFFER

REAL-TIME STRESS BIOMETRICS

We measure biometrics (GSR, HRV, Accelerometry) that offer behavioral insights unavailable outside of the laboratory for use in your training systems. We can show it and how stress impacts your performance and provide tools to self-regulate.

INDIVIDUALIZED BEHAVIORAL ANALYTICS

Cool data. So what? We apply recent advancements in neuroscience to offer you behavioral insight via metrics that matter:

- Shot Precision
- Threat Identification Rate
- Threat Recovery Rate
- Baseline Physiological Stress Level

SMARTBASE CLOUD INTEGRATION

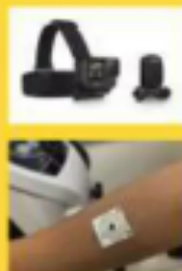
We integrate with Smartbase so you can keep all your data in one place.

THREAT RESPONSE TRAINING SYSTEM

Low-Profile Sensing

Our sensor system is extremely invisible as you won't even know it's there. The sensing system consists of a flexible wearable patch placed on your wrist, and is synchronized with a helmet-mounted video camera so you can optimize your tactical decisions frame-by-frame and see the impact of your physiology on your decisions, and the impact of training your physiology.

Easy-to-Use Monitoring and Personalized Self-Regulation Software



Contact us for the brochure: neurosmart@lists.stanford.edu



NeuroSmart is taking off... We are looking for:

PILOT PARTNERS

- SOCOM units
- Law Enforcement agencies
- First responders
- Athletic teams

FUNDING

- SBIRs
- H4X Labs
- Crowdfunding
- Friends and family
- Angel investors

INTERNS: Want to work in a high-paced environment and make societal impact?

- Operations
- Data Science
- Human Subject Research Regulation

CONTACT US

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Thank You

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