



# Firefighter Resilience Blue Sky

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November 7th and 8th, 2023



# Firefighter Resilience Blue Sky

Workshop, 7-8 November 2023

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**ABSTRACT** – This report presents discussions, concepts, and recommendations related to improving resilience for firefighters developed during a 1.5 day “Blue Sky Meeting” with a group of current and former firefighters and military, community leaders, and subject matter experts in relevant scientific and medical disciplines. This study was hosted by the Florida Institute for Human and Machine Cognition (IHMC) in Pensacola, FL on 7-8 November 2023.

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## **EXECUTIVE SUMMARY**

The Institute for Human Machine Cognition (IHMC) was requested by Marion County, FL, community organizations to conduct a 1.5-day “Blue Sky” event in November 2023 in Pensacola, FL, which hosted a group of firefighters, military, and scientific/medical experts to explore concepts for building a resilient firefighting community, focused on reducing the incidence of suicide and burnout in the active and retired firefighter population.

## **THE STUDY TEAM**

The study team was led by Dr. Kenneth Ford (Director, IHMC), IHMC Blue Sky participants, along with subject-matter experts and Marion County community leaders. The team included active and retired firefighters and military, scientists and physicians, and other leaders from academia and industry. From IHMC, Dave Blakely led the brainstorming process with Anil Raj assisting. Shaner Crooke provided administrative and meeting logistics support, while Alan Ordway provided technical support. Anil Raj, Brady DeCouto and Morley Stone captured ideas and points raised during meeting presentations, discussions, and brainstorming sessions. Please See Appendix-1 for biographies of all participants.

## **METHODOLOGY**

The Marion County Hospital District sponsored this meeting with the twin goals of:

- 1) Identifying potential contributing factors that impact firefighter mental health.
- 2) Identifying key, cost effective approaches that could promote firefighter resilience during and after service.

On Day 1, Dr. Ken Ford, director of IHMC, welcomed the participants, introduced the topic, reviewed the agenda, and recognized the IHMC staff support for the workshop. Mr. Rich Bianculli, a trustee of the Marion County Hospital District (MCHD) then described the importance of reducing stress and increasing resilience for firefighters nationwide. He described that developing an action plan represents a multifaceted challenge requiring buy-in from citizens, firefighters, political leaders and administrators. The remainder of Day 1 (7 November) included six formal presentations from subject matter experts (SMEs), which included Q&A and discussion, followed by Brainstorming instructions, two brainstorming sessions and finally an assessment and consolidation activity.

Day 2 (8 November) started with welcoming comments from Dr. Ford and Mr. Bianculli. The participants were then divided into eight groups, which each further explored the eight topics which had been generated on Day 1. These topics were chosen from the mostly highly ranked ideas from the first day’s consolidation/down-selection activity. Each team developed posters to refine and summarize their topics and then presented them to the entire group followed by discussion. The workshop ended following a wrap-up session.

This report represents a high-level summary of the Blue Sky workshop presentations, brainstorming sessions and subsequent discussions. The brainstorm ideas are presented as bulleted points grouped by overarching themes and relative importance to the participants. The discussion points are presented in a paraphrased threaded dialog format. See Appendix-2 to review the agenda.



## **DAY ONE**

### **1. Presentation: “A Room Full of Elephants: The Factors that are Contributing to Firefighter Physical and Mental Ill Health” – James Geering**

Mr. James Geering, a former firefighter and now host of the Behind the Shield podcast, led off the presentations, noting the popularity of firefighting; hundreds of applicants apply for single digit positions leading to a 5-10% acceptance rate. His personal experience has included working for many fire service departments covering the east and west coasts, and central and south Florida, some with great and some with not so great cultures. He noted that the firefighting profession results in many funerals and many of his friends have died over the years.

He provided an overview of the process of becoming a firefighter, which begins with enrolling in a fire academy, usually an out of pocket expense. Most firefighters also train as emergency medical technicians (EMTs) or medics. Fire services typically require a Minnesota Multiphasic Personality Inventory (MMPI), as well as a physical capabilities test for preselection screening. Most fire services employ shift schedules designed in 1950's with one day on and two days off. This is considered 10 workdays per month, each consisting of a 24-hour shift. Thus, the scheduling condenses three 8-hour workdays into each shift. Many firefighters do not sleep while on duty because the culture encourages them seek to fill the 24 hours of work (no naps). When able to sleep, it is difficult to sleep well when anticipating alarms. For the past 50+ years, most services also require firefighters to provide emergency medical services (EMS), rescuing everything from nuisance calls to cardiac arrest. Abuse of the 911 system has increased firefighter workload, who are called to try to solve almost any issue.

Awareness of firefighter suicide has increased over the past 20 years; statistics available on the Internet discourage potential high quality recruits and contributes to the current hiring crisis. This has led fire services to lower physical and mental fitness standards and require forced additional shifts where mandatory 56 hour work weeks result in 80 waking hours per week (unions have been resisting these changes).

Firefighters suffer from lack of sleep leading to health problems such as hormonal disruption, and sleep apnea; some need continuous positive airway pressure (CPAP) support to sleep. Unlike going to war overseas, firefighters see their battlefield every day, triggering post-traumatic stress disorder (PTSD) acutely, and firefighters are dying from multiple causes, including numerous cancers.

While the stigma associated with mental health has decreased and peer support exists to help find support, peer support specialists may not be available. Many firefighters self-medicate leading to high levels of addiction and overdose. Unlike military veterans, firefighters have no post-retirement health coverage, and no organization like the Department of Veterans Affairs exists to provide healthcare or track for mental health in retirees. There is no coordination for dissemination of information and methods among individual fire departments, and each city, and county department may have its own procedures and methods, and county and city services might not speak to each other.

### **2. Presentation: “Esprit des Corps the Cornerstone of Resilient Organizations” – Art Finch**

IHMC Research Scientist Dr. Finch described key qualities, such as esprit de corps of resilient organizations based on his experience working with the U.S. Army Special Operations community.

Like firefighters, individuals in these organizations often experience high levels of persistent stress.

At Ft. Bragg (now Ft. Liberty), the Army decided to promote resilience as a counter to post-combat mental health issues by building ultra-resilient teams, which rely upon ultra-resilient individuals. They implemented a resilience program developed at the University of Pennsylvania. This Penn Resilience Program (PRP) focuses on developing cognitive and emotional fitness, strength of character and strong relationships by targeting self-awareness, self-regulation, mental agility, character, interpersonal connections, and optimism to increase positive psychological health and resilience. Dr. Finch noted that warfighters are more likely to participate in this empirically designed program if they do not feel they are in “a program”. In general, they will work with program nutritionists, chaplains, and certified strength coaches, but seeing a psychologist still carries a connotation that an individual has a problem. This program needs to have broad team participation as well as meet individual accomplishment goals for success.

Organizations that promote esprit de corps maintain commitment to the following: rigorous assessment and selection; shared gateway experiences, distinctive uniform elements, rituals and traditions, inner sanctums and gathering places, physical fitness, behavioral wellness and health, “bottom up” leadership, and appropriate financial compensation. Successful organizations promote resilience.

Rigorous assessment and selection: The best programs combine development and selection for both physical and mental attributes. Using operational tasks enables real assessment of probable future performance and helps inform decisions on who should be allowed into the organization. Once trained and assessed, they leave better at their job regardless of outcome; failed candidates become team ambassadors and effective recruiters. Psychological assessments can help define personality profiles most likely to fit within specific organizations, but most personality assessments only pick up major pathology that would be obvious without a screening test.

Shared foundational experiences for all members can be powerful promoters of esprit de corps. Because it is not a participation trophy, the shared experience carries a lot of meaning for the team. These shared gateway experiences should assume a base level of participant capability and allow graybeards and experienced individuals to transfer advanced tactics and specialized tools knowledge to trainees, ensuring a minimum level of training common competencies. Graduation may include training tasks with separate private ceremonies with specific symbology and rituals (e.g., Army Rangers have a tan beret donning ceremony for which graduates spend weeks preparing). This can include simple distinctive uniform elements such as logos, T-shirts, hats, and patches, both shared and exclusive. Making even minor exceptions to uniform policy, such as different boots or sunglasses, can make units feel special, unique, and appreciated and act as an incentive in recruitment.

Rituals and traditions contribute to the shared experience through post event routine group activities (event recover, after action reviews) that punctuate the end of an event. Meanwhile memorials, family days and community events can help family members and the community understand the day-to-day life, which firefighters mostly compartmentalize. Meanwhile, providing exclusive access to inner sanctums, such as team dining facilities and gathering places, access to fitness and rehabilitation centers (physical trainers, strength and conditioning coaches, nutritionists, physical therapists, chiropractors, body mechanics training, etc.), meeting/locker

rooms, and training programs and equipment, as well as team bars, creates opportunities for developing team social interaction and bonding.

Focusing on a narrative of resilience over mental health pathology, can incorporate meditation, mindfulness, yoga, tai chi, educational programs (professional development, college), etc., to avoid stigma and promote behavioral wellness and health. Firefighters need counseling (someone to talk to who is able to realize when someone is broken) more than they need psychotherapy; they are stressed but not pathologic. This has created an increasing workload for resilience counselors, and post pandemic, psychological and therapeutic resources are hard to access with insurance coverage. However, resilient organizations can use their own assets or leverage individual and family support groups. Because post event evaluations and crisis response debriefings can increase pathology, post event counseling must be voluntary rather than compulsory.

Strong organizations employ “Bottom up” leadership where members police themselves, complying with team decisions to avoid wasted time. They operate more democratically with transparent and open dialog, active organization involvement on both policies, leadership decisions, and clear expectations and pathways to promotion.

Lastly, financial compensation signals the value of the members’ role, and higher salary ranges expand the candidate pool and improve retention. Paying livable wages helps operators maintain focus on their work role, by reducing the need for additional employment. Expanding the recruitment pool typically increases the quality of selection pool. As an example, New York State Highway Patrol officer starting salary is \$110K/year, which can easily increase up to \$180K/year depending on role and time in service. This level of compensation provides an enlarged and improved recruitment pool for that agency in comparison to similar agencies.

### **3. Presentation: “Resilience and Recovery: Marion County Fire Rescue’s Journey to Addressing Firefighter Mental Health” – James Banta**

Mr. James Banta, Marion County Fire Rescue (MCFR) Department Chief related his experience with four firefighters committing suicide in his department that occurred over a period of four years, despite the existence of a departmental resilience program. He noted that Marion County firefighters cover all hazards (both non-transport and transport) and advanced cardiac life support (ACLS) using 27 total fire stations to service an area of approximately 1,600 sq miles. Most of the firefighters started their careers between 18-20 years old, but many do not reach retirement in a happy, healthy state.

MCFR has developed a program to build resilience that includes a strong chaplaincy, which provides financial and emotional counseling and religious guidance, as well as peer support, though the department needs to help firefighters increase awareness of how to access peer resources. Additionally, MCFR has instituted an annual peer fitness program eight years ago. The department previously only evaluated fitness as a screening tool during hiring but did not re-evaluate physical fitness throughout a firefighter’s career. In the first year, 80% of MCFR passed the annual check of ten representative firefighting activities, but most were in the young male cohort. In 2022, 99% of all MCFR firefighters passed as a result of the availability of peer and other fitness support resources.

Following the four suicide events, the International Association of Fire Fighters (IAFF) sent a strike team to interview each MCFR firefighter and monitor for crises. The department also initiated the Second Alarm Project that added health and safety personnel and proactively set-up

clinical awareness programs with local mental health clinicians to ensure timely availability of resources when needed and documentation of how to access it. The Florida Fire Chiefs Organization, following the Pulse Nightclub (Orlando, FL) massacre, developed a roadmap for firefighter behavioral health access that MCFR has adopted. In addition, the department has made a philosophical change to how it approaches the disciplinary process, eliminating “zero tolerance” in favor of behavior modification and graded responses. Individuals unaware of or unable to follow standard operating procedures (SOPs) are handled differently than those who violate SOPs willfully. This approach includes a change in management of substance abuse so that an otherwise good employee does not lose their career over a single event.

Chief Banta concluded by describing programmatic changes made to reduce workplace stressors. This includes consistent and open messaging about mental health to reduce stigma and promote mental health resource utilization (no more expectation to “suck it up, buttercup”). They have also created a culture of rest (oftentimes firefighters would find work to do or extra shifts to take) to increase mental health resilience. This includes better planning for overtime assignments, workload reduction and stabilization of staffing. By offering improved compensation and incentives for retention, turnover and understaffing have been reduced.

#### **4. Presentation: “Repairing Trauma: The First Clues” – Dave Rabin**

Next, psychiatrist and neuroscientist David Rabin, M.D., Ph.D., chief medical officer, co-founder and co-inventor at Apollo Neuroscience, Inc., and executive director of the non-profit public health focused Board of Medicine, provided a presentation on managing the effects of trauma. He noted that while resilience is a common term in the military and firefighter communities and is understood to cover what we do in advance to bounce back before we are burdened by chronic stress, it is not used in psychiatry. Chronic stress exposure, however, has impacts on both biological and emotional health, the latter of which is often unaddressed. He first discussed the concept of hormesis, a toxicology term that describes the buildup of tolerance to chronic, low level exposure. Inducing low level stress exposures can increase resilience by helping individuals learn to cope with stress in a known, safe environment. For example, cold plunges can be used as a stressor for both physiologic and emotional hormesis. Because both safety and fear shape perception, perception training to reduce fear can reduce negative outcomes when framing meaning from traumatic experiences.

Increasing parasympathetic nervous system (PNS) tone decreases heart rate and blood pressure, while improving heart rate variability (HRV), focus, sleep quality, and control of emotions. Promoting feelings of safety can increase PNS tone. Techniques such as yoga, mindfulness, etc., can all increase vagal nerve (i.e., PNS) even tone under stress, shifting fight-or-flight responses toward rest-and-digest and reducing the negative impacts of trauma. The more we practice thinking, perceiving, and doing, the better we get. This occurs because neurons generate proteins that increase the strength and efficiency of their neural connections, an evolutionary mechanism dating back more than 300 million years that was discovered in Dr. Eric Kandel’s Nobel Prize-winning work. Without adequate preparation (or after event, without coping and adaptation support), intense, meaningful challenges that include a perception of threat can become traumatic experiences that result in a more “negative” reference toward oneself and the world that persists. Intense, meaningful challenging experiences can use the same mechanism to promote healing if one has a perception of safety and adequate preparation and support, resulting in a more “positive” view of oneself and the world. Trauma and healing also generate epigenetic changes that can lead

to heritable changes to DNA (e.g., via mechanisms such as DNA methylation, which affect gene expression) that can persist for multiple generations. Thus, storage of traumatic memories occurs in neural connections as well as on DNA that, without healing (processing, reversing and coping), can be passed on to four to ten (or more) generations of offspring.

Clinical studies with the psychedelic prodrug psilocybin found in many fungi and with 3,4-Methylenedioxyamphetamine (MDMA) have both shown to have healing properties that manifest during treatment and persist post-treatment for severe major depression AND post-traumatic stress disorder (PTSD), respectively. Both promote a sense of safety, improved feelings of connection to self and others, and patients report the treatment as one of their most, if not the most, meaningful experience of their entire lives. While both are classified as Schedule I drugs (addictive with no currently accepted safety criteria or medical use in treatment) by the United States government, they are being actively investigated in Food and Drug Administration (FDA) clinical trials. Psilocybin and MDMA treatment regimens, one dose and 1-3 doses, respectively, require concomitant and post-treatment psychotherapy to ensure a safe and directed recovery, and the dramatic remission of PTSD symptoms (55% of subjects in remission after 3 doses increasing to 67% 1 year later with no additional treatment in Phase 2 FDA trials of MDMA) suggests potential epigenetic repair. A pilot study using saliva samples from patients with PTSD undergoing MDMA-assisted therapy has shown statistically significant changes in the methylation of the glucocorticoid (e.g., a stress hormone) receptor gene NR3C1. The amount of change in methylation was found to be directly proportionate to score improvements on the Clinician-Administered PTSD Scale for Diagnostic and Statistical Manual of Mental Illnesses-5 (CAPS-5), a standard measure of PTSD.

Similarly, six to twelve doses of the dissociative anesthetic ketamine (a legal drug) with adjuvant psychotherapy, has been studied for more than 70 years and has shown to enhance the perception of safety and treat symptoms of PTSD over a period of 12-20 weeks. These interventions demonstrate that it is possible to enhance the perception of safety within the patient's body itself and that the perception of safety is critical to the recovery and healing process.

Dr. Rabin concluded by describing his company's Apollo Neuro system that provides a safety signal using a wearable device that generates a tactile-vibratory stimulus to promote PNS tone. The commercial device has been available since 2020 and has been widely adopted by first responders. He is currently testing it to see if it can replicate the MDMA effects with respect to activation of the body's safety pathways as reflected in the epigenetic code.

## **5. Presentation: "It's Not All In Your Head: How Physical Health Affects Mental and Emotional Health" – Tommy Wood**

Tommy Wood, Ph.D., Research Assistant Professor of Pediatrics and Neuroscience at the University of Washington and a Visiting Scientist at IHMC provided a presentation focused on how lifestyle and environmental factors interact to impact physical and mental health. He defined the six pillars of lifestyle medicine essential to human health and individuals flourishing, namely: 1) Mental well-being; 2) Minimizing harmful substances; 3) Healthy relationships; 4) Healthy eating; 5) Sleep; and 6) Physical activity. These pillars are interconnected and modifiable, and deficiencies are associated with chronic disease. He provided a framework on how peripheral health factors such as body composition, metabolic health (including blood sugar and pressure), inflammation, nutrient status and fitness interact with the pillars to drive mental well-being (including neuroinflammation, suicidal ideation, personality, and resilience). Currently, 60% of

firefighters suffer from sleep deprivation and an equal percentage binge drink, which both affect safety and social bonding. Alcohol abuse correlates proportionally (>30%) with suicide risk, affecting both mood and impulsivity. Likewise, 50% of U.S. adults have diabetes or pre-diabetes (<10% are in good metabolic health) and shift workers, including firefighters, have an increased risk of diabetes and metabolic syndrome. They tend to eat more processed foods (high in refined carbohydrates and low in nutrient and protein content), and more than 50% of firefighters are overweight with 25% clinically obese. This leads to glucose spikes, which increase stress responses, and also affects mood and contributes to depression, suicidal ideation and aggression/impulsivity. Dietary supplementation of vitamin D, folate and other B vitamins or omega-3 fatty acids with multivitamins substantially decreases suicide and self-harm, depressive symptoms and aggression, with B vitamin supplements reducing both cortisol and inflammatory cytokine levels. Thus, B vitamin levels (e.g., folate and homocysteine) can act as biomarkers for suicide risk. Nutrition and environmental factors act together to alter brain chemistry; for example, exercise increases circulating and brain tryptophan levels, yet sufficient vitamin D and Omega-3 levels are required to support serotonin signaling. This promotes normal executive function, sensory gating and prosocial (versus impulsive) behavior.

Both aerobic and resistance training positively impact risk of depression, anxiety and suicidal ideation, and the benefits increase with longer intervention. Sleep deprivation, however, decreases executive function and empathy and increases anxiety, anhedonia, distress, anger, impulsivity, depression, and suicide. For individuals with chronic insomnia, cognitive behavioral therapy for insomnia (CBTi) has been shown to significantly decrease suicidal ideation likely by reducing insomnia-related depression. Digital tools exist for CBTi, such as the SleepIO App (BigHealth.com, San Francisco, CA) that have demonstrated these benefits in randomized clinical trials (RCTs).

Work stress increases depression risk, particularly when the individual has little control over the stress. Low work demands (stress) with low control is manageable, but low control with high demands increases depression risk and compounds with irregular shift work. Greater autonomy in work decreases the risk of depression. Mental health drives physical health and the social environment drives physiology because feeling isolated, unsupported or like you're not doing enough increases stress and inflammation signaling as an acute survival response that leads to chronic changes in metabolic and cardiac health as well as depression and anxiety.

A study of firefighters using the self-reported distress tolerance scale (DTS), a measure of resilience, however, demonstrated that those with higher distress tolerance exhibited decreased effects of stress on depression risk. Multiple interventions can buffer stress and emotional reactivity; for example, regular exercise (one time/week), improved sleep quality, and increased HRV all increase resilience to stress, decreasing suicidality while increasing friendliness and elation. Dr. Wood developed a model of the interacting network of the statistically significant risk factors he had discussed. In general, sleep issues and lack of exercise are the biggest adverse factors for depression and suicidality and being married/cohabiting (having someone at home) is the most adaptive. Vitamin D deficiency is associated with helplessness and alcohol abuse and folate levels correlate with health outcomes. He concluded with a discussion of the efforts by the California Center for Functional Medicine that distributed Ōura rings (Ōura Health Oy, Oulu, Finland) to firefighters to monitor improvements in mental and physical health in response to their lifestyle factor modification wellness program, which included measures of HRV, deep sleep duration and time to fall asleep, as well as perceived stress, body fat and hemoglobin A1C levels.

## **Brainstorm 1: How might we increase physical, mental, and psychological resilience of firefighters?**

Following a brief overview from Dave Blakely of the brainstorming process of seeking many and sometimes wild ideas, deferring judgement, using visual illustrations, one idea per sticky note, etc., the team generated a broad range of measures and methods related to firefighter resilience.

Framing questions:

- How might we anticipate challenges before they become acute?
- How might we boost resilience with coaching, engagement, and connection?
- How might we provide programs for firefighters aimed at increasing physical and mental health and resilience?
- How might we improve education on fitness, sleep deprivation and mental health with proactive lines?
- How might we develop workable mandatory fitness standards based on real world firefighting evolutions?
- How might we provide equipment to support firefighter strength and conditioning fitness?

The participants discussed different strategies to increase resilience in firefighters. The facilitators prompted participants to write down ideas on sticky notes and explain them further to the group. The facilitators clustered the ideas into different labeled categories on a whiteboard. Simultaneously, discussion ensued between participants about some of the ideas, and the ensuing discussions are documented further down in this section.

### ***Brainstorm 1 Discussion***

“We could explore various options and best practices for shift scheduling.”

“It would likely be beneficial to make the sleep schedule as consistent as possible to minimize circadian disruption.”

“DoD has extensive experience with how to implement *after action reviews*. There may be lessons learned.”

“Enhanced pre-screening for mental health may be beneficial.”

“Could explore the use of appropriate psychological assessments to give optimal assignments and roles. If done correctly, this can be a powerful tool at a low investment.”

“Culturally, it could be beneficial if mental health discussions with counselors were seen as relatively normal.”

“Once you destigmatize the therapeutic process, this creates an ongoing relationship that you can maintain your psychological and emotional well-being within.”

“Part of the challenge with operators in military settings is that there is no confidentiality with military folks. The only confidentiality is with the chaplains. Veterans do not trust their therapist or counselors. We could solve this through ensuring the counselor is completely independent of the agency.”

“Peer support programs exist. I am only aware of one peer support program that is effective in the context of firefighters — the IAFF one. The peer support program is drawn from the 12<sup>th</sup> step of alcoholic’s anonymous program.”

“Talking to a good friend is often just as good as talking with a professional, with the exception of more severe pathologies. One of the solutions could be building in a “peer day”. You get a day off to go do an activity with a friend of your choosing.”

“This is interesting, but who does the peer supporter go to? After they talk to the peer, they might not know who to go to. How do they offload trauma from peers offloading on them?”

“It can be best to have an outside organization in this role. What outside influences are they going through? Are there alcohol or marriage problems?”

“How do we anticipate challenges before the issue becomes acute? What do we do right now? Family crisis and family issues are a significant problem. It would be a good idea to integrate family or spousal counseling. It’s imperative to have that structured outside party that is independent. Once trust is built with counselors that the discussions are truly confidential, word spreads around to teammates.”

“In DoD, we try to practice prevention. Programs for family relations and singles. We teach how to discuss ... and even argue ... effectively with each other.”

“In some cases, it may make sense to explore building resilience through psychedelic therapies which could be very helpful with professional supervision.”

“The Sound-off app was conceived and created by a CIA operative who lost a buddy of his. I found it when we lost an operator who had everything going for him. This app allows you to talk to someone without knowing who it is. But, you *do* know they are a mental health professional. Everything is anonymous. This app has been helpful to many.”

“This app is controversial because of the anonymity. I’ve sent people to it. In military settings, regulations can at times get in the way.”

“What does overtime and sleep deprivation do to your health? In addition, we should start *week one day one* with education on financial and relational classes.”

“In Marion County, we will provide mandatory financial literacy training to all firefighters.”

“We could provide mandatory training for how to deal with stress. For example, we could train breathing techniques, vagal tone, etc.”

“Even if individuals are provided the time and resources to practice good health habits such as providing time for relaxation or sleep, there is no guarantee they will capitalize on it. Biosensing can be used to monitor their actual health status for interventions. Also, structured monitoring of mental health status could serve a similar purpose.”

“One thing that can be done is implement a strategic psychological assessment. You could then review the results from the previous testing and look at changes from baseline. This is an opportunity to shift them through the right resources.”

“We need to educate individuals on biosensing, not just provide it. The data can become self-motivating, putting them in a situation of being informed. Biofeedback is a great idea when it is feasible. We can also leverage teaming for collaboration, but also healthy competition. There is real value in healthy competition. The one thing that struck me from the presentations was the benefit of having a chief health and safety officer. Having a person who has been in the trenches but is also receiving feedback on all levels is important.”



“In a couple sentences, could you provide an explanation of what the peer support and therapy programs look like? Is there already someone doing things like health and fitness coaching in most fire departments?”

“In our Ohio-based organization, no. We have a fitness instructor program and others. But they are at a high-end cost. Do we buy 10 more sets of firefighting gear, or do we spend thousands to make people peer supporters?”

“My experience is that fitness instructors are better than therapists. You need to have multiple pathways. Some people will never talk to the chaplain, never talk to the shrink, but all talk to the physical trainers. If this is done deliberately, it could be a big deal.”

“That is so true ... and could be very valuable if handled in a thoughtful way.”

“Physical performance has a big impact on mental state. Physical activity or just accomplishing a task can improve confidence and self-efficacy. It is vital to put physical fitness in a position that is not just about fitness but also about getting people to understand the impact of fitness on mental and emotional health.”

“We need to define the spectrum of the fitness level. What is fitness? You will see all kinds of fitness. How do we most effectively enhance a firefighter’s performance and physical capability?”

“We did a study on police forces and looked at performance standards, then looked at the physiology to meet those standards. Did these have face validity in terms of job performance? You may want to introduce these types of things because they are directly job-related.”

“We could have the best program under the sun. People ask, “Will I get terminated for that?” There are concerns about biosensing too. Some people do not want superiors to see biosensing data.”

“At Ohio State, I give biosensing information to strength coaches. I deal with regulations for biosensing.”

“Shared suffering during a rigorous selection process can forge comradery. An elite team does not need fitness standards. A police chief in Idaho gives bonus points for doing well on fitness evaluations. This incentivizes fitness and performance.”

“How do we discover the right diet, vitamins, and supplements per individual to maximize physical and mental performance. What is it for me? My numbers are different from someone else’s.”

“Yes, periodic extensive blood testing would be valuable and provide much actionable information.”

“With respect to identifying nutrient deficiencies. The basics are cheap. Perhaps \$70. Some key vitamins in which firefighters are likely to be deficient are very inexpensive. There are more advanced assessments and wearables that can work well.”

“I would wager, that many, perhaps most, firefighters are deficient in vitamin D. This can have serious consequences and is easily remedied and very low cost.”

“Normal” vitamin D levels cover an excessively wide range with the low end of the range being very unrealistic in my opinion. A low vitamin D level may be normal, but it is certainly not optimal. Homer Simpson is, unfortunately, “normal.”

“Also, some hormonal testing such as testosterone would be helpful along with a few others.”

“In my organization, we just added in testosterone testing.”

“Also, individuals with blood pressure issues can be monitored and coached to good effect.”

“Mandatory rest is essential. We could implement recovery spaces in firefighter environments. This can normalize rest and wellness. We use it with athletes.”

“In my fire department, we are building three new fire stations with a “purple room” decompression space with individual control: blinds or no blinds, privacy, one chair versus two chairs. You can just sit there, and no social media is utilized in that space (it is a soft no-phone zone). The policy is that if you are in the decompression space, the vehicle or truck you are assigned to goes out of service.”

“It can be tricky to define what is ‘doing it right’. What does this look like financially? We should compartmentalize different areas of expertise. For instance, “this person is a great firefighter but sucks at relationships... This person is great at relationships but sucks at firefighting...” We also need to define trauma. Trauma can be different for different individuals. Trauma might be yelling for someone, and a missing arm for someone else. What is failure? We are engaged mostly on fear of failures. “I am going to work extra hard; I did not save this person’s life...” Is that failure?”

“What is the optimal age to start as a firefighter or EMS firefighter. Police officer starting age is normally 21; for firefighters it is 18 years old. Data shows that 18–21-year-olds can be more susceptible to negative effects of trauma. We can study members that are doing the job, but perceive they have no issues. Why are some people not having the problems that somebody else has?”

“Resilience is key, and we need to learn more about how to enhance and sustain it.”

“In the movie *The Natural*, the sport psychologist talks to the losing team, and everyone dismissed it completely because the psychologist never walked the walk. Counselors and educators who walked the walk will be perceived as more credible.”

“No one wants to learn about finances from an accountant. If you want to scale this stuff, you want to use the local people. You want to learn these things from your buddies.”

“It could be worth exploring sabbaticals to allow firefighters to embed in organizations with high-performance programs and cultures.”

“An issue is that we do not have facilities available to get rest. We need to educate the importance of rest, but we also need to create an environment at home that is a restful one for recovery. We need to have environments that foster recovery processes.”

“We should emphasize the education of shift work. We need to understand the choice of second jobs. Education on the “why” and “what this does to us mentally and physically.”

“We have opportunity to do analyses on how to detect stress. These systems should ensure privacy and security while providing recommended interventions.”

“As a fire chief in Ohio, I am trying to prevent firefighters from dying in their sleep because it happens all the time. I know this because they did not get up to leave for the day. How can we have some of that passive monitoring occurring when we have threshold levels changing?”

“We need to know more about how medical marijuana affects firefighters to know how to manage its use in firefighters.”

“Or even CBD [cannabidiol] oils.”

“Used properly CBD can ameliorate anxiety and other symptoms.”

“Fire departments could explore the use of psychedelics when medically indicated. In my practice, we use ketamine with telehealth, and this reduces the cost by 50%. We can safely administer at home or through self-administration.”

“Advanced fire stations have alarms in separate rooms. However, older units have alarms for everyone.”

“One thing we have is that we can select the voice. Day-to-day calls have normal voice, but high stress calls have a female voice.”

“Thinking about recruiting, my mom was a nurse and she needed to find something for me to do after school. I helped with basic firefighter programs. These programs require funding and attention though.”

“What about an internship program?”

“I think internship programs and similar efforts can pay big dividends both in recruiting low-risk, high quality people into the fire service, but also in terms of community support.”

### **Evaluation & Prioritization of Ideas from Brainstorm #1:**

Following idea generation, participants voted to identify the most promising ideas by adding a tick mark (each participant could distribute up to 3 tick marks) to the sticky note.

#### Improving Selection Process

*4-6 votes*

- Purposeful and strategic psychological assessments (rule-in versus rule-out) to drive assignments and inform teaming.
- Reformulate selection process consistent with best practices (which could include the above among other tools and approaches).

*3 votes*

- Counseling sessions for new hires. Offload childhood trauma, eliminate barriers to entry, and normalize mental health (example: mandatory 6 counseling sessions for new recruits)
- Use high standards in physical selection; shared suffering [to meet standards] translates to a close community and greater recruitment demographics.

#### Fitness

*4 votes*

- Define the spectrum of fitness levels [to set the] focus [for] each member and have helpers to develop the system [for determining individual level].

*2-3 votes*

- Award points towards promotion based on fitness evaluation.
- [Promote inclusion of] injury prevention warm-up exercises. Takashi Nagai, PhD, at the U.S. Army Research Institute of Environmental Medicine has developed specific recommendations.

## Reduce Stigma

*4-5 votes*

- Normalize mental health counseling. Must be done during activity. Maybe insert counsellors in runs and other activities. Things comes out in activities versus being forced “sit in” groups.

*2 votes*

- Multiple counseling approaches – therapists, chaplains, physical trainers, physical rehabilitation.

## Therapies and Interventions

*3-4 votes*

- Who do I call when I need help? Counseling must be easily available and free to use.
- Monitor the emerging research on advanced therapies such as the use of psychedelics (e.g., MDMA) and Ketamine as discussed by several participants.
- Through the use of affordable and accessible blood tests assess the health status of each firefighter and identify deficiencies in vitamins and hormones known to be relevant and actionable. This could then lead to a customized supplementation plan for each individual aimed at maximizing performance and mental/emotional health.

*1-2 votes*

- Structured monitoring of mental health.
- Define doing it right. Define what trauma is. Define failure for a member.
- Consider what should be the minimum age to start as a firefighter or EMS provider.
- Create a firefighter version of Sound-Off app (<https://sound-off.com>), an app that veterans can use to speak anonymously with a professional clinician or a screened, trained peer.
- Robust therapy for spouses. Provide an educational piece on how to deal with a firefighter.
- Develop science-based policies for medical marijuana usage.

## New Process Steps

*3-4 votes*

- Establish [an] effective system for triaging non-urgent EMS calls.
- After-action reviews patterned after DoD processes.
- Assign a chief health/safety officer to oversee and implement programs.

*2-3 votes*

- Preserved (allocated) time for peer-network events.
- Mandatory counseling at regular intervals for all first responders (both individuals and groups) to assess and preserve psychological and emotional well-being.
- Recurrent psychological evaluations for personal development and to compare to older testing results.

## Education and Training

*4-6 votes*

- Couple relationship and family training programs. Access to fire chaplain resources. Communication and negotiation skill building.

- Create and maintain physical standards and promotion-based educational standards.
- Mandatory education on financial literacy, health, relationships, exercise, diet, etc.
- Start firefighter internship programs in high schools.
- Vocational or “ROTC”-like high school programs.

#### *2-3 votes*

- Mandate training of acute recovery techniques. Vagal (PNS) maneuvers, breathing techniques, movement meditation, and sleep enhancement techniques.
- Anticipate: Provide proactive intervention with family/spousal counseling services available to first responders.
- Education [should come] from those [individuals] who have walked the walk.
- Explore sabbatical for selected firefighters to embed in a performance program.
- Training/teach about causes for self-medication for depression and stress (family/employment/education).
- Embedded local peer topic-specific experts (e.g., finance). Optionally, promote individual continuing education.
- Continuing education with on call availability. Education about importance of insulin sensitivity. Probably better to increase protein and decrease carbohydrates. Longevity in harsh environments/jobs. Individualization. Need a doctor who is on board to measure things like insulin.
- Restructure the peer-support program and training to include a mental health director, change training requirements, and include family training policy change.
- Show new hires how to cook healthy and delicious foods.
- Education on the effects of shift work – sleep hygiene and overtime choices.
- Peer support – Policy of no-questions-asked support from peer supporters. Develop spouse program and social connections.
- Social media educational campaign for local firefighters that include develop specific PSA’s for families on how to spot substance use disorder (SUD) and depression and find confidential treatment.
- Make firefighters feel not like a statistic but a human who has leadership that cares deeply about their well-being.

#### Scheduling

##### *8 votes*

- Explore moving to a 24hr on/72hr off schedule giving one more full recovery day between shifts.

##### *3-5 votes*

- Dedicated recovery spaces in the firehouse. Now common in high performance environments. Help Normalize mandatory rest.
- Mandatory rest. Change the culture from the top-down.
- Engage sleep experts to explore 12 hour shifts vs. 24/48 and 24/72 in terms of health, performance and the work that must be accomplished.
- Evaluate schedules for shifts that balance workload of EMS to fire.
- Work toward more consistent shifts and less mandatory overtime.

- Improve sleep resilience and recovery through sleep pods, hyperbaric oxygen therapy (HBOT), dry float tanks, Shiftwave, and other recovery tools and modalities.

#### Tech-enabled evaluation and treatment

##### *4-6 votes*

- Metabolic health/hormone testing. Studies have shown that the vast majority of Americans are metabolically unhealthy.
- Identify and reverse nutrient deficiencies.
- Inexpensive blood test to identify less than optimal levels of selected biomarkers and vitamins (vitamin D, folate, cortisol, testosterone).

##### *2-3 votes*

- Continuing education and real-time biofeedback (physiological sensors, etc.). This is self-motivating.
- Wearables for biofeedback (Apollo, Sleep-IO), breathing.
- Individualized wake-up procedures for better performance.
- Monitoring sleep quality with biosensing.
- Leverage wearable trackers of sleep, HR, and HRV to predict decompensations before they happen. Even smartphones can do this.

**Following the brainstorm session and a short break, the team reassembled for the sixth and final presentation.**

#### **6. Presentation: “Navigating Change: Current Organizational Shifts and Future Opportunities” – Jacob King**

The final presentation of the workshop was given by Jacob King, Chief, Springfield (OH) Fire Rescue Division regarding the changes in management of firefighter behavioral health and how they impact wellness issues. Firefighters, paramedics and EMTs experience significant stress and trauma throughout their careers. This includes incidents involving children, violence, and danger inherent to firefighting which can have a cumulative and lasting impact on mental health and well-being. Firefighters tend to not focus on retirement, which seems a long way off, and likewise do not focus on their mental health (“only crazy people need mental health support”). Firefighters develop PTSD at the same rate as military servicemembers, and the U.S. Centers for Disease Control (CDC) notes that law enforcement officers and firefighters are twice as likely to die from suicide than in the line of duty, and emergency medical service (EMS) providers are more likely to commit suicide than the general public. This was recognized in the Public Safety Officer Support Act of 2022, which added PTSD as a covered benefit, but raises the question of whether fire departments should be recruiting 18 year old candidates, whose brains have not fully developed. While there is only one triage system approved by the CDC, which is the four-step sort, assess, lifesaving interventions and treatment/transport (SALT) algorithm, most firefighters do not follow the guidance. Most firefighters also do not effectively manage their time off, feeling like they are missing out on the “good” calls (“I missed saving a life to go to a birthday party”) and team interactions (a chief missed an active shooter event while on vacation and ended up resigning).

Peer support has been available in fire departments, but initially they consisted of recovering substance abusers (typically from alcohol) who had completed a twelve-step program and volunteered for other firefighters who wanted a sponsor from within the fire service. However,

evidence and competency-based health and wellness is necessary (firefighters used to sit in saunas to “sweat out” the toxins from a fire, but this actually increased absorption). In 2016 the IAFF created a certification pathway for peer support personnel using a formal two day in-person or three day online training curriculum developed to address mental health issues. Firefighters will generally speak with and trust peer support who understand the PTSD and recovery from experience, but community mental health/wellness providers and employee assistance programs need additional cultural competency to address the needs of first responders and get their buy-in. Unfortunately, the IAFF only makes their peer support training available to their full-time firefighter members.

Looking toward the future, Chief King described a concept that could be integrated to support the mental health and wellness of the “whole” person. This includes fire/EMS stations designed to provide natural light, control of room temperature, and quiet, private spaces for decompression, as well as simple changes to vehicles, such as using tinted but openable windows to provide controlled privacy (firefighters are always in the public spotlight). Ideally, fire departments would eliminate mandatory overtime, but if not feasible, development of an alternate shift “buddy system” to manage family related tasks would help. Developing training for families, spouses and other support would help these individuals better understand how to help their firefighter. Current advances in artificial intelligence (AI) should allow fire departments to utilize unobtrusive sensors and machine learning (ML) systems that can recognize deviations from a firefighter’s baseline to support decisions about individual readiness for each call and improve safety for the firefighter and the department. In addition, incorporating applied suicide intervention skills training (ASIST) would help peer support persons quickly redirect suicidal firefighters to mental health professionals, bypassing the emergency department.

Trauma exists in firefighting, but the those who cannot be helped create worse memories. In one situation, because the police incident commander told the EMS to stay put until the situation was safe, only one patient was transferred to the hospital by ambulance and twenty were transported by police officers. We need to define “what is failure?” Chief King suggested looking at the social, emotional, wellness counsellor model used in Ohio K-12 schools, which helps train children to manage trauma (e.g., parents’ divorce) and take more control of their situation, problems, and emotions to increase their resilience.

The overall result would support firefighter social, emotional, physical, mental, spiritual, and family wellness.

## **Brainstorm 2: How might we facilitate cultural and organizational resilience?**

### Framing Questions

- How might we improve the selection process in which the mental and physiological resilience of prospective firefighters are evaluated before they join the force?
- How might we improve the organization's awareness, preparation, response, and ongoing support for firefighters?
- How might we provide an adaptable, flexible organization?
- How might external organizations assist in supporting resilience?
- How might we assess the resilience of the entire organization?
- How might we reduce the problems associated with scheduling and mandatory overtime?

## ***Brainstorm 2 Discussion***

“Float tanks are often thought to be useful for decompression and stress resolution. However, traditional float tanks can be problematic in terms of throughput, costs, and maintenance. Josh do you have experience with dry float?”

“Yes, quite a bit. Zerobody Dry Float (Starpool, S.r.l., Trento, Italy) markets a dry-float experience that is like a high-tech waterbed; you are floating on plastic. We did a crossover study at a university that showed a significantly enhanced positive effect. Subjectively, the benefits of dry float are similar to those associated with wet float for 20-minute sessions and 60-minute sessions. There were 40 participants in the study.”

“In special ops during selection, you put people out in the middle of nowhere without any reinforcement. It is impossible not to get lost. Everyone gets lost. It is just you and the reflection pool. It forces mistakes while ensuring personal accountability for those same mistakes. You will find out who recovers from the mistakes and keeps going. I was so used to being lost that it wasn’t a big deal for me. Others couldn’t manage and failed.”

“Generally speaking, we have the issue of the broader community not fully appreciating the challenges and stresses of the firefighter occupation. This makes it more difficult to garner support from the community.”

“Explore more efficient use of resources and the associated improvement in optics. There are routine low-risk non-fire calls. Large firetrucks and crew respond to most calls. It can appear wasteful to send large firetrucks and crew for non-fire related events. One sees firetrucks and crew at supermarkets buying food. The public image is not good.”

“The reason they are calling the fire department is because there is no one else to call. We always bring our stuff with us in case of emergencies.”

“The problem is not that the public calls the fire department, but rather the issue is that the fire department respond with a large, expensive fire truck for calls having nothing to do with fire. This sounds like a cultural problem. Two people in a EMT vehicle could be sent to answer many of the calls that do not involve fires.”

“Sometimes a call is not framed as serious, but a fall could actually mean broken bones.”

“Yes, send an EMS type vehicle and crew rather than a firetruck which is not needed in the case of fractures for example.”

“They commercialized EMS in our area. Because they will be billed for service, individuals must consider “do I really need an ambulance?”

“If we think about best practices for everyone involved, we can do good for both the community and first responders.”

“We need some sort of meta-analysis to identify best practices.”

“What barriers need to be removed to use ketamine therapies? The relationships with hospitals in the area that you described in your talk, Jacob, seemed like a novel arrangement.”

“It could be important to really understand why mandatory overtime is so prevalent. How can this be remedied? We should ask ourselves, “how do we go back to staffing where mandatory overtime becomes rare?” We must create an environment that allows responders to thrive again. There are



lots of factors. We can improve working conditions and especially scheduling. As other departments move to a 24/72 schedule, it will likely become increasingly difficult to compete for the best new recruits.”

“Personnel will leave just to get a better schedule. They might make less money but have to work less. That is more advantageous to their families. Other amenities go into the decision.”

“You tell a man he can’t to go home to his son until the next day because of staffing issues; that takes a toll. Who is at home? A “Kelly Day” (a firefighter term for paid scheduled days off) is an attempt at improving work week. Some departments give one shift off every three weeks. It is better than none but still piecemealing and not ideal.”

“Are 24-hour shifts the right answer?”

“24/72 seems to be the best solution identified thus far for firefighters.”

“When assessing organizational resilience, you will end up with sub pockets of resilience. The #1 metric for worker satisfaction is turnover rate. Turnover rates can be used as a metric. You can assess the highest and lowest turnover rates, then figure out why. Do a historical review. Do 360 degree assessments on top levels of leadership. Is the leadership toxic? Is it really good? None of these will give all the data, but it will get you pretty good data. It becomes easier to argue when you have legitimate data.”

“Any plan can be good, but a union president might say, “I did not like the person” and work to kill any innovations.”

“Yes, and I suggest a strong focus on relationship building with the chief and union president to ensure buy-in from everyone.”

“There is a list of turnover rates for all departments in Florida, and the top is Leesburg, FL. demographics are similar.”

“One clear way to improve recruiting, retention, and resilience is a 24/72 schedule. This will increase the participant pool significantly.”

“It may be helpful to identify something that is a distinguisher, something that is unique and desirable about the Marion County fire service. This can be important for recruiting, retention, and *esprit de corps*.”

“Even small things can be very beneficial for recruiting and retention such as some Army units are authorized to wear non-standard combat boots.”

“Do what’s necessary to develop a strong *esprit de corps*.”

“We should consider the resources (type of vehicle and human) that you send out on a call. When this was mentioned earlier, it seemed that perhaps institutional/traditional stuff was baked into responses.”

“There may be a culture of over confidence/reliance in how things have always been done. Perhaps this is unfair. Medical doctors have started to get away from the paternalistic torture occurring during their training. I used to work 120 hours per week. I was not functional as a Doc, but it was required. These are examples of things that had to change due to safety and productivity.”

“Resiliency-based leadership (RBLP) training programs focus on three levels (morale, teamwork, motivation). In my department, we took it and infused all levels at once. We can infuse this

program to allow for cultural changes in the fastest direction. You become a coach then an executive to drive and continue the coaching. This is bringing people back to being people, adding the human element to decisions.”

“This brings me back to high-performance models. It’s all about access to care in Division I university athletic department models. There are virtually no barriers to care. There is prompt care.”

“Use creative partnerships in the community (e.g., local fitness centers, local dieticians, etc). These promote the department and allow use of outside expertise and facilities.”

“Universities have athletic trainers and physical therapists who are embedded, going to games at no additional cost. There are some community development opportunities for things like that. Perhaps the local universities and colleges would be interested in such a model? IHMC also may be able to help in some fashion with focused research.”

“As mentioned earlier, we should also consider raising the selection bar. I realize this is hard when recruiting is difficult, but it is the right thing to do. Lowering standards to address recruiting shortfall is usually a mistake.”

“What is the public relations plan? Is there an opportunity to develop a strategic recruitment plan?”

“Fire departments tpcially have little to no budget for for PR.”

“If you have something special, the word gets out, if you have a negative situation, it *really* spreads like wildfire.”

“In Marion County, we average two building fires per day. We have many vehicle accidents a day. No one knows this. It is a challenge to get the info to the community.”

“Returning to the minimum age of entry into the fire service. What if 18 year-olds were placed mostly on non-crisis responses and/or partnered with mentors for an initial period? Perhaps this is not practical or desirable.”

“This makes sense, but I would not sign up if I felt I would not get any real action.”

“Every fire department could say that you can’t work as a fully functional EMS until you are 21, but to get into the pipeline, you have to work your way up. We do that in medicine.”

“In Marion County we give awards each year. There is a firefighter ball. There is a family day for new hire classes. The family comes in and sees the trucks and get talks about mental health.”

“That is terrific.”

“For community building and resource sharing, two stations can provide training on something that they are specialized in. It could be anything. They could have competitions at the local level. This would create a unified approach. We are talking to the people about change who are most likely to resist change. The decision-makers who are in charge of changes will face resistance from leadership who can say no. Organizational changes are difficult. Events like this (BlueSky) allows ideas like this to gain momentum. Data can always be smoke and mirrors, but if data is neutrally available, it is harder for cults of personalities to kill an idea. It requires building a sense of community though.”

“Is there a centralized database for suicide rates?”

“The only thing we report nationally is our run data. I would like to see some real statistics on suicide. Medical examiners don’t identify the causes of death nor correctly categorize it. I have people that still don’t believe a suicide even after a suicide is confirmed. Retirees are not counted in the statistics.”

“Modernizing training that emphasizes a shift around competence rather than certification. We could use objective quantification of skills that we are interested in, then create targeted skill training. This will create a more effective and resilient workforce. Also, at the Air Force, my colleagues looked at robust decision-making. We wanted to understand what makes people robust. We combined multiple domains and found three core mechanisms for robustness: redundancy, system control, and adaptability. You could look at intentionally designing programs around those mechanisms that achieve robustness.”

“Could you elaborate on competence versus certification?”

“An example would be the long-standing tradition of checklist-based, calendar-determined training events. Everyone does this training event at this time of the year. This is not a question about competence, it is a question about certification. It is checking a box. You are operating at a potentially lower level of competence.”

“You train for a certain timeframe independent of skill, as opposed to training a skill independent of timeframe.”

“Yes, I had developed a quantification performance prediction assessment for American Heart Association. We make projections of CPR (cardio-pulmonary resuscitation) skills over time based on individuals’ history. AHA (American Heart Association) has evidence of loss of CPR skills. Most trainees cannot execute CPR within 1-3 months after certification.”

“In that training environment, what about the incorporation of augmented VR (virtual reality)? High performing teams can talk through their performance. The Navy’s Blue Angels do it. They walk through the entire show, and this enhances operational capability.”

### **Evaluation & Prioritization of Ideas from Brainstorm #2:**

Following ideation, participants voted to identify the most promising ideas by adding a tick mark (each participant could distribute up to 3 tick marks) to the sticky note.

#### Scheduling and Logistics

##### *4-6 votes*

- Explore how to reduce mandatory overtime, addressing an area that discourages retention and recruitment.
- Explore adding more time off between shifts (24/72 schedule). This approach may be necessary to recruit effectively as other departments move to it.
- Conduct a study to understand the true costs of the current duty schedule considering overtime costs, recruiting shortfalls, injury, medical costs, etc.
- Study cost/benefit of escalation versus de-escalation of resources (EMT vehicle vs large fire trucks) on non-fire calls.

##### *2-3 Votes*

- Expand hospital EMS transport provisions (e.g., handle retirement homes, community).
- Expand triage to paramedic/EMS for overdoses and high utilizer calls.

## Support for Innovative Therapies & Recovery Protocols

### *4-6 or more votes*

- Explore the possibility of reducing barriers to therapies using substances such as ketamine and MDMA coupled with counseling for PTSD.
- Conduct a meta-analyses study for data consolidation, identification of best practices and what works/what doesn't work.
- Consider the use of decompression spaces which would offer non-invasive recovery tools such as Apollo, Shiftwave, and dry float. There are many others.
- Consider establishing a trained and certified Health & Safety Officer (HSO) position.
- The HSO and Union President should visit organizations working with elite military units and Division I/professional sports to learn current best practices to improve both the health and performance of the firefighter.

### *2-3votes*

- Partner with local therapists/providers to offer preventative care before trauma events (i.e., “left of bang”).
- Continue engaging community partners such as universities, colleges, and hospitals.
- Intentionally design restful, safety-promoting (e.g., cool, quiet, dark) environments for recovery at work and home.
- Explore the use of new sleep alarm systems that do not wake up the entire station.
- Partner with non-profit medical boards and educational organizations and producers of potent non-psychoactive cannabinoid products.

## Assessment of Organization & Leadership

### *4-5 votes*

- Track turnover rates (transfers and those leaving their career). Compare with other similar departments to understand best practices.
- Focus on relationship building with the chief and union president.

### *1-2votes*

- What changes to structure are needed? Research metrics for total organization resilience.

## Training

### *4-6 votes*

- Modernize training – objective, quantifiable measurement, personalized scheduling, and competence rather than certification.

### *2-3 votes*

- Provide training to all on techniques for managing stress identification, or self-awareness of issues.
- Train answering and service/dispatchers to ask better, more thorough questions to assess the nature and seriousness of the situation.
- Develop a training, mentoring, and integration program aimed primarily at very young (18-21 yr/old) personnel.

## Public Relations and Communications

5 votes

- Develop a plan to raise the bar on selection and use PR to publicize it and help expand the candidate pool. Tell the terrific story of the Marion County Fire Rescue Department.

## Cultural Experiments and Changes

4-6 votes

- Explore more efficient use of resources where routine, low risk, non-fire calls are not answered by fire trucks and crew.
- A key to resilience, recruiting and retention is to make a conscious effort to elevate *esprit de corps* and pride.

2-3 votes

- Focus on community building, culture sharing, and events across each organization.
- Intentionally adapt organization designs, policies, and procedures that promote robustness: redundancy, system control (internal mentoring), and adaptability (outward monitoring).
- Identify and analyze the culture of “this is how things have always been done.”
- Foster a culture of personal accountability. Accept that mistakes will be made while ensuring personal accountability for those mistakes.
- Conduct capability-based analysis (CBA) with firefighting stakeholders (tasks, conditions, standards, force structure, risk).
- Build a culture of best practices.
- Use RBLP (Resilience-Building Leadership Professional) training, which consists of three modules (morale, teamwork, motivation), should be infused at all levels of the organization.

**Day One Wrap Up:** Dr. Ford and Mr. Bianculli thanked the participants for a productive session and Mr. Blakely gave a preview of the Day-2 activities.

## **DAY TWO**

Dr. Ford and Mr. Bianculli welcomed the group back for the second day of the workshop, noting the notable effort and effectiveness of the brainstorming. Mr. Bianculli noted the need to produce a small number of suggested actionable items. Mr. Blakely also provided instructions on the eight subgroup topic assignments based on the key ideas generated in the prior day's brainstorming sessions.

### **A Short Discussion Ensued Regarding the Need for More Research on Firefighter Stressors.**

“Firefighters face unique stressors and are under-studied.”

“When considering a study, can you find a cohort of people who must stay awake as long as firefighters? Matthew Walker (psychology professor at University of California-Berkley) says 24 hours of sleep deprivation is like blood alcohol level of 0.1%.”

“It would be tough to conduct a realistic study of the stressors, including sleep deprivation, faced by firefighters in a university setting with students; it would be hard to get institutional review board (IRB) approval.”

“Very true, but a university setting is not the right setting, firefighters should be studied *in situ*. The research must take place not with university students pretending to be firefighters but with actual firefighters in the context of their daily lives.”

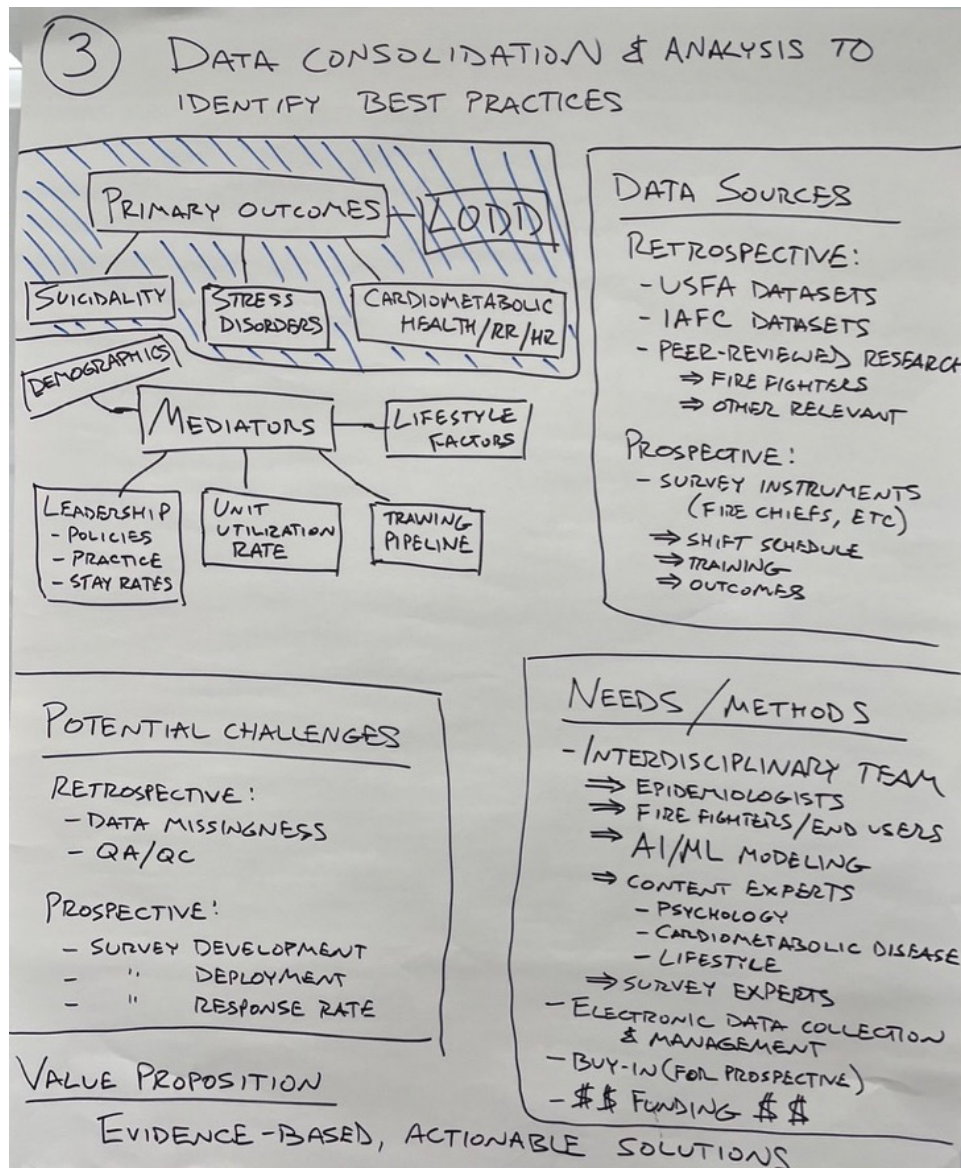
“I agree, one would have to study this in firefighters because we cannot simulate the environment in a lab setting.”

“Biometrics and wearables could be valuable but would likely have to mask identifiers, for HRV, temperature, pulse oximetry, blood draws (hormones, biomarkers).”

### **Group Work and Poster Sessions**

The participants were divided up into the eight subgroups of 2-3 team members that each explored one highly ranked topic over a period of 90 minutes after which each group presented their topic using a poster format. The following section includes each poster and the comments of the group leader who presented the poster.

## 1) Data Consolidation and Analysis to Identify Best Practices—Marcas Bamman

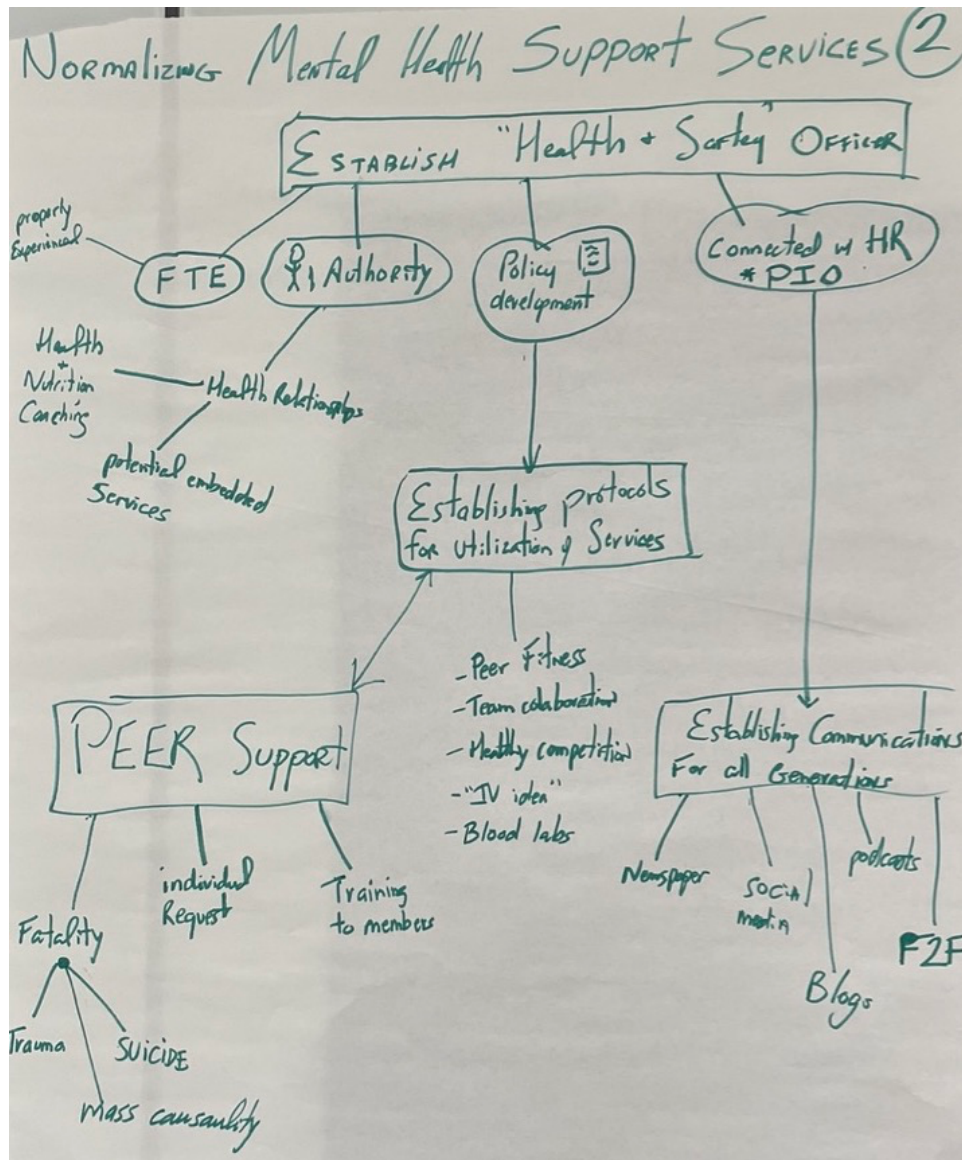


Dr. Bamman noted that we don't have sufficient data for retrospective study. We can analyze what we have and what we need (cardiometabolic health, risk, and deaths). Would be good have data on leadership policies, demographic lifestyle factors and unit utilization rate (calls per shift) for primary outcomes.

The U.S. Fire Administration (USFA, part of the Federal Emergency Management Agency) and the International Association of Fire Chiefs (IAFC) have peer reviewed, retrospective data sets, which have gaps where we need to capture more info. There is a need for prospective studies that would capture key information. Prospective study challenges include missing data, quality, prospective survey development, deployment, and participant response rate.

We need an interdisciplinary team of epidemiologists, firefighters, end users, and experts in AI/ML modeling, content (psychologists, physiologists), survey design.

## 2) Normalize Mental Health Support Services—Jacob King



Mr. King described the need to establish a trained and certified Health & Safety Officer (HSO) position. The HSO would need:

- Budgeted full time effort (FTEs)
- Authority to make decisions for the organization.
- Authority for policy development (e.g., for on/off duty)
- An organizational connection to human resources (HR) and the public information officer (PIO)
- Establish contract with health support to embed with stations, get buy in and familiarity.
- Establish protocols for communication, utilization, and services (e.g., peer fitness, IV/blood draw skills for blood work, healthy team collaboration competitions, nutrition).


This would normalize peer support (currently driven by the firefighter in need) and use automatic triggers with embedded peer support where firefighters don't need to request support related to



trauma associated with suicides, fatalities, mass casualty events, etc. Also we need to provide training to mentor other firefighters and establish communications for all generations (print media, social media, blogs, podcasts, firefighter to firefighter, etc.).

### 3) Show Me the Money—Rich Bianculli

"SHOW ME THE MONEY!"



The illustration shows two stick figures. On the left is a firefighter wearing a helmet with a '1' on it. On the right is a businessman wearing glasses and a red tie. Between them is a money bag with a dollar sign on it.


- EVALUATE THE TRUE COST OF THE CURRENT FIREFIGHTER SCHEDULE TO THE CITIZENS OF MARION COUNTY.
- OVERTIME
- WORKMAN'S COMP
- COST OF NEW RECRUIT
- TURNOVER RATE
- MEDICAL RETIREMENTS
- LAW SUITS
- TECE HEALTH - 911
- REVIEW RESPONSE UNITS

When looking at the budget, there are two buckets of money: real dollars going out each week and soft costs. Marion County Fire Rescue incurred 173,000 hours of overtime in 2022 on 24-48 schedule. How do you characterize costs due to workers' compensation, the high turnover rate (\$18,000 in training costs for each new recruit), medical retirements (back, etc.), and lawsuits from on the job mistakes? Triaging 911 calls to telehealth or using EMS/community paramedics instead of sending the big truck with firefighters to non-emergency issues would reduce real costs and improve public relations. For example, when taxpayers see the big truck responding to a non-fire event, there can be a negative perception.

#### 4) Project 96 – James Geering


PROJECT 96

24/48  
"BEFORE"



/

24/72  
"AFTER"



WHAT ARE THE PHYSICAL, EMOTIONAL AND MENTAL HEALTH BENEFITS OF A 24/72 FIREFIGHTER SCHEDULE.

- LIFE SPAN IMPROVEMENT
- ELIMINATION OF CONSTANT MANDATORY OVERTIME
- POSITIVE IMPACT ON FAMILY
- IMPACT SUBSTANCE ABUSE
- MENTAL HEALTH IMPROVEMENT - BRAIN HEALS WHEN SLEEPING
- RECRUITMENT - COMPETITORS GOING TO 24/72
- INCREASE HIRING STANDARDS
- IMPROVE HORMONE REGULATION - WEIGHT GAIN, TESTOSTERONE
- IMPROVED MORALE
- HIGHER LEVEL OF SERVICE
- INJURY REDUCTION

A better work schedule would be very beneficial. While 24hr on/48hr off is the current schedule in Marion County, the City of Gainesville, and Pasco County (FL) are about to go to 24/72 which is anticipated to improve recruitment and retention. A recruit will want to go to the 24/72 schedule if given a choice. You will get more people staying in the department and more people lining up. If we can mitigate the things that are becoming negative (e.g., constant mandatory overtime), we can increase the desire to become a firefighter. It would extend the lifespan of firefighter, who start as very healthy recruits, but often die within 5 years of retirement, by decreasing substance abuse issues. It would also likely reduce injury and workers' compensation claims and improve delivery of service (less depressed, less mistakes, improved decision making). Sleep is a pillar of health, and the cost benefits would revolutionize firefighting. The 24/72 schedule would also enable work at a second job on days off or educational advancement if sleep hours are met.

Departments with very high standards have increased morale and retention; Marion County is known for being a training-heavy department. People want to be challenged. The bar can be raised.

### ***Discussion***

“The 24/72 schedule will not likely save money; but should improve mental and physical health of the firefighter and their marriage/family life as well.”

“As we have discussed earlier, it should also substantially improve recruiting and retention.”

“It’s insane that as a firefighter I am permitted to drive a large fire engine after 48 hours of no sleep. A 24/72 schedule going to cost more, but you are investing in your personnel and your citizens and will recoup soft cost savings from fewer injuries and improved recruiting and retention.”

“Business experience and research has shown that fewer workdays and managed hours improve productivity, while rotating shift work is the worst. More time between shifts is better.”

“Can we get more data on the shift structure to validate 24/72 schedule to substantiate the change?”

“The IAFF is studying it.”

“How long does it take to recover circadian rhythm from 24 hour shift/lack of full night sleep (~2 days?).”

“We need to make data driven decisions, more than opinion to support 24/72.”

“In Gainesville, we were losing people at a ratio of 2:1 before we shifted to 24/72 and it only cost a few million, which was moved around within the existing budget. It has been 5-6 years since we have been fully staffed. We’ve got a year to get the baseline.”

“We can study departments that are shifting to 24/72 to understand the budget impacts.”

“If many other departments are going to 24/72, Marion County may have to make this change as well.”

“There are two separate but intertwined questions here– one for cost, and one for firefighter health benefits.

“In some respects, it is the simple story of “we have to have a fire department, there is under recruitment, how do we fix this?” Scheduling is an important factor.”

“Recruiting and retention would likely not be a problem with 24/72. We are being reactive to the past right now.”

“I’m sure you’re right, but administrators and political leaders need data or at least study of the experiences of other departments that have made the change.”

“In Marion County, how is the fire department financially supported?”

“Fire departments are supported by local assessment, property tax, and ambulance fees.”

“Storytelling was used to support change in Boynton Beach to 24/72. It’s not just a story and not just a spreadsheet. You combine the two together, and you get to the human being.”

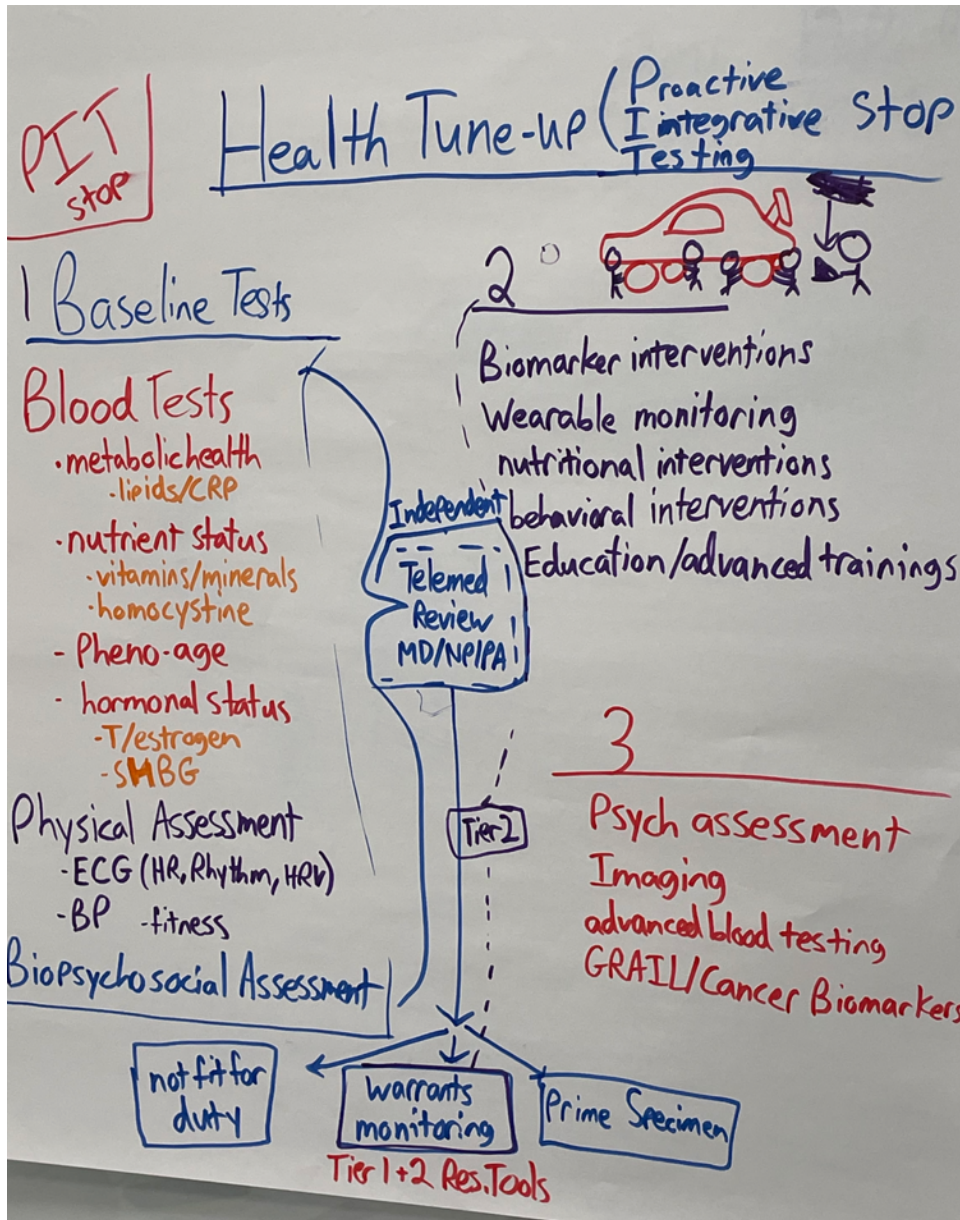
“At some level, it is the simple story of “we have to have a fire department, we are significantly under-staffed, how do we fix this?”

“Need to have metrics defined for proof of benefit.”

“I realize that it is a much smaller department, but it might be worthwhile to study how Gainesville managed to move to 24/72. There are probably some useful lessons to be learned.



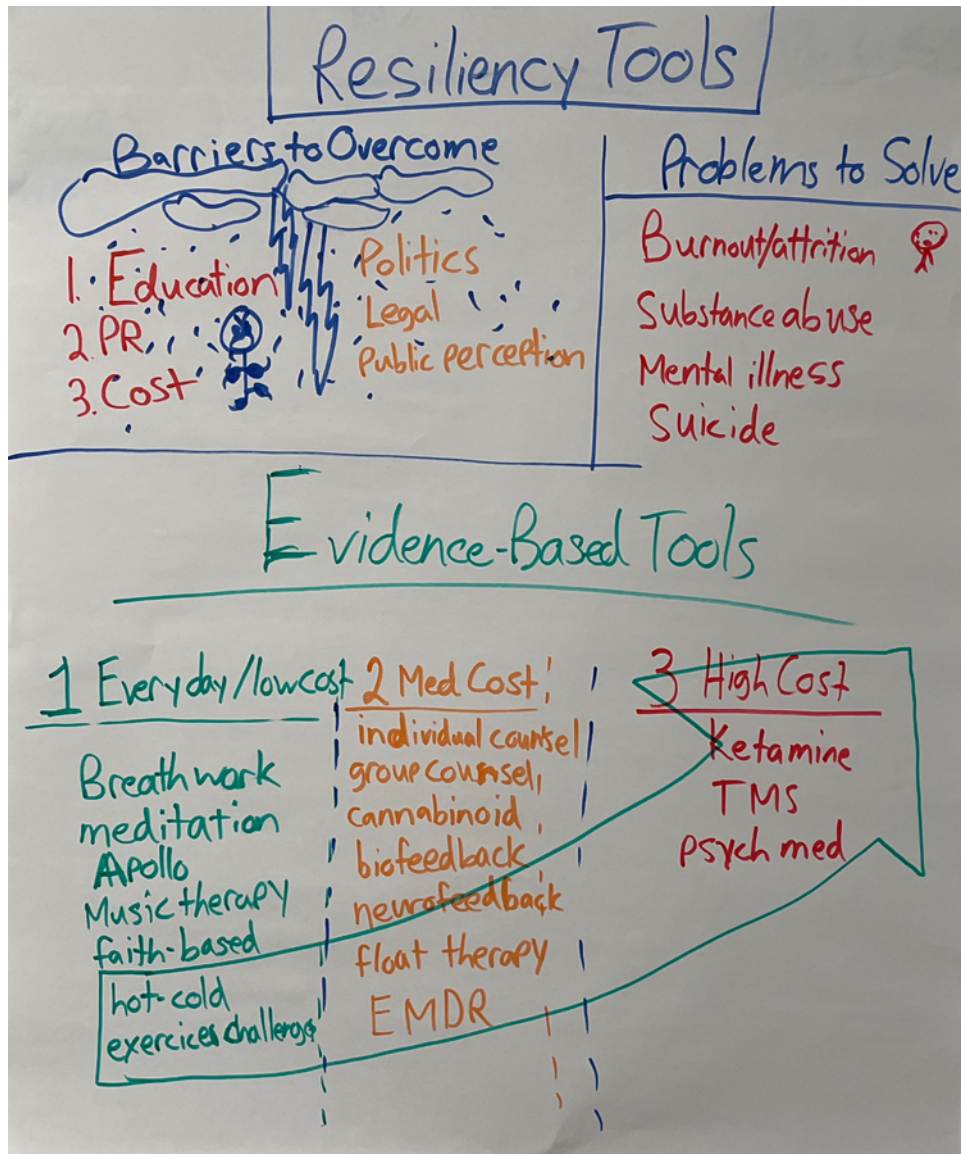
5) "Pit Stop" Health Tune up – Tommy Wood



We want something easily implementable for firefighter biopsychosocial assessment. Baseline tests would include blood levels with normal ranges specific for firefighters (not general population-base normal ranges) to guide blood/biomarker value based supplements. Simple protocols could be administered using human in the loop evaluation via telemedicine to determine three levels: Not Fit for Duty, Warrants Monitoring, and Prime Specimen. Most firefighters would be in the "Warrants Monitoring" bucket. The baseline testing would allow biomonitoring and design interventions (nutritional, behavioral dietary, education, training, etc.) with more personalized regimens than available from primary care providers.

Higher risk individuals would undergo more rigorous interventions (psychological assessment, imaging, cancer biomarkers, cardiovascular testing).

## 6) Resiliency Tools – Dave Rabin



If we can get everyone to go through simple baseline tests (barriers to implementation include education, public relations, and cost), and we understand the health status and needs, we can determine fitness for duty and identify those who need monitoring with evidence-based tools to address burnout, substance abuse, mental health, and suicide. Evidence-based tools can be used preventatively and can be clustered into three tiers.

Tier 1 can be taught immediately and practiced anywhere and include: hot/cold therapy, breath control/mindfulness, exercise challenges, etc. (e.g., to address substance abuse).

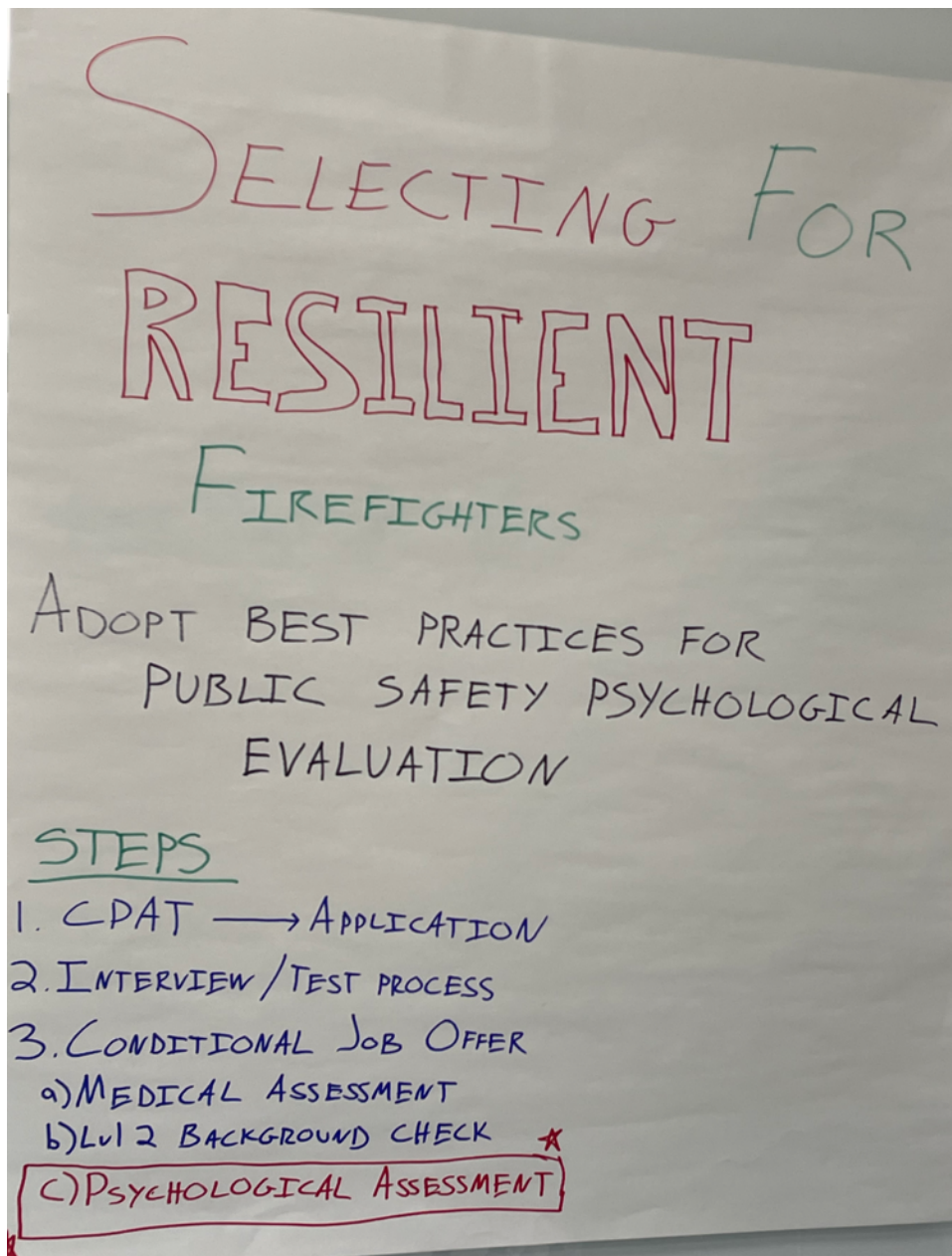
Tier 2 are medium cost interventions. This includes individual/group counseling, non-psychoactive drugs (CBD, etc.), biofeedback, float therapy, EMDR (eye movement desensitization and reprocessing therapy). These are evidence-based tools. Cannabinoids are interesting because they are talked about the least, but evidence shows they are effective for chronic pain, mental



health, PTSD, sleep, mood restoration with no psychoactive side effects. CBD has fewer side effects than ibuprofen. These are important tools that are cheap.

Tier 3 would require a prescription or a provider and include Ketamine, TMS (transcranial magnetic stimulation), and psychiatric medication management. Ketamine is interesting and costs \$20/vial, and the price is dropping. If someone warrants for testing positive on traumatic experiences from assessments, this could move into a low cost solution in ketamine. One vial is enough for two people. Four weeks of ketamine treatment is under \$350. This becomes a viable solution. You could identify individuals needing monitoring for trauma and treat them with Ketamine before they have an event on the job.

## 7) Selecting for Resilient Firefighters – James Banta



We need to adopt best psychological evaluation practices for public safety. Everyone who wants to be a firefighter currently has to take the Candidate Physical Ability Test (CPAT) before they can even apply. This is a third party test required by the state of Florida and provides information about physical abilities for specific firefighter tasks. There are additional requirements for paramedics. Then potential candidates undergo a level 2 background check, medical assessment, and pro forma interview under a conditional offer. We are looking for criminal background, felonies, driving records, and DUIs (driving under the influence) within three years. You really have to mess up to get weeded out. Interestingly, asthma and the use of beta-blockers (for hypertension) is disqualifying, but bipolar and schizophrenia, disorders that may contribute to suicides, are not disqualifying because we are not looking at these things. This needs to be updated by adding psychological assessments.

### *Discussion*

“Just like any medical evaluation, there are multiple ways to get lab results. There are multiple tests of personality that will get the 80% solution (Big Five surveys). Screening can improve with MMPI (Minnesota Multiphasic Personality Inventory), which should enable the department to exclude candidates who will not perform over long term. Helps “select in” as well as “select out”. You could rule out high-risk candidates.”

“A problem could be that they might be a stud physically and otherwise a desirable candidate, but if they fail one psychological test, they will go to a neighboring agency.”

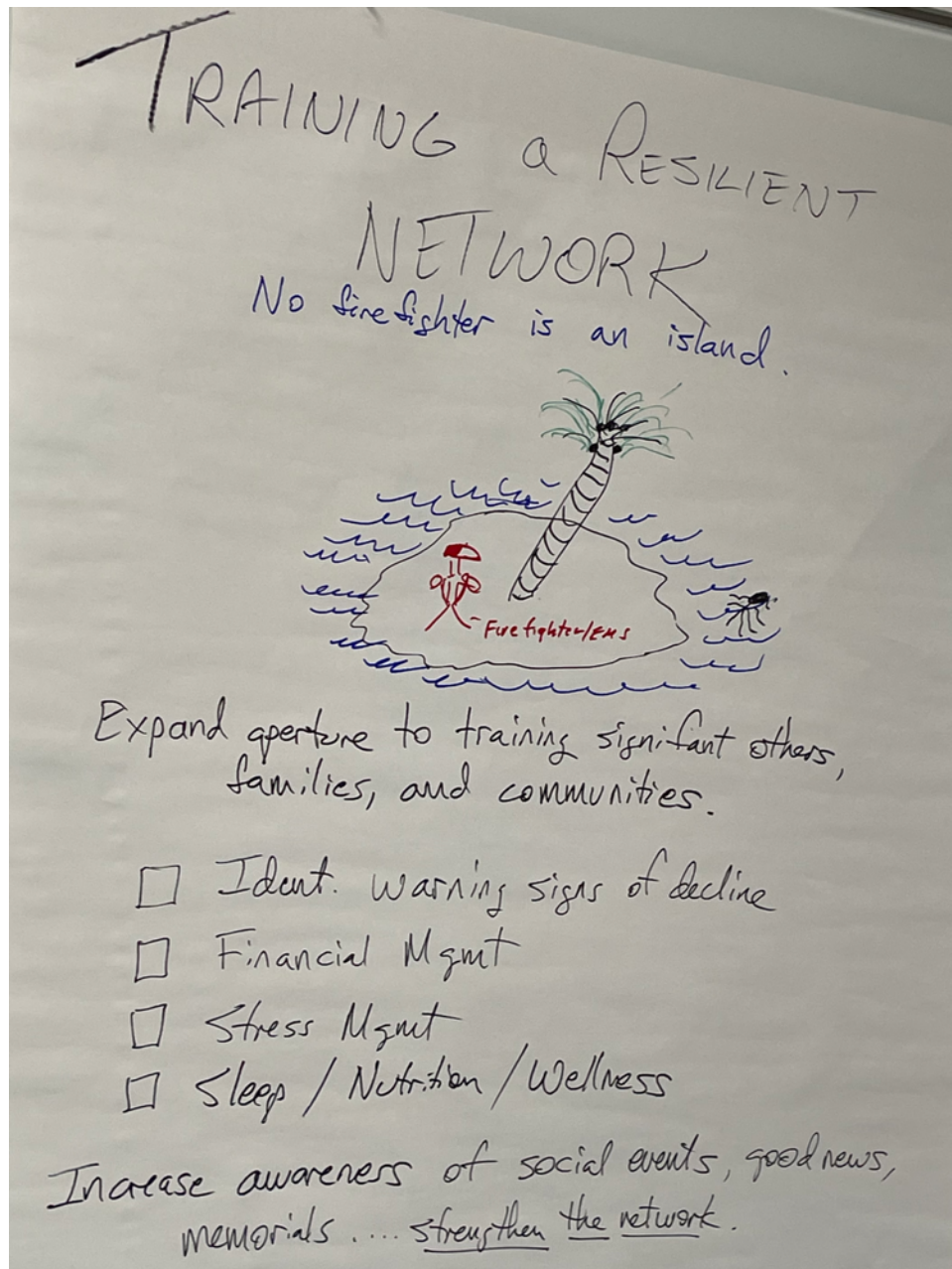
“Knowing how many have childhood trauma is useful. If you process trauma, it can become a strength. How do you transition a recruit with trauma to process that trauma?”

“That has been a long held assumption. There was zero correlation between childhood trauma and resilience in SOF (special operations forces) in a black study I was involved in. We could measure resiliency, but if we base that on the prevalence of childhood trauma, there is no correlation.”

“It seems that, perhaps drawing on the experience of some of the folks in this room, a more robust and appropriate psychological assessment program could be put together for the department.”



## 8) Training a Resilient Network—Kevin Gluck



When considering resilience in our firefighters and EMT personnel, we need to think about the network in which these people exist. No firefighter is an island. We can expand the existing intersecting networks aperture to include families and communities. We want to bring additional people into this effort and train them to identify warning signs of decline. Training would include a collection of themes such as financial, sleep, nutrition, wellness and stress management for the firefighters and the entire network in which they exist. We have the opportunity to do more internal and external sensing of good/bad news, events, etc., and to understand how to respond proactively when we see indication of declines in order to strengthen communication and activity across the network and enhance awareness.

## **Wrap up Discussion:**

This was a brief period of consolidation and reflection among the participants.

*Ken Ford:* I'd like to point out two books authored by Blue Sky participants – *One More Light: Life, Death and Humanity Through the Eyes of a Firefighter* (James Geering) and *The Revolutionary Ketamine: The Safe Drug That Effectively Treats Depression and Prevents Suicide* (Johnathon Edwards, MD). Both books are relevant and excellent.

*Rich Bianculli:* The team identified a lot of actionable items. Thank you to everyone at this meeting.

## **The Most Promising Opportunities Identified at the Meeting:**

Although many interesting ideas surfaced during our meeting, the opportunities listed below (in no particular order) are those deemed most worthy of further consideration and analysis by the fire department and community in Marion County in the relative near-term.

- 1) Explore how work scheduling could be improved with the interconnected goals of improving firefighter resilience and health, improving recruiting and retention, and reducing mandatory overtime. Several presenters suggested exploring options for adding more time between shifts. In particular there was extensive discussion of possibly moving to a 24/72 schedule. The potential financial impact as well as non-financial impacts should be considered. There is an opportunity to learn from the experience of other departments who have already made this transition. Boynton Beach, Gainesville, and Pasco County Fire Departments are in the process of transitioning to 24/72.
- 2) Perform a total-cost analysis of firefighter operations to streamline firefighter operations freeing resources to implement other interventions to increase firefighter resilience. This would include a financial analysis of different shift schedules including impact of overtime, turnover, new recruit training, medical leave, etc. This analysis would also fold in use of capital infrastructure.
- 3) Implement biopsychosocial assessment and support. Baseline blood testing would guide development of a wellness plan for each member to maximize performance and mental/emotional health. Simple protocols could be administered using human in the loop evaluation via telemedicine to determine three levels: Not Fit for Duty, Warrants Monitoring and Prime Specimen. This baseline testing would allow biomonitoring and design interventions (nutritional, behavioral dietary, education, training, etc.) with more personalized regimens than available from primary care providers.
- 4) Implement tools for resiliency. From the baseline testing in #3, we can determine fitness for duty and identify those who need monitoring with evidence-based tools to address burnout, substance abuse, mental health, and suicide. Evidence-based tools can be used preventatively and can be clustered into three tiers.
  - Tier 1 can be taught immediately and practiced anywhere and include: hot/cold therapy, breath control/mindfulness, exercise challenges, etc. Explore the use of new sleep alarm systems that do not wake up the entire station. Explore enhancing resilience through the use of decompression rooms featuring technologies such as dry float, Shiftwave, and others.

- Tier 2 are medium cost interventions. This includes individual/group counseling, non-psychoactive drugs (CBD, etc.), biofeedback, float therapy, EMDR (eye movement desensitization and reprocessing therapy). These are evidence-based tools. Cannabinoids/CBD are interesting because they are talked about the least, but evidence shows they are effective for chronic pain, mental health, PTSD, sleep, mood restoration with no psychoactive side effects.
  - Tier 3 would require a prescription or a provider and include TMS (transcranial magnetic stimulation), and psychiatric medication management, e.g., ketamine.
- 5) Explore development of an internship program in the high schools similar in some respects to the junior ROTC programs used by the military. The envisioned program would aim to develop character and community service while familiarizing participants with the opportunities to serve in the Marion County Fire Rescue department.
  - 6) Assess and consider reformulating the selection process consistent with best practices in high performing organizations. In particular, consider working with folks knowledgeable of effective selection method used in elite military units.
  - 7) A key to resilience, recruiting and retention is to make a conscious effort to elevate esprit de corps and pride. Lots of little inexpensive efforts can lead to meaningful improvements that improve group cohesion and sense of purpose, key contributors to resilience. Again, there are lessons to be learned from selected military units.

# Blue Sky Agenda



## Building a Resilient Firefighting Community

November 7th and 8th, 2023

### Monday, November 6th

- 5:50 Meet in the Courtyard Marriott Lobby - Shaner
- 6:00 No-Host Dinner: Union Public House, 36 East Garden Street, Downtown Pensacola

### Tuesday, November 7th

- 7:45 Meet in hotel lobby for transportation to IHMC - Shaner
- 8:00 - 8:30 Hot Breakfast
- 8:30 - 8:45 Introductory Comments - Ken Ford and Rich Bianculli
- 8:45 - 9:05 Presentation: "A Room Full of Elephants: The Factors that are Contributing to Firefighter Physical and Mental Ill Health" - James Geering
- 9:05 - 9:25 Presentation: "Esprit Des Corps - The Cornerstone of Resilient Organizations" - Art Finch
- 9:25 - 9:45 Presentation: "Resilience and Recovery: Marion County Fire Rescue's Journey to Addressing Firefighter Mental Health" - James Banta
- 9:45 - 9:55 Break
- 9:55 - 10:10 Presentation: "Repairing Trauma: The First Clues Into Remodeling Epigenetic Memory" - Dave Rabin
- 10:10 - 10:30 Presentation: "It's Not All In Your Head: How Physical Health Affects Mental and Emotional Health" - Tommy Wood
- 10:30 - 10:50 Presentation: "Brainstorming Primer" - Dave Blakely
- 10:50 - 11:00 Break
- 11:00 - 12:30 Brainstorm 1: How might we increase physical, mental, and psychological resilience of firefighters?
  - How might we anticipate challenges before they become acute?
  - How might we boost resilience with coaching, engagement and connection?
  - How might we provide programs for firefighters aimed at increasing physical and mental health and resilience?
  - How might we improve education on fitness, sleep deprivation and mental health with proactive lines?



- How might we develop workable mandatory fitness standards based on real world firefighting evolutions?
- How might we provide equipment to support firefighter strength and conditioning fitness?

12:30 - 1:15 Lunch

1:15 - 1:45 Review, Clustering, and Discussion of Brainstorm Topics

1:45 - 2:05 Presentation: "Navigating Change: Current Organizational Shifts and Future Opportunities" - Jacob King

2:05 - 2:15 Break

2:15 - 3:45 Brainstorm 2: How might we facilitate cultural and organizational resilience?

- How might we improve the selection process in which the mental and physiological resilience of prospective firefighters are evaluated before they join the force?
- How might we improve the organization's awareness, preparation, response, and ongoing support for firefighters?
- How might we provide an adaptable, flexible organization?
- How might external organizations assist in supporting resilience?
- How might we assess the resilience of the entire organization?
- How might we reduce the problems associated with scheduling and mandatory overtime?

3:45 - 3:55 Break

3:55 - 4:55 Down-Selection Activity:
 

- Agree on attributes of evaluation
- Select a small number of concepts from the brainstorm for deeper discussion and ideation

4:55 - 5:00 Closing Discussions - Ken Ford

5:00 Social at IHMC

### Wednesday, November 8th

7:45 Meet in hotel lobby for transportation to IHMC - Shaner

8:00 - 8:30 Hot Breakfast

8:30 - 8:45 Introductory Comments - Ken Ford and Rich Bianculli

8:45 - 10:15 Small Group Sessions: In groups of 3-4, refine the concepts and create concept posters

10:15 - 10:30 Break

10:30 - 11:30 Present and Discuss: Review and discuss refined concepts

11:30 - 11:55 Wrap-up Discussion: Discuss most promising opportunities for further investigation

11:55 - 12:00 Closing Comments - Ken Ford

12:00 Lunch

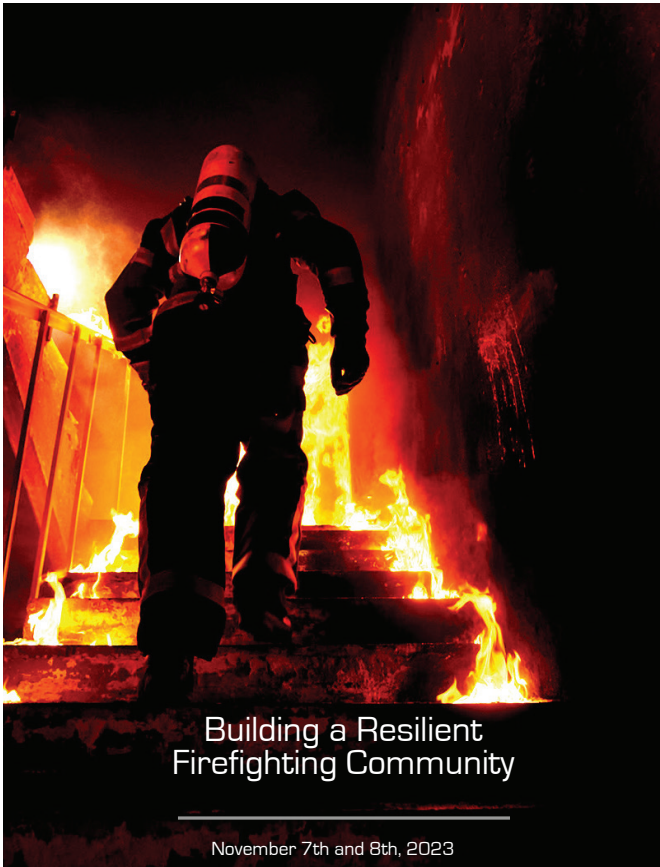
### Participants

Marcas Bamman  
 @James Banta  
 Rich Bianculli  
 Dave Blakely  
 John Blitch  
 Mounir Bouyounes  
 Rolin Boyd  
 Curt Bromund  
 Steve Cantrell  
 †Brady DeCouto  
 Johnathan Edwards  
 @Art Finch  
 †Ken Ford  
 @James Geering  
 Kevin Gluck  
 Josh Hagen  
 Matt Harrison  
 @Jacob King  
 @Dave Rabin  
 †Anil Raj  
 Morley Stone  
 @Tommy Wood  
 Miguel Zeran

†Rapporteur @Presenter







## Building a Resilient Firefighting Community

November 7th and 8th, 2023

## MARCAS BAMMAN



Marcas Bamman is a Senior Research Scientist and Director of Healthspan, Resilience, and Performance Research at IHMC. In this capacity he helps catalyze high-impact research development and leads clinical and translational research to advance knowledge across the spectrum from elite performers to chronic disease populations, and from biological underpinnings to clinical outcomes. Bamman has a history of leading clinical trials focused on dose-response optimization, combinatorial treatment interactions, and biological underpinnings of inter-individual response heterogeneity, supported by federal funding since the 1990s from NIH, VA, NASA, and DoD. In 2019 he ranked third nationally in NIH funding among more than 820 investigators in cell biology. Prior to joining IHMC in 2020, during a 25-year academic career at the University of Alabama at Birmingham (UAB), Bamman served as Professor in the Departments of Cell,

Developmental & Integrative Biology, Medicine, and Neurology; founding Director of the UAB Center for Exercise Medicine; UAHSF Endowed Professor in Regenerative and Translational Medicine; Director of the NIH National Rehabilitation Research Resource to Enhance Clinical Trials (REACT); Director of the Coordinating Center for the NIH National Medical Rehabilitation Research Resource Network; Executive Steering Committee member of the NIH Molecular Transducers of Physical Activity Consortium (MoTAPAC); and Director of an NIH T32 training program (Interdisciplinary Training in Pathobiology and Rehabilitation Medicine). He now holds the position of Professor Emeritus at UAB. Bamman is a Fellow of the American College of Sports Medicine (ACSM), member of the ACSM Board of Trustees, and served as Chair of the 2021 ACSM World Congress on the Basic Science of Exercise in Regenerative Medicine. He has served on more than 90 federal grant review panels and site visit teams, as Associate Editor of three peer-reviewed journals, and has published more than 160 research papers.



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## JAMES BANTA



James Banta possesses a tenure spanning over 30 years with the Fire Service, underscored by his unwavering commitment to leadership and professional development. His journey began in 1992 when he embarked on his career as an EMT in an Ocala, FL emergency room. Shortly thereafter, he joined Ocala Fire Rescue as a Firefighter EMT, marking the initial steppingstone in his path. In 1997, Banta joined Marion County Fire Rescue (MCFR), where he served as a Firefighter Paramedic. Stationed in MCFR's busiest battalion, he tackled the challenges of emergency response with skill and determination. Throughout his career, Banta has consistently demonstrated his leadership acumen. He ascended through the ranks, assuming vital roles as a Lieutenant and Captain. In the wake of the tragic events of 9/11, he displayed an unwavering commitment to public safety by joining the hazardous materials team and becoming a Weapons of Mass

Destruction (WMD) technician, positioning himself as a key figure in preparing for potential future threats. His leadership extended to overseeing special operations teams as division Chief. Banta continues to immerse himself in all aspects of the fire service, most recently becoming a SWAT Paramedic and ensuring the establishment of a new partnership with the Marion County Sheriff's Office. Banta's commitment to continuous learning and professional growth includes earning a bachelor's degree in fire service administration. He has also invested significantly in leadership training, equipping himself with the skills and knowledge necessary to lead his team effectively. In 2013, Banta's leadership qualities led to his promotion to Division Chief, where he took on the role of Shift Commander, managing over 150 personnel. In 2015, he continued his upward trajectory by earning the title of Deputy Chief, and then in December 2017, Banta was selected to assume the pivotal role of Fire Chief, a position he has held with distinction ever since. Under his leadership, MCFR has embarked on a transformative journey characterized by groundbreaking initiatives. These initiatives encompass critical areas such as first responder mental health, cancer prevention, hiring, workload balance/reduction, and notably, leadership training. Banta's commitment to nurturing and empowering the leadership potential within his team has become a hallmark of his tenure, ensuring the continued excellence of MCFR and the safety of the community it serves.



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## RICH BIANCULLI



Rich Bianculli is a Partner at Richmond Hill Capital Partners and before that he was the TGIF General Manager at Ocala Recycling, Inc. Bianculli was also a chef at Disney. Bianculli currently serves on the following boards: Marion County Hospital District, Community Foundation of Marion County, and Marion County Opioid Task Force among other boards. Past boards include Trinity Catholic Advisory Board, Blessed Trinity Pro Life Committee, and Wells Fargo Advisory Board.



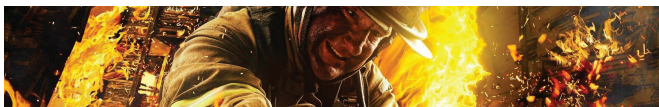
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# DAVE BLAKELY



Dave Blakely is a visiting Research Scientist at the Florida Institute for Human & Machine Cognition (IHMC). He is also an innovation consultant who helps his clients to explore links between emerging technologies, business opportunities and customer needs. Blakely's project work involves helping companies to build innovative teams who can deliver breakthrough products and services to the market. He also helps organizations foster a culture of innovation to maintain market leadership. Blakely helps global companies understand how attributes of Silicon Valley culture can transcend political borders and organizational charts. Of particular value for many of these clients is Blakely's knowledge of emerging technology from Silicon Valley startups. He also advises executives at a number of different technology companies, serves on advisory boards for business and academia, conducts innovation workshops, and speaks frequently to

academic and business groups. Blakely is proud to serve on the UC Berkeley Engineering Advisory Board, helping his alma mater to adjust the engineering curriculum to the needs of a rapidly changing global economy. He is also a faculty advisor to Singularity University, a new academic institution that understands and facilitates development of exponentially advancing technology to address broad challenges to humanity. Blakely received a B.S. in Engineering Physics (Class of 1982) with honors and an M.S. in Mechanical Engineering with a controls specialization (Class of 1983) with honors, both from the University of California at Berkeley. Blakely's experience comes from 25 enjoyable years spent at IDEO, most recently as Director of Technology Strategy. In this role he built and managed strategic business relationships with several of IDEO's technology-focused clients such as Cisco, Johns Hopkins and Qualcomm. In his earlier years at IDEO Blakely built and led a successful business unit of IDEO called "Smart Products" which focused exclusively on electromechanical systems with embedded controls. He and his 35-person team provided the market with full-service design and development of embedded systems by assembling an interdisciplinary staff of human-factors experts, interaction designers, and electrical, mechanical and firmware engineers. Working with his team, Blakely helped visualize the future of computing for Microsoft, created streaming media players for Philips, and created a new category of appliances for Whirlpool. Blakely holds six patents.



# JOHN G. BLITCH



John G. Blich is a cognitive neuroscientist and consultant who currently endeavors to share lessons learned from his many misadventures with explorers, entrepreneurs, military personnel, and first responders while conducting operational research in naturalistic settings outside the laboratory or clinical environment. He holds a Master's Degree and PhD in Cognitive Psychology from Colorado State University, a Master's Degree in Math and Computer Science from the Colorado School of Mines, and a Bachelor's Degree in Civil Engineering from the U.S. Military Academy at West Point. Blich's military experience is derived from an operational background in nuclear weapons delivery, space operations, special forces, hostage rescue, and robot assisted emergency response. In addition to his academic training and military duties, Blich has also served as a Program Manager at the Defense Advanced Research Projects Agency (DARPA), Vice President and Center Director at Science Applications International Corporation (SAIC), President & CEO of a small consulting firm (Blitz Solutions Incorporated) and the founding director of two non-profit search and rescue organizations: CRASAR (the Center for Robot Assisted Search and Rescue) and ARACAR (the Alliance for Robot Assisted Crisis Assessment and Response). Blich currently serves on several advisory boards as well as the International Space Council for the Australian Remote Operations for Space and Earth (AROSE) consortium.



# MOUNIR BOUYOUNES



Mounir Bouyounes joined Marion County government in 1993 as a Traffic Engineering Technician in the Office of the County Engineer. He was promoted through the ranks to the role of County Engineer in 2003 and then in 2011 to the dual-role of County Engineer and Public Works Assistant County Administrator. He served in the acting county administrator role beginning in July 2015 until he was selected as permanent county administrator in December 2015. Bouyounes obtained a B.S. in Civil Engineering from the University of Toledo in 1985 and a M.S. in Civil Engineering from the University of Central Florida in 1992. He has held the designation of Professional Engineer since 1997. Bouyounes is a member of the local chapter of the Florida Engineering Society and served on the board of directors for two years. He is also a member of the Florida Association of County Engineers and Road Superintendents and was a proud member of Leadership

Ocala Marion Class XXVI serving on their Board of Regents for three years. Bouyounes and his wife, Latife, have raised three children in Marion County, Sara, Paul and Elias.



# ROLIN BOYD



Rolin Boyd is a lifelong resident of Marion County, Florida. He attend the Florida State Fire College where he received his Emergency Medicine Technician certificate along with his Minimum Standards certificate in firefighting. He started his career with Marion County Fire Rescue in 2011 as an EMT and worked his way up through promotions. Boyd currently holds the position of Paramedic Firefighter Hazardous Materials Technician Driver Engineer within the department. He has also taken numerous classes in urban search and rescue along with multiple company officer classes. Boyd took office as the Professional Firefighter of Marion County Union President in January 2023. Aside from his professional endeavors within the fire service, Boyd is a small business owner based in Ocala, FL. He has owned the business since 2021. Rolin is also currently working towards a bachelor degree in Fire and Emergency Services.





# CURT BROMUND



Curt Bromund is the Chief Executive Officer at Marion County Hospital District where he has been instrumental in pioneering healthcare and public health projects that aim at improving the health and well-being of Marion County's residents. This includes key achievements like the creation of a \$15M annual public health grant system, the Fitness and Nutrition in Schools (FANS) program, the Active Marion Project (AMP), and the visionary Beacon Point treatment campus aimed at tackling the opioid crisis and substance use disorders for uninsured and income-constrained citizens of Marion County. Before this, Bromund served in various leadership capacities as CEO at Childhood Development Services, Inc. in Ocala, FL. Here, the responsibilities encompassed a wide array, from directing HR and finance functions across multiple counties, to crafting strategies for expanding the corporation's funding sources. The tenure at CDS is

also marked by the oversight of a multitude of federal, state, and proprietary programs (\$69M annual budget with 400 employees operating in 42 counties). Beyond his multi-disciplinary corporate journey, Bromund also made significant contributions to academia in his community. As an Adjunct College Instructor at the College of Central Florida since 2011, Bromund was awarded the Adjunct Instructor of the Year in 2018 and was instrumental in developing the curricula for business administration courses, providing a pragmatic blend of theory and real-world applications. The earlier years of Bromund's career saw significant contributions as the President of Bromund Consulting Group, authoring "The Roadmap to Effective Leadership," and serving as an integral part of the executive team at Financial Independence Network Ltd., Inc. (ranked 63rd in Inc. 500's fastest growing privately owned companies in the U.S.). With a diverse career spanning over three decades in leadership, healthcare, education, and business, Bromund built a reputation for transformative and innovative strategies that left a beneficial mark on the communities served. Educationally, Bromund holds an MBA from the University of Florida and a Bachelor of Arts in Business Administration from Governors State University. A former Senior Professional in Human Resources (SPHR), Bromund has also been an active contributor on several boards and committees, emphasizing a commitment to community development, education, and public policy. Throughout his career, Bromund consistently participated in visionary leadership roles, and committed himself to the community's well-being, and displays a unique ability to bring innovative ideas to fruition.



# STEVEN CANTRELL



Steven Cantrell is the Director of the Chaplain Capabilities Development and Integration Directorate in the Futures and Concepts Center at the Army Futures Command. As one of three US Army Chaplains to make a night combat parachute assault into Bashur, Iraq in March of 2003, Cantrell avoids theorizing about ethics under difficult circumstances and tries to live out the promise of resilience and purpose that ethics and faith offers humanity when real life is overwhelming. Similar to how firefighters today may be more likely to die by suicide than on duty, Cantrell is also helping the U.S. Army address a similar human resilience challenge in its ranks of selfless servants. As the Institute for Human & Machine Cognition seeks to pioneer technologies to extend human capabilities, Cantrell and the Chaplain Corps Capabilities Development and Integration team he leads, at the Army Futures Command Futures and Concepts Center, shares this mission. From several angles, Cantrell and team are working with the world's top technical communities to strengthen long term soldier resilience and effectiveness. First, Cantrell's work seeks to strengthen leaders' ethical decision making in increasingly more demanding and complex warfighting environments. Second, his team is also helping develop the technology to achieve the Army's new and more holistic health and fitness objectives. The Army has expanded their focus beyond physical and nutritional readiness to now include sleep, mental, and spiritual readiness. Some of the novel holistic health technologies Cantrell is providing advice for are AI/ML tech that will help individuals and organizations detect problematic stress early as well as detect early malevolent social media AI/ML influence. Finally, while tomorrow's robotics, AI, and other novel human and machine interface technologies offer soldiers and society great promise, they also carry significant threats to our individual and collective well-being. Cantrell and team are also establishing the human trust factors needed to safely employ these impressive extensions of human capabilities without damaging our neuroplasticity and highest ethical ideals. Hailing from Cartersville, Georgia, when Cantrell is not helping the Army bring to bear tomorrow's technology to bring about human flourishing, he is leveraging his musical talents to help his wife Katherine Lee Cantrell touch lives through her professional music career. What Steve and Katherine enjoy most in their free time is loving on their children and grandchildren.

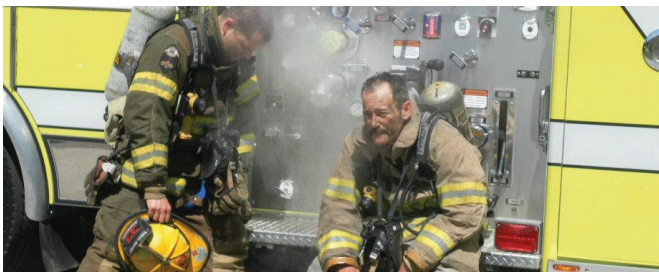


# BRADY DECOUTO



Brady Decouto joined IHMC as a Research Associate and Postdoctoral Fellow in June 2022. He earned his Ph.D. in Kinesiology with an emphasis on cognitive motor neuroscience from the University of Utah, and his M.S. and B.S. in Kinesiology from Jacksonville University. DeCouto's research interests concern the development of expert performance, which entails perceptual-cognitive skills, motor skills, and psychosocial influences. As a Ph.D. student, DeCouto worked with the U.S. Ski and Snowboard, assuming responsibility for analyzing data and disseminating research on developmental, sociological, and psychosocial factors contributing to performance and mental health in youth alpine ski racers. His dissertation elucidated visual processing mechanisms of skilled soccer and volleyball athletes using EEG measures and manipulating visual displays. He has also conducted research on the impact of anxiety on visual behavior and postural control in expert performers. At IHMC, DeCouto applies

his expertise in human performance to enhance how individuals learn and utilize technologies that are of growing importance to clinical, industrial, and military domains. Consequently, he has sparked collaborations with researchers of robotics, exoskeletons, automation technologies, and artificial intelligence with the goal of better understanding how the constraints and characteristics of human cognitive processes contribute to effective human-machine teaming. He has also pursued research on interventions that mitigate operator stress. When not at work, DeCouto enjoys playing volleyball, piano and guitar, and literally any type of game.



# JOHNATHAN EDWARDS



Johnathan Edwards is a board-certified anesthesiologist and the author of several books. He aims to discuss the potential of ketamine treatment for mental health conditions, especially in suicide and adolescent patients. He has provided ketamine in his practice for many years, along with psychiatrist Dr. Sam Zand. Edwards shares the current state of research exploring many studies about ketamine for mental illness. This topic is especially relevant to the mental health crisis and the increase in teen suicide. He emphasizes that pediatricians, psychiatrists, family doctors, anesthesiologists, and others must collaborate. Edwards has written a book titled "The Revolutionary Ketamine." His books can be found on Amazon as well as at [www.johnathanedwardsmd.com](http://www.johnathanedwardsmd.com)



# ART FINCH



Art Finch joined IHMC as a research scientist in July 2020, working with Dr. Tim Broderick on the Peerless project. He has more than 20 years of direct support to executive level military and government leadership teams. He has conducted more than 5,000 executive coaching and developmental feedback sessions and created personality profiles for more than 10,000 candidates in support of assessment and selection events. He is a graduate of U.S. Army Airborne, SERE, and Ranger Schools with more than 20 combat deployments to both Afghanistan and Iraq. Finch retired at the rank of colonel. He is the founder and president of The Gauge Group, a psychological consulting and executive coaching firm. The Gauge Group has led leadership consultation and executive coaching for Fortune 100 tech companies; led assessment and selection support for Major League Baseball and National League Football; conducted high-stakes, high-performance

psychological support for elite athletes; and assessment and selection psychological support for FBI, HRT and New York State Police SWAT team. His previous work include time a senior psychologist and director of psychological applications for U.S. Army Special Operations Command at Fort Bragg, N.C.; command psychologist at the U.S. Army John F. Kennedy Special Warfare Center and School at Fort Bragg; and chief psychologist at Combat Applications Group at Fort Bragg.



# KENNETH FORD



Kenneth Ford is Founder and CEO of the Florida Institute for Human & Machine Cognition (IHMC) — a not-for-profit research institute located in Pensacola, Florida. IHMC has grown into one of the nation's premier research organizations with world-class scientists and engineers investigating a broad range of topics related to building technological systems aimed at amplifying and extending human cognition, perception, locomotion and resilience. IHMC headquarters are in Pensacola with a branch research facility in Ocala, Florida. Ford is the author of hundreds of scientific papers and six books. His research interests include: artificial intelligence, cognitive science, human-centered computing, and entrepreneurship in government and academia. Ford received his Ph.D. in Computer Science from Tulane University. He is Emeritus Editor-in-Chief of AAAI/MIT Press and has been involved in the editing of several journals. Ford is a Fellow of the Association for the Advancement of Artificial Intelligence (AAAI), a charter Fellow of the National Academy of Inventors, a member of the Association for Computing Machinery, a member of the IEEE Computer Society, and a member of the National Association of Scholars. Ford has received many awards and honors including the Doctor Honoris Causas from the University of Bordeaux in 2005 and the 2008 Robert S. Englemore Memorial Award for his work in artificial intelligence (AI). In 2012 Tulane University named Ford its Outstanding Alumnus in the School of Science and Engineering. In 2015, the Association for the Advancement of Artificial Intelligence named Ford the recipient of the 2015 Distinguished Service Award. Also, in 2015, Ford was elected as Fellow of the American Association for the Advancement of Science (AAAS). In 2017 Ford was inducted into the Florida Inventor's Hall of Fame. In January 1997, Dr. Ford was asked by NASA to develop and direct its new Center of Excellence in Information Technology at the Ames Research Center in Silicon Valley. He served as Associate Center Director and Director of NASA's Center of Excellence in Information Technology. In July 1999, Ford was awarded the NASA Outstanding Leadership Medal. That same year, Ford returned to private life and to the IHMC. In October of 2002, President George W. Bush nominated Ford to serve on the National Science Board (NSB) and the United States Senate confirmed his nomination in March of 2003. The NSB is the governing board of the National Science Foundation (NSF) and plays an important role in advising the President and Congress on science policy issues. In 2005, Dr. Ford was appointed and sworn in as a member of the Air Force Science Advisory Board. In 2007, he became a member of the NASA Advisory Council and on October 16, 2008, Ford was named as Chairman — a capacity in which he served until October 2011. In August 2010, Ford was awarded NASA's Distinguished Public Service Medal. In February of 2012, Ford was named to a two-year term on the Defense Science Board (DSB) and in 2013, he became a member of the Advanced Technology Board (ATB) which supports the Office of the Director of National Intelligence (ODNI). In 2018, Ford was appointed to the National Security Commission on Artificial Intelligence. In 2020, Florida Trend Magazine named Ford one of its Living Legends, a list of all-time influential Florida leaders in business, medicine, academia, entertainment, politics, and sports.

# JAMES GEERING



James Geering was born and raised in Bath, England. After being told he was color blind as a schoolboy, his dreams of becoming a firefighter were shattered. For years he drifted through a spectrum of jobs from lifeguard to stuntman and everything in between. It wasn't until he emigrated to the US that he challenged the fire service entrance medical, proving his vision was more than effective for the career. Geering spent 14 years as a firefighter/paramedic working on both the West and East coasts of America. He began to see the impact of service on his brothers and sisters, losing countless first responders to a host of work related physical and mental health issues. The unending funerals sent him down a new path. In 2016, he started a free podcast called Behind the Shield, which brings the greatest minds in wellness to the first responders, military, and civilians of the world. The show has since been downloaded 5 million times internationally. The 800+

guests range from warfighters to farmers, medics to psychologists and everything in between. In 2020, Geering wrote his first book combining stories from his own career with the wellness lessons he had learned from his guests. One More Light: Life, Death and Humanity has received incredible reviews, and he is now in the process of writing a second book, his first fiction. Geering is a lifelong martial artist, strength and conditioning coach and Exercise Physiology Major. He is a husband, father, and a grateful recipient of the unconditional love from his German Shepherd, Ember.



# KEVIN GLUCK



Kevin Gluck joined the Florida Institute for Human & Machine Cognition (IHMC) as a Senior Research Scientist in March 2023. He has a leadership role in building a basic and applied research program in computational cognitive sciences. He will also be a contributing faculty member to the Joint UWF-IHMC Intelligent Systems and Robotics Ph.D. program, and will play a prominent role in fostering collaborations in these areas with government, industry, and academia. Gluck earned a bachelor's degree in cognitive psychology from Trinity University; he earned both a master's and a Ph.D. at Carnegie Mellon University (CMU), also in cognitive psychology. While in graduate school at CMU, he was awarded a training fellowship from the Air Force Research Laboratory, marking the start of his tenure as a civilian scientist with AFRL. Over the subsequent 24 years, he collaborated with an assortment of government,

industry, and academic colleagues on research topics ranging across spatial processing, fatigue effects on cognitive function, robust decision making, personalized learning, and human-machine teaming. In 2010-2011 he held a visiting scientist position at the Max Planck Institute for Human Development in Berlin, Germany. In addition to his work as a government scientist, Gluck also has nearly four years of private sector research and development experience. Gluck has authored more than 100 peer-reviewed publications, is an inventor on two U.S. patents, and had a lead role in the organization and management of 14 international conferences and workshops. He is a Fellow of the Psychonomic Society and served as Chair of the Governing Board for the Cognitive Science Society. When not working, Gluck's priority is spending time with family and friends. He especially enjoys outdoor activities like biking, hiking, snowboarding, and traveling to new places. Kevin's wife, Julie, is an artist, and together they have two wonderful children, Ashlyn and Liam.





# JOSH HAGEN



Josh Hagen has worked in the field of biosensors since his graduate research began 21 years ago, and additionally in the field of Human Performance research for the last 11 years at the Air Force Research Laboratory for the US Government and in academia at West Virginia University and the Ohio State University. This research involves the optimization of Human Performance in athletes, military, clinical, and general populations through the measurement of physiology, data analysis to provide a deep understanding of the data, and finally research in augmentation therapies to maximize performance.



# MATT HARRISON



Matt Harrison is currently a Driver/Operator and Paramedic for the fire department and serves as a SWAT Medic for the local Sheriff's Department and Police Department. Harrison has his Bachelor's degree in First Responder Management from Santa Fe College, where he also attended Paramedic school. Harrison and his wife Kat were co-founders of The Grit Foundation, a non-profit whose purpose is to raise money in support of the local Fire, EMS, and law enforcement departments in North Central Florida. Currently, The Grit Foundation is officially affiliated with 14 local departments. Harrison was born and raised in Gainesville, Florida. He has called North Central Florida his home for his entire life, where he has worked for Gainesville Fire Rescue for the better part of 16 years. When not working, Harrison travels to D.C. with Kat to spend time with her while the House is in session.



# JACOB KING

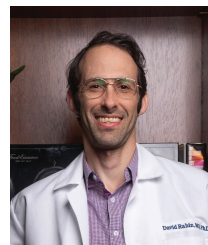


Jacob King is an accomplished professional with a distinguished career in fire and emergency services. The city of Springfield, where King's tenure is marked, covers an expansive 26.16 square miles and holds the position of being the county seat of Clark County. With its substantial population, Springfield ranks as the 12th largest city in Ohio. Under King's leadership, the Springfield Fire Rescue Division has thrived, benefiting from a dedicated team of 133 personnel spread across six strategically located Fire Stations, as well as divisions for Administration, Training, and the Fire Marshal Bureau. His tenure with the division commenced in June 2023, where he brought his wealth of experience to further enhance the city's fire and rescue capabilities. Before his service with the city, King held the esteemed position of Fire Chief at Wright-Patterson Air Force Base since 2009. He oversaw critical operations at one of the nation's most significant

military installations. Thus, marking an impressive and impactful 27-year career with the Base. He dedicated his service to federal institutions and retired from Federal Service in May 2023. King's journey to his current position started after graduating from Berryville High School in 1992. He pursued higher education at a Community College before embarking on a distinguished career in the United States Air Force. During his time in the military, he held various vital roles, including serving as a Fire Protection Specialist at the 178th Air National Guard Base in Fort Smith, Arkansas, and as an Aerospace Medical Evacuation Technician with the 445th Airlift Wing. He was honorably discharged in 1998. King's commitment to education was unwavering, culminating in his graduation from Bryant University with a Bachelor of Science in Administration in 2011. In his personal life, Jacob King is a family man. He is married to the former Heather Schwilk of Glidden, Wisconsin. Together, they are parents to five daughters: Ciara, Kiana (currently attending Ohio Northern University), Kory (currently attending Wright State University), Maleah, and Mariah (currently attending Middle School). The family also includes a son, Cody, who has pursued a career as a full-time firefighter/paramedic, carrying forward the family's dedication to serving and protecting their community. King's accomplishments in both his professional and personal life reflect his unwavering commitment to excellence and service.



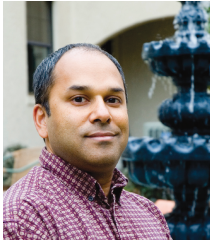
# DAVID RABIN



David Rabin is a neuroscientist, board-certified psychiatrist, health tech entrepreneur & inventor who has been studying the impact of chronic stress in humans for more than a decade. He is the Co-Founder & Chief Medical Officer at Apollo Neuro, which has developed the first scientifically-validated wearable technology that actively improves energy, focus & relaxation, using a novel touch therapy that signals safety to the brain. Rabin has always been fascinated by consciousness and our inherent ability to heal ourselves from injury and illness. As such, he has specifically focused his research on the clinical translation of non-invasive therapies for patients with treatment-resistant illnesses like PTSD and substance use disorders. Rabin is the Co-Founder and Executive Director of the Board of Medicine, a 501(c)(3) nonprofit organization of physicians and scientists establishing the first peer-reviewed, evidence-based clinical guidelines for the production and safe use of currently unregulated alternative medicines, including plant medicines. The Board of Medicine trains and certifies healthcare providers, and provides quality control standards for complementary and alternative medicines to support high-quality clinical research, best practices, and risk-reduction. In addition to his clinical psychiatry practice, Rabin is currently conducting research on the epigenetic regulation of trauma responses and recovery to elucidate the mechanism of psychedelic-assisted psychotherapy and the neurobiology of belief. Rabin received his MD in medicine and PhD in neuroscience from Albany Medical College and specialized in psychiatry with a distinction in research at Western Psychiatric Institute & Clinic at the University of Pittsburgh Medical Center.



## ANIL RAJ



Anil Raj is a Research Scientist at the Florida Institute for Human & Machine Cognition (IHMC). Raj received his M.D. from the University of Michigan School of Medicine in 1990. His interests in aerospace medicine research led him to the Naval Aerospace Medical Research Laboratory in Pensacola, FL, following a two-year fellowship as a National Research Council Resident Research Associate at the NASA Johnson Space Center in Houston, TX. Raj's interest focuses around the human physiologic and psychological responses to accelerative forces, particularly how changes in acceleration affect the sense of spatial orientation. He has been involved with the development, testing, and evaluation phases of the US Navy/NASA's Tactile Situation Awareness System. Since joining the Institute for Human & Machine Cognition in 1996, Raj has been involved with the development of human-centered interfaces and the development of automated systems for tracking and analyzing human response characteristics in dynamic environments.

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## MORLEY STONE



Morley Stone is the Chief Strategic Partnership Officer of the Florida Institute for Human & Machine Cognition (IHMC). Prior to joining IHMC, Stone served as the Senior Vice President for Research at The Ohio State University, where he oversaw an annual budget of more than \$1 billion in basic and applied research. Prior to OSU, Stone served as the Chief Technology Officer for the Air Force Research Laboratory (AFRL), where he was responsible for assisting with the planning and execution of an annual \$2.1 billion Air Force science and technology program and an additional \$2.3 billion in externally funded research and development. Before that, he served for more than six years as the Chief Scientist of AFRL's Human Performance Wing. From 2003 to 2006, Stone accepted an assignment as Program Manager in the Defense Sciences Office at the Defense Advanced Research Projects Agency (DARPA). Stone earned his Ph.D. in biochemistry from Carnegie Mellon University and his research interests are broad spanning areas such as the interface of materials science, biotechnology, human performance, and autonomous systems. In addition to his research leadership, Stone is a recognized leader in government and higher education in addressing and preventing foreign influence in research and development. He is a Fellow of both AFRL and SPIE.

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## TOMMY WOOD



Tommy Wood is a Research Assistant Professor of Pediatrics and Neuroscience at the University of Washington and a Visiting Scientist at the IHMC. The majority of his academic work has focused on developing animal models of hypoxic-ischemic and traumatic brain injuries in the developing brain in order to test therapeutic approaches, but also includes adult neurodegenerative and metabolic diseases. Alongside his academic training, Wood has provided performance consulting for Olympians and world champions in a dozen different sports. He is a director of the British Society of Lifestyle Medicine and sits on the scientific advisory board of Hints Performance, which includes researching performance optimization strategies for Formula 1 drivers. Wood's current research includes the physiological and metabolic responses to brain injury and their long-term effects on brain health, as well as developing easily-accessible methods with

which to track human health, performance, and longevity. He and his wife, Elizabeth, share their home with two goofy boxers, and in his spare time, Wood can usually be found cooking, reading, or lifting something heavy.



## MIGUEL ZERAN



Miguel Zerán is a retired Reconnaissance Marine who specializes in solving fitness, wellness, and human performance issues for military and first responders. After attaining his master's degree in Kinesiology, he began his doctoral pursuits in Human and Sport Performance in an effort to better serve the brave men and women in uniform whom he interacts. Alongside his unique perspective and skillsets from life as a former Operator, his motto, "lives are at stake" directs his coaching, teaching, and knowledge transfer in all interactions he has with state, county, federal, and government personnel. After retiring from the military, Zerán spent two years in the industry serving as the Director of Tactical Athlete Science and Research for Momentous, a human performance company bridging the gaps between biotechnology, sports nutrition, and innovation. His work there gave him insight into clinical research, grant writing, networking, and performance consulting. Zerán has worked with, trained, and coached men and women from the US National Guard, US Army, US Forest Service Interagency Hotshot Crews, Bureau of Land Management, and King County Sheriff's Office. Hailing from Issaquah, Washington, Zerán lives with his wife of 21 years and their two boys, where they spend time hiking in the mountains, lifting weights together, and enjoying the sauna.

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