

Sociotechnical Synthesis

STS 4600


Spring 2021

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Civil and Environmental Engineering

Signature James A McDonald Date 27 April 2021

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Date 11 May 2021

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Introduction

My technical project is titled “Safe and Sustainable Fleet Management with Data Analytics and Training.” The project was open to both civil and systems fourth year engineering students and was requested by the University of Virginia’s Facilities Management Department, FM, to improve their fleet’s driving habits. My STS project is titled “The Lone Star Tick, an Actant in the Actor-Network of the US Army” and is about how a tick-borne illness impacts readiness and soldier health within the US Army. I chose to research something unrelated to my technical project because the STS topic impacts me personally. In August of 2020 I was bitten by multiple lone-star ticks which made me allergic to mammalian meat for the next four months. Thankfully I have since recovered. Additionally, it is personally relevant because I will commission in May as an Active Duty Engineer Officer in the US Army. The project is relevant to engineering practice because it analyzes the effects of exposure to the tick in a direct and indirect capacity.

Summary of Projects

In my STS research I established a link between the lone-star tick and the readiness of the US Army. This connection was established by first explaining what the lone-star tick is, the expansion of its range, and its role in spreading tick-borne illness. The tick spreads numerous illness but most notably it causes an allergy to a sugar found in meat derived from mammals. This allergy can be quite severe by inducing shock which is an issue when the majority of the Army’s field rations include mammal-based entrees. The Army’s solution was to introduce permethrin, an insect repellent, into the uniform the soldier’s wear. This exposure has caused soldiers to metabolize the insecticide. All of these factors, coupled with the high rate of Americans being unfit for service proves the tick’s impact on readiness.

In my technical project, my team analyzed the data from GPS sensors installed in FM vehicles to understand the behaviors and trends of the Drivers. Our goal was to create a program to establish safer driving habits as well as environmentally friendly driving habits. We conducted research to understand how to address these deficiencies, our research included literature review and reaching out to industry leaders to understand how they create driving programs. We then had focus groups and meetings with FM drivers and leadership to better tailor the training to their wants and needs. We developed a training program for the FM trainer, Ms. Sandra Smith, who executed the training on our behalf. After two weeks, we analyzed the results and found our training had been successful in at least two of our metrics.

Conclusion

Through the course of these two projects, I have learned many things. From my STS research, I learned the extent a tiny insect has on the readiness of the greatest fighting force on the planet. I learned about the ethical challenges military leadership has to deal with when deciding how to mitigate insect exposure and maintain readiness. Through my technical project I learned how to develop and execute a data-driven training program. I learned about how to balance driver privacy with data-driven training and the ethical implications of managers tracking employee's location.

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