Thesis Project Portfolio

Hypersonic ReEntry Deployable Glider Experiment (HEDGE)
(Technical Report)

Unveiling Remote Technological Applications: The Effect of the Microsoft 365 Package on Program Management
(STS Research Paper)

An Undergraduate Thesis

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Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

Technical Paper

Hypersonics is a growing field that is changing the way the world works. To keep up with this new technology, I enrolled in the Spacecraft Capstone Design class that is performing a Hypersonic ReEntry Deployable Glider Experiment (HEDGE). The capstone is investigating how to deploy a CubeSat, a small satellite glider, to conduct a hypersonic experiment within the Earth's orbit for research purposes. The mission of the experiment is to demonstrate the feasibility of using CubeSats in hypersonic flight experiments for sustained flight applications. Undergraduate students in The Mechanical and Aerospace Department at the University of Virginia are trying to prove that the CubeSat is an inexpensive way to launch and collect hypersonic research. The CubeSat is more feasible than a rocket and more accurate than a wind tunnel. HEDGE will show the world that undergraduate students can perform hypersonic experiments with a lower cost and more accessibility than traditional programs.

To maintain professional accountability, the experiment is organized into six functional teams: Program Management, Communications, Software and Avionics, Power, Thermal, and Environment (PTE), Attitude Determination and Control System (ADACS) and Orbits, and Structures and Integration. The class design emphasizes a real-world structure to provide students with hands-on experience in their field. Currently, HEDGE is undergoing testing to assess whether the design is mature enough to start fabrication and testing. A Systems Integration Review will be held at the end of the Spring 2024 semester to evaluate the next steps

and the course for next year's class. Overall, HEDGE is a proof-of-concept mission that will create a new trajectory for undergraduate hypersonic research.

Paper Inspiration

My role in HEDGE helped influence the topic of my STS Research paper. I am the Program Manager for the class. I lead the six functional teams to ensure cohesiveness during the design process. My role consists of leading the End of Year Presentation, Technical Thesis, outreach to third years, professional class relations, and communication between the six functional teams. Out of my responsibilities, communication between the teams was the most important. Coming up with ways for teams to meet with one another was essential because all the design components create one deployable glider. An open-based program management software was adopted but soon proved ineffective. Finally, I decided on remote technological applications, like Zoom and Google Drive, to promote a continuous streamline of communication.

The use of remote technological applications proved to be beneficial to the communication between the functional teams in HEDGE. However, this made me wonder if I had not decided to change the communication method. There was a strong possibility that the progress of the experiment could have been delayed, and the effectiveness of program management could have been jeopardized. In comparison with my prior internship, the Microsoft 365 package, a remote technological application, was also used to communicate during projects. The influences of my role in HEDGE and my prior experience influenced my STS research topic.

STS Research Paper

My STS research Topic addresses the effect of remote technological applications, like the Microsoft 365 Package, on program management. The impact of COVID-19 was detrimental in

many ways, including in the workplace. Workplace dynamics have transformed since the heightened adoption of working from home. The balance between work and home, global job opportunities, and the surveillance of employees have come into perspective as homes become offices. Cultural and political aspects have been impacted as labor exploitation and the blurred line between personal and professional persist.

This topic explores the impact of the Microsoft 365 Package to address the effect of remote technological applications on the effectiveness of program management. The research adopts a Social Construction of Technology (SCOT) Framework to examine the relationship between the technology and the relevant stakeholders, employees, and program managers. The framework helps to analyze how the Microsoft 365 package has affected the relevant social groups in all regards. However, in this paper, I argue that this technology is detrimental to program management and its employees and employers.

As the world recovers from COVID-19, the workplace will continue to adjust, and technologies like the Microsoft 365 package, will not go away anytime soon. The research from this paper provides a basis for the next steps with remote technological applications. Despite the perceived negative consequences, there are also positive outcomes of the technology. The only thing standing in the way is a lack of policy around misuse. By proactively addressing the challenges and possibilities associated with working from home, businesses can maximize the effectiveness of program management to ensure a positive impact on their employees.