

## **Thesis Portfolio**

### **Enterprise Resilience of Maritime Container Ports to Pandemic and Other Emergent Conditions**

(Technical Report)

### **The Impacts of Winning in NCAA Athletics**

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science  
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Peter F. Myers  
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Department of Systems and Information Engineering

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## **Sociotechnical Synthesis**

The optimization of systems and organizations that effect surrounding communities is vital in ensuring that the maximum public good is produced by these entities. Considering them both in this light, as massive organizations with the ability to create economic opportunities and social benefits, the National Collegiate Athletic Association (NCAA) and the Port of Virginia (POV) do bear some resemblance. The technical work described in this research regards initiatives researched by a University of Virginia capstone team in order to be presented to the Port of Virginia as feasible alternatives to optimize operations at POV facilities. These initiatives are investigated with the intent of recommending the most optimal changes in terms of increasing revenue for the POV, as well as maximizing the positive social impacts through methods such as increased job opportunities and decreasing pollution. The STS portion of this research seeks to address the financial and social benefits received by universities and their surrounding communities as a result of NCAA games. This research was motivated in large part by a piece by the Atlantic's Jemele Hill, in which she posed the question "What would happen if they [elite African American college athletes] collectively decided to go to black schools?" (Hill, 2019). This intriguing question leads one to wonder what are the total scope of the impacts of college sports, especially how they are able to affect the communities they represent through these endeavors. These reasons were a large part of the motivation behind performing both the technical and STS research presented in this paper.

The Technical aspect of this report summarizes a project intended to assist the Port of Virginia in optimizing its operations and increase trade capabilities and positive impact on the economy in Virginia. The POV is one of the most important and influential organizations in Virginia, both socially and economically. Not only does it enable national and global trade at a

massive scale, but, as a publicly-owned entity, it also makes a priority to affect its surrounding communities positively through bringing businesses and job opportunities all over the state. By attempting to optimize operations at the port, this research seeks to improve the ability of the POV to positively impact economic operations in Virginia and beyond, as well as decreasing the negative impacts it can have on society through consequences such as pollution or congestion. A couple of examples of initiatives that have been discussed with these goals in mind are the implementation of Alternative Maritime Power and using Small Modular Nuclear Reactors for more efficient means of power supply, thereby significantly reducing pollution caused by the shipping industry in surrounding communities.

The STS Research portion of this report seeks to quantify the benefits of winning games in the National Collegiate Athletic Association, specifically addressing the economic and social impacts of college sports. The effects of having successful sports programs, especially high-publicity and revenue sports like men's basketball and football, have been shown to be substantial on many universities. First noted after Boston College quarterback Doug Flutie's miraculous game-winning touchdown pass against the University of Miami in 1984, the resulting boom in applications and revenue after successful seasons in college sports is now referred to as the 'Flutie Effect' (Silverthorne, 2013). As the NCAA has continued to increase its profitability, grossing over \$1 billion annually (NCAA, 2018), these effects have only continued to grow as well. Results show that the value of winning a single regular season football game for a school in a major conference can have impacts on revenue greater than \$3 million (Pamintuan, 2016). Other social effects resulting from successful college sports programs include: quality of a school's average applicant (Anderson, 2017), academic and overall reputation (Vedder, 2016), and rises in reported levels of student happiness and institutional identity (Zook and Holm,

2016). It is important to note that these results are prone to fluctuation due to varying levels of success, as well as the sports being played and the conference that a given university competes in. However, the benefits of college sports have been shown to be numerous both financially and socially.

Each of these projects undoubtedly presented many chances for reflection and learning, but working on them simultaneously provided further clarification on the ability of massive, economically powerful organizations such as the NCAA and the POV to effect massive change in their surrounding communities. In both cases, choices made by those in charge of or within the organizations have the ability to have widespread, and sometimes unseen, effects within society around them. As engineers, it is critical to not only be aware of, but to actively consider and use this potential for positive societal change to shape our surrounding environment into a better and more sustainable world for everyone.

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