

Thesis Portfolio

ASNE PEP 2024 Unmanned Design Competition

(Technical Report)

Safety at the Forefront of Racing

(STS Research Paper)

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In racing, drivers, fans, governing bodies, crew members, and many others fight to have the top priority in the development of the sport. Each group has different values, so disagreement is common. Given the large number of stakeholders involved in almost every problem frame, it is challenging to meet all stakeholders' priorities with a single solution. Therefore, in many cases, one stakeholder makes the final decision about what the most important priorities are, which can cause tension between stakeholders. Latour's actor-network theory can be used to explain the relationships between different stakeholders, human and non-human, and how the desires of one group influence others (1992). These relationships are visible in all topics I have researched: Formula One (F1), NASCAR, and unmanned boat racing.

F1 and NASCAR, two of the world's most popular racing series, provided exceptional examples of relationships in technological development for my STS research. In both sports, fatal crashes have occurred, with Ayrton Senna being killed in 1994 in F1 and Dale Earnhardt being killed in 2001 in NASCAR. A review was conducted into safety innovations that have been implemented since the fatal accidents. Major improvements have been made to track layouts, restraints, durability, and regulations, all of which have been proven through scientific research or testing to reduce the overall harm to the drivers and prevent further fatalities from happening. Through the analysis, it was shown that the stakeholders, particularly the fans and governing bodies, do not agree on how to adapt the sport in many cases. Fans want the greatest action, which occurs at the highest speeds. However, governing bodies are fighting for safety so that the image of the sport is not tainted by deaths to participants. In both F1 and NASCAR, it was illustrated that the governing body for the sport gets the final say, which has led to the prioritization of safety when implementing new devices.

A similar approach was taken for my technical project. My group and I worked to develop an unmanned, electric maritime vehicle capable of completing a five-mile course for the Promoting Electric Propulsion competition. From the beginning, the development centered around several major topics: speed, durability, and safety. Our group quickly realized that a balance would have to be struck between the three. While speed and durability were important, the competition rules clearly outline safety features that must be implemented on every competition entry. Features including fuses and emergency stop buttons for boats over a voltage threshold are clearly stated in the rulebook. Therefore, development centered around the guidelines of the governing body of the competition. While our final system has a better power-to-weight ratio than supercars and can withstand the forces of waves and other turbulence, making sure all features operate safely over the entirety of the five-mile course was our priority in development, demonstrating that the governing body of the competition holds the most power of all the actors.

Safety within racing has improved by leaps and bounds over the past 30 years. This has not come easily, but governing bodies in F1, NASCAR, and electric boat racing have all remained firm on their belief that safety is the highest priority. The research conducted described the dynamic between actors in the scenarios and further enhanced the discussion of how each sport has remained extremely popular today, despite stakeholder disagreement. My research was effective, as I explored in my STS research, and contributed through my technical project, to the importance of having a governing body to attest to safety in racing. Future research can further investigate the dynamic between stakeholders and understand if actor-network theory is reasonable to apply, as all actors exercise different levels of power in development. This research has helped to spark a discussion about stakeholders and their roles in safety development in

racing. This discussion will remain relevant in the future, as technology enhances and racing continues to grow in popularity around the world.

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