

**Determining Factors of Heart Quality and Donor Acceptance in Pediatric Heart
Transplants**
(Technical Report)

The Political and Economic Role of OneLegacy's Noncompliance in Transplantation Rates
(STS Research Paper)

An Undergraduate Thesis Portfolio

Presented to the Faculty of the
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In Partial Fulfillment of the Requirements for the Degree
Bachelor of Science in Systems and Information Engineering

By

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

Signed: Megan Grieco

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Socio-technical Synthesis

My technical and STS projects both address aspects of the socio-technical problem of significantly low organ transplantation rates in the United States. Through data analysis and logistical modeling of the data that physicians use to decide whether to accept a heart, my team and I sought to address what factors most influence donor hearts being accepted or rejected in pediatric heart transplants. I am more fully able to understand this socio-technical problem through my STS research into OneLegacy, an organ procurement organization, specifically through examining their noncompliance in organ recovery and transplantation rates.

In my technical project, my team and I used data provided by the United Network for Organ Sharing (UNOS) to investigate the utilization of donor hearts in pediatric heart transplants. Currently, there is no clear consensus among surgeons as to what factors of a heart's health most impact recipient survival, leading to many hearts being discarded unnecessarily and candidates dying on the waiting list. We developed a model to discover what factors are most predictive of whether a donor heart is accepted or rejected. Among these are cardiovascular milieu (i.e. blood pressure, heart rate, medical management), surrogate markers of organ perfusion, and echocardiogram results. Logistic regression identified Age and Left Ventricular Dysfunction, an echocardiogram measurement, as two highly significant factors correlated to heart acceptance. We also developed a visual tool through which physicians can view individual donor data over time to see whether they fall into normal ranges and whether echocardiogram results indicated normal heart functioning.

In my STS project, I explored the relationship between OneLegacy, an organ procurement organization that guides the organ matching process in the Los Angeles area, and the patient population which it serves. I used Langdon Winner's theory of Technological Politics

to argue that misappropriation of funds through its federally unassociated foundation has contributed to their misallocation of organs and noncompliant transplantation rates. This has ultimately disadvantaged the recipients who await an organ transplant.

It has been extremely valuable to have worked on both of these projects simultaneously this year. My curiosity as to why organ transplantation rates are so low, sparked by my technical project work, allowed me to discover other political and economic factors that contribute to an insufficient number of donors and too few transplants. Without the STS project, I might not have realized the full scope of the lack of donor-recipient utilization in organ transplantation that I am addressing with my technological solution. While pure research, which I am undertaking with my STS project, is important for discovery and exploration, the technical project complements it well because it is an applied solution to the socio-technical problem at hand. As an engineer, both projects have helped me realize the complexity of the systems that I will design for and the importance of maintaining inclusivity and avoiding bias in the design as well as throughout the lifecycle of my technological solutions.