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30 Apr 2021

STS 4600

Socio-Technical Synthesis

My technical work and my STS research are connected primarily through the idea of a stable plant with several moving parts revolved in the chemical engineering field. My technical work focuses on the interworking's of a water-purification system originating from human waste, whereas my research explores the failure of the chemical plant which produced methyl-isocyanate (MIC) in Bhopal, India that led to a large gas leak which became one of the world's worst industrial disasters and killed approximately 4,000 people. Though they are not the same process, my technical and STS projects both address the challenge of an unstable plant environment that inhibits the ability for chemical processes to occur.

My technical project scales-up and designs the Janicki Omni Processor (JOP). It was developed to provide a sustainable solution to the lack of clean drinking water and sanitation. This project essentially takes human waste from pit latrines and converts it into clean drinking water. The JOP uses a steam engine which can then produce enough energy to power and while also creating fertilizing ash to be used in farming processes. The goal of this project is to determine the amount of drinking water, fertilizing ash, and power that will be produced through using human waste as the input. This system will be scaled up to serve a city of approximately 1,000,000 people who do not have access to sanitation services. Ultimately, we want to determine if the amount of useful products produced is worth the investment on a new water-treatment plant.

My STS project explores the failure of the UCIL pesticide plant located in Bhopal, India. Using actor-network theory, and specifically Callon's idea of translation, I was able to determine the various human and non-human actors in the network that led to an unstable plant. I claimed that the cause of the failure can be pointed to the poor plant management and negligence towards severe problems within the plant prior to the gas leak. My paper explores the reasons to why all other actors, like cost-cutting policies, safety measures, local government, and laborers, are all related to the lack of management. The goal of my research is to demonstrate that responsibility for a gas leak is not from one single action or tangible item. It can be the accumulation of ignored precautions of an entire organization whose emphasis was only on saving money and taking the easy way out.

Working on these two projects simultaneously added significant value to both. A stable network is crucial to the success of any plant or business. A pesticide plant is not a stand-alone system as it also greatly affects those surrounding around. The Bhopal plant failure impacted the surrounding communities by releasing toxic gas into the air, and people are still suffering from the effect even after over 30 years. Connecting this to the JOP, I learned that the same consequences apply here. The JOP will serve as a system that finally brings a stable source of clean drinking water. However, if a failure were to happen, like in Bhopal, toxic sludge and possible disturbances will impact everyone's everyday lives. Analyzing the failure of a system makes the project important just as much as the success does. As the JOP is being executed, the lessons learned from the Bhopal plant (like having proper safety measures, skilled laborers, and a good core safety culture) can greatly impact it in the future to ensure that the JOP project stays a stable system so that those around them can have a consistence source of clean drinking water, without compromise.