STS 4600 Thesis: Takata Airbag Incident

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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.

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Introduction:

Automobiles have become a foundation for many parts of American culture, revolutionizing the speed and reliability of everyday travel. However, when the majority of Americans wake up in the morning and get in their car, their first thought is not “will my car’s airbags keep me safe in an accident, or further my injuries because of a faulty inflator mechanism?” This was the reality of the situation as the Takata airbag incident unfolded before the eyes of the American public. In the early 2000’s it was discovered that the airbags supplied to many automakers by Takata Company were prone to catastrophic failure. Some faulty airbags sent shrapnel into the occupants upon deploying. As of January, 2018 there are around 72 million vehicles with recalls for faulty airbags, and only a fraction of those vehicles have been repaired (Top, 2018). A variety of different opinions have emerged regarding the situation and who is responsible for the distribution of these airbags on a massive scale. Some hold Takata Company responsible for the incident. Others place responsibility on the engineers, the consumers that own the cars, or automakers using Takata Airbags. However, all these arguments only consider individual responsibility and none of these address the fact that there is a shared responsibility between the different parties. By taking a different approach to analyze the responsibility, it becomes possible to achieve a deeper understanding of a complex situation where deadly airbag technology was distributed to tens of millions of people. Highlights above were shortening edits

I propose that rather than holding a single individual responsible for the Takata airbag incident, it is more beneficial to study the case as a collective responsibility between various actors who share the moral and legal responsibility. I believe this is a more effective way to analyze this case because multiple actors meet the criteria for individual responsibility for this incident, so it is not possible to single one out and fully explore the topic. To analyze the case I

will draw from primary sources such as sections of the *Wisconsin Law Review*, 2018, and the *Automaker Report Card* from Staff Report for Senators Richard Blumenthal and Edward J. Markey March 2018. I will first identify the different actors at play in the case and construct a homogeneous network between them using Actor-Network Theory, as outlined by Darryl Cressman (Cressman, 2009). Once the different actors have been identified, I will isolate the human actors and view them through the lens of the ethical framework of responsibility to determine whether one group can truly be held accountable, or if there is a collective responsibility for the Takata airbag incident.

Literature review:

The Takata airbag incident has had lasting effects, starting in the 1990's and enduring to modern day. Scientists have researched the effects of environmental factors and internal actors on the likelihood of airbag system failure, along with the different stages of product development and integration into the market. While lots of research has been done on the different actors which hold partial responsibility for the Takata Airbag failures, few scholars have addressed the collective responsibility of the different parties involved in the incident.

Some choose to place the responsibility for these faulty airbags squarely on the automotive companies that purchased the airbags. In their New York Times article "A Cheaper Airbag, and Takata's Road to a Deadly Crisis," author Hiroku Tabuchi describes the situation of automotive manufacturer General Motors (GM) from a business standpoint, and the main contributors to their decision to use Takata's airbag technology. Tabuchi writes "details of G.M.'s decision-making process almost 20 years ago, which has not been reported previously, suggest that a quest for savings of just a few dollars per airbag compromised a critical safety device, resulting in passenger deaths" (Tabuchi, 2016). A number of other authors have cited similar

accounts of automobile manufacturers who, in cost saving efforts, opted for a cheaper alternative to their current supplied airbags. Tabuchi then goes on to explain how Takata Airbags were around 30% cheaper than the previously supplied airbags, and when the former supplier Autoliv was presented with an ultimatum to either match their prices or lose GM's business they simply could not match the prices. The former head chemist of Autoliv refused to match the design specifications that reduced the cost of airbags because of the unsafe chemical employed in the inflator of the airbag, which expanded too rapidly and would cause the inflator to rupture. Tabuchi then chronologically reviews Takata's history and the development of their airbags, leading up to the crisis that left the company bankrupt in 2016.

Author Tabuchi later clearly emphasizes the responsibility of the auto-makers later in the article, bringing up the fact that the safety standards are developed and enforced by a consortium of automobile manufacturers, the United States Council of Automotive Research. This form of self regulation was then proven to be ineffective in the article, due to the fact that the standards this consortium set were not being enforced or followed by its own members. In particular, once it was discovered that the Ammonium Nitrate compound found in many airbags was unsafe, many auto-makers failed to take action to make their vehicles safe. Automotive giants such as Honda failed to even place a recall on the affected vehicles until 2013, and still produced vehicles with Ammonium Nitrate airbags until recent years.

In his academic research paper, "Takata's Exploding Airbags: Lessons from a Quality Debacle," author Eisenhower C. Etienne provides another perspective on responsibility from Tabuchi. Etienne goes into detail on Takata Company's role in the manufacturing and distribution of an unsafe airbag, and places much emphasis on the legal and moral responsibility Takata bears. This author describes questionable decisions made by Takata, one example being

how Takata knew of the faulty airbags' role in fatal accidents as early as 2004 but failed to report the issues to the NHTSA until 2014. The company is cited as conducting secret tests outside of typical operating hours to test the airbags, and it was found that in 2/50 tested airbags the inflator had cracked, which could have been the cause of the shrapnel during airbag deployment. Additionally, Etienne describes an incident at Takata's Mexico factory where the Ammonium Nitrate compound used in their airbags exploded and led to numerous damages. Takata quickly covered the fact that the Ammonium Nitrate compound exploded and shifted the focus to their safety procedures which prevented any injuries or deaths occurring at the site.

The New York Times Article by Tabuchi does much to display the role of the automakers in the distribution and use of the faulty airbags in many cars on the road. It clearly illustrates that there were decisions made by manufacturers to use the airbags despite known safety concerns. Additionally, the academic paper by Etienne highlights the role that Takata had in manufacturing the faulty technology and covering it up throughout the manufacturing process. In this paper I will use the ethical framework of responsibility to illustrate how the moral responsibility for this incident is a Problem of Many Hands, with numerous actors playing a role in the problem.

Conceptual Framework:

My analysis of the Takata airbag incident draws upon the tenants of Actor-Network Theory and the ethical framework of responsibility, to identify the different actors within the network created and explore the distribution of responsibility of the human actors.

Actor-Network Theory (ANT) is a framework that classifies artifact development as "black box" network with a heterogeneous set of actors influencing development. In this framework, a "network builder" assembles a network of actors that is meant to solve a problem (Cressman, 2009). The network builders are typically the engineers and scientists, or groups of

them, that combine the efforts of many actors to participate in the creation of technology. The network builder can also be considered a primary actor in this process. It is important to note that some actors can enter and exit a network before the artifact is finalized. The heterogeneity comes from the fact that actors can be human or non-human, so long as they have an effect on the development of the artifact. This is an important distinction from other STS frameworks, due to the fact that the effects of non-human actors are considered in the development of an artifact and its effects on society (Cressman, 2009).

responsibility is often difficult to dictate, especially when there are multiple actors involved in a situation. When there are many different groups of people to blame for an incident, there becomes a "Problem of Many Hands," where one particular group cannot be held at fault. In cases where there is a Problem of Many Hands, there becomes the notion of a collective responsibility where the entire group of actors in a network become responsible for an outcome of a situation (Van de Poel and Royakkers, 2011). Individual responsibility is designated when an actor meets one of the Four Conditions of responsibility: wrong-doing, causal contribution, foreseeability, and freedom of action. When the Problem of Many Hands occurs there are three mechanisms that ensure a proper distribution of responsibility: legal responsibility, organizational models of responsibility, and technological development (Van de Poel and Royakkers, 2011).

This paper seeks to analyze the Takata airbag incident using a combination of Actor-Network Theory and the ethical framework of responsibility in order to better understand who is culpable for the incident in the development and distribution of faulty airbags. Actor-Network Theory will first provide a deeper understanding of the different parties involved. It will allow an analysis of not only the different groups of people who can be held accountable,

but also the technological and other non-human actors which allowed for the situation to get so out of control. Once the actors and the network composed of the actors is identified, my paper will seek to better understand who is responsible for the situation using the Four Conditions of Individual responsibility to determine if this is truly a Problem of Many Hands, or if there is one actor whose responsibility in the matter is paramount.

Analysis

Takata Company, Network Builder and Human Actor

Numerous human and non-human actors contributed to the development of the Takata Airbags, but a select few were important in the network surrounding the catastrophic failure of the artifact. Of the actors involved in the incident, there is no single actor that can be singled out as solely responsible for the chain of accidents and injuries associated with the incident. In order to even scratch the surface of who is responsible for the Takata airbag incident, the different parties involved in the development and distribution of the product must first be identified and analyzed. To accomplish this I will be using Actor-Network Theory to identify a homogeneous network, constructed by a network builder.

The network builder is one of the main actors that often remains involved in the network from its conception until the end of the network itself, if there is one. Network builders are actors that align and advance the interests of potential actors through translation, interessment, and enrollment. Translation is essentially creating a level ground such that all actors, human and non-human, can operate in the same network. Interessment is the actions of the network builder that are used to leverage the different actors and stabilize them in the same network. Lastly, enrollment is the recruitment of more actors into the network to modify and improve the artifact (Passoth and Rowland, 2010). Using this criteria for what makes an actor a network builder, it

quickly becomes apparent that the builder is the Takata Company that engineered and manufactured the airbag that the incident is surrounded by.

They first joined the different actors in the creation of their airbag, recruiting engineers and manufacturers to create the airbags. In doing this, they introduced two important non-human actors in the situation: the airbag assembly and the Ammonium Nitrate compound Takata uses to inflate the airbag. After the production of the airbag there the next step is for the network builder to implement their technology by selling to vehicle manufacturers, which introduces another actor to the network - automakers. Lastly, once the technology is implemented into automobiles, the vehicles that use the tech must be sold to the public. The actor that serves as the distribution mechanism in this case is the car dealerships that sell the cars to the general public. The consumers are the last actor in the network, purchasing and using the product. The implementation of the airbag technology follows a similar track to the implementation of the automobile itself. A product will start on the drawing board, become a designed concept, be engineered and tested, manufactured, and launched as a product in the market (Sherman, 2015). Along the way, a network is formed around the product and different actors are introduced into the network. There are many more actors that feed into this network than the mentioned actors, but these have been selected due to their importance in the scope of identifying which actors in this network bear responsibility for the failure of the network.

Engineers and Manufacturers, Human Actors

Engineers and manufacturers have been grouped together since they work in tandem during the design process to produce the artifact, and they both share the role of the physical creation of the airbag in the case of the Takata Company. For this section I will refer to the whole as “Engineers,” meaning both the design engineers and manufacturers that carry out the

production of the airbag. Engineers have a profound impact on the final product in a manufacturing network, from coming up with the initial design to working out all the kinks and hazards associated with the product before it is actually produced. Engineers are equipped with the knowledge of what is safe, where costs can be saved, and where resources are necessary to produce a valid artifact. The authors of the book *Engineering Decisions for Life Quality:How Safe is Safe Enough* assert that in order to be a responsible engineer, it is paramount in engineering to serve the public interest, and "there is a requirement on engineering… officials to pay exclusive attention to real, quantified, assessed risk," (Nathwani, Pandey, Lind, 2009). This does well to describe the particular impact that engineering has beyond just designing a functional product; engineers are also the only actor in the network that can ensure an artifact is not unsafe or flawed from the very start.

Airbag Assembly, Non-Human Actor

The actual airbag assembly is an obvious, but important actor in the Takata airbag incident since the entire network was centered around its creation. Additionally, the incident we seek to find the distribution of responsibility is centered around its failure. The network is composed of human and non-human actors because there is a certain association between the two in a network, the airbag itself cannot be overlooked in the Takata airbag incident because without the airbag there would be no incident to analyze. Using actor network theory allows for analysis that overcomes an unnecessary duality between human and non-human actors (Cressman, 2009). In this case, the airbags inflated violently due to their unstable inflating compound, which caused self-destruction of the steel inflator and sent shrapnel into the occupants of the equipped vehicles. These failures often led to injury or death, and were more prevalent in humid environments where the materials of the airbags were more prone to propellant degradation

which would cause the airbags to explode violently (Kessler and Ivory, 2015). This string of occurrences and the associated recalls are noted as the reason for Takata Company's ultimate bankruptcy in 2017 (Top, 2018). The non-human artifacts of the airbag assembly were a crucial actor in the formation and rapid deterioration of the associated network.

Automakers, Human Actors

The next important actor to identify in the network around Takata Airbags is the automakers that use the airbags in their vehicles. Automakers are considered to be a human actor within this network, due to the fact that they have decision making abilities that affect the outcome of such an incident. Automakers have the connection to the artifact of being the purchasing party. The vehicle manufacturers purchase the technology from the airbag company, along with the individual units to put into their vehicles. With this comes the freedom to choose from a variety of suppliers, based on the price of the units, the quality of production, and the more complex underlying engineering efforts behind a product as described by Tabuchi (Tabuchi, 2016). Another important role of vehicle manufacturers is to issue recalls on products they have endorsed that may be defective or dangerous. In a letter to the general public Senator Blumenthal and Senator Markey describe some additional implied responsibilities and roles of automakers within the production network, and rank them based on their effort to accommodate such a failure as the one seen with the Takata Airbags. They give many large automakers good or bad "report card" ratings based on how they respond to the safety issues,whether they accommodate a wide variety of consumers, rental and loaner options, and the flexibility of the policy for which someone falls under a recalled status (Blumenthal and Markey, 2018). This article showcases another interaction automakers have within this network, and that is the connection between the automakers and the individual consumers who use their cars. The

automakers are responsible for acting ethically towards their consumers to ensure their product meets all safety and manufacturing standards.

Car Dealerships, Human Actors

The car dealerships that sell cars represent an important link between the manufacturing half of this network, and the consuming half of the network. Dealers communicate with the clients, and take the brunt of the marketing to the public. Ultimately, they are the link that sells the cars to the public. Along with selling the cars, many dealerships also offer service centers, especially dealerships that sell new cars and are associated with specific manufacturers. Dealerships and the service centers within are also responsible for repairing recalls that are either administered by the NHTSA or recommended by automakers (National Automobile Dealership Association, 2022). Dealers depend on the automakers to supply the dealers with parts to complete their recalls and fund the repairs, but it is ultimately the role of the dealer to execute these repairs and interact with the customers. Therefore the dealers are also the party that appropriately portrays the risk to the customers, and can sway them on whether or not a repair is necessary for the safe operation of their vehicle.

Consumers, Human Actors

The last key actor in the Takata Airbag network is the consumers. Consumers are the party that actually benefits or suffers from the use of the artifact, with a number of them placed throughout the consumer automobile. If the airbag were to fail, the consumers would face the most immediate consequences of the airbag deployment. This relationship between the consumers, the artifact, and the rest of the manufacturing and commercial network is important because the consumer-artifact relationship is what makes the scenario of moral importance. Consumers were described as “looking like they were shot or stabbed,” and oftentimes having

profuse bleeding from the shrapnel wounds caused by the failed airbag assembly. Pictured right is a sample of the shrapnel taken from the site of an accident (NY times) that measures almost two inches in length, and became a projectile when the inflator ruptured on airbag deployment. The most direct impact, and what makes this relationship of moral importance, is that the users are being seriously injured or killed by the artifact. Considering how the airbag is meant to make an automobile safer in the case of an accident and this particular one has done the opposite, someone must be held responsible for the failure of the artifact.

Figure 1: Airbag Inflator Shrapnel (Keely, 2014)

responsibility - Who is responsible?

In terms of responsibility, it is not possible to identify only one actor responsible for the Takata airbag incident. Individual responsibility could be placed on Takata Company since they had the Four Conditions of Individual responsibility: wrong-doing, causal contribution, foreseeability, and freedom of action. The wrongdoing was their creation of a faulty airbag that degrades in humid environments, leading to catastrophic failure. Their causal contribution is creating the airbag and forming the entire network around it. It was a foreseeable issue since there was much controversy around the use of Ammonium nitrate, and there were numerous large scale manufacturing accidents caused by the propellant in the 1990's and 2000's, including their own manufacturing plant in Mexico (Etienne, 2020). It was well within the ability of Takata

Company to enact change and use a safer compound, and otherwise modify the unsafe airbag model but they chose to produce it as-is anyway.

It is true that Takata Company meets the Four Conditions for Individual responsibility, and a person might be inclined to hold them individually responsible based on the previous analysis. It was noted in one article that Takata Company internally knew about the airbag failures due to their technology as early as 2004, and they failed to report it for a recall despite the knowledge that it could cause harm (Top, 2018). This does shift some of the blame away from other actors and onto Takata Company, since without this knowledge automakers lack the full scope of the dangers exhibited from the faulty airbags. Still, the notion that this makes Takata solely responsible is incorrect because other sources cited the airbags as having the potential to explode around that same time period, providing the automakers and engineers the situational awareness they needed to take action (Tabuchi, 2016). Certainly, Takata takes much of the responsibility for the incident, but there are other actors within the network that meet the same criteria for individual responsibility.

The engineers of the airbag had a similar wrong-doing and causal contribution in the creation of the airbag, foreseeability due to their extensive design knowledge and use of Ammonium Nitrate, and freedom to modify the design earlier in the production process or even after initial production. The automakers were wrong in installing an airbag that was known to have potentially fatal flaws before implementing it into their vehicles, and their causal contribution was continuing to use that faulty technology. There was foreseeability from internal and external advisors that suggested the technology may not be safe despite the cost savings (Tabuchi, 2016). Lastly, there was a freedom of change because the automakers had other safer options for airbag supply, which they could have installed in their vehicles and avoided the

incident. Due to the fact that multiple parties all meet the requirements for individual responsibility, I assert that Takata Company, automakers, and the engineers behind Takata Airbags are collectively responsible for the ultimate failure of the product. The combination of their failures led to the catastrophic string of events in which multiple people were seriously harmed or killed.

responsibility - Who is not responsible?

Those parties who cannot be held responsible, or are less responsible for this case must also be addressed in this paper, since not all of the actors involved meet the requirements to be individually responsible. Firstly, the consumers cannot be held responsible simply because there is no way for a customer to have causal action. Customers do not install the airbags, therefore they cannot be at the root of this issue. The same applies to car dealerships; since dealerships do not construct new cars they do not have the causal action to implement the faulty airbags. Nor do they have foreseeability of defects in selling new cars, so dealerships cannot be held responsible for the Takata airbag incident.

Conclusion:

Throughout this paper, I have argued the collective responsibility of Takata Company, automakers, and Engineers in producing defective, dangerous airbags that were implemented in tens of millions of vehicles. By first creating a network of actors using the tenants of Actor Network theory it became possible to identify the different actors who play a role in the production and use of the product, along with those who are connected to the artifact in question. Then, using the Four Conditions for Individual responsibility I determined that some actors did not meet the requirements for individual responsibility of the incident, while multiple others met

all the requirements. For this reason I have argued that there is a collective moral and legal responsibility for the distribution of faulty airbags to the public.

Analysis of this case from the perspective of a collective responsibility allows engineers and businesses to have a deeper understanding of the shared roles at all levels of safety and quality management. The collective responsibility underscored by this particular case applies to any technology that failure would result in injury or death, and it is the responsibility of all parties during product development and implementation to ensure safe products reach the market for the general public to use.

Word Count: 4149 words

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