An Ethical Exploration of the Canterbury Television Building Collapse

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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

From September 4th 2010 to February 22nd 2011, a series of three earthquakes shook the city of Christchurch to its very core. It left New Zealand's second largest city with unfathomable property damage and the loss of countless lives. The Darfield Earthquake that occurred on September 4th 2010 had a magnitude of 7.1 and marked the start of the end for the Canterbury Television (CTV) building (*Earthquake - Christchurch, New Zealand 2011*, n.d.). The 2011 Christchurch Earthquake had a magnitude of 6.3, and claimed the lives of 185 people (*Christchurch Earthquake Kills 185*, n.d.). 115 lives were lost due to the collapse of the Canterbury Television (CTV) building. This led to a Royal Commision (RC) investigation being launched by the New Zealand government to investigate the situation and better understand what changes needed to be made so that it never happens again (*What Is a Royal Commission*, 2011). The resulting information from the RC has been analyzed by professionals and scholars alike. Current scholarship is either focused on creating a quantitative argument about what materials failures occurred to cause the collapse or the qualitative side, which focuses on the role that humans played in the collapse. However, current scholarship has yet to apply a sociotechnical or ethical framework to the case and analyze it through that perspective. By not applying a framework to this case, we cannot fully understand the key ethical missteps that were made by the human actors throughout this case, and we will be doomed to repeat this mistake, which could lead to the tragic loss of more life. In what follows, I argue that a multitude of human actors acted unethically during the lifetime of the CTV building due to them failing to practice the engineering virtues of proper competence and clear and effective communication with each other throughout the lifetime of the CTV building. To support my argument, I will draw on actor-network theory (ANT) to identify all of the human and non-human actors involved in the

case. Next, I will use the professional engineering virtues of competence and clear and informative communication to determine if the human actors involved acted ethically. I draw on articles as well as the findings published by the RC to further support my argument.

Literature Review

Over the years since the collapse of the CTV building, few scholars have analyzed both human and non-human actors, instead overwhelmingly focusing either on the non-human actors such as the resulting structural failure, or the human actors such as the failure of the initial planners. For example, engineers Yukari Ido and Daigoro Isobe stated that the primary cause of the collapse was due to the column members losing their strength due to shear strain (Ido & Isobe, 2017). They were able to come to this conclusion by recreating the CTV building using the structural drawings presented in the CTV Building Collapse Investigation for the Department of Building and Housing within computer modeling software (Clark & Smith, 2012, Appendix L). Once this was completed, they then were able to use seismic data to recreate the earthquake that occurred therefore allowing for the recreation of the infamous incident (Ido & Isobe, 2017). While this study allowed for new understanding to be gained, it focused only on the non-human actors that caused the collapse. Therefore a key contributing factor was omitted when determining the reason as to why the CTV building collapsed in the first place, humans.

In this regard, political scientist Wolfgang Seibel is much more successful. Seibel aims to give the readers a much more comprehensive view of the human actors that were involved in the initial planning of the CTV building. He presents a multitude of actors, going into detail about how each actor contributed to the building throughout its creation and lifetime. The main conclusion that he was able to reach was that the quality of leadership throughout the process of the building's creation and inspection after the first earthquake was the primary reason why it

collapsed (Seibel, 2022, p.127). This analysis provides much more insight into the poor decision-making made by leadership, however neglects to mention the non-human actors that caused the structure to collapse.

While current scholarship has examined the plethora of mechanical and social factors that caused the CTV building collapse, scholars have not yet adequately considered an ethical perspective that led to this disaster. In the following, I will analyze human and non-human actors, who were involved in this tragedy using the STS framework of actor-network theory (ANT). I will then leverage the virtues of competence and clear and informative communication from the professional engineering virtues framework created by Michael S. Pritchard to further analyze the human actors involved to see if they acted morally during the construction of the CTV building.

Conceptual Framework

My analysis of the CTV building collapse draws upon ANT and virtue ethics, which allow me to evaluate the human and non-human actors behind the collapse as well as if the human actors involved acted ethically according to professional engineering virtues. The initial development of ANT within the English-speaking world can be attributed to Micheal Callon, John Law, and Bruno Latour (Cressman, 2009). This framework was primarily developed to describe an approach to scientific and technical innovations (Cressman, 2009). In its most basic form, ANT consists of a network builder that recruits actors to aid in accomplishing a task or goal. The actors can be non-human or human and have roles that are variable, contextual, and relational. For that reason, power does not reside with any single actor, rather it is the connections between the actors themselves that determine how successful a network will be.

Virtue ethics was initially developed by Aristotle and evaluates the character of the moral actor rather than the outcome of a situation. This ethical framework focuses on the idea that humans need to practice certain qualities (virtues) to attain the good life. Virtues qualities refer to those that can be described as being in the middle of two extremes. For example, the middle of cowardice and recklessness would be that of courage. The good life refers to living a life that humans are meant to lead (van Poel & Royakkers, 2011, p.96). Due to humans being rational beings, it is said that the good life uses reasoning to determine how to live morally. Aristotle also stated that the good life is not only determined by activities related to reasoning but by also participating in virtuous activities (van Poel & Royakkers, 2011, p. 96). Therefore, according to Ibo van de Poel and Lamber Royakkers, the good life is an "active life in agreement with the virtues necessary to realize one's uniquely human potential (van Poel & Royakkers, 2011, p.96). Virtues are something that is not innate and must be learned through practice and learned through observation, study, or analysis. Pritchard was able to take the teachings of Aristotle and apply them to engineering, which resulted in the creation of the professional engineering virtues. According to Pritchard, the framework was developed to aid in "addressing questions of character and imagination" of engineers (Pritchard, 2001, p.391). In the analysis that follows, I will draw on ANT to identify the human and non-human actors that were primarily involved in the collapse. Thereafter, I will apply the virtues of competence and clear and informative communication from the professional engineering virtues framework created by Pritchard to further analyze the human actors to see if they acted ethically or not.

Analysis

Identification of Human and Non-Human Actors

To begin, the human actors will be identified. Within ANT a network builder is needed to create the network and recruit the necessary actors to work together toward a common goal. In this case, the network builder is the Prime West Corporation Ltd, who approached Williams Construction "about leading a speculative design-build on the site" (Wright & Greenhill, 2017). Michael Brooks at Williams Construction came up with the idea of maximizing possible floor space by putting the elevator outside of the floor plan. To bring his idea to reality, Brooks brought in Alan Reay Consulting Engineer (ARCE), led by firm principal Dr. Alen Reay, to create the necessary building plans and conduct the necessary calculations for the CTV building. Within ARCE, this responsibility fell onto engineer David Harding, who had never designed a multi story building before. After the structural drawings were completed, they were sent to the Christchurch City Council (CCC), led by Bryan Bluck, for review. This responsibility fell onto Grame Tapper, who noticed a multitude of flaws within the design as well as missing necessary calculations (Wright & Greenhill, 2017). Despite this, after a conversation with Dr. Reay, Bluck approved the design even though the CTV building was still under code.

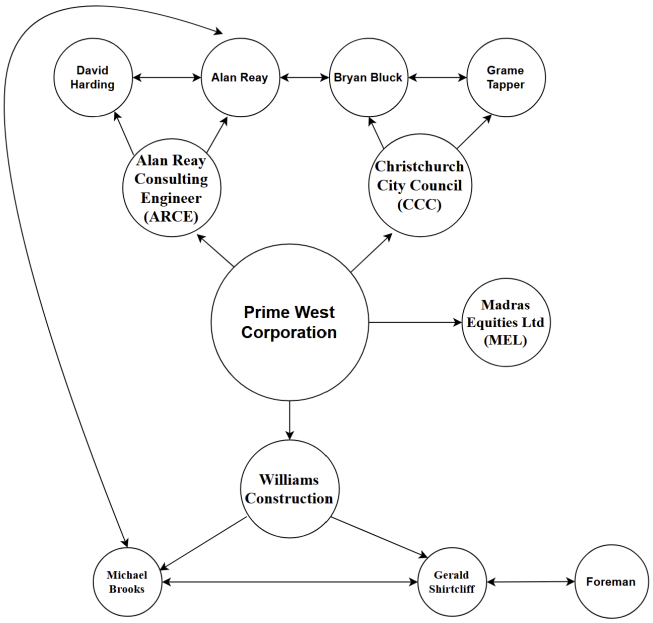

Figure 1: Prime West Corporation Actor Network Diagram

To aid in construction efforts, Brooks hired a construction manager named Gerald Shirtcliff, an engineer, who had worked on projects in Australia and South Africa respectively. The relationships established within this version of the network can be seen in Figure 1. During this time, a number of business decisions led to ownership changing from Prime West to Madras Equities Ltd (MEL) with construction finishing during this time as well. Therefore, MEL has become a new network builder with the responsibility of creating a new network to work toward its goals. This change is reflected in Figure 2. Soon after MEL took over, tenants started to move in and the CTV building was officially opened.

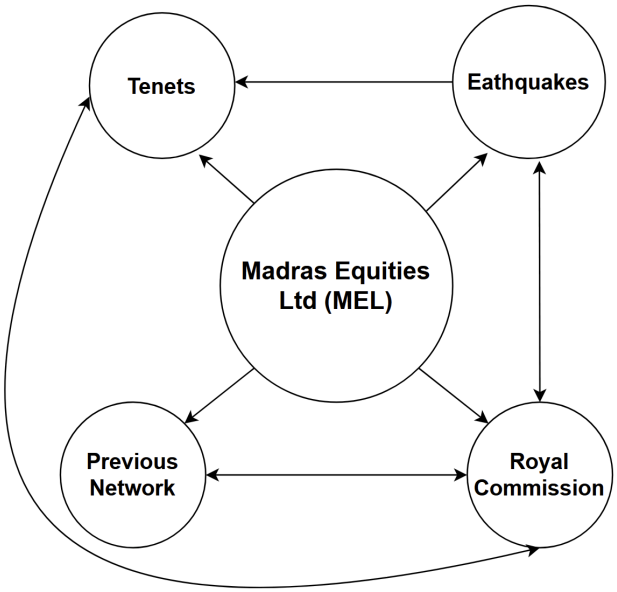

Figure 2: Madras Equities Ltd Actor Network Diagram

After the Darfield Earthquakes, two separate assessments were conducted by two different groups of people to ensure that the recently afflicted building was ready to be reoccupied. The first group, which consisted of three people including an engineer, had the responsibility of conducting “basic structural checks for obvious signs of damage that might

warrant further scrutiny", which it passed (Wright & Greenhill, 2017). The second group, who had no prior inspection experience, fully approved the building for reopening. Now that the key human actors have been identified, the non-human actors will be identified.

Throughout the case, an ever present natural actor were the three earthquakes that caused the building to experience any harm in the first place. They caused not only damage to the CTV building but to other buildings within the central business district of Christchurch. Another non-human actor would be the raw materials used during the construction of the building. The materials were an inherent part of the failure however, it was more so how they were used rather than a flaw within the materials themselves. Now that all of the actors have been identified, the necessary ethical analysis can be conducted.

Ethical Analysis of Human Actors

Due to the power that engineers have, it is extremely important for them to follow a code of ethics that ensure the integrity of the work done as well as ensure the protection of those who engage with it. Unfortunately, many of the human actors have failed to follow any form of ethics. In what follows, I will use the professional engineering virtues of proper competence and lacking proper communication to showcase the persistent unethical behavior throughout the case. Due to the overall complexity of this case, I will focus on the pertinent human actors that acted unethically throughout.

Incompetence

Competence is best defined as "having sufficient knowledge, judgment, skill, or strength to complete a task or duty" according to Merriam Webster (Merriam-Webster, n.d). Throughout the planning and construction that occurred during the lifetime of the CTV building, there was a consistent lack of competence that led to its collapse. The initial planning of the building was led

by Harding and Reay at ARCE. According to the RC, “Mr.Harding had not designed a multi-story building with significantly eccentric configuration. However we have found that he did not seek assistance with the design from Dr.Reay or anyone outside of ARCE” (Royal Commission Vol.6, p.302). First, note that Harding has never designed a building of this complexity before. Which demonstrates that he lacks the necessary knowledge and skills to be the sole engineer working on a project of this magnitude. When designing a multi-story building in New Zealand, it is necessary to conduct computer analysis to measure earthquake loading to ensure everything is up to code (Wright & Greenhill, 2017). Harding leveraged Extended Three-dimensional Analysis of Building Systems (ETABS) to conduct the necessary calculations. However due to his lack of experience with multi story building design, he also had no experience with the software. This is supported by the RC when they state Harding “lacked experience with the….unaware of the program’s important limitations” (Royal Commission Vol.6, p.302). Despite the lack of knowledge/skill Harding possessed, he “did not see assistance” at any point during the planning process. Therefore, Harding also lacked the necessary judgment of his own engineering skill set. In totality, this suggests that Harding acted in an unethical manner because he was truly unfit for the role that was given to him by Reay due to lacking the necessary skills for the job, failing to recognize his lack of knowledge, and failing to ask for help when encountering unfamiliar issues. Harding’s inability to recognize his own abilities resulted in “critical structural weakness and straight blunders” in the structural design of the building (Royal Commission Vol.6, p.100). This incident, however, was not the only instance of incompetence within this case.

Another instance of incompetence occurred during the construction of the CTV building. More specifically, Shirtcliff failed to properly complete the duties assigned to him by taking the

role offered by Williams Construction. According to the Royal Commission, “Mr. Shirtcliff evidence was that he only visited the site about once a month because he believed it was a reasonably simple and straightforward job and other projects required more of his attention” (Royal Commission Vol.6, p.96). First, Shirtcliff visited the site “about once per month”, which was not enough. As the clerk of work of the site, Shirtcliff was to act as the main source of technical information for the forman working on the project. Therefore, Shirtcliff lacked the necessary jugement that comes with proper competence for the role of construction manager. This is further suggested when he states that the job is “straightforward”, lacking the necessary complexity for his attention. However, Shirtcliff later stated that “it was apparent once he started his job that there was a need for more management and oversight of the project” (Royal Commission Vol.6, p.96). This means that he was able to recognize that additional management was needed but throughout the construction process he failed to provide any, which is indicative of a lack of the necessary skills for his position. This is also supported by Patrick Durrant when he states that Shirtcliff, “confessed to using a stolen identity and falsified credentials to pursue a lengthy and prolific engineering career” (Durrant, 2014). It is very clear that Shirtcliff acted in an unethical manner by using “falsified credentials” to mask his lack of necessary skills for the CTV building project. This led to poor decision making that caused errors from the planning process to propagate forward toward the final construction. According to the Royal Commission, “the failure to roughen the faces….both a construction and design issue” (Royal Commission Vol.6, p.90). Therefore, if Shirtcliff spent more time on the site (or someone more qualified was in his role) this error would have been caught and this tragedy would have been prevented.

Based on the argument made above, one might think that Reay acted slightly incompetent but the blame primarily falls onto Harding. However, this is not the case. According to Micheal

Wright and Marc Greenhill, “Reay didn’t have much experience in designing multi-storey buildings and the only engineer at his company who did, had left the company abruptly” (Wright & Greenhill, 2017). Therefore, Reay also lacked the necessary knowledge/skills for the project however, he still decided to take on the project even after the person who had the necessary experience left the company, which is also indicative of poor judgement. This lack of judgment is reinforced by Engineering New Zealand when they state, “Dr Reay knew Mr Harding lacked the necessary experience to design the CTV building and that he failed to adequately supervise Mr Harding” (Engineering New Zealand, 2024, p.2). A key portion of being a manager is being able to properly support the subordinates that happen to be under your care. In this case, Reay failed to support Harding with the necessary guidance or connections that would have been instrumental during the initial planning of the CTV building. This is further supported by the Royal Commision when it states that Reay also “did not check or review the drawings” created by Harding. Overall, Reay failed in his role as acting principal of ARCE by taking on a project no one within the firm was capable of completing in a competent manner. Despite Reay taking the contract, he also failed to give his subordinate the resources that were needed to successfully complete the project even though Reay knew that Harding had little experience. Therefore, Reay is just as unethical as Harding if not more.

Lack of Communication

Communication is a key skill to help ensure that a project is able to be completed successfully. Throughout the CTV building's lifetime, there failed to be proper communication between actors, which led to the progress of errors throughout. To properly evaluate how good the communication was, the core principle of communication including clarity, active listening, empathy, and feedback will be applied to see how the actors performed (Sahni, 2024). During the

permit approval process for the CTV building, Tapper and Bluck had many spirited discussions regarding if the drawings followed New Zealand building code. This is supported by Kurt Bayer when he states that, “The concerns often sparked "heated arguments" between his respected senior colleagues Mr Bluck and Mr Tapper” (Bayer, 2012). Bluck failed to practice active listening, which led to the discussion between Tapper and himself becoming very intense. This is due to Reay often bypassing the Tapper and going to Bluck to try and get consent for a building. Therefore, Bluck, rather than listening to Tapper was a puppet to Reay, who had inherent conflicts of interests. For this reason it can be said that Bluck failed to be fully engaged when speaking with Tapper because of the formation of bias that occurred during his conversations with Reay. Consequently, Bluck acted unethically by failing to fully listen to the very valid issues that his deputy had with the design of the CTV building. Another instance lacking proper communication would appear during the inspection of the building after the Darfield Earthquake.

After the Darfield Earthquake occurred, a multi-level inspection system called the Rapid Assessments consisting of multiple levels of escalation was used to examine the CTV building to ensure it was safe for re-occupation. The building passed level one with a note stating that their inspection was brief in nature (Wright & Greenhill, 2017). According to Wright and Greenhill,

> “The three building experts assembled for these inspections did not include an engineer, which was a requirement if they were going to conduct the next logical step - a Level 2 Rapid Assessment (an internal and external review). The trio were sent out without clear instructions on what they were supposed to do, and when they arrived at CTV and saw the green placard on the door the problem was clear: someone had done an L1 assessment

already and they couldn't do an L2. They decided to have a look around anyway" (Wright & Greenhill, 2017).

First, note that the three building experts selected for this task did not include an engineer; even though this was a necessary requirement in proceeding with the inspection to follow. Once the inspection was completed, the building manager sent the following email "We've just had an internal inspection from three engineers and they found the building was in good condition and has been deemed habitable", which was not the case (Bayer, 2012). There was an overall lack of clarity between the leadership at the CTV building as well as the trio, who were on the ground inspecting the building. This is supported by the trio being "sent out without clear instructions on what they were supposed to do" (Wright & Greenhill, 2017).

Conclusion

In conclusion, the human actors failed to employ the professional engineering virtues of competence and proper communication throughout the course of the case in different ways. Lack of competence was proven by engineers who never worked on a multi story building and a construction manager who faked his credentials to get there. Lack of communication occurred during the planning process by engineers who could not be in agreement and inspectors who lacked any true instructions on what they were supposed to do. Overall, this analysis showcases what engineers should be looking out for when working on projects so that they do not occur again. Many of these things were avoidable if the proper people were in place to prevent them. Going forward, it is imperative for engineers to recognize when they do not have the skills for a specific project and be willing to put aside pride and ask the necessary questions to learn, especially when people's lives are at stake.

Words: 3543

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