



BUSINESS COMPETITION AND INNOVATION: BUSINESS AND ETHICAL ISSUES IN ENGINEERING DISCUSSED VIA NARRATIVE FILMS

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Abstract

This paper addresses ethical issues related to competitive product design and innovation in engineering. It provides a multidisciplinary approach to engineering and business management proposing the benefit of using narrative films in engineering education. Either based on real events or completely fictional, narrative films combining ethical issues and aesthetic experiencing can stimulate important discussions relevant for contemporary engineering production, management, and behavioral approach. Narrative films can serve as simulators for identification with filmic characters and for anticipating one's own approach to ethical dilemmas. In discussing ethical concerns as relevant to engineering competition and innovation, the paper presents cases such as Robert Kearns versus Ford and Chrysler dated 1978-1992, and Preston Tucker against Big Three Automakers from 1940s. We discuss related narrative films: *Flash of Genius* from 2008 adapting Kearns' case and a fictionalized story of Preston Tucker and his innovative automobile, adapted in the film *Tucker: The Man and His Dream* in 1988. The paper expands on the work presented in the book *Professional and Business Ethics through Film: The Allure of Cinematic Presentation and Critical Thinking* from 2019. In addition, we discuss the 2019 film *The Current War* about 1880s competition between Edison and Westinghouse and Tesla over which electric power delivery system would be used in the United States.

Keywords

Ethics, Engineering, Competition, Innovation, Narrative films, Pedagogy

Introduction

This paper presents business, management, and ethical issues related to engineering competition and innovation. We suggest enhancing business and ethical education and behavior of engineers via discussions of relevant narrative films, the most prevalent artistic and entertainment form.

Consideration of fairness in engineering as well as other domains of human endeavors has been extensively studied via quantitative approach related to game theory. We suggest some articles describing cooperative games and issues of fairness. [1], [2], [3], [4]

In this work we take a qualitative approach for considering competition and innovation in engineering research and production, combining issues related to business decision making and issues related to creativity via artistic means, namely, via narrative films.

Using narrative films exploring ethical issues has already been proven as a successful approach when teaching professional and business ethics.

In "*Fictional Film in Engineering Ethics Education: With Miyazaki's The Wind Rises as Exemplar*" the authors argue for the benefit of using fiction films in classroom discussions to promote critical thinking cultivating virtues and considering stakeholder perspectives. [5] The authors further argue that fictional films offer an aesthetic experience allowing viewers to identify with characters and their ethical dilemmas, hence becoming personally involved.

The course "*Business Ethics: Critical Thinking through Film*" [6] was recognized as exceptional and did receive the *2017 Ideas Worth Teaching Award* from the Aspen Institute [7]. The related book *Professional and Business Ethics through Film: The Allure of Cinematic Presentation and Critical Thinking* describes several cases

and narrative films addressing ethical issues and dilemmas arising in professional and business settings.[8] The book elaborates on critical thinking and on normative ethical theories, subsequently presenting the structure and cinematic elements of narrative film. Narrative films are used for discussions dealing with ethical problems. This includes various corruptive activities including fraudulent behavior, social irresponsibility, and greedy machinations. In addition, the films presented ethical issues related to inequity and inequality, as well as cases related to harassment and violence due to whistleblowing. Related to career issues, the films presented cases of identity challenges and technological issues of losing privacy and cyber harassment. [8]

Among cases and films discussed in the book, two cases and relevant films discuss engineering ethical dilemmas and could be especially interesting for engineering education. Both cases and biographical films are related to innovation and competition in the automobile industry. These are the cases of Robert Kearns versus Ford and Chrysler dated 1978-1992, and Preston Tucker against Big Three automakers from 1940s. We discuss the film *Flash of Genius* (Marc Abraham, 2008) which is an adaptation of Kearns' case, and the film *Tucker: The Man and His Dream* (Francis Ford Coppola, 1988) presenting a case of Preston Tucker. In this paper we expand on the ethical issues discussed in those two films, elaborating on their potential to explicate ethical arguments related to the engineering profession. In addition, we discuss the film *The Current War* (Alfonso Gomez-Rejon, 2017), released in the USA in 2019. This film presents various ethical issues related to Tesla's and Westinghouse's invention of alternating current (AC) and Edison's opposition to change the established approach of direct current (DC), leading to "the war of the currents" to decide which electric power delivery system to use.

Engineering research and inventions leading to competition can create personal problems and involve lots of stress. Engineering innovations could lead to infringements and lawsuits. Engineering development offers possibilities to tackle some contemporary problems, and due consideration must be given to ethical issues, to possibly envision future consequences. Our goal is to add to ethical education of inventors and engineers, enforcing considerations of morality and virtues, and consideration of ethical perils dealing with competition and engineering innovation.

Narrative films provide examples allowing a spectator to imagine oneself in each position and think about possible responses to ethical dilemmas. Neuroscientists provided evidence of viewer's experiences considering identification with filmic characters. They discovered the activity of *mirror neurons* in the brain, termed *embodied simulation* [9]. Due to embodied simulation and similar neuronal wiring, a film viewer can imagine her/himself in such a situation and can feel similarly as a character presented in the film. Such a simulated environment could point to one's moral and ethical behavior, as when asking: what would I do in such a situation? Hence, future engineers, managers and inventors could profit by encountering ethical dilemmas and challenges in a simulated environment, in turn preparing them for fulfilling engineering careers. This approach to ethical education would enrich engineering student's experience offering various visual and dramatic elements. In addition, as film is an art form, viewers could benefit from various artistic elements enhancing creativity and ways of presenting messages visually as relevant for engineering innovation.

In discussing filmic characters, the viewer can ponder about normative ethical approaches used by different characters. Normative ethics describes rules governing ethical conduct and behavior. There are various normative ethical theories, differing in the prescribed rules for behavior. *Virtue Ethics* relates to character development of virtues, pondering questions: Who should I be? Who is my ideal? *Teleological (or consequentialist or goal ethics)* leads to activities emphasizing the result, or the consequence of actions. One can ask: who will profit from the activity? Often the consequentialist ethics is associated with the stance that the ending result justifies the method used. An activity would be viewed as morally right if the result/its consequences are more positive than negative. Various strands of teleological ethics include ethical egoism (when the activity/result benefits the agent), ethical relativism (if the activity benefits a group or an organization), and utilitarianism (if the activity benefits all). As opposed to teleological ethics, *deontological or duty ethics* emphasizes duties, regardless of consequences. One can ask oneself: How am I supposed to act? How will my activity impact society in a positive way? Philosopher Immanuel Kant (1724-1804) provided the dominant theory of duties and proclaimed a fundamental duty, called *Kant's Categorical Imperative*. It has several formulations, including the need to "act only according to that maxim whereby you can, at the same time, will that it should become a universal law."

On Competition

Competition is a human driving force towards establishing a better position than other competing individuals and/or other companies with similar lines of research and/or business. As such, competition has many positive consequences, but it can lead to ethical problems. Henry Clay (1777 –1852), a former US Secretary of State, stated that "*Of all human powers operating on the affairs of mankind, none is greater than that of competition.*" [10]

Benefits of competition regarding engineering research include drives for innovation leading to new or improved products and services. Ethical issues arise when the drive for profit (personal or firm's) overtakes professional or societal issues, discarding other's interests. As related to business practices, the paper "*Does Competition Destroy Ethical Behavior?*" elaborates on the factors that could lead to unethical market competition.

The paper lists various corruptive activities including fraud in accounting practices, using child labor, various unethical leadership activities and commercial activities interfering with teaching and research activities. [11]

On Engineering Invention and Innovation

Invention and innovation are two different concepts. An engineering *invention* denotes completed research and development of new products that is proposed, but not necessarily implemented yet. An *innovation* refers to the implementation and application of an invention, i.e., of a new product. Innovation implies new production, necessitating changes in previous production and creating financial issues for employees, shareholders, and stakeholders such as customers and society at large. In the paper “*Technological Innovation and Ethics*” the author argues that:

“...ethics cannot be cut out of innovation; therefore, innovation management should include analysis of the ethical impacts of innovation, both positive and negative. Moreover, innovation ethics is linked to politics, and therefore politics plays an important role. Policies have to deal with patents (laws) and the potential ethical impacts. Furthermore, innovation governance should avoid innovation ethical blindness, and therefore it should include a code of ethics for ethical innovation. We also need to introduce innovation ethics as part of the innovation management curriculum.” [12]

Business Roundtable [13] is an association of CEOs of American companies. In collaboration with business faculty, they established *The Business Roundtable Institute for Corporate Ethics*, serving as an independent entity considering ethical issues that could appear in companies.[14] *Policy Perspectives of Business Roundtable* present “TECHNOLOGY AND INNOVATION POLICY PRIORITIES: TOP RECOMMENDATIONS FOR THE ADMINISTRATION AND CONGRESS IN 2021” In writing about supporting collaborative research partnerships, the paper states that the federal government should:

“a. Expand the scope and funding for existing research programs that are collaborations of the private sector, academic and research institutions, federal agencies, and national labs (e.g., **the National Science Foundation’s Engineering Research Centers**, Industry-University Cooperative Research Centers, Manufacturing Institutes & Manufacturing Extension Partnerships, National AI Research Institutes Program, and National Quantum Initiative)...”[15]

The initiatives of *the Business Roundtable* include **innovation** and **technology**. Regarding *innovation*, it is stated:

“...Any innovation agenda must ensure a thriving economy for employees, their families and their communities so that America remains the global leader in innovation across all industry sectors for generations to come.” [16]

Hence, implementing innovation ethically implies consideration of how it will affect different stakeholders. As opposed to shareholders having a monetary interest in the company, stakeholders are all entities impacted by the innovation, including customers and society (e.g., city, state government, natural environment). Challenges of innovation include ensuring that inventions ‘match’ the needs of the market, monitoring and adjusting for unintended consequences of innovations, assessing the overall impact of innovations. In this paper we discuss three cases dealing with competition and innovation in engineering. Following the cases, we discuss relevant narrative films, adapting those cases.

Robert Kearns versus Ford and Chrysler and the film *Flash of Genius*

Robert Kearns (1927-2005) from Detroit was an engineer, inventor, and educator. During the World War II he served in the Office of Strategic Services, the forerunner of the US Central Intelligence Agency. After the war Kearns went to study engineering, earning a bachelor's degree in mechanical engineering, a master's degree in engineering mechanics, and a PhD degree from Case Institute of Technology. Following his studies, in 1957 Kearns accepted a professorship position at Wayne State University, becoming a tenured Associate Professor of Engineering Mechanics. In 1967 Kearns decided to become a building commissioner for the city of Detroit, leaving the university to pursue his new position.

Kearns is the inventor of the *intermittent windshield wipers*. He filled his patent on December 1, 1964. Wipers with different speeds provided an important invention, helping driver's visibility on rainy days. Kearns initially wanted to have a deal with Ford by ensuring a contract and secure a license. However, this effort did not go well and in 1969 Ford, as well as other car companies, proposed intermittent windshield wipers, however without mentioning Kearns' patent. Nine years later, in 1978 Kearns did sue Ford Motor Company for patent infringement.

Ford did not accept Kearns' arguments and insisted that Kearns' patent is not a valid patent, arguing that Kearns' invention does not have any new concepts. Kearns went to court but rejected an attorney and insisted on acting as his own defense lawyer. It was a lengthy battle, proving very stressful for Kearns. Finally, in 1990 it was decided by the jury that Ford indeed had infringed on Kearns' patent. The court accepted Kearns's argument that his *invention* included the use of electric motor to activate the wipers. This was different from the activity of Ford's engineers because they experimented with vacuum-operated wipers. Hence, the jury decided that Kearns indeed delivered an invention. Following the court decision, Ford decided to settle the case for \$10.1 million. Since Chrysler also used intermittent windshield wipers without acknowledging Kearns' invention, in 1982 Kearns also sued Chrysler for the same patent infringement. In 1992 Kearns won the award of \$18.7 million plus interest. Chrysler attempted to overturn the award, but in 1995 Chrysler's motion was rejected.

Kearns was certainly immensely proud of his engineering profession and wanted to get the proper acknowledgment for his invention. The legal battles with auto giants were very exhaustive, but Kearns insisted on the recognition of inventors' rights. His wish to manufacture his invention was not possible due to the interests of the big carmakers. Kearns' case epitomizes the clash of "*one man against the might of the industrial world and a patent system he believed had let him down.*" [17] In his article, Schudel describes Kearns' private life, including his desire to produce wipers with his children, mentioning his nervous breakdown in 1976, and his subsequent legal battles. While in the end Kearns got about \$30 million in settlements, he suffered personally via his divorce, losing his job, and having health problems. Kearns died in 2005 at the age of 77. [18]

John Seabrook in his *The New Yorker* article portrays Kearns' life, emphasizing Kearns' drive for recognition of his invention, and explains the development of US patent laws stating that such patent system "*is designed for the independent inventor—for the person whom Nikola Tesla described as “the lone worker who follows the fleeting inspiration of a moment and finally does something that has not been done before.*" [19]

The *US Court of Appeals for the Federal Circuit* was created in 1982. This resulted in a creation of favorable patent law giving inventors bigger influence over their patent, with less possibilities for infringement by manufacturing companies.

While the published information about Kearns' life and invention offers many details, it was the 2008 film *Flash of Genius* by director Marc Abraham that brought Kearns character to life. Presenting his battle in visual terms can provoke identification with the character, analyzing ethical issues an engineer/inventor could experience. Discussion of the film is presented in [9].

The film starts by introducing the character of Kearns through his mental breakdown and hospitalization in 1976, raising viewer's interest. Using flashback disrupting the standard timeframe, the film then presents earlier time with events leading to Kearns mental breakdown. As a contrast to the initial scene, we now see Kearns' family, including his wife and six kids. We see him at the university, as an effective engineering professor. Kearns provided ethical education for his engineering students, as related to engineering innovations and inventions. Namely, Kearns is seen as lecturing about engineering ethical challenges, stating that ethics is extremely important for engineering activity, providing examples with positive and negative consequences from engineering innovations. He emphasizes that an engineer "*designed the gas chambers at Auschwitz*", and that an engineer "*designed the artificial aortic heart valve*". Kearns concludes:

One man was responsible for helping save tens of thousands of lives, another man helped kill millions...
Everything we do in this classroom ultimately comes back to that notion. (The Flash of Genius, 2008)

This quote presents Kearns' approach to engineering profession, clearly considerate about possible ethical consequences of engineering inventions. The film then presents Kearns' invention of the motor-driven wipers, his wish to produce his wipers with the Ford corporation. While Ford initially asks for a prototype, eventually Ford decides to manufacture it by its own team. In 1978, dismissed from the hospital, Kearns starts his legal battle because of patent infringement, eventually deciding to function as his own legal attorney. The interesting courtroom scene shows Kearns talking about Charles Dickens' classic story *A Tale of Two Cities*. As a counterargument to Ford's claim that his invention did not provide new elements, Kearns said that Dickens did not invent new words, and yet Dickens' story is a classic and innovative literary work.

The film shows that ahead of the jury's deliberation, Ford Corporation offered a \$30 million settlement, but Kearns did not accept it. The reason Kearns' did not want to accept Ford's offer was Ford's unwillingness to recognize that Kearns was the inventor. Kearns clearly wanted recognition as an inventor, more than he wanted money, and insisted that he "*was being deprived not just of money but of his very identity as an inventor.*" [20] Finally, the jury decided that Ford would pay \$10.1 million damages for non-willful infringements of Kearns' patent. Clearly, this amount was much smaller than what Kearns rejected when it was initially offered \$30 million in settlement.

The film title *The Flash of Genius* is related to a test for patentability. This was part of the US patent law terminology from 1941 to 1952. The implication of the phrase “the flash of genius” refers to the fact that an inventor suddenly (in a flash) gets an innovative and creative idea. Talking about an invention, the case *Cuno Engineering Corp. v. Automatic Devices Corp.*, 314 U.S. 84 (1941) states,

“That Mead’s combination performed a new and useful function did not make it patentable. The new device, however useful, must reveal the flash of creative genius, not merely the skill of the calling. P.9 900.” [21]

In 1952 there was a change regarding the condition for patentability, “5 U.S.C. 103 Conditions for patentability; non-obvious subject matter” [22]” stating,

“A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section **102**, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.” [22]

The ethical dilemma for an engineer would be: how important is the acknowledgment of an invention as opposed to profit? The film shows Kearns’ wish to be recognized as the inventor, a wish more important than the money he could receive. This shows his character of a genuine inventor. The film presents his long battle with the legal system, going against big automakers.

Following the film, engineering students should discuss normative ethical approaches taken by various characters. When rejecting a large settlement and asking for proper recognition, Kearns acts according to virtue ethics and teleological or duty ethics. He didn’t look for profitable consequence, but acted as a genuine inventor, asking for proper recognition. In contrast, Ford Motor Corporation leadership acted according to consequentialist or goal ethics trying to maximize their profit, regardless of unlawful infringement of Kearns’ patent. In addition, film invites meditation on how far one would go with sacrificing one’s private life to achieve the required result. The answer depends on the viewer’s character, and it can be simulated by imaging oneself in Kearns’ position.

Preston Tucker, the Big Three automakers and the film *Tucker: The Man and His Dream*

Detroit engineer Preston Tucker (1903 –1956) designed an armored car for the military during World War II and after the war he continued proposing car safety designs including: disc brakes, seat belts, a pop out windshield, and head lights which swivel when turning. His Tucker 48 sedan nicknamed “Tucker Torpedo” used various innovative features. However, due to scandals and accusations of stock fraud, production of “Tucker Torpedo” was shut down in 1949. The 1988 biographical film *Tucker: The Man and His Dream* directed by Francis Ford Coppola presents Tucker’s ordeal. Coppola began development of a film in 1973. However, he did not continue until 1986 when he added George Lucas as a producer. The film presents an adaptation of Preston Tucker’s biography related to proposing business innovations while developing a new car model. There are various views about the involvement of the **Big Three** automakers (General Motors, Ford, and Chrysler) in the demise of Tucker’s enterprise. In the paper *The Tucker Car: Did the Big Guys Do It In?* the author writes:

“Let us also be careful not to add Tucker’s failure to any catalog of Big Three wrongs. There’s simply no evidence that any Big Three company was more than an innocent bystander while the Tucker venture was running its erratic course. Tucker did himself in and lost money for lots of trusting shareholders and prospective dealers at the same time. And Tucker was never a victim of anybody or anything other than his own ineptitude. The Tucker Torpedo was a dud from the start, and Tucker was the triggerman with faulty aim.” [23]

However, in the film *Tucker: The Man and His Dream* filmmakers Francis Ford Coppola and George Lucas show that Tucker faced animosity from the Big Three automakers, celebrating Tucker who unconditionally believed in the American dream. Tucker is presented as a likeable guy and a very creative and optimistic inventor. However, he was not a genuine businessman and did not know how to develop a proper business plan.

The film presents how launching “the car of tomorrow” in a spectacular way, the Tucker Corporation was met with enthusiasm from shareholders and the public. The production did not go smoothly, and the Tucker company board of directors attempted to take complete control of the company and to change the design of Tucker’s car to a more conventional design by eliminating the safety and engineering advances. The film shows that at the same time Tucker faces animosity from the Big Three automakers (Ford, General Motors, and Chrysler). After returning from his publicity campaign, Tucker made modifications to the engine, but was confronted with accusations of performing fraudulent stock activities. This starts ruining Tucker’s public image, but the ultimate courtroom battle is resolved when he parades his entire production run of 50 Tucker Torpedoes, proving that he has reached production status.

In the film Tucker is presented as an optimistic dreamer inspiring others to build a great car. However, he lacked pragmatic views about possible business problems. While his designs and safety innovations were pioneering, Tucker's business model lagged. As written in the paper *The Tucker 48: The Greatest Car That Ever Could Have Been*,

"In December 1946 (before the prototype was complete), Tucker had his car featured in the popular magazine *Science Illustrated*, with a model of the car photographed to look like it was production ready... Tucker took the company public, then began selling dealer franchises and accessories for cars that hadn't been built yet... The media began to allege that Preston Tucker was a scam artist, and that the car was a dog. Thousands of people that put money down on Tuckers began clamoring for their cars, and eventually, the government got involved. The Securities and Exchange Commission shut the company down on March 3, 1949, Tucker and his board of directors were indicted for fraud. The company's assets were auctioned off by the government in 1950." [24]

During the court deliberations, Tucker was defending himself and gave an inspiring and passionate speech. He emphasized how difficult is for an individual inventor/entrepreneur to pass the limitations and constraints posed by big car manufacturers. Tucker stated that "*if big business closes the door on the little guy with a new idea, we're closing the door on progress and sabotaging everything we fought for, everything that the country stands for.*" (Tucker: *The Man and His Dream*, 1988)

Eventually, Tucker was declared not guilty and was cleared on all charges. However, he went bankrupt a year later. This made him unable to mass produce his new car. Nonetheless, he did produce 50 Tucker Sedan cars and the film ends with the scene showing his cars driving in Chicago, with an admiring audience.

While Preston Tucker, as presented in the film, shows elements of virtue ethics due to his innovative spirit, creativity, courage, and optimism, he certainly had flaws leading to the demise of his enterprise. In his activity he follows a combination of duty and goal ethics. When asking for funding he certainly has a goal in mind, a goal to obtain enough funding to produce his 'dream car'. On the other hand, he seems to follow the duty of delivering a new safer car for the benefit of humanity. For an engineering student it is important to realize that the business aspect of delivering an innovative product is extremely important. Pragmatic elements of business deals require necessary involvement to survive in a competitive market.

Steve Lehto, the author of *Preston Tucker and His Battle to Build the Car of Tomorrow* wrote: "*Preston Tucker became a household name...People fell in love with the idea — a guy who will build a car that is different and remarkable.*" [25]

The film presents a scene with Tucker is about to enter the courthouse and he passes by the poster of Nicola Tesla. This clearly emphasizes the notion of the individual inventor since Tesla was the legendary inventor/engineer, facing many hindrances. In an article by Williams entitled *Tesla and Tucker: A tale of two startups* [26], Elon Musk, the CEO of Tesla, Inc. was compared with Preston Tucker. The article quotes Lehto writing, "*Is Tesla doing it on too large of a scale? It was a criticism of Tucker, who went out and got the largest factory in the world.*" [26]

Edison, Tesla, Westinghouse, and the film *The Current War*

The Current War (Alfonso Gomez-Rejon, 2017) is a historical drama about competition between Thomas Edison on one end and George Westinghouse and Nikola Tesla on the other, over which electric power delivery system would be used in the United States: either direct current (DC) or alternating current (AC). This 19th century competition is known as the "war of the currents". In addition to the businessman Westinghouse, the film depicts relation between two main inventors, Edison, and Tesla. It depicts various ethical issues surrounding their behaviors and competition in general.

Backed by financial tycoon J.P. Morgan, Edison is shown as sacrificing his ethical principles for success. In order to show how AC power could be dangerous, Edison creates the electric chair trying to attribute it to Westinghouse and uses animals to show how AC power can electrocute, hence is not safe for humans. Upon arrival in the USA, Nikola Tesla starts working with Edison, but leaves the company disappointed by Edison's unwillingness to reconsider his ideas. Tesla tried to work by himself, but he was not a businessman and had to accept working with Westinghouse on building a practical AC motor.

Edison eventually merges Edison Electric into General Electric. The competition between Edison's DC and Tesla's and Westinghouse's AC systems culminated by creating proposals for illumination of the 1893 World's Columbian Exposition in Chicago. Westinghouse and Tesla win and AC system is selected as power grid for the United States, ending "the war of currents".

The film presents various ethical issues around business practices and the nature of competition. Looking at normative ethical approaches taken by characters, obviously Edison follows consequentialist or goal ethics since his main wish is to preserve DC system and tries to win the competition at all costs. Edison's ethical dilemma is the conflict between going against his belief of not harming humans and by having a man executed to save his

company and invention. Hence, the dilemma is whether to stick to his morals and risk being outcompeted by Westinghouse, or to disregard his ethics and do what is helping his money and fame. The character of George Westinghouse shows elements of virtue ethics. He wants to leave a legacy for contributing to a better world. Nikola Tesla is shown as a first-rate creative inventor, a genius wishing to benefit the world with his inventions. He is shown as an idealist, not concerned with business activities. JP Morgan is shown as following ethical egoism by caring only for money.

Talking about the film, director Gomez-Rejon said that the film is about “*ego and humility and invention and responsibility*”. The producer Timur Bekmambetov said “*It’s a story about the responsibility of creators.*” [27] About Edison’s and Westinghouse’s characters, Director Gomez-Rejon said:

"How far would a man go to win? You had the ego and the ambition of Edison, who carefully curated his own image and wanted to be remembered. And then there are the rare people like Westinghouse, who didn't care about that. He was truly a benevolent industrialist and inventor and creator." [28]

The film presents both Edison and Westinghouse as having ethical and moral convictions but shows how such convictions could get overridden by considering fame and money. Edison had a vow never to harm humans but destroyed his ethical standing by deciding to execute a man and trying to blame it on his competitor’s AC invention. On the other hand, Westinghouse is presented as an honest man sticking to his ideals and moral virtues and wishing to make a world a better place. For an engineering student, such a story about engineering visionaries and the well-known ‘war of currents’ presents a possibility to think how they would act in such a position: either accept the new engineering paradigm beneficial for the society, regardless of the personal consequences, or stick to the older technology by thinking on personal gains. This could certainly create useful classroom discussions.

Conclusions

In this paper we presented three cases and related biographical films dealing with engineering inventions, competition, and ethical and moral issues. We discussed Robert Kearns against Ford and Chrysler from 1978-1992, Preston Tucker against Big Three automakers from 1940s, and the 1886-1893 competition between Edison and Westinghouse and Tesla over which electric power delivery system would be used in the United States. The following films were discussed: an adaptation of Kearns’ case in *Flash of Genius* from 2008, a story of Preston Tucker adapted in the film *Tucker: The Man and His Dream* in 1988, and Edison versus Westinghouse competition in the film *The Current War* from 2017. We argue for the educational benefit of using narrative films when teaching engineering ethics as related to innovations and competition. Using narrative films as simulators allows for identification with filmic characters, helping spectators to anticipate their own behavior when faced with ethical dilemmas.

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