The Corporation was created in the late sixteenth century through a series of government charters. As its potential to create vast amounts of prosperity and meet society's needs grew, the Corporation gained autonomy. A state law at the turn of the twentieth century allowed U.S. corporations to define the scope of their own charters without government oversight, which resulted in the variety of corporate forms that exist today, each with their specific advantages and all with the common goal of maximizing profit.

The modern Corporation is the backbone of the economy, with its employment, tax base, and unparalleled wealth creation for shareholders, executives, and charities. The Corporation is responsible for the economies of scale of assembly lines, the implementation of the Green Revolution, the efficiency gains from cheap energy, and the public health improvements from the innovation and manufacturing of lifesaving devices and medicines, including vaccines. Many believe there is no force more powerful to solve any crisis that humanity faces.[1]

The Corporation cultivates an image as "human, benevolent, and socially responsible"[2] although its core purpose is the pursuit of profit. Professors may debate[3] the extent of the Corporation's legal obligations to maximize profit, but there is no doubt that

financial returns are the primary expectation of shareholders and executives. The Corporation can voice public support for other social values, but that support cannot come at the expense of the fundamental responsibility of financial performance.

As society's most powerful engine of prosperity, it will come as no surprise that the Corporation is always at risk and is always under threat. A study of more than 25,000 publicly traded companies in North America between 1950 and 2009 found the average company lifespan is just ten years.[4] Regularly discussed risks to the Corporation include market competition, globalization, unemployment, cyber attacks, and the unavailability of finance. But another risk can contribute to the Corporation's downfall: scientific knowledge.

SCIENTIFIC KNOWLEDGE

Modern scientific knowledge, which dates back to the seventeenth century, is a way of producing knowledge that uses a process of observation, hypothesis formulation and testing, and results. These methods and results should be reproducible by others. Scientific research is often written up and reviewed by several experts before it is published in a scientific journal. There is no single "science" and there is no "the science." Instead, there are many different views on how to approach questions in a scientific way.

Scientific knowledge is just one form of knowledge, but it is arguably the most powerful and most trusted. Science is "supreme among belief systems in its ability to create new knowledge."[5] Science is "certainly the most reliable body of natural knowledge we have got"[6] and "the most reliable deliverer of knowledge society has ever known."[7]

DENIAL: A FIDUCIARY DUTY

Among the many achievements of science is its ability to uncover the existence and causes of human-made problems. The scientific process can lead to discoveries that challenge intuition—for example, that a communal water pump can spread cholera; giving teenagers certain antidepressants can actually increase their risk of suicide; the insecticide DDT can weaken birds' eggshells; industrial refrigerants and solvents can deplete ozone in the atmosphere. Scientific knowledge can also precipitate government regulations, as it did in each of these cases.

Therein lies the risk of scientific knowledge.

Science can establish possible harm caused by the Corporation's product or its means of production, that can in turn catalyze a change in consumer preferences or, worse, government regulation. New rules inevitably increase the cost of production and reduce revenue or market expansion.

On the one hand, the reliability of science makes scientific knowledge potentially dangerous to the Corporation. On the other hand, a fundamental principle of scientific knowledge is that it is always open to revision. This revisionist quality is what makes science dependable over long time periods, but it also creates opportunities to challenge science in the short term. Science takes all pushback seriously, regardless of motive.

Fiduciary duty obligates the Corporation to dispute scientific knowledge that threatens operations. While the Corporation may not be able to control the scientific process or consensus forever, significant delays can be achieved through funding scientific experts to dominate an academic discipline or introduce scientific controversy.

Science can be used to challenge science, in part because science is never 100 percent sure of anything and always open to

adjustment. Most features of scientific evidence can be easily and legitimately questioned. Which research questions are asked, how data are interpreted, the assumptions built into models, alternative hypotheses, uncertainty, confidence, the strengths and weaknesses of randomized controlled trials, the standards of statistical significance, possible confounding factors—almost every aspect of the scientific process presents an opportunity to refute independent research and a chance to show that the facts remain unsettled.

Scientific knowledge can be made and it can be unmade.[8] Progress gained toward scientific consensus can be lost. When scientific disagreements emerge, that division can undermine public confidence in experts or the science, and help buy time against burdensome regulations. *The Playbook* will help with the execution of this strategy.

DENIAL

Some professors have referred to attempts to challenges of scientific knowledge as "normatively inappropriate dissent"[9] while others use the simpler term "denial." Denial is most typically understood as a psychological reaction by an individual person, but, for the purposes here, that particular form of denial will be referred to as rejection.[10] Many instances of rejection have nothing to do with scientific knowledge—like a refusal to accept the existence of the Holocaust or that Barack Obama was born in the United States. Some scientific ideas that individuals reject—the safety of vaccines, or evolution by natural selection—did not originate with the Corporation.

Top-down, coordinated activities to discourage public acceptance of scientific knowledge—destroying, suppressing, conceal-

ing, challenging, or countering scientific evidence—are referred to here (in confidence) as denial. It is understood that some industries may consider these activities as "creating doubt" about a problem or a cause "without actually denying it."[11] The fact there is no broadly shared social understanding of the difference between doubt and denial or how to define denial is an advantage and there should be no attempt to clear up any confusion. However, in *The Playbook* the terms are clear: rejection is a psychological state; denial is a business operation.

Using these definitions, it is possible that the Corporation's employees do not personally reject a particular strain of scientific knowledge that they may nonetheless play a role in denying. Those hired to be part of a network to challenge scientific knowledge need only see themselves as doing their job or, in some cases, delivering value to their firm, clients, or shareholders. Individuals involved in the denial of scientific knowledge may come to see their participation simply as an obligation or a form of role-play, as opposed to genuine advocacy for an epistemic truth.

THE DENIAL OF SCIENTIFIC KNOWLEDGE

Denial of scientific knowledge that poses a risk to the Corporation may begin with preventing certain questions from even being asked. At times, "unsettling knowledge is thwarted from emerging in the first place, making it difficult to hold individuals legally liable for knowledge they can claim to have never possessed."[12] Pedants refer to this tactic as "strategic ignorance."

Other times, denial involves destroying and suppressing internally generated scientific knowledge that implicates the Corporation. The destruction or concealment of internal knowledge is

easier than destroying or suppressing knowledge that was created outside the Corporation. Manufacturers of vinyl chloride conducted their own studies on animals that showed vinyl chloride caused cancer, which those manufacturers could (and did) prevent from being publicized. When independent research later showed potential harms associated with vinyl chloride, the manufacturers were not able to destroy outside results, but they could pose a challenge to them. The vinyl chloride manufacturers questioned the utility of animal studies, despite having conducted animal studies themselves, and insisted that long-term epidemiological studies on humans be conducted before regulations be considered. They suppressed internal knowledge, challenged external knowledge, and successfully postponed burdensome regulations.[13]

A large portion of scientific denial may be characterized as bullshit. As philosopher Harry Frankfurt pointed out, "the essence of bullshit is not that it is *false* but that it is *phony*." Bullshit is "produced without concern with the truth" and therefore may or may not be true.[14]

In the early 1950s, several research studies in influential medical journals called attention to the link between cigarettes and lung cancer. Due to "the grave nature of a number of recently highly publicized research reports on the effect of cigarette smoking"[15] and the fact that cigarette sales showed a decline for the first time in more than two decades,[16] cigarette manufacturers met in December 1953 to mount a collective defense against the attack from medical knowledge. They decided to hire public relations firm Hill & Knowlton to defend the industry. On their side, Hill & Knowlton did not independently assess any medical research or seek opinions from experts.[17] Hill & Knowlton was there to support the goal of their clients, the cigarette companies, in a way that

aspired to be "conservative and long-range" without "any flashy or spectacular ballyhoo."[18]

The cigarette companies funded the denial of scientific knowledge, and hired a public relations firm to administer the bullshit. Hill & Knowlton challenged the science using tactics that were real but nevertheless phony, because the central objective was not scientific truth, but to create scientific confusion and regulatory delay on behalf of its clients. What was scientifically true was only relevant insofar as it served the objective to restore the sales of cigarettes.

DENIAL PAYS

Denial is an investment. Delay is the deliverable. The measure of success is the degree and duration of government gridlock—the "holding strategy" or the "not so fast" strategy[19]—that permits continued sales of the product.

Regulations can be so costly, leading to increases in production costs, forgone revenues, or both. After scientific research implicated neonicotinoids (a type of insecticide used on crops like soybeans) in the decline of bees, the European Union restricted their use in 2013. According to the CEO of Switzerland-based pesticide manufacturer Syngenta (now owned by Bayer) at that time, the new regulations led to a loss of $75 million for the company that year.[20] (That Syngenta did $13.6 billion in total sales in 2019 is beside the point.)[21] An executive for Luzenac America, the U.S. branch of a French talc mining company, said that if the National Toxicology Program's Report on Carcinogens listed talc in their report there would be "devastating consequences for the talc market worldwide." For Luzenac, the company would "see a virtual

immediate loss of our sales to the personal care market—around $10 million in sales the first year." Luzenac would also "likely suffer a deterioration of sales in all markets" in subsequent years and "civil litigation would likely skyrocket."[22] When a science-based regulation is likely to impose tens of millions of dollars in costs and snowball into more regulations and lawsuits, the justification for allocating funds to deny the science is clear.

Denial of scientific findings makes economic sense. The denial of climate change, arguably the boldest scientific denial that exists, cost at least $9.77 billion[23] from 2003 to 2018, but the payoffs, including effectively zero legally binding international policy, legitimize the expense. Cigarette manufacturers were under threat by science for decades before they lost their first court case in the 1990s. Industry-funded studies indicating that the chemical bisphenol A (BPA) was not likely to cause harm (despite independent research that showed otherwise) bought regulatory delays in the U.S. and the European Union.[24] Although denial efforts can be expensive, the costs can be shared by an entire sector or even several sectors.

There are three preconditions for scientific denial: 1) a company or industry for which 2) scientific knowledge 3) poses a genuine regulatory threat. If there is scientific knowledge, but no threat of science-based policy, there is little need for companies to spend money challenging science, just as if there are no taxes, elaborate tax avoidance efforts are unnecessary. The oil and gas industry has not worked to deny climate change outright in Brazil, because the oil and gas sector is not as economically powerful there as it is elsewhere. Instead of denying the link between fossil fuels and climate change, denial occurs about the role of the beef industry, which makes up almost 10 percent of the Brazilian economy.[25]

Agrochemical companies are actively leading efforts to challenge scientific authority in Argentina, the world's third-largest exporter of soybeans. Scientific knowledge and its denial are ultimately geopolitical.

A SHORT HISTORY OF SCIENTIFIC DENIAL

Scientific denial became an important part of business operations beginning in the twentieth century. Prior to that point, it was up to the manufacturers to know whether their product was harmful, which primarily meant harmful to workers. If the Corporation did not document an increase in disease from job-related activities in its workforce, regulations were unlikely.[26] Denial was unnecessary because the only oversight of the Corporation's affairs came from the Corporation itself. But the twentieth century saw an increase in government involvement.

The first wave of corporate-led scientific denial occurred in the early twentieth century over worker health and safety due to handling of hazardous materials, including radium, lead, and asbestos. Physicians were the main source of expert scientific understanding. By the mid-1920s, seven U.S. Radium Corporation employees had died from using the radioactive glow-in-the-dark paint, but U.S. Radium denied that the cause of their deteriorating bones was radium. In the 1920s, some refinery workers who had been exposed to lead as a new additive to gasoline showed concerning symptoms (such as memory loss and convulsions) and a handful eventually died. The Lead Industries Association endeavored to "correct misstatements" and "calm misapprehension" through the 1930s,[27] and companies continued selling leaded gasoline and paint, which lingers in households to this day.

Then the asbestos industry elevated the efforts to deny scientific knowledge. Several asbestos companies discovered in the 1920s and 1930s, through their own medical doctors, that workers who repeatedly breathed in dust from asbestos, a mineral fiber used as insulation, developed scar tissue in their lungs and some workers eventually suffocated. It was standard practice that company doctors would not tell a worker about signs of asbestosis (an illness for which the cause was regrettably made explicit in its name). Industry lawyers deleted passages from company medical documents that linked asbestos work to sickness. Johns Manville, the largest North American asbestos producer, suppressed a 1943 report that confirmed the link between asbestos and cancer. Compensation claims filed during that time period were settled out of court with a secrecy order and, due to both the social context of the Depression and the industry suppression of information (which insurance companies abetted), the first attempts at asbestos litigation were unsuccessful and then forgotten.[28] Then, decades later, in 1982, more than 16,000 workers threatened asbestos-related claims. Johns Manville was forced to declare bankruptcy but the lesson remained clear: denial bought the asbestos industry nearly five decades of regulation-free profits.

A second wave of denial occurred over consumer products, especially tobacco and pharmaceuticals. Cigarette manufacturers conceived of scientific denial as a "holding strategy"[29] and "sand in the gears."[30] They achieved a half century without regulation. The manufacturers even accomplished a short-term increase in consumption in the U.S., where smoking grew 20 percent between 1954, when tobacco companies launched their denial efforts, and 1961 (387 billion cigarettes a year to more than half a trillion).[31]

A third wave of denial occurred in response to the environmental and animal protection movements, and can be seen in the energy sector, the chemical manufacturers, forestry, and food production, including the meat, dairy, and aquaculture industries. Fossil fuel companies and their network of allies benefited from tobacco's experience and likewise achieved regulatory delays, all while forging their own new methods for denying scientific knowledge. Global greenhouse gas emissions were the highest in world history in 2018—thirty years after the first testimony on greenhouse gases and climate change before the U.S. Congress (and thirty years after the establishment of the Intergovernmental Panel on Climate Change). Just like cigarette manufacturers, fossil fuel companies put aside their differences, their belief in competition, and their employees' personal moral standards, and came together to fight the threat of scientific knowledge and its impact on public perception and, ultimately, government policy.

A RANGE OF DENIAL

Sometimes, the stakes are high enough to justify extreme denial. A prime example is the bold campaign to deny the existence of climate change, which threatened one of the largest and richest industries in the world. Energy producers came together to challenge not only the cause of climate change, not only the people studying it, and not only the policies, but the entire problem of climate change itself. The denial of climate change required titanic investment and coordination but offered handsome payoffs.

Other times, denial may be more moderate. Merck Pharmaceuticals sponsored research that misrepresented the safety of

its arthritis relief medication Vioxx, which caused heart attacks and strokes in many of its users. It allegedly paid scientists and its sales representatives to also misrepresent the drug's safety.[32] Once medical research revealed that Vioxx was unsafe, Merck also allegedly tried to suppress research on the dangers of Vioxx. However, Merck never went quite so far as to launch a campaign to deny the publicly available scientific findings (they did take Vioxx off the market in 2004 and later pled guilty to criminal charges, but they expressly denied that they misrepresented the drug's safety or suppressed research).[33] There are degrees of denial, and the Corporation must choose the best fit for its situation, while always adapting to cultural shifts and new political and technological landscapes.

FOCUS ON THE SHORT RUN

It is important to stay focused on the short-run benefits of denial. There are long-term risks associated with denying scientific knowledge. The Corporation might jeopardize institutions, including trust in science, the media, and possibly even democracy as a political system. Scientific denial may result in compromises to human health. Many industries, including tobacco,[34] have worked to undermine the public trust in national health organizations, which may mean less preparation for a global health crisis.

Philosopher of science Thomas Kuhn noted that nothing guarantees that science will go on forever. Kuhn said in a 1991 interview, "There was a beginning to [science]. There are lots of societies that don't have it. It takes very special conditions to support it. Those social conditions are now getting harder to find. Of course it could end."[35]

Would losing the authority of science really be that bad? Fortunately, the question about the large-scale, social effects of undermining scientific knowledge are not central to the Corporation's immediate financial performance. Corporate executives are under immense pressure to deliver quarterly earnings, not to save science, democracy, or the planet.

Long-term implications of denial campaigns lie outside the Corporation's singular and short-term goal to generate revenue, and they should lie outside any individual employee's purview, too. The Corporation must convey, preferably implicitly, that scientific denial is part of fiduciary duty, and that duty takes precedence over any individual employee's morality. Denial can be easily rationalized by executives, as well as by most employees. A former manager for Johns Manville, the asbestos manufacturer, explained, "At Manville, denial became endemic to the corporate culture, so much so that even after top executives had recognized health and safety as a critical issue, many middle- and lower-level managers continued to hide behind rationalizations."[36]

Research has shown that the Corporation can create a culture and incentive structure that is maximally conducive to scientific denial and overrule to a large extent any individual's belief in what is right or wrong. The banking sector has successfully created a culture that encourages dishonesty for monetary gain. An experiment involving hundreds of Europeans showed that bankers are more morally conflicted than other social groups. If they did not think about their professional identity, bankers were just as honest in the experiment as the general population, but when their "banker" identity was activated, bankers were less honest than prison inmates.[37] The culture of the workplace can hold remarkable sway over an individual employee's conscience.

DISCRETION

The denial of scientific knowledge is a delicate subject that must be treated with discretion. It will never be addressed in a TED talk, at a roundtable at Davos, or in the pages of *Fortune* magazine. *The Playbook* is strictly confidential for use only by trusted members of the Corporation.

Any evidence of executing the tactics outlined here should be contained and eventually destroyed. The discovery by the public that there has been an intentional effort by the Corporation to undermine or suppress scientific knowledge can lead to backlash. Judges and juries who may eventually be called upon to assess punitive damages may be angered by evidence that the Corporation in fact had internal knowledge of potential harms, yet denied outside knowledge of those same harms. Energy companies like Exxon, BP, and Shell are under attack from claims that they mounted a long-term effort to oppose action to mitigate carbon emissions while having internal knowledge of climate science.[38] Car manufacturers like General Motors and Ford are in a similar predicament.[39] DuPont settled thousands of lawsuits alleging that one of their chemicals (perfluorooctanoic acid) had contaminated Ohio and West Virginia drinking water.[40] Part of the case rests on the claim that DuPont knew the chemical caused disease and concealed that knowledge.[41]

Deny, and then destroy or conceal evidence of denial—a form of second-order denial. As one historian put it, first falsify the science, then falsify the history.[42] If the topic ever comes up, follow the lead of the General Motors spokesperson who responded to allegations in 2020 about the company's previous denial of scien-

tific knowledge with: "There is nothing we can say about events that happened one or two generations ago since they are irrelevant to the company's positions and strategy today."[43]

There have been unfortunate moments when denial-related documents have been published through whistleblowers, leaks, or during pretrial discovery and legal settlements. Four thousand pages of historical documents from Brown & Williamson Tobacco Corporation made their way to a university professor, who gave them to *The New York Times*.[44] The disclosure of 40 million pages of tobacco industry documents through the Master Settlement Agreement was also a setback for cigarette manufacturers. One early climate change denial campaign was dissolved after memos related to the public relations campaign were leaked to the press.[45]

Those who work to expose the denial of scientific knowledge, including activists, journalists, historians of science, and some sociologists, have been cause for concern. The activists running the Climate Investigations Center have beleaguered the fossil fuel industry. Monsanto-obsessed reporter Carey Gillam has tormented chemical manufacturers. Historians of science Erik Conway and Naomi Oreskes harassed the handful of Cold War scientists who denied science on behalf of many industries with their book on the subject. Robert Proctor has viciously attacked the cigarette manufacturers, has named the university historians who had testified on behalf of the tobacco industry,[46] and in his book *Golden Holocaust* drolly thanked "those many cigarette industry lawyers [fourteen in total] with whom I have sparred over the past dozen-odd years."[47] Historian Stanton Glantz glibly claimed that his years exposing the tobacco industry's tactics prevented a midlife crisis.[48]

Fortunately, the number of activists, reporters, and professors interested in this subject is few and there is no institutional support to incentivize researchers who work on denial to act together in any strategic way. To date, there is no top-ranked university that has created a department where experts convene to study scientific denial or consider how to protect science from the interests of free enterprise. Only one major news organization has a designated "disinformation" unit. There is no undergraduate program of study that prepares students for denial and disinformation. There is a course here and there (such as Carl Bergstrom and Jevin West's "Calling Bullshit"), a few books, a few dozen scientific articles, and some long-form reporting. But the work has not coalesced into the power of an actual field of research or public policy. Nobody has gotten out in front of the Corporation. Everybody is reacting. This is all for the best (although see the chapter on Near-Term Threats).

As a result, citizens are naive and often fail to discern or prevent the tactics of denial. Students at Princeton University who heard fossil fuel industry ally[49] and professor emeritus William Happer speak in 2017 told their professor afterward that they did not know how to respond to scientists like him who question climate change.[50] This kind of paralysis among students at an elite university is testament to *The Playbook*'s achievements. The more people understand about denial strategies, the harder it will be for the Corporation to achieve regulatory gridlock.

On a somber note, sometimes a denial effort fails. The trade association for the nuclear energy industry hired the best public relations firm and a polling and marketing research firm to launch an expensive campaign in 2006 in an attempt to win over public support for the Yucca Mountain Project, a repository for nuclear

waste. Opposition to the project actually grew and plans for the repository were abandoned in 2011.[51] Climate change denial has not yet taken strong root in Germany, although many have tried.[52] These failures present learning opportunities.

There are also rare cases when employees or even entire companies rebel. In many cases, subversion can be quietly and effectively addressed. After an Exxon employee pointed out in a 2020 meeting with managers and executives the contradiction that Exxon had publicly acknowledged the need to reduce emissions, but nevertheless had internal plans to grow emissions, he claimed he received a poor performance review and says he was pushed out of the company.[53]

Other times, an insurrection can be disruptive. In 1997, BP broke ranks with the other major Western energy companies and admitted to the existence of man-made climate change. In 2015, a handful of top executives left Edelman, the world's largest public relations firm, because of Edelman's representation of fossil fuel companies and climate change denial, which created a public relations issue for the public relations firm (Edelman caved in to the pressure and says it no longer represents fossil fuel companies).[54] In the mid-twentieth century, Dr. Kenneth Smith, a former doctor for the asbestos manufacturer Johns Manville, went against company advice and gave a deposition stating that the company indeed knew of the hazards workers faced because workers received regular X-rays. The lawyer who deposed the doctor said, "As for Dr. Smith's motive in revealing all this incriminating evidence, I can only tell you what I surmise. I think that his conscience was bothering him and that he wanted to set the record straight."[55]

Fortunately, the Corporation is not bound by a conscience. The denial of scientific knowledge is simply part of fiduciary duty. An