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Moral Imperative

If you see something that is not right, not fair, not just, you have a moral obligation to do something about it.

Rep. John Lewis
U.S. Congressman

When I was a young man and my father told me to leave the world a better place than I found it, it appealed to me as a nice sentiment. Now, his advice strikes me as a moral imperative.

The world is screaming to be made better. We look around: tragedy and misery abound.

Foreign states hack the infrastructure of governments and their economies.¹ Deep fakes, bots, trolls, and fake news are capitalizing on our political and cultural divisions.^{2,3,4} Malware monitors our computer activity and steals our passwords.⁵ And ransomware captures our computers and holds our companies, records, projects, finances, and health hostage.⁶ Our preferences are sold to advertisers, our privacy lost.⁷

Our excesses are overloading our trash dumps, fouling our oceans, and polluting our rivers and air.⁸ Each year, U.S. municipalities dispose of approximately 250 million tons of solid waste left over from our consumption.⁹ The “Great Pacific Garbage Patch” of plastic waste is estimated to be at least 79,000 tons of stuff that doesn’t make it into the dumps, but instead floats inside an area of 617,000 square miles, an area more than twice the size of the state of Texas.¹⁰

In the U.S., more than 33 million people, including five million children, are going hungry, according to the US Department of Agriculture.¹¹ 12.8% of Americans live in poverty.¹² Throughout the world, 183 million people in 47 countries are on the edge of hunger, with 135 million more suffering from malnutrition.¹³ The World Bank reports that in 2020, after nearly a quarter of a century of steady global declines in extreme poverty, poverty reduction had its worst setback in decades.¹⁴ The report estimates that as many as 115 million more people have been pushed into extreme poverty during the COVID pandemic. This is a level of poverty that economist Jeffrey Sachs calls “poverty that kills.”¹⁵

As I write this in January 2023, the world has experienced 6.7 million deaths due to COVID-19.¹⁶ 1.1 million COVID deaths have occurred in the United States and over 100 million Americans have been infected. At its worst, 10 million jobs in the United States were lost due to the pandemic.¹⁷ And each day, 800 small businesses were closing for good.¹⁸ Globally, the equivalent of 255 million full-time jobs were lost with \$3.7 trillion in lost income.¹⁹

In 2021, due to the pandemic, drug overdoses, and the rise in diseases, life expectancy in the United States dropped to 76.1 years from a peak of 78.8 years in 2019 and is the lowest life expectancy among countries with large economies.^{20,21} Americans can now expect to live only as long as they could

back in 1996. This continues a trend since 2016 that represents the longest consecutive decline in lifespan since World War I.²² Addictive drugs have taken hundreds of thousands of lives.²³ In 2017, the U.S. suicide rate was 33% higher than in 1999 and was the highest rate since World War II.²⁴ One in three Americans know someone who has committed suicide,²⁵ the same number who know someone who has died from drug addiction.²⁶ In 2020, aggravated assaults and gun assaults rose significantly in the United States, and homicide rates were 30% higher than in 2019, an historic increase.²⁷

In 2021, 3,597 children in the U.S. died by gunfire and guns are now the leading cause of deaths for children ages 1–18 and more die from gunfire than from auto accidents, cancer, or drug overdoses.²⁸

Human-generated greenhouse gasses have resulted in melting glaciers, rising ocean levels, extreme weather events, and lost species.²⁹ From 2010 to 2019, the world saw nearly twice as many days (14 days per year) above 122°F as in the previous three decades.³⁰ The United Nations' panel of climate scientists (IPCC) warned that based on the most recent action plans submitted by 191 countries to curb greenhouse gas emissions, the planet is on track to warm by more than 2.7°C by the end of the century, far above what scientist and world leaders have agreed is the acceptable upper limit of global warming.³¹

But climate change is not some far-off prediction; it is happening now and extreme weather is having devastating effects. In 2018, a raging forest fire in my home state of California destroyed the town of Paradise, killing 85 people and the population of the town fell by 92%.³² Since 2000, the annual average of 7 million acres burned is more than double the annual acreage burned in the 1990s.³³ In February of 2021, Texas and other southern states experienced a severe cold snap that killed 58 people, knocked out power for millions, and froze pipes that burst and flooded homes.³⁴ In July 2021, a heat wave killed hundreds of people in western U.S. states as temperatures reached all-time highs.³⁵ And in September 2022, Hurricane Ian hit the coast of southwestern Florida, causing \$60 billion in insured losses³⁶ and at least 114 deaths.³⁷ The latest IPCC report concluded that things will get much worse unless systemic transitions and transformational changes are made to safeguard human well-being.³⁸

Much of the misery we see is human-made. Even the impact of natural disasters, such as extreme weather and COVID-19, are caused or worsened by human behavior and policies. The world we live in today—for good and bad, better and worse—is the result of our own doing, the consequence of our own personal, corporate, and governmental actions.

Is this the world we want?

In many ways we got ourselves into this mess. And in any case, we can get ourselves out of it—we must. There is hope. We can change things. It's in our nature. But Nelson Mandela reminds us, "As long as poverty, injustice, and gross inequality persist in our world, none of us can truly rest."³⁹ And as Dr. King would say, "We are confronted with the fierce urgency of now."⁴⁰

To Design Is Human

I contend that the characteristic that makes our species distinctively human—that which defines us and leaves our mark on the world—is not our exceptional intelligence, our language, or our use of tools, but humankind's ability to use these powerful resources in combination to create objects, processes, policies, institutions, and environments that go beyond the current condition in which we find ourselves to fashion a world that does not yet exist. That is, what defines human beings is our ability to plan, to create, to solve problems, and in so doing, to aspire to a different world. What is distinctively human is our ability to *design*. If other species are evolutionarily tuned to blend in, run, or hunt, we are evolutionarily tuned to design. It is through our designs that we will have a better world, that we will survive. . . or if we fail at it, perhaps not.

Design is the organizing concept that we explore in this book. We will see how it is that we've designed the world we live in, for good and bad. And we will see that by thinking of design as the everyday way that we all cope with and change our world, we can design not just to make new things, new services, and new experiences but to make the world a better place.

The prospect that our world will get more unequal, more hot, more contentious, more complex, and more challenging, means that our response—our designs—will need to meet those challenges. More and more people will need to take on the role of designer, in one way or another. And this role need not only include professional designers and specialized design teams and companies, but encompass everyday people, neighborhoods, and communities, as these complex challenges play out differently in local situations. Do we need product designers, software developers, engineers, architects, and urban planners? Most certainly. But also, teachers, healthcare providers, social workers, lawyers, managers, legislators, social influencers, and retirees. Church congregations and social clubs, men's groups and women's groups, fraternities and sororities, block clubs, and book clubs. Working together in twos, tens, and hundreds, we can improve our neighborhood, our city, our country, our world.

By participating in designs, we all have a moral obligation. Each of us, in our own way, has an obligation to see that designs make the world a better place by funding, creating, supporting, implementing, purchasing and using designs that improve not only our own condition, but also the condition of our fellow humans, our community, our country, and the world.

In this book, you will see some appalling designs that create harm and destroy people's lives, sometimes inadvertently, sometimes through casual disregard, and too often, through greed and malice. You will also see designs that solve problems, save lives, and bring great joy. This book will lay a foundation for telling the differences between them. It will provide you with analyses, ideas, and moral principles that have practical implications for real design situations and for making the world better.

I hope this book convinces you of the urgency of our situation and inspires you to act. The designed world surrounds us, defines us, and challenges us. The future of the world and the human race may very well depend on our ability to develop the creative, innovative, and moral capacities of each of our citizens so that our future designs will meet the challenges of the increasingly complex and critical problems we face. It is your passion, purpose, and values, coupled with your creative ideas and efforts, and those of many others can help get us from where we are today to where we ought to be. We do now and will forevermore live in a designed world. And it is imperative that we—all of us—design it better.

Moral Responsibility of Designers

Designs can be good or bad. And I firmly believe that designers have a special moral role in making the world a better place. I'm convinced that, in light of the immense challenges we face, it is the passion, purpose, and moral values of designers that will make a difference in the world.

But, a voice from the sidelines says that it is none of your business. In his book *The Philosophy of Design*, professor Glenn Parsons claims:

One might agree that Design has the potential to reshape society in profound ways, but still maintain that this is not really the Designer's concern. The Designer, it might be said, should not concern herself with these larger problems, or try to engage in "comprehensive designing." Rather, she should merely "stick to the brief." These larger issues are the proper concern, not of Designers, but of someone else—perhaps the companies who decide which sorts of designs to commission or put into production, or perhaps the politicians whose job it is to regulate the use of certain products.⁴¹

He goes on to say:

It is true, of course, that Designers, like other professionals, are significantly constrained by the economic system in which they work—they are not free to reshape the world at their whim, but must satisfy their corporate masters.

By denying designers the right or obligation to participate in the moral aspects of their designs, Parsons assigns that right to those with the monetary resources needed to hire others—their “corporate masters.” Corporations, politicians, and regulators have moral responsibilities, of course. However, one must ask, why would the possession of money give those that have it a special moral status that allows them to, in effect, set the moral agenda for society and shape it in the way they see fit? And why should designers assume that politicians and regulators have all the moral bases covered?

Unfortunately, the motives of business owners and investors—those with the resources to hire people—are too often driven by the bottom line rather than a desire to make the world a better place. Too often the bottom line favors design ideas that make money in the short term, but degrade the overall quality of our society and world. And too often, politicians are beholden to special interests and regulating agencies are headed by people from the industries they regulate. So, why should we put our well-being and our lives exclusively in the hands of corporations and regulators? We have moral rights, responsibilities, and obligations, too. All of us are moral agents.

Neither designers nor anyone else give up their moral agency merely because they are employees or subject to being fired. Professional designers do not give up their humanity along with giving their labor, when hired. We are responsible for our own behavior. And as professionals, we owe an employer or our client not just our labor, skill, and expertise but our professional advice, including advice on the ethics or morality of a design, if the project implies it.

However, I do agree with Parsons on at least one thing: designs have the potential to reshape society in profound ways. Designers are in a unique position—maybe even more so than pastors, rabbis, mullahs, and philosophers—to shape our moral behavior. In his book *What Things Do*, philosophy professor Peter-Paul Verbeek, contends that the way we perceive and act in the world is mediated by designs and interacting with designs shapes our behavior.⁴² Designs are created with certain functions, or affordances, that enable users to act in the world in ways that are easier or more efficient, increasing or decreasing the likelihood of these actions. Or they make certain behaviors possible that users couldn’t do otherwise. Hammers are designed to be pounded, cars to be driven, cigarettes to be smoked, guns to be shot; so, with these artifacts, we pound, drive, smoke, and shoot.

In these ways, Verbeek contends, designs “materialize morality”⁴³ With the creation of designs, designers are often building in features and capabilities that, with their use and impact, have moral implications. It is in this way that designers have a special moral responsibility. They must think not only about the features they invent and intensions of their designs—what they would like to happen—but think about the moral impact, the consequences of their use.

The Designed World

Humans have been designing since the beginning. But human invention has grown exponentially and it has only been in the last 200 years that humans have come to be enveloped in the designed world, with all its desired benefits . . . and unintended consequences.

The Industrial Revolution was a major turning point in human history. It started with refinements of steam-powered engines in Great Britain in the mid-18th century that made them useful initially in the production of textiles. By the late 18th and early 19th century, the revolution was fully developed in Great Britain and established in the United States. Steam engines were particularly important in the growth of the United States, where they powered locomotives and river boats, facilitating movement across the huge land mass and river networks as the new nation expanded.

In 1844, a new power source, electricity, proved its practical use with the invention of the telegraph, introducing what some call the Second Industrial Revolution.⁴⁴ By 1866, a telegraph line had been laid across the Atlantic between Europe and the United States.⁴⁵ Ten years later, Alexander Graham Bell was awarded the first U.S. patent for the telephone. Thomas Edison invented the first practical electric light bulb in 1878.⁴⁶ With the widespread generation and transmission of electricity, electric lightbulbs replaced the use of candles and gas lights. The potential of this Second Industrial Revolution was fully realized with the invention of the AC electric motor by Nikola Tesla in 1887.

In 1946, the year I was born, the first electronic general-purpose computer, ENIAC, was also born and it launched the Third Industrial Revolution. It filled a 50-foot room and weighed 30 tons.⁴⁷ At the time, Thomas Watson, the President of IBM, thought the worldwide market for computers was five, at the most.⁴⁸ The early internet was established in 1969 and the World Wide Web in 1989.

The Fourth Industrial Revolution, which builds on the computer revolution, consists of three technological megatrends—physical, digital, and biological—that are impacting our economy, businesses, governments, society, and individuals.⁴⁹ These trends are the result of an explosion of digital devices and their interconnectivity, including the internet of things (IoT), sensors, virtual and augmented reality (VR and AR), biotechnologies, neuro-technologies, artificial intelligence and robotics, and blockchains.

These revolutions have had a dramatic impact on our world and our everyday lives. Prior to the Industrial Revolution, most humans survived off the land. Objects were made by hand in cottages or small shops. Most people lived a relatively simple life, rarely traveling far from their home or place of birth. Since then, there has hardly been an aspect of daily life these revolutions have not touched, often in ways not anticipated.

While Watson believed that the world would only need five computers, 349 million personal computers were sold around the world in 2021 alone.⁵⁰ There are now 15 billion mobile devices in the world⁵¹ and approximately 5 billion of the world's 7.7 billion people have accessed the internet.⁵² The world's internet users make approximately 3.5 billion Google searches of the World Wide Web every day,⁵³ 2.45 billion users are active Facebook members,⁵⁴ \$4.2 trillion worth of online purchases were made in 2020,⁵⁵ and 293 billion emails were sent and received every day in 2019.⁵⁶

To give you a sense of how fast things have changed, my grandparents were born in an era of horse and buggy; they raised my parents in the age of the automobile; and before they died, my grandparents saw Neil Armstrong take “one small step.” In the span of a single lifetime, humankind moved from a form of transportation that they had used for 4,000 years to one that landed them on the moon.

The best of times

During the last 200 years, we came to live in a fully designed world, from the clothes we wear, the houses we live in, the food we eat, and the cars we drive to the “natural” world that surrounds us—the grass in our yard and 51% of U.S. land mass that are crops and pastures.⁵⁷ But has all this made the world better?

Despite my bleak assessment, so far, the answer is a qualified “yes.”

The design of new machines, products, and processes have become a principle driver of our economy, and since the 19th century, have created a vast amount of economic wealth, as shown in a chart of gains in per capita gross domestic product (GDP) (see Figure 1.1).

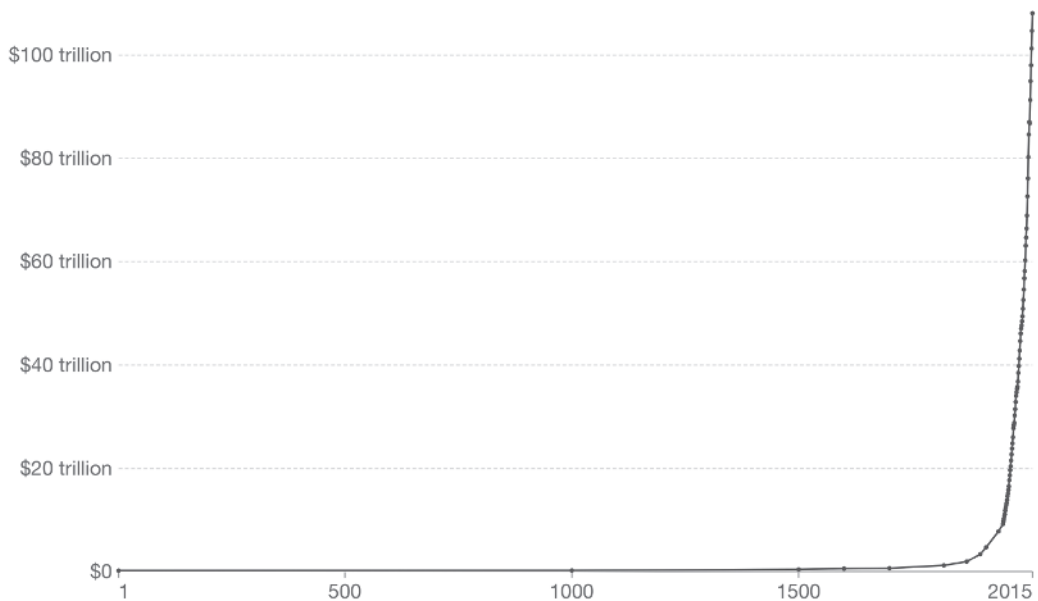
These revolutions also unlocked a different way of thinking about the world. We’ve come to think that if there is a problem, if there is a need, a new invention or a new idea can take care of it. Prior to the Industrial Revolution and its intellectual cousins, the Scientific Revolution and the Enlightenment, the world was pretty much taken for granted as it was. Change was incremental and came slowly. Since the Industrial Revolution, change is the norm, and the faster, the better.

Take, for example, the biological and health sciences. Plagues have wreaked havoc on the world throughout history.⁵⁸ And as late as 1900, the three leading causes of death were pneumonia, tuberculosis, and diarrhea and enteritis, which caused one third of all deaths while 30% of all deaths occurred among children aged less than 5 years.⁵⁹ It was less than 100 years ago, in 1928, that the antibacterial properties of penicillin were discovered and the drug was applied to treat a range of illnesses, including diarrhea, pneumonia, urinary tract infections, meningitis, syphilis, and gonorrhea. A vaccine was discovered for tuberculosis in 1921, for polio in 1955, and for measles in 1968. Smallpox was declared eradicated in 1977. And, the cocktail of drugs to treat human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) was designed in 1997. In late 2019, the world was hit by COVID-19. In response, the pharmaceutical industry, with government encouragement and support, designed the first approved vaccine within 7 months. Within 9 months, 11 vaccines had been approved for use around the world.⁶⁰

World GDP over the last two millennia

Total output of the world economy; adjusted for inflation and expressed in international-\$ in 2011 prices.

Our World
in Data



Source: World GDP - Our World In Data based on World Bank & Maddison (2017)

OurWorldInData.org/economic-growth • CC BY

Figure 1.1 World GDP (Source: Our World in Data).

In his book *Enlightenment Now*, Harvard professor Steven Pinker documents a wide range of positive social impacts of these developments.⁶¹ For instance, from 1990 to 2017, child mortality across the world dropped from 9.3% to 3.9%. During that same period, deaths around the world due to diarrhea dropped from 1.7 million to 580,000. The share of the earth's children under 5 years old who suffer from malnutrition dropped from 25% in 1990 to 13.5% in 2017.⁶² The number of people in the world living in extreme poverty dropped from 1.9 billion in 1990 to 730 million in 2015.⁶³ Correspondingly, life expectancy around the world grew from 32 years in 1900 to an amazing 72 years in 2018.⁶⁴ The global literacy rate grew from 21% in 1900 to 86% in 2016.⁶⁵ The global rate of primary school completion rose from 74% in 1970 to nearly 90% in 2016.⁶⁶

We have designed a truly amazing world.

The worst of times

However, our designs have not always made the world a better place, as noted in the opening of this book. There is a dark side to Pinker's rosy picture of progressive improvement. And then, of course, in 2020, there was a pandemic reset.

While, as Pinker claims, new designs and developments have driven dramatic economic growth, huge inequities remain in wealth between countries, most dramatically played out in GDP, the market value of all the goods and services produced by a country. In 2016, the per-person GDP for Singapore was about \$65,000; it was \$50,000 in the United States, \$45,000 in Germany, and \$37,000 in the United Kingdom, but it was only about \$8,000 per person in Paraguay, \$6,100 in India, and \$3,500 in Zimbabwe.⁶⁷ While the child mortality rate was .7% in the United States and .3% in Norway in 2017, it was 7.5% in Pakistan and 12.7% in Somalia.⁶⁸ In education, the rate for completion of lower secondary school is universal in Sweden, France, and South Korea as well as many other rich countries.⁶⁹ But it's only 71% in Brazil, 48% in Iraq, and in Chad, it's only 15% overall, with only a 10% completion rate for girls.⁷⁰

But even within rich countries there are huge disparities in the distribution of the benefits of our designed world. For example, in the United States, wealth distribution is highly unequal. The top 1% of the wealthiest people own 32% of the country's wealth and the top 10% own 69%.⁷¹ The bottom 50% own only 2.8% of the wealth.

There are significant wealth and income differences among other groups. For example, there is a significant pay gap between men and women, particularly with a college degree, with women making only 74 cents for every dollar that college-educated men make.⁷²

The income gap is even larger for some racial/ethnic groups. In 2019, the median annual family income for Black Americans was \$58,500, and \$61,000 for Hispanics, while it was \$97,000 for Whites and \$112,000 for Asians. As for accumulated wealth, the median for Black families was \$17,000 and \$21,000 for Hispanic families, while it was \$171,000 for White families.⁷³ Even with a college degree, Blacks have a lower income and the difference between them and Whites with a degree has increased in recent years.⁷⁴

Prior to the pandemic, there were 34 million Americans living in poverty, and the poverty rate was 10.5%.⁷⁵ Black Americans are more than twice as likely as Whites to be living in poverty; 26% of Blacks compared with 10% of Whites in 2014.⁷⁶ In 2016, 31% of Black children and 26% of Hispanic children under the age of 18 were in families living in poverty, while the poverty rate was only 10% for White and Asian children.⁷⁷

Homelessness is a major problem in most U.S. cities. Among the country's richest cities, New York City has over 78,000 people living on the streets and there are 56,000 in Los Angeles, 11,000 in Seattle, and over 8,000 people sleeping on the streets in my home city of San Francisco.⁷⁸

Across the United States, African Americans make up 40% of the homeless population, yet account for only 13% of the general population.⁷⁹ In 2015, while 72% of White household heads owned a home in the United States; only 43% of Black household heads owned one.⁸⁰ Evictions are far more likely in neighborhoods that are predominantly Black than in other neighborhoods.⁸¹

Prior to the Fair Housing Act of 1968, there was a widespread practice, called “redlining,” that resulted in poor quality of life patterns that persist to this day.⁸² The practice was used by the housing and mortgage industries to deny minority populations loans to buy homes in certain neighborhoods as well as to deny them improvement loans for their own homes. This practice not only reduced the value of homes, it created a cultural understanding that these areas were not only undesirable, they could also be used for other undesirable practices, such as the location of factories and toxic waste dumps.⁸³

As for health, nearly 11% of the non-elderly population in the United States did not have health insurance as of 2019.⁸⁴ And with the increased health risk of the pandemic, it is estimated that roughly 2 to 3 million people may have lost employer-based coverage between March and September 2020.⁸⁵ Black Americans are more than twice as likely as Whites to be uninsured.⁸⁶ The fact that Blacks have less access to healthcare contributes to a 2.5 times higher prostate cancer mortality rate for Black men, for example, compared to non-Hispanic White men.⁸⁷

Quality education is also unevenly distributed within the United States and it has an impact on employment, income, and other quality of life conditions. Studies show that schools with high concentrations of low-income and minority students receive fewer instructional resources than schools in wealthier neighborhoods.⁸⁸ Minority students have fewer and lower-quality books, curriculum materials, laboratories, and computers; significantly larger class sizes; less qualified and experienced teachers; and less access to high-quality curriculum. Many schools serving low-income and minority students do not even offer the math and science courses needed for college, and they provide lower-quality teaching in the classes they do offer.

All of these factors—income, wealth accumulation, poverty, homelessness, health, and education—interact with each other to systematically impact certain groups—race, gender, age—to the advantage of some relative to others. These systemic differences drive the products, services, and policies that are designed and for whom they are designed. This skews the distribution of benefits of our designed world.

If you are White, middle-age or older, and live in the United States, Western Europe, or certain parts of East Asia, you are able to take advantage of all the delightful discoveries, inventions, devices, and services our designed world has to offer. On the other hand, if you are someone of color or from much of the rest of the world, you are likely to be living a simple life and not able to take advantage of the much world’s wondrous designs. You are more likely to be poor, sick, and to die young. If you are Black in the United States, you are particularly disadvantaged.

It doesn’t have to be this way. We have the capability of creating new designs that allow us to respond to the impact of our previous ones. We are able to design new products, services, policies, and economic responses that address these problems and the ills of society. We can create designs that benefit more people and reduce harm.

The question that hangs in the air is: Why hasn’t that happened?

How Has Design Failed Us?

To create better designs, those that make the world a better place, we must first understand why design has failed us so often and so spectacularly. The list of reasons is long and varied.

Designs and users fail

Sometimes it is designs themselves that fail: materials fatigue, parts corrode, structures collapse: the design was well conceived and executed but time and natural processes take their toll—over time, parts fail, bridges crumble, airplane wings crack. In the United States, over 46,000 bridges, or 7.5% of the nation's total, are aged and considered structurally deficient.⁸⁹

In 1979, the failure of the Three Mile Island nuclear reactor in Dauphin County, Pennsylvania, started when a release valve in the primary system failed, sticking open to allow large amounts of nuclear reactor coolant to escape putting the lives and health of approximately 2 million people at risk.⁹⁰

Often, failures are due to user error, where the design is fine but used in ways not intended by the designer, where users implement the design outside the designers' specifications or fail to follow procedures. The 1986 Chernobyl nuclear power plant disaster started with a planned safety test that was delayed, resulting in an unprepared crew to be on duty at the time, which then triggered a reactor shutdown that caused an uncontrolled nuclear chain reaction. The accident caused the deaths of 30 workers, radiation injuries to over 100 others, and years later, 6,000 cases of thyroid cancer reported in children and adolescents.⁹¹

The design process fails us

Sometimes design failures are due to errors during the design process. Failure is an inherent risk in the design process, according to Professor Henry Petroski. In his book *To Engineer Is Human: The Role of Failure in Successful Design*,⁹² Petroski acknowledges that a designer's duty is to avert failure, but he admits that the demands of the design process require compromises. In their designs, engineers try to achieve more speed, lighter weight, more heat tolerance, more comfort, more safety, and to finish the product sooner and at lower cost. Often, all of these demands cannot be met at the same time. Compromises are made and compromise implies a risk of failure. And maximizing or minimizing any single variable—speed, weight, cost, profit—increases the likelihood that others will suffer.

As a result of risky compromises in the design process, the first commercial jet airliner, the Havilland Comet, suffered three crashes within a year of entering service due to catastrophic in-flight breakups. In 1940, the newly-opened Tacoma Narrows Bridge in the state of Washington collapsed as the deck oscillated in a heavy wind in a twisting motion that increased until the deck tore apart, while people watched in shock.

Sometimes the process fails because it doesn't include entire system thinking during the design process, focusing instead on only one kind of situation, one target population, or one kind of impact and ignoring others. Among the most egregious examples of this are what economists call "externalities," the imposition of costs on others who do not participate in a production or transaction. Think of the local factory that dumps its waste that pollutes your river or the exhaust from your car that contributes to global warming. These designs intentionally offload responsibility for their consequences onto someone else.

For example, in 1945 the DuPont de Nemours Company designed Teflon as a coating for cooking products that made them nonstick and easy to clean. The product worked as intended and was a great seller. But its manufacture involved the use of a toxic chemical, perfluorooctanoic acid (PFOA), which DuPont dumped onto property it owned. It ran into streams and leached into groundwater causing illness, including cancer, in thousands of people in the area of Ohio near the plant.⁹³

Designers fail us

Sadly, designers fail us in many ways through commission and omission. The failure of the Teflon design was not only a failure to account for secondary consequences during the design process, it was also a moral failure of designers who ultimately knew the consequences of their designs and its externalities, and continued dumping anyway. It was a failure of commission. The negative impact of their design was no longer their problem; they made it someone else's.

Some designers are knowingly malicious, often masquerading the design as good; take John Kapoor, for example. Kapoor was CEO of Insys Therapeutics, a drug manufacturer. Insys designed a fentanyl-based synthetic opioid product, called Subsys, which was 100 times more powerful than morphine and was approved by the Food and Drug Administration (FDA) for cases of extreme pain, such as end-stage cancer. Kapoor and his executives designed a sales scheme to motivate doctors to prescribe Subsys for off-label conditions, such as back pain and migraine headaches, by paying them bribes as high as \$140,000 a year, disguised as medical conferences, consultations, and speaking engagements.⁹⁴ And because Subsys is highly addictive, addicted patients created a constant stream of profit for Insys. But it also meant that far more patients suffered the devastating effects of addiction, from the pain of withdrawal, or loss of jobs and families, and even death. In May 2019, Kapoor and his top executives were found guilty of a range of crimes, including racketeering, illegal distribution of a controlled substance, and fraud.⁹⁵ In January 2020, Kapoor was sentenced to 5½ years in prison for his crimes.⁹⁶

On the other hand, designers often fail us not by commission, but by omission. The designs they create are not immoral or harmful, but they don't solve an important need and they crowd out the possibility of more-important, more-helpful designs. Designers may only choose projects or only create designs that are likely to bring them fame or riches. They want their name to become a household word, to become an international brand. They want their designs to fill the racks of high-end stores on New York's Madison Avenue, LA's Rodeo Drive, Berlin's Kurfürstendamm, Paris' Rue du Faubourg Saint Honoré, and Dubai's Sheikh Zayed Strip. They want their designs to be seen on the streets of London, the beaches of Maldives, the night clubs of Ibiza, the casinos of Monte Carlo, the catwalks of Milan. They create designs for the 1%. These are "Veblen goods," designs for which demand increases as the price increases because of the item's exclusive nature and appeal as a status symbol and for which the profit margins are the highest.⁹⁷ There isn't room for designs that solve everyday problems for everyday people in a world of Veblen goods.

And some designers look only for easy problems where success is assured, those with short-term solutions—a quick fix and move on. It's easier to come up with the latest version of the iPhone or another installment of the *X-Men* than to come up with something truly novel that might contribute to solving hunger, poverty, inequality, and injustice. If something is too complex, they pass it by.

Systems fail us

Many of the world's biggest problems are not addressed because the economic or political systems are not structured to address them or cultures do not value their solutions. System structures and processes shape and constrain our activities, including our designs, as Parsons reminded us at the beginning of this chapter. Projects that get funded are the ones that support the system's function. Some designs are valued; other design ideas are ignored.

Typically, in our culture, the designs that are valued are the ones that make the most money. It isn't sufficient for designs to make people happy or to solve important problems unless they also generate significant profits. Designs that cannot be monetized, that don't bring a significant return on investment, don't get off the drawing board. This is the system in which designers most often work.

In 1970, Milton Friedman, Professor of Economics at the University of Chicago and future Nobel Laureate, wrote an op ed piece for the *New York Times* that was titled “The Social Responsibility of Business is to Increase Its Profits.”⁹⁸ It was subtitled “A Friedman Doctrine.” His argument is that in a free-enterprise, private-property system, a corporate executive is an employee of the owners of the business, typically the stockholders, and the executive’s sole responsibility is “to make as much money as possible while conforming to the basic rules of the society.” This rejection of any other corporate social responsibilities has had a profound effect in the United States on the business culture and government policies ever since, as we will see in Chapter 16.

The result of these systemic priorities is that while the bottom 50% of the country has lost ground since 1980, well-paying manufacturing jobs have disappeared, drug addiction and poverty have increased in the face of a global pandemic, racism is systemic, and our democracy is under threat, companies worth trillions of dollars are spending hundreds of millions to design a virtual world, driverless cars, and a space tourist industry. Designers are not creating products, services, and government programs that make life better for the majority but for the top 10% or even the top 1%, not because that’s where the need is greatest, but because that’s where the money is.

In short, I claim, design has lost its moral compass.

The premise that society will benefit by people maximizing their self-interest has made the world worse off, not better. In such a system, people with little or no money don’t have much power; they don’t own a business and they don’t make good customers. If their needs cannot be monetized or generate a profit, they go unmet. And sadly, the worst conditions and the biggest problems in the world happen to those with the least money and political power. Billions are spent to send billionaires into space, but there isn’t enough money to build affordable housing for the poor.

In our current system, even well-intentioned designers must both create the solution to urgent, complex problems *and* find the money to fund it. In the face of everything, they not only have to create a design that is great, but also one that has a high return on investment. In such a system, the threshold for this is often too high, and great designs remain only good ideas.

Moral Decisions and Their Consequences

For the most part, we go through our daily lives not having to confront moral issues. We can go days doing our jobs, interacting with colleagues, reading the news, watching TV, playing with our kids, kissing our spouses, all without feeling a need to make a moral decision. When moral issues come up, it is most often with our kids, those in our moral care. When we advise our children, morality seems to be so cut and dry—do this, don’t do that; do good; avoid bad.

But morality in the real world is often not so clear; it is situated and often problematic. On occasion, we encounter situations where the moral considerations are more complex or vague, or we are faced with conflicting moral principles. When this occurs, it is often as part of our job and this is particularly so when we are engaged in design. Even when our design purpose is good, trade-off decisions must often be made, decisions that may have both practical and moral consequences.

Often these dilemmas sneak up on us. Our intentions are good; our actions are professional, and yet, here we are in a situation we didn’t expect. Or we’ve made a decision with moral consequences and didn’t even realize it at the time. When personally confronted by a moral dilemma, it may be uncomfortable, even risky, to step up and say something, to point out a moral flaw or an inconvenient truth, especially if it means stopping production, going back to the drawing board or contradicting a superior. It’s much easier to sidestep the problem. But such dilemmas

cannot be morally resolved simply by ignoring them or by saying, “that’s not my responsibility,” “that’s not my job.”

The moral implications of our decisions and actions, at work and elsewhere, are entailed whether we acknowledge them or not. That is, ignoring a moral dilemma, side-stepping a moral decision, or tossing it to someone else is itself a moral decision.

Case Study: Boeing 737 MAX 8

Let’s look at how everyday moral decisions were played out in the real world in the case of the Boeing 737 MAX 8.

Case Study: Boeing 737 MAX 8

Boeing is one of the largest global aerospace manufacturers in the world and is the largest exporter in the United States by dollar value. Boeing’s purpose, as stated on its corporate web-site is: “Connect, protect, explore and inspire the world through aerospace innovation.”⁹⁹ And among its enduring values, Boeing once stated: “We value human life and well-being above all else and take action accordingly. We are personally responsible and collectively accountable for safety at all levels: for our teammates, our passengers and those who service our products.”¹⁰⁰ (The company has since modified this to say, “We are personally accountable for our own safety and collectively responsible for each other’s safety.”¹⁰¹)

In 2011, Boeing’s board of directors faced a major challenge. Boeing’s competitor, Airbus, launched a brand-new plane, the A320neo, the previous year, and at the 2011 Paris Air Show, and it broke records for the number of planes ordered. To meet the challenge, Boeing’s board decided that it would again re-engineer the company’s best-selling 737, rather than build an all-new plane, at a cost savings of nearly \$10 billion.¹⁰² Named the 737 MAX 8 (see Figure 1.2), the plane was expected to exceed the A320neo in range and fuel efficiency. The plane gained regulatory certification to fly from the Federal Aviation Agency (FAA) in March 2017.

Among the first customers to receive delivery of the new plane was Lion Air. On October 29, 2018, Lion Air Flight 610 took off from Jakarta’s international airport in clear weather.¹⁰³ Shortly after, the plane plunged into the Java Sea, killing all 189 people onboard. Another early customer was Ethiopian Airlines. On March 10, 2019, Ethiopian Airlines Flight 302 took off from Addis Ababa’s international airport, heading for Nairobi, Kenya. Six minutes after take-off, the plane crashed into the Ethiopian highlands, killing all 157 passengers and crew.¹⁰⁴

A detailed investigation of the crashes identified the Maneuvering Characteristics Augmentation System, or MCAS, as the source of the crash. MCAS is a software program initially designed to kick in and override the pilot’s manual control only in extreme circumstances, such as the imminent danger of an aerodynamic stall, thus potentially avoiding a crash and saving lives. However, 2 minutes and 34 seconds into the Lion Air flight, MCAS kicked in and took the plane into a nose dive of 700 feet. Unaware that this component existed, the pilots struggled to bring the plane back up to 5,440 feet until the computer system again took the plane into a dive. This tug of war took the plane down and up more than 20 times before the plane plunged 5,000 feet into the Java Sea at 450 miles an hour. With the Ethiopian flight, the captain reported a flight control problem almost immediately after take-off. Controllers on the ground noticed that the airliner had accelerated to a high rate of speed and was oscillating erratically up and down before the MCAS-controlled plane crashed into the ground going nearly 600 miles an hour.



Figure 1.2 Boeing 737 MAX 8 (Photo by Andreas Zeitler, Shutterstock).

What transformed a component initially designed to avoid crashes and save lives into one that caused crashes that took 346 lives?

During the early development of the 737 MAX 8, before it was certified, MCAS evolved from a relatively minor software and control system into a significant component of the plane's flight operation. Initially, the system was designed to work in the background, and because it was meant to activate only in rare cases, the pilots wouldn't know it was there. However, during early testing of the MAX, a Boeing test pilot was trying out high-speed situations on a flight simulator and the plane wasn't flying smoothly. To fix the issue, Boeing engineers decided to give further responsibilities to MCAS.

MCAS came to compensate for other changes in the plane so as to make the MAX 8 feel the same in the air as the previous 737 models for pilots who were used to flying them. Consequently, MCAS engaged at lower speeds and exercised more control over the flight. Pilots did not receive training about MCAS and weren't even aware of its existence until after the Lion Air accident. Boeing marketed the fact that the plane did not need pilot training as "the 737 MAX 8 advantage."

But people within Boeing knew about MCAS and they knew about problems with it early on, based on corporate emails and text messages that Boeing released as part of the crash investigation. In November 2016, prior to the FAA certification of the 737 MAX 8, the project's Chief Technical Pilot and a Technical Pilot exchanged emails acknowledging they had experienced problems with MCAS in the simulator. The Chief Technical Pilot, the person at Boeing responsible for communicating with the FAA about pilot training, told his colleague that the MCAS was "running rampant in the sim [simulator] on me" and it was "trimming itself like crazy" [sic].¹⁰⁵ The Technical Pilot responded, "that's what I saw on sim one." The Chief Technical Pilot replies that the situation was "egregious."

Despite warning signs, Boeing engineers, in a review of MCAS, decided that the MCAS system was not a safety risk so they didn't bother telling the FAA about the changes.¹⁰⁶ In 2018, after industry lobbying, the congressional act reauthorizing the FAA gave power to the industry for certifying almost every aspect of new planes,¹⁰⁷ authorizing as much as 96% of its own work. Given Boeing's statement that the MCAS was relatively benign and rarely evoked, the FAA approved Boeing's request that the system would not be mentioned in the pilot's manual.

In September 2020, the Congressional Committee on Transportation and Infrastructure released a 238-page report on their investigation of the Boeing 737 MAX 8 debacle.¹⁰⁸ After reviewing the findings, the report castigated both Boeing and the FAA, saying both had failed to do things right and failed to do the right thing. The report cited Boeing for its “culture of concealment” in withholding crucial information from the FAA, its customers, and 737 MAX 8 pilots. The report specifically pointed to a period in time, following Boeing’s merger with McDonnell Douglas, when the culture shifted from an emphasis on solving difficult engineering problems to one dedicated to enhancing and expanding the company’s financial profits.

In December 2020, the Senate Committee on Commerce, Science and Transportation issued a report on their investigation of the Boeing 737 MAX 8 and the FAA.¹⁰⁹ In it, they concluded that the FAA had a failed culture of safety management, that it was overly cozy with the airline industry, and that it punished people within the FAA who raised issues about airline safety.

How is it that a company with an enduring value of “human life and well-being above all else” and a software program that was designed to prevent stalls and save lives resulted in 346 deaths? What happened along the way that turned an intended good into a harrowing tragedy?

In January 2021, Boeing, charged with fraud and conspiracy, agreed to a \$2.5 billion deferred prosecution agreement with the Justice Department over the MAX crashes, which cost Boeing more than \$20 billion.¹¹⁰ In March 2022, the Chief Technical Pilot was tried on charges of misleading U.S. regulators about a MCAS and defrauding Boeing’s U.S.-based airline customers of tens of millions of dollars by withholding information when they made their purchase decisions. A Texas jury found him not guilty. In September 2022, Boeing agreed to pay \$200 million to settle civil charges by the U.S. Securities and Exchange Commission that it misled investors about its 737 MAX.¹¹¹

But I’m less concerned here with legal responsibility and more concerned with moral responsibility, raising questions about the moral behavior and responsibility of Boeing design engineers, the Chief Technical Pilot and the Technical Pilot, Boeing executives, and about the corporate culture at Boeing and the FAA. What if any of them had asked the uncomfortable questions? What if they had changed the conversation? What if they had stopped and redesigned MCAS or designed pilot training materials to include MCAS? What if all of them, or even one of them, had acted with passion, purpose, and values?

What if each of us act to design a better world?

Your Designs Might Save Us

What makes a design—of a plane or company—good or bad? What are the “oughts”? Are we in safe hands when only “corporate masters,” regulators, and politicians are in charge of moral design decisions, to address Parsons’s point? What is it about a system or a culture—corporate or societal—that shapes our decisions and our designs? As designers or employees participating in a design, don’t we each need to consider the moral implications of our own decisions, actions, and trade-offs? And given all the problems in the world, do we need to think deeply about what we choose to design?

Would you be satisfied with designing the latest version of a first-person shooter video game, creating a virtual shopping mall of nonfungible tokens, or setting up speculative virtual “land” sales in the metaverse?

Or do you go against the grain? Do you think outside the box? Do you design where the need is greatest? Do you make the world a better place?

These are the questions we will explore in this book.

My purpose for this book is to provoke you, to inspire you, and to challenge you to make the world better. Ultimately, we are all confronted by our purpose in life, what the Japanese call *ikigai*: the convergence of one's personal passions, beliefs, values, and vocation.¹¹² We must all decide on that which influences our career plans and our everyday actions, that which gives us satisfaction and a sense of accomplishment and meaning to our lives. In that personal quest, I hope you will find this book useful, and perhaps, apply what you learn, along with your own passion, purpose, and values, to design a better world.

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