

Designers vs Doom

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SUST 704: Applied Theories in Sustainability
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PREFACE

I was born in Monterrey, Mexico. Monterrey is the city of mountains and its name can translate to “mountain king”. Monterrey “Nuevo León is a state distinguished by its rich biodiversity, spanning from arid plains to majestic mountains, which is the habitat for a surprising variety of flora, fauna, and fungi.” Today Monterrey, suffers from extreme weather pollution and has previously held the sport for number one most polluted city in the world. The deterioration of my home town and our planet has led me to pursue sustainability in the field of design.

When I was a kid I wanted to be a scientist, what that meant to me was being an inventor. I wanted to work in a lab testing and inventing innovative solutions that would one day make this world a better place. At the same time I wanted to be a professional football player, football had become a big part of my childhood development and I dreamed to someday play in the national team. Today, I am a football footwear designer. I carry the same inventive curiosity for wanting to create a better world and the football mind my childhood self had, because of it, my life has become interwoven with sports and design and believe that both can act as powerful forces for change in much needed times.

As a product designer I have been able to see first hand how wasteful and toxic our industries are and how our consumption patterns and economic activities are having a tremendous negative effect on the environment and societies. Throughout my career I looked for ways to incorporate sustainability and start conversations around the subject but realized that it was never given the importance or priority it should have to generate real impact. On my quest to try to make this world a better place I have decided to dive deeper into the subject.

Over the past months I have had the opportunity to learn about sustainability theories and how design can act as a force of change to attack the complex global issues we face today.

Throughout this book we will explore the past, the present, and the future in order to understand where we stand, how we got to where we are, and where we need to go as designers navigating a complex world. It is complicated to be a young designer in the 21st century, the rise of artificial intelligence, inequality, political and trade tensions, low pay for entry level positions, depreciation of design in the workplace, and unsustainable industry practices make one question whether it's a profession worth pursuing. After three years in the footwear and fashion industry, working collection after collection, to create low costing yet desirable products that are built for short term use, I started to ask myself the question, am I just creating more trash? As we explore sustainability theory further on we will realize that as designers have the power and are the best positioned to lead the transition towards the sustainable future we want. Through the lens of sports, fashion and design we will navigate the complex world of sustainability and touch on key concepts that can help us designers transform our world for the better across the triple bottom line (people, planet, profit). As we understand our strategic position as designers we will start to see a world full of opportunities yet to be tapped instead of a world that is falling apart.

Throughout this journey we will first look at our current states across the economy, our societies and our consumption patterns. We will understand where we have gone wrong and why it's the right time to re-write the script. Then we will dive deep into design and systems

thinking, and understand what tools and lenses we can use to better tackle the wicked problems we face in the 21st century. Finally we will learn about the importance of collaboration for a better future.

PART 1:

**TIME TO REWRITE
OUR SCRIPT**

WELCOME TO THE ANTHROPOCENE

Earth's climate has shown to fluctuate throughout history, only in the last 800,000 years the planet has seen eight cycles of ice ages and warmer periods. Since the end of the last ice age around 11,700 years ago the planet entered a period of warm and stable climate which has been known as the Holocene. The Holocene has given us our home sweet home, allowed for agriculture to be invented, for hunter gatherers to settle down and for human civilization to flourish. Scientists believe that if left undisturbed the Holocene conditions could continue for another 50,000 years due to the "unusually circular orbit that the earth is currently making of the sun - a phenomenon so rare that it last happened 400,000 years ago." (Raworth, 2008).

The evidence today is clear, human activity on the planet and stress on planetary resources have now left the Holocene in the past. We have now entered a new geologic era known as the "Anthropocene: The first geological epoch that is shaped by human activity," (Raworth, 2008). We have interrupted the balance of nature and the environment "from the intentional manufacture of nitrogen to fertilize our crops to the unintentional release of carbon dioxide in the generation of energy from fossil fuels" (Walker et al, 2013).

The question is how did humanity get here? How did we go from the Holocene, a promising stable climate, to the Anthropocene, an epoch of uncharted territory shaped by human activity?

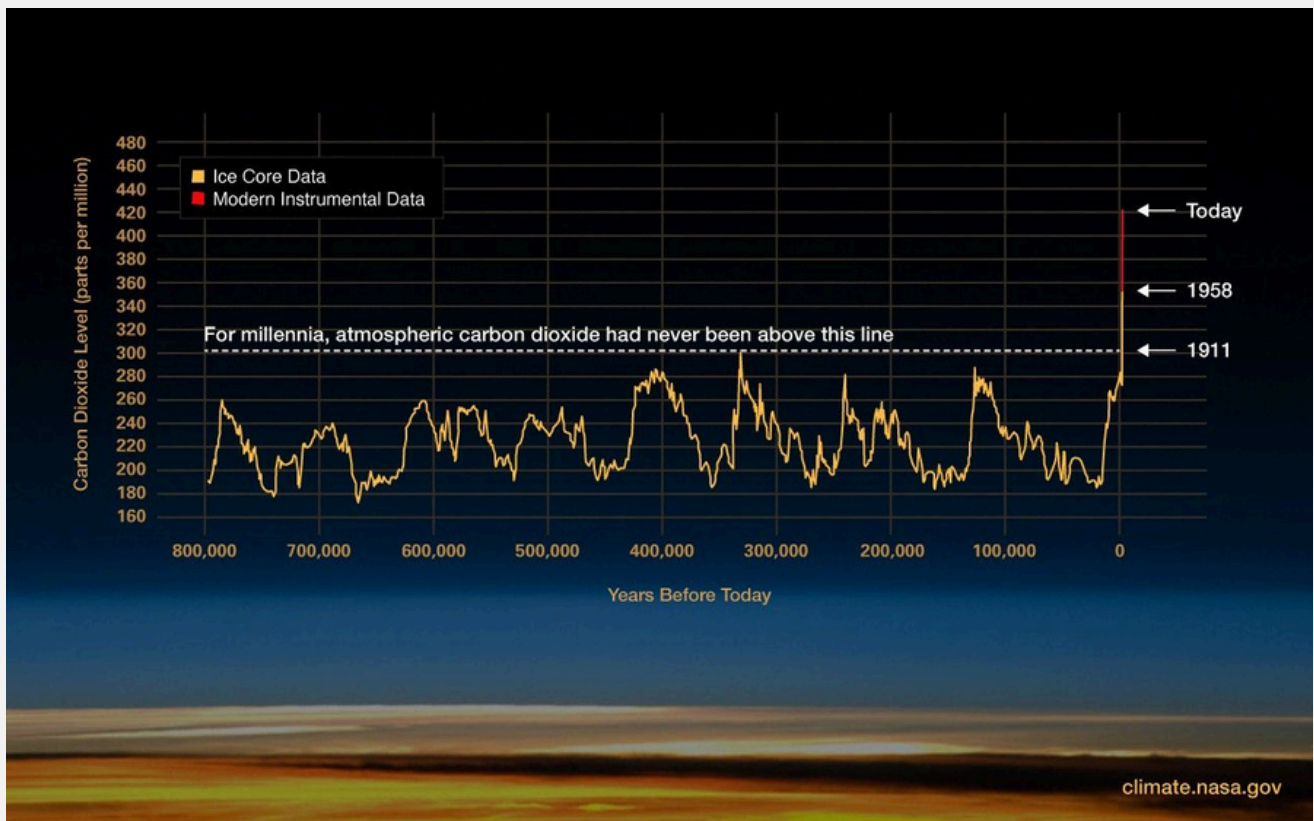
Our deterioration of the planet has shown how we as humans have become disconnected from our mother nature. Mentally and physically we are out of touch with the natural cycles of life. Our attention and our goals have become short term and we have created concrete and pavement technologized worlds that

push us away from the natural ecosystems and cycles we depend on. We have developed societies and systems that do not resemble the planet we call home and there has been little commitment to change by global international bodies and corporations.

Today we know that global temperatures are rising, the ocean is getting warmer, arctic ice, ice sheets, and glaciers are melting, sea levels are rising, the ocean is becoming acidified and extreme events are increasing in frequency (NASA, 2025). In the next page you can see carbon dioxide levels throughout the past 800,000 years. The graph illustrates how in the beginning of the 20th century our CO2 levels have spiked upwards towards levels never seen before.

The ten most recent years have been the warmest on record (NASA, 2025). Current warming levels are a result of human activity since the mid 19th century and the start of the industrial revolution. Our world has become "dominated by a belief in the power of technological innovation to enhance human experience" (Margolin, 2002). We have bought into the idea that the satisfaction material goods can provide is without limits. As designers and creators of the world we live in we have contributed to this obsession.

After World War II, Dr Aurelio Peccie from the Club of Rome (Swiss-based non-profit global think tank made up of current and former heads of state, UN bureaucrats, government officials, diplomats, scientists, economists and business leaders) and the Massachusetts Institute for Technology (MIT) developed a mathematical World3 model, set out a study and examine the problems troubling men of all nations, including poverty, degradation of the environment, loss of faith in institutions among other issues. The idea was to analyze the world as a

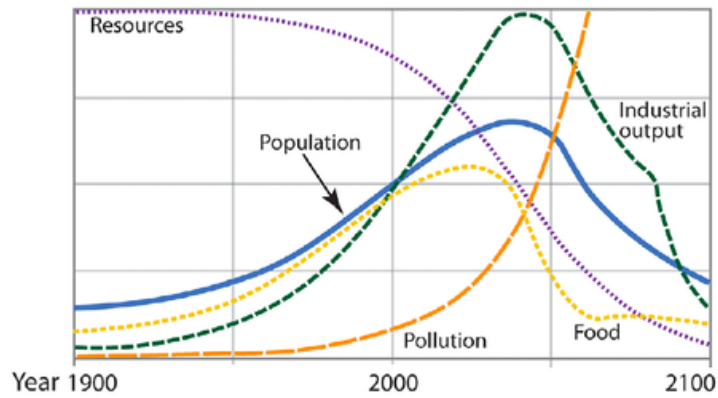


(NASA, 2025)

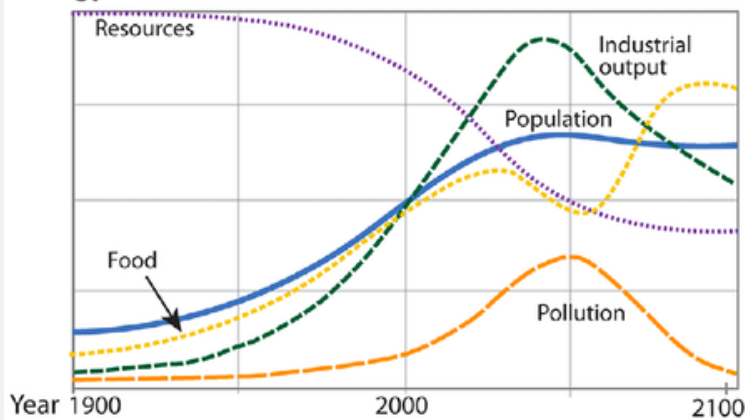
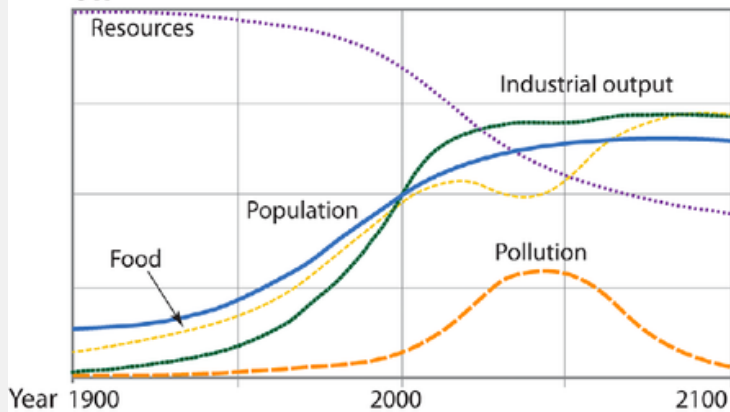
whole system. In their published 1972 report, titled *The Limits to Growth*, the Club of Rome argued the limited availability of natural resources and the need to achieve global equilibrium based on limits to population growth, the economic development of less developed countries, and new awareness of environmental problems (Margolin, 2002). The report sold millions of copies however it also was received with skepticism and criticism by experts.

In 2021, Gaya Herrington, Sustainability and Dynamic System Analysis Lead at KPMG, set out to analyze *Limits to Growth* and compare the 1972 report to new existing empirical data. The goal was to understand how closely we align today to the report published by the Club of Rome and the MIT models. Herrington's study examines data across 10 variables (population, fertility rates, mortality rates, industrial output, food production, services,

non-renewable resources, persistent pollution, human welfare, and ecological footprint. She found that our latest data is most aligned with two of the MIT World3 models: Business as Usual (BAU2) and Comprehensive Technology (CT) which both show an end to growth within the next decade and a steep decline to set around 2040. In the figure below. We see both BAU2 and CT graphs. The BAU2 scenario "shows a clear collapse pattern, whereas CT suggests the possibility of future declines being relatively soft landings, at least for humanity in general" (Ahmed, 2021). The most optimistic model and the one we least align with is the Stabilized World (SW). In this scenario we follow a sustainable path and experience minimal decline in the economy "based on a combination of technological innovation and widespread investment in public health and education." (Ahmed, 2021)

BAU2

When we speak about collapse we do not mean that humanity will disappear but instead we refer to the collapse in economic growth which can negatively affect our standards of living. We are headed into uncharted territory, if business as usual and current warming trends continue, the world our youth and future generations in will be vastly different and pose greater challenges than the world we have had for the past 800,000 years.

CT**SW**

OUR ECONOMIC GOALS

We live in an economic world that champions the idea of growth. It is the dominating mentality that has spread across the globe as a measure of a country's success. Our economies today "expect, demand, and depend upon continual GDP growth" (Raworth, 2017). Our fixation to measure our linear throughput, which resembles the military-industrial-complex paradigm that proved to win the wars, and our continuous growth.

But how did this come to be, how did we become a society in which consumption and growth have become the normal way of life? The story starts in the 1930s when the US Congress commissioned economist Simon Kuznets to come up with a measure of America's national income. Kuznets calculation was the Gross National Product (GNP) and it was based on the income generated worldwide by the nation's residents. For the first time you quantify America's output and income and could be compared year by year. The metric helped President Roosevelt monitor the economy and assess the effectiveness of his policies. When the United States was about to enter the second World War the GNP was a helpful tool to convert the industrial economy into a military economy, while sustaining consumption to generate output. Around the 1950s, Arthur Okun seemed to have figured out that growth could offer an end to unemployment too. According to Okun, two percent growth in output corresponded to one percent fall in unemployment. The GNP was now starting to be seen as a remedy for social, economic and political ills. (Raworth, 2017).

In the middle of the 20th century, countries that survived the war were reinventing themselves by utilizing the machinery and capacity that had helped them win the war. Converting resources into material and consumable products demonstrated

to be a way to regrow the economies. Twenty years after World War II, Germany and Japan, two of the most devastated countries from the war embraced consumer capitalism, recovered, and grew economically and politically (Walker et al, 2013). Soon other countries around the world followed and turned to consumer capitalism and GNP to grow.

The Gross National Product does not allow for the health of our children, the quality of their education, or the joy of their play. It does not include the beauty of our poetry, or the strength of our marriages, the intelligence of our public debate, or the integrity of our public officials." (Meadows, 2008)

The GNP instead groups together the good and the bad (more car accidents, medical bills, and repairs make GNP go up.) It counts only marketed goods and services. It does not reflect distributional equity. It measures efforts rather than achievement, production and consumption rather than efficiency. More efficient and longer lasting lightbulbs make the GNP go down. (Meadows, 2008)

When wealth became linked to the consumption of products, a new dynamic system emerged, one with reinforcing feedback loops that supported the wealth it created and grew stronger with time. The adoption of this new system meant for the design and the redesign of new products and businesses to emerge, design then became part of the system and complicit to it. (Walter et al, 2013).

Rational Economic Man

Our goal for growth and expansion through linear consumption has brought about a portrait of the rational economic man "a self

centered depiction of humanity at the heart of economic theory.”



(Raworth, 2017)

Standing alone, money in hand, calculator in head, and egos in heart.

The earliest depiction of the rational economic man comes from Adam Smith's ideas on the “role of self-interest in making markets work.” Smith believed self interest to be the most helpful of virtues of an individual but not the most admirable topped by “humanity, justice, generosity, and public spirit.” Today the economy does not look at all of man's complete traits but instead looks at him “solely as a being who desires to possess wealth,” (Raworth, 2017) Over the next centuries the economic man would evolve and in the 1920's economist Frank Knight would gift him god-like traits like perfect knowledge and foresight. Today we know him as “a solitary man, ever calculating in utility, and insatiable in his wants.” Someone who “treats other human beings as if they were slot machines.” Knight would defend his caricature of the rational economic man in the 1960's by arguing that since in real life people behaved ‘as if’ they were self interested, all knowing and calculating then the caricature was legitimate. “What had started as a model for man had turned into a model of man.” Our goal for growth has given rise to a model of man, which unlike a citizen, has limited expression through the market, while citizens address all aspects of cultural, social, and economic life.

Business as usual projections indicate that we will experience 3% annual growth until 2050, doubling the size of the global economy by 2037 and almost trebling it by 2050. (Raworth, 2017) Given the current state of the

planet it is worth asking if our current economic models and goals, which paint a narrow image of man and the living systems, are fit for purpose.

Windigo

During the freezing nights of the northern woods when the snow gets heavy and the night grows darker, you can hear loud “unearthly shrieks” through the blizzard. You might see unrecognizable footprints on top of yours, or feel the presence of a tall creature lurking behind you, but when you look back you will find nothing but darkness. The Windigo is a creature of North American folklore. It is the legendary monster of the Aneshinaabi people and believed to be a human being turned into a cannibalistic beast. According to scholar Basil Johnson, Windigo is derived by root meanings like “fat excess” or “thinking only of oneself.” The creature comes from a “human whose selfishness has overpowered self control to the point of no satisfaction.” It is believed that the Windigo myth arose from the banishment of people due to greedy behavior in a common-base society. When their greed posed a threat to society they were banished from the community. Made to wonder alone in the blizzard, turning into a monster.

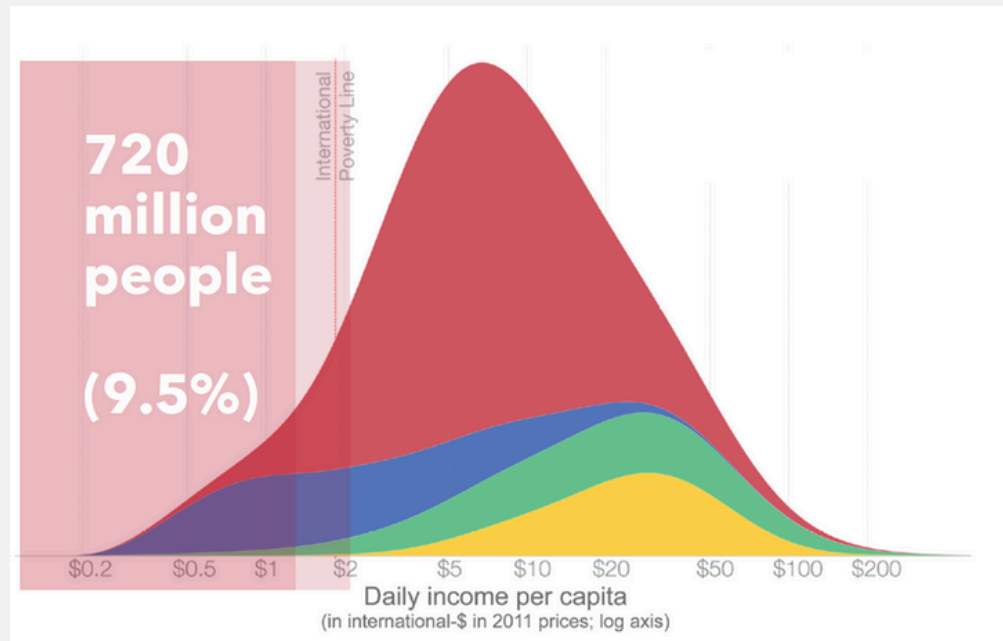
OUR SOCIETIES

When I was seventeen years old during my junior year of high school in my hometown Monterrey, Mexico I started getting more involved in community service. I enrolled in an activity that involved going every Saturday morning, to a low resource neighborhood called “Pinos” (which was only 2.5 km away from my home) to meet with the children and teenagers from the area and engage in learning or restoration activities. My task was to teach English to a group of teenagers my age. My teacher at the time knew the group I would be working with well and gave an introduction. Over the course of the next two years after going mostly every Saturday of the semester to teach, my relationship with them grew and we became close friends. I did not succeed in making them fluent English speakers, learning it once a week with little practice and a lack of interest made it difficult, however English wasn't the reason they kept coming every Saturday morning, it became more about nurturing a relationship that continues to this day. They started to invite me to parties, social gatherings and events which I would happily attend. Our relationship grew stronger and we have chosen to see the similarities rather than the differences between each other. A relationship of this kind is seen as rare in conservative communities such as Monterrey. Monterrey is home to one of the richest municipalities in Latin America and the state of Nuevo Leon has one of the lowest poverty rates in the country, 10.6% in 2024 (NL, 2025). Despite this, there exists great marginalization in the city. Low resource communities exist meters away from luxurious buildings and commercial areas, education systems fail to retain and provide opportunities for students, less opportunities are available due to lack of education, and in many cases individuals can fall into a life of drugs and violence. In the figure below we can see the global.

income distribution of 2015. The illustration highlights extreme poverty, people falling below 1.25 dollars a day (today that figure has been adjusted to \$3.00 per day by the World Bank in 2021). In 2015, 720 million people or 9.5% of the population fell below the extreme poverty line, today the figure remains at around 700 million people. As of 2015, the richest 1 percent of the population own more wealth than the rest combined (Hardoon, 2016).

In our current systems and economic models we see winners being systematically rewarded with the means to win again in a system trap called “success for the successful” described by systems thinker Donella Meadows as “whenever the winners of a competition receive, as part of the reward, the means to compete even more effectively in the future.” “Using accumulated wealth, privilege, special access, or inside information, to create more wealth, special access, or information.” This trap makes the rich richer and the poor poorer. While in 2015, tax heavens enabled the rich to hide 7.6 trillion. People with low income today are not able to borrow from most banks resulting in no capital improvement or paying large interest rates from local lenders. In most societies today the poorest children receive the worst education in the worst schools, that is if they are able to get a continuous education. To them opportunities are limited to low paying and at times high risk jobs, perpetuating their poverty. Unequal land distribution also results in farmers becoming tenants and workers of someone else's land while the landowner uses the rent to buy more land. (Meadows, 2008).

“The gap between rich and poor nations is widening - not shrinking - and there is little prospect, given present trends and institutional arrangements, that this process will be reversed.” (Our Common Futures,



(Boylsont, 2025)

1987). The widening of this gap has resulted in growing social marginalization. As defined by Oxfam, social marginalization is the “social process of “othering”—where certain individuals or groups are systematically excluded based on societal norms and values—and the resulting experience of disadvantage.” Social marginalization research as of 2024 shows that over the past 50 years marginalization has grown experiencing an exponential increase in the 2010’s. From the 1970’s to the 2020’s social marginalization has increased 18 times. (Hardoon, 2016, Oxfam). As stated by the United Nations Agenda 21 from the Summit in Rio de Janeiro in 1992 “the degradation of our environment and poverty are closely interrelated.” Our international relations are based on a global north and global south dynamic which further widens our inequalities. We have to acknowledge that today the global north, also referred to as the west, has been “built upon the colonization of other nations.” (Khandwala, 2019). In the fashion industry, “they system entrenches a colonial power dynamic where money flows into rich countries (many of which were once colonial powers) even though its made off the backs of poorer ones (many of which were once colonized)” (Leach, 2021) the same can be said for many other product and consumer goods

industries. “Most of these (developing) countries face enormous economic pressures, both international and domestic, to overexploit their environmental resource base” (UN, 1992, Agenda 21) these are also countries where the basic needs of large parts of the population are not being met. The unsustainable consumption patterns driven mainly by the Global North and industrialized nations are deteriorating our environments, widening our inequalities and aggravating poverty.

“While poverty results in certain kinds of environmental stress, the major cause of the continued deterioration of the global environment is the unsustainable pattern of consumption and production” (UN, 1992, Agenda 21). Our unsustainable consumption patterns and global south and global north dynamics further widen our inequalities. The Windigo spirit has taken over and what we thought was only a monster that possessed us individually has now resulted to have graver consequences across our entire systems and populations.

MATERIALISM

As we discussed earlier, most businesses and economies today operate in relation to growth and the expansion model, coined by Victor Margolin in 2002 as a model where “the world consists of markets in which products function first and foremost as tokens of economic exchange. They attract capital which is either recycled back into more production or becomes part of the accumulation of private or corporate wealth.” Our materials, most of which are made of extracted non-renewable resources, are a very important piece of the economic model, it is the token of exchange for your capital but they have also become objects of hypnosis that keep us consuming. The expansion model has also placed technological innovation and these economic tokens as a desire for the betterment of the individual human experience. Through the lens of fashion we can understand our behavior and relationship to the material world. Fashion and the clothes we wear are the closest objects to us, the most proximate to our body. In a way they can be a reflection of who we are. “Fashion is intimately connected to our sense of self. That makes shopping a pretty existential experience... When we get dressed we’re building an idealized self.” (Leach, 2021). Purchase and consumption of fashion and consumer goods has become a way for us to find escapism and imagine what we could be, it has also come to represent a sense of status and belonging, and become a stimulating experience. “The very meaning and significance of our lives today (are) expressed in consumptive terms.” Growth “demands that we make consumption our way of life, that we convert the buying and use of goods into rituals, that we seek our spiritual satisfaction, our ego satisfaction, in consumption” (Walker et al, 2013)

“Over 90% of plastics produced are derived from virgin fossil feedstocks.

This represents, for all plastics (not just packaging), about 6% of global oil consumption, which is equivalent to the oil consumption of the global aviation sector. If the current strong growth of plastics usage continues as expected, the plastics sector will account for 20% of total oil consumption.

(Ellen McArthur Foundation, 2016, The New Plastics Economy).

“Materialism has become so integral to notions of happiness that product development is now inextricably bound to the striving for human betterment.” (Margolin, 2002) Through small incremental product refinements and trickle down versions of products for different purchasing power consumers, the industry lures us to always consume next generation products. Products today are not built for repair, are hard to disassemble, and are built to last less to encourage more consumption. This can be referred to as “planned obsolescence” a concept coined by American industrial designer Brooks Stevens, that grew in popularity as a business strategy encouraging the consumer to always want something a little newer and a little better. (Walker et al. 2013).

At the end of their use most materials end up in landfills, incinerated, or in our ecosystems, our linear throughput with no consideration for end of life has resulted in a grave waste crisis.

95% of plastic packaging material value, or USD 80–120 billion annually, is lost to the economy. A staggering 32% of plastic packaging escapes collection systems, generating significant economic costs by reducing the productivity of vital natural systems such as the ocean and clogging urban infrastructure.” (Ellen McArthur Foundation, 2016, The New Plastics Economy)

Our concept of waste today is a big

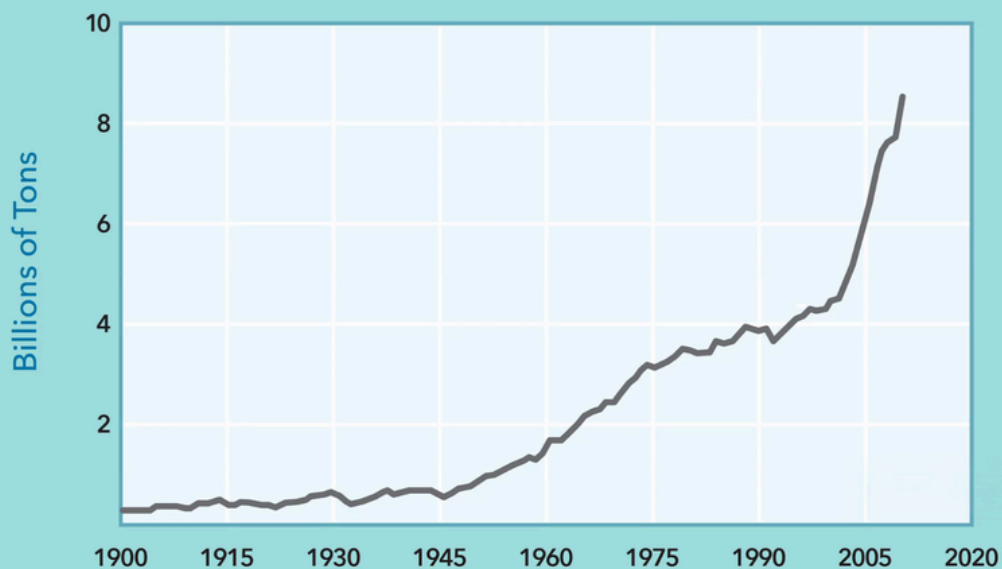
issue. traces of human activity can be found in most parts of the world today. There is no consideration for where waste ends up and there are very few attempting to collect and repurpose it to avoid the contamination of our living systems. Our materials and processes have also become extractive, destructive, and energy and water intensive depending on the generation of non renewable energy sources such as fossil fuels adding greenhouse gases to the atmosphere. In addition our processes involve a large amount of VOCs (Volatile Organic Compounds), toxic and forever chemicals which contaminate our water streams and oceans.

The making of our material world has resulted in an excessive extraction of nonrenewable resources from the planet. The figure below shows the world extraction of non-renewable resources (mainly fossil fuels) since the beginning of the 20th century.

Our technological advancements and developments have allowed us to extract more resources to keep producing and feeding our Windigo. In the past 25 years we have seen a spike in our extraction of resources largely due to the growth of the

middle class in countries like India and China which are experiencing industrial transitions ten times faster than the British industrial revolution. The middle class is expected to grow from 2 billion in 2017 to 5 billion by 2030 (Raworth 2017). Our consumption patterns are only expected to grow to satisfy the needs of the growing middle class in the near future.

WORLD EXTRACTION of NONRENEWABLE MATERIALS 1901 - 2010



(Boylsont, Kelly + Matos , 2025)

A NEW COMPASS FOR THE 21ST CENTURY

In the figures below we see Kate Raworth's Doughnut, a "new compass for guiding humanity this century." With the goal of having a more balanced system as opposed to the current narrow economic models. Raworth illustrates how there is a social foundation ring that no one should fall below and an ecological ceiling ring of planetary pressure we should not surpass. Between the social foundation ring and the ecological ceiling ring there exists an ecologically safe and socially just space for humanity. The social foundation is made up of twelve life needs no one should fall short of and beyond the ecological ceiling consists of critical areas of planetary degradation. (Raworth, 2008)

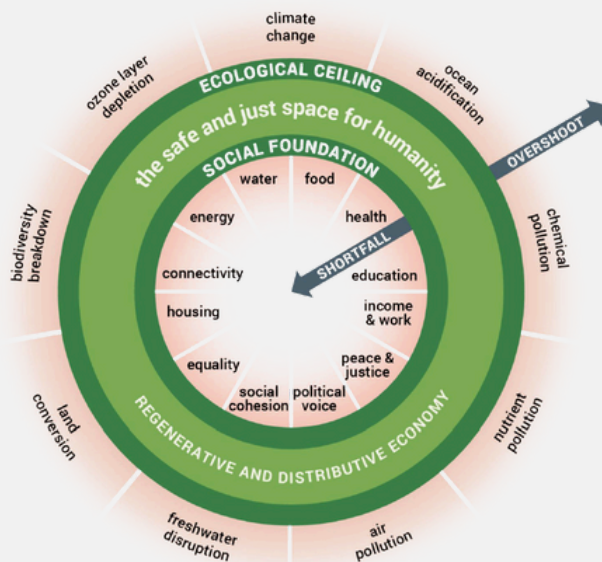
The figure on the right is the original doughnut and to the right is the most recent updated doughnut with data from 2024 showing which planetary boundaries we have crossed and which social foundations we are lacking on.

The Natural Step, a leading consulting organization focused on transitioning companies into a more sustainable

future, have a unique approach which they call first order principles. The first order principle addresses both planetary and human relations and are the rules of the game and allow teams to come to agreement first before moving forward. The principles are the following:

1. Substances from the earth's crust must not systematically increase in the biosphere
2. Substances produced by society must not systematically increase in the biosphere.
3. The physical basis for the productivity and diversity of nature must not systematically deteriorate.
4. There needs to be a fair and efficient use of resources with respect to meeting human needs.

It is now our time to take responsibility for our destructive actions, we must understand that the source of this new epoch is deeply rooted within our human behavior and our current systems. Abiding by these principles can help us live within the safe space for humanity outlined by Raworth's Doughnut.



WICKED PROBLEMS

What we see unraveling before our eyes in our economies, societies, and environments are what Richard Buchanan would call “wicked problems”:

“A class of social system problems which are ill-formulated, where the information is confusing, where there are many clients and decision makers with confusing values, and where the ramifications in the whole system are thoroughly confusing.”

—C. West Churchman
(Boylston, 2025)

As described by Richard Buchanan, wicked problems have an indeterminacy to them. Unlike our current linear processes which have determinate problems with definite conditions, wicked problems pose an indeterminacy to the problem. As defined by Horst Rittel, properties of wicked problems include: an inability to be formulated, no list of operations to solve, cannot be true or false only good or bad, is a symptom of a higher level problem and is unique in its nature. (Buchanan 1992,). Wicked problems are systems problems that are messy and confusing and require new problem solving approaches. To confront the wicked problems of the 21st century such as climate change, water security, poverty, crime, forced migration, and loss of biodiversity, there is the need for a new design lead approach that could bring forth the sustainable and desirable future we need (Irwin, 2018).

In ancient Greece, the liberal arts were known to be the disciplines which were meant to give man and society the education and freedom to lead for themselves without the need for any ruler, hence the word liberal. The liberal arts that we have today are the arts and sciences that originated in the renaissance (history, natural sciences and mathematics, philosophy, and social sciences), however they no longer fit their

original purpose as liberal arts. “Today, these subject matters retain an echo of their old status as liberal arts, but they flourish as specialized studies... Although these subjects contribute to the advance of knowledge, they also contribute to its fragmentation, they have become progressively narrow in scope, more numerous, and have lost connection” (Buchanan 1992) with each other and the complex problems we face today. However, even though there might be no one definition for all design disciplines or branches of specialization, the design field has transformed and evolved from a trade, to a technical field, to what we should now consider a new liberal art.

Buchanan defines the four domains of design as:

- Symbolic and Visual Communication
- Material objects
- Activities and organized services
- Design of complex systems or environments for living, working, playing, and learning.

Victor Margolin explains how designers should transition from the material domain into the fourth domain of design for complex systems. Without the limitation of materials, “designers can intervene in organizations and situations in a greater number of ways.” As designers we must understand that we “occupy a dialectical space between the world that is and the world that could be” (Margolin, 2002). Designers must see themselves as nutrient managers of the world and creators of the future.

Now more than ever, the world needs someone to step up to the challenges of our 21st century our governments and corporations have been unable to tackle. It is time to rewrite the script. Humanity has evolved and created systems that are destroying ourselves and the planet. We have started seeking narrow and unrealistic goals,

our consumption habits and extraction of resources are destroying the planet and devastating societies, and we are contaminating and polluting the planet at unprecedented rates.

So what is the new story? And what does it mean for the design discipline? Design as a new liberal art has shown to offer a new approach to solving our systematic problems. A new integrative discipline that already holds methodologies and skills (analysis, observation, invention, shaping or giving form, and communication) helpful for dealing with wicked problems. By understanding and seeing design as a discipline that encompasses all domains of design from communication to design of macroenvironments we can design with more “flexibility and authority to engage with a wide range of problems.” (Margolin, 2002) The Anthropocene is here and as designers we must be prepared. The world as we know it will experience great and unprecedented change, business as usual is no longer a sustainable way to which we should operate.

**“ We are in trouble just
now because
we are in-between
stories.”
-Thomas Berry**

PART 2:

**Designing
against Doom**

SYSTEMS THINKING

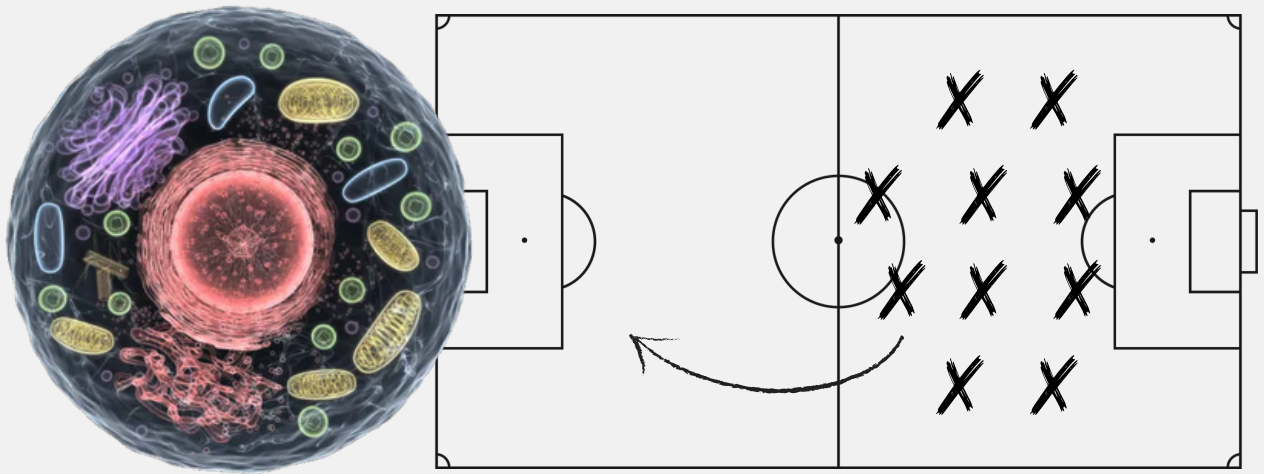
Through these next sections we will explore concepts, theories and tools that will better prepare us designers to attack the complex wicked problems of the 21st century. The models we have today are leading us towards the wrong path. Current warming trends and the frequency of natural disasters caused by human activity have shown us the damage of our unsustainable behavior. It is important to keep in mind that everything everyone has done is just a model and was done by someone no different than you. As we gather new knowledge about the world of design for sustainability I invite you to challenge existing models and be open minded to new possibilities and approaches to problem solving.

In her PhD in 2019, Mariana Amatullo set out to define what the design attitude is and what it is constituted of. In her research, she came to find out that seven attitudes that make up a designer: connecting multiple perspectives, creativity, empathy, engagement with aesthetics, ambiguity tolerance and systems thinking. Ambiguity tolerance could be described as the ability for the designer to stay in 'divergent mode' as opposed to 'decision mode.' In fact, designers can get so caught up in the 'divergent mode' that they might have difficulty getting out. In this mode designers are caught up with sketches, creating multiple iterations, they are in the moment sensing the future in a never ending quest for the perfect solution. During 'ambiguity tolerance' designers are cooking and thinking what their ideas will crystalize into, it is a critical yet sometimes overlooked part of the process. To move from the material dimension into the fourth dimension of design we must tap into our divergent state and ask ourselves what are we thinking, what are our goals when we are wrapped in the creation process, where are we putting our focus and what lenses are we using to filter and

refine our ideas. In her research as she interviewed designers in the field Amatullo she noticed that designers did have all design attitudes except one. Even though systems thinking was a design attitude, it was an attitude that not every designer had. While some designers were great at connecting multiple perspectives, they lacked fundamental understandings of systems such as nonlinear growth, interconnectivity and unintended consequences. Today there is a "call to reconceptualize the skill sets, knowledge bases, and professional identities of designers" (Walker et al, 2013). If we designers are capable of staying in divergent mode and dedicating time to exploring, iterating and sensing during our creation process how could we inject new ways of thinking to transform our attitude towards what we create.

To turn into a systems thinker first we must understand what a system is. "A system is an interconnected set of elements that is coherently organized in a way that achieves something." A system must consist of three kinds of things: elements, interconnections, and a function or purpose." Systems can be self-organizing, often self repairing, and can evolve over time. (Meadows, 2008). They are made up of elements, interconnections and a function or purpose. New systems can also arise from existing systems.

To understand how living systems work. We can take a look at the smallest living system, a single cell organism. Fritjof Capra studied the workings of a single living cell and identified that they are made of metabolisms or internal systems and membranes which contain the system. Metabolisms eliminate whatever threatens the system and replicate wherever preserves its present function. Membranes are accepting what enhances its vitality and rejecting things in order to maintain control and autonomy.



(Medium, 2024)

Through its internal systems and membrane a cell balances its dynamic stability and homeostasis, which is the function. Capra also mentions how systems work like the dissipative structures in thermodynamics, all systems tend towards entropy, that means towards chaos or less order. (Boylston, 2025)

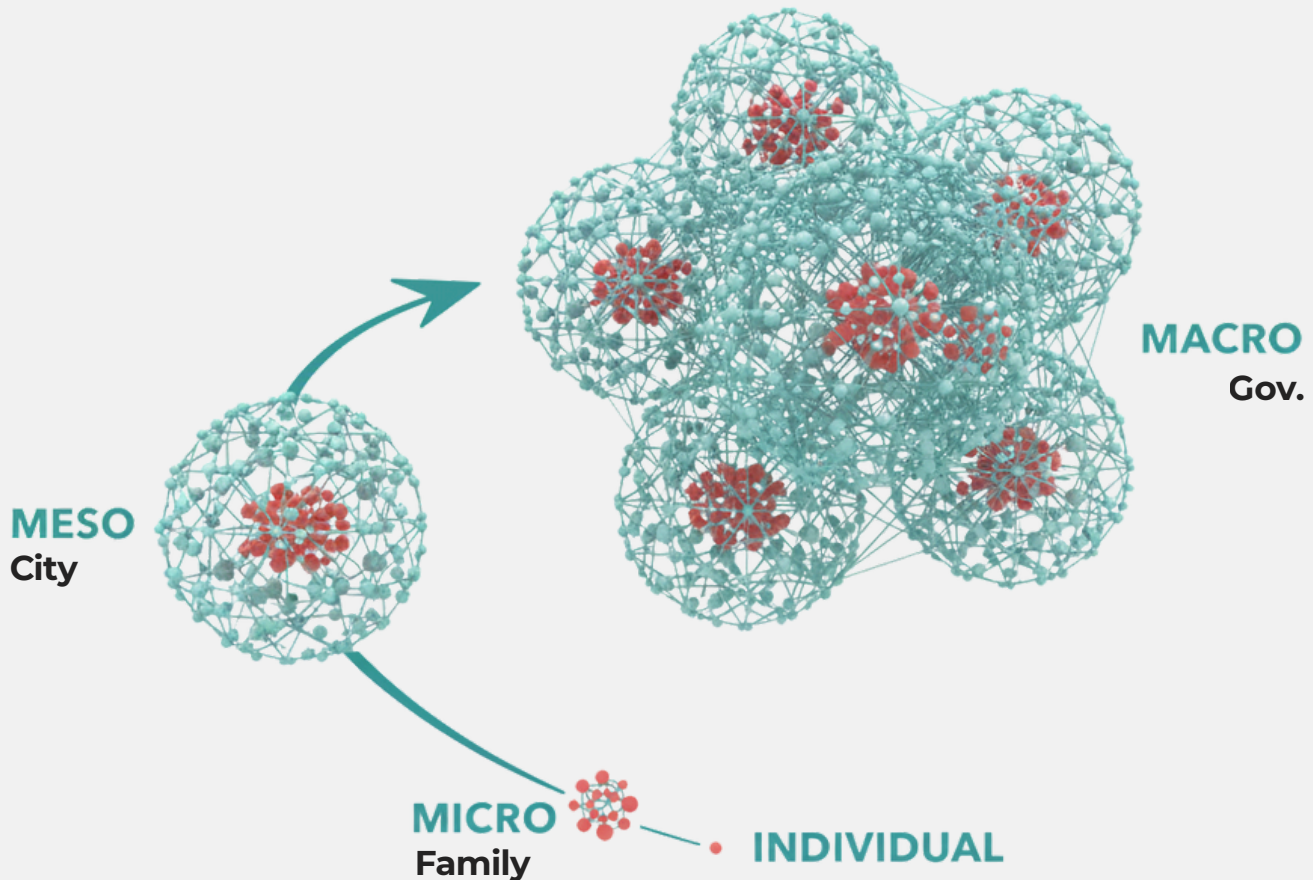
Just like a living cell, we can about a football team like a living system, its elements such as the players, coach, ball and field. The interconnections of this system are the rules of the game, the coaches strategy, player communications, and the laws of physics that govern the motions and movements of the game. (Meadows, 2008)

Systems also consist of feedback patterns. As Jay W. Forrester stated "Everything we do as individuals, as an industry, or as a society is done in the context of an information-feedback system." Feedback is what allows a system to run itself. Consistent behaviour patterns over a long period of time are evidence of the existence of feedback loops." Feedback loops can be balancing, reinforcing, or negative allowing a system to maintain, grow, and decrease a certain output or behavior.

"Self-organizing, nonlinear, feedback systems are inherently unpredictable. They are uncontrollable. They are understandable only in the most general way." -Donella Meadows

A football game is an example of an unpredictable and uncontrollable system. All of its elements and interconnections make one game different from the other, you will never be able to predict the final outcome or score. If you were to be a coach in a football match trying to win the game the only thing you can do is observe the system and effect change by employing strategies and substituting players for ones that could better the system and help you win. As a player inside the field, you are also trying to win the game but your goal is to actually score and to do that you depend on the team, its interconnections and the chemistry between them. Whether you are the coach or the player you will never be able to control the unpredictable system, you never know what situation can present itself during the game and you must be prepared to act quickly and decisively.

"Always design a thing by considering it in its next larger context—a chair in a room, a room in a house, a house in an environment, an environment in a city plan"
-Eliel Saarinen



(Based on Boylston, 2025)

Like mentioned earlier, systems are continuously evolving and are always part of a greater and larger system. American architect and designer Eero Saarinen's design philosophy highlighted that "in working out a design you always have to keep thinking of the next largest thing." His philosophy which echoed the fundamental thinking of his father, Eliel Saarinen, who spoke to the idea of always keeping in mind the next larger context when designing.

Understanding systems thinking means understanding that systems exist within larger systems and that we can exist in many systems at the same time. We currently live in holarchies, which are autonomous systems composed of other autonomous holes that are nested between and within each other. In the

above diagram we see a visual representation of holarchies. "The micro level, that of individual action; the meso level is the level of groups where the individual may still have some influence; and the macro level includes governments, international organizations, and large companies." (Margolin, 2015). According to Margolin, the best place for system intervention is the meso level. The "city, which, though large, is still potentially capable of adopting coherent and effective policies for change. In fact, I would suggest that the city, rather than the individual artifact is the most effective site of utopian vision for the current moment."

Fixing a wicked systems problem is never easy, we always have to analyze the different stakeholders involved

(the elements), their interconnectedness and their purpose or function. We know that the macro level is the best place to intervene but the unpredictable nature of systems can make it challenging for practicing designers who do not have a systems thinking mentality to infuse real impact and change. To understand systems further we have to acknowledge that the world works in a nonlinear way, today our growth mentality has made us visualize progress and success with an up or down linear measure. Our current systems are causing problematic behaviors in our societies which have led to our climate, economic and societal issues of today. To try and fix our systems, today, we use very surface level solutions and blaming, Donella Meadows, identifies that there are certain kinds of systemic structures which contribute to problematic behaviors, she calls these "systems traps" (Meadows, 2008)

System Traps

Policy Resistance:

When various actors with differing goals pull at the system trying to bring it closer to their goal. Policy can pull stocks further from ones goals causing policy resistance.

Tragedy of the Commons

When there is a commonly shared resource, users can benefit and bare the cost of abuse by everyone else. Overuse of resource will erode it and make it unavailable for everyone.

Escalation

When the state of the stock is determined by trying to surpass another stock. A reinforcing loop that can cause arms race, and escalating violence.

Success to the Successful

Winners are systematically rewarded with the means to win again. Can cause the winner to take it all and losers to be eliminated.

Drift to low performance

When performance standards, are perceived by past performance especially if there is a negative perceived state. Causes eroding goals and drift to low performance.

Shifting the Burden to the Intervenor

When a systems solution reduces or disguises the symptoms of the problem without actually solving it. The intervention can cause a self maintaining capacity of a system causing it to erode and require more of the intervention and less able to maintain itself.

Rule Beating

Behaviors that gives the appearance of following the rules but distorts the system instead.

Seeking the Wrong Goal

If goals are defined inaccurately or incompletely the system can produce a result that is not intended or wanted.

System traps have ways to work around them and can be solved if attacked properly. Donella Meadows also identifies a list of leverage points. Leverage points are "points of power to intervene in a system. There is no silver bullet or one solution that will solve all the issues of a system instead we can look for where to leverage. (Meadows, 2008)

Leverage Points

Numbers

Constants and parameters such as subsidies, taxes, standards.
Changing the size of the flow.

Buffers

Size of stabilizing stocks relative to their flow.
Stabilizing the system by increasing the capacity of its stock.

Stock and Flow Structures

Physical systems and their nodes of intersection.
Changing the structure of the system, a slow and expensive process and rarely a leverage point due to unchangeable systems.

Delays

The lengths of time relative to the rates of system changes.
Changing a delay to be shorter or longer.

Balancing Feedback Loops

The strength of the feedbacks relative to the impacts they are trying to

connect.
Setting strengthening balancing loops can improve a system's self correcting abilities.

Reinforcing Feedback Loops -

The strength of the gain of driving loops

They are self reinforcing and snowballing the more it works the more it gains, driving behavior in one direction.

Information flows

The structure of who does and does not have access to information

Missing information often leads to a system malfunctioning.

Rules

Incentives, punishments, constraints
Pay attention to the rules and those who have power over them.

Goals

The purpose or function of the system
Seek to intervene in goals of an entire system which are larger, less obvious, higher leveraging.

Paradigms

The mindset-set out of which the system - its goals, structure, rules, delays, parameters - arise
Changing a paradigm can totally transform a system.

Transcending Paradigms

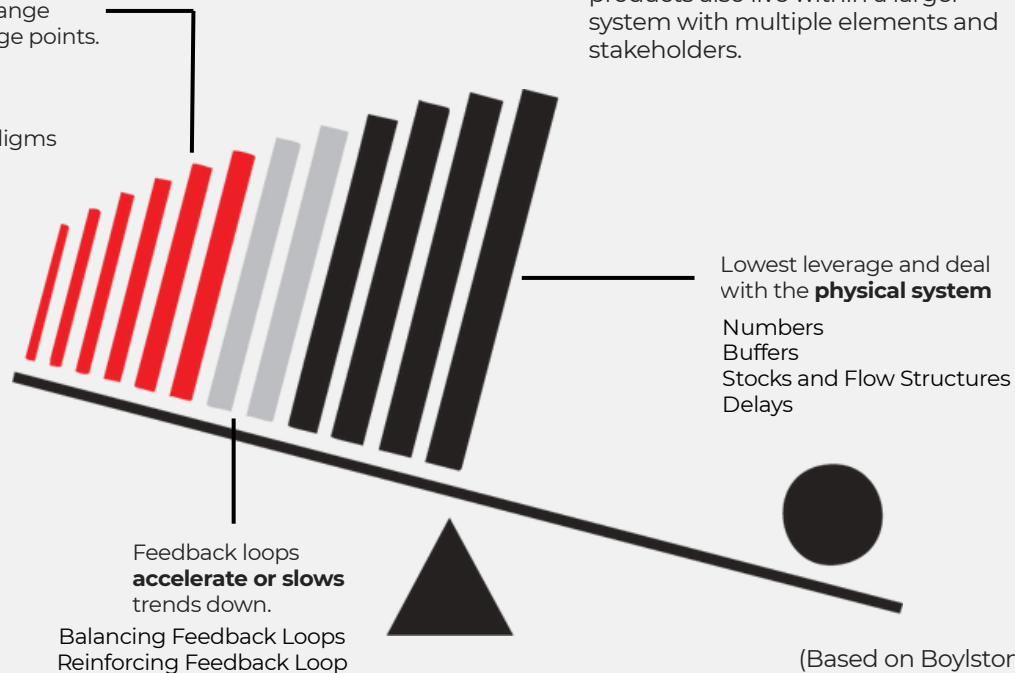
Be unattached to paradigms and stay flexible. No paradigm is "true." We are limited in understanding.

In the next figure we can clearly see which leverage points are higher leverage in causing system change. The first four are the ones with lowest leverage and deal with the physical system. The next two points focus on the feedback loop and can accelerate or slow trends down. Finally the last six leverage points can generate larger systems change, if one of these leverage points change they can automatically change other lower leverage points.

As we move towards the 4th dimension of design, systems thinking helps us see through the complexity of wicked problems in our current systems and identify possible leverage points for systems change. Designers can start to look at a non linear world that is interconnected and understand how our design decisions and solutions live within a larger context and can have other consequences. Currently, most of our design and manufacturing processes are organized in linear and vertical systems beginning with raw material extraction and an end where products end up in landfill, go through incineration, or contaminate our environments. Through systems thinking we can understand the products also live within a larger system with multiple elements and stakeholders.

Generate greater **systems change** and can change impact other leverage points.

Goals
Paradigms
Transcending Paradigms
Self-Organization
Goals
Information Flows



(Based on Boylston, 2025)

LIFE CYCLE ANALYSIS (LCA)

Another tool we designers can use to drive sustainable change is Life Cycle Analysis. When designing the material world through a sustainable lens we are engaging in what is called Eco Design. In eco design we engage in design for the environment. Through concepts and tools like Life Cycle Analysis (LCA) and life cycle thinking we can work to optimize the entire product lifecycle for the better of the environment. (Boylston, 2025) "Rather than calculate cash flows and apportion legal responsibilities, LCA tracks the energy expended and mass consumed in products" (Walker et al, 2013). During Life Cycle Analysis we analyze all stages of the product from raw material extraction, design and manufacturing, transportation, usage, to its end of life. We then realize that all stages in a product, service or system consume natural resources in direct or indirect ways. Materials have a direct impact but indirect impacts refers to the energy consumption from emissions in the production stage. In this type of thinking there is a focus in recognizing the water and energy impacts involved with the product from its manufacturing, to use, all the way to its end of life. Life Cycle Analysis breaks "down the lifecycle into manageable steps and calculates its impact by assessing all stages, its inputs and outputs." (Walker et al, 2013) At the end of the analysis we can learn if they are carcinogenic, eutrophic, its climate impacts in terms of carbon, pollution in general, and transportation impacts. By conducting lifecycle analysis of different products we can then do comparative analysis of individual impacts and also of different products or product iterations, to determine what solution is best. Understanding the entire lifecycle can also bring together different stakeholders to analyze and help change internal mindset about the product creation process. Based on our design and materiality choices as designers, LCA can help us

understand the impacts of each material and design choice and where in the process these impacts are coming from.

Okala Wheel

The Okala wheel is a great tool for designers to alter and reduce impacts of a product. In its seven stages the wheel shows kinds of opportunities and poses questions for designers to think about when designing in the material realm, starting from do we even need this product to exist and from the beginning asking us to think about dematerialization and systems innovation. By starting at number one and going around the wheel we can see what choices we can make to reduce the impacts. In the next page we can see the Okala eco design strategy wheel.

Product Service System

Another way we can think about product systems is through the concept of Product Service System (PSS). PSS refers to innovative business offers based on a combination of products, services and systems. Helps dematerialize by replacing products with services and can also increase the lifecycles and reduce waste by implementing reuse or sharing services. These solutions will reduce material extraction and decrease energy consumption from the production of new products.



OKALA's ECODESIGN STRATEGY WHEEL

(Boylston, 2025)

GREEN GIANTS

Businesses are an important component to society and also have big impacts on the environment. Many businesses today speak about operating like a family, it is time to move past this mentality and start looking at businesses and corporations as professional sports teams who share a common goal. By viewing companies in this way we can change the attitude of employees and foster stronger collaboration. In her book Green Giants, Freya Williams analyzes companies that are leading the transition towards sustainable operations. She highlights six key elements we can learn from businesses in order to lead in the transition towards more sustainable operations.

Six Key Elements

1. Iconoclastic Leader

Conviction, commitment, courage, contrarian.

2. Disruptive Innovation

An innovation that totally disrupts a category

3. A Higher Purpose

A purpose beyond than profit, margin and growth.

4. Built In, Not Bolted On

Built on the core of sustainability

5. Mainstream Appeal:

Diffusion of Innovation

- **Competitive Advantage:** Degree to which innovation is seen as better.
- **Compatibility:** Degree to which the innovation is consistent with current values and experiences of adopters
- **Complexity:** How simple to understand is the innovation

- **Trialability:** Degree to which it can be experimented or tested
- **Observability:** Degree to which innovation is visible to others.

6. New behavioral contract

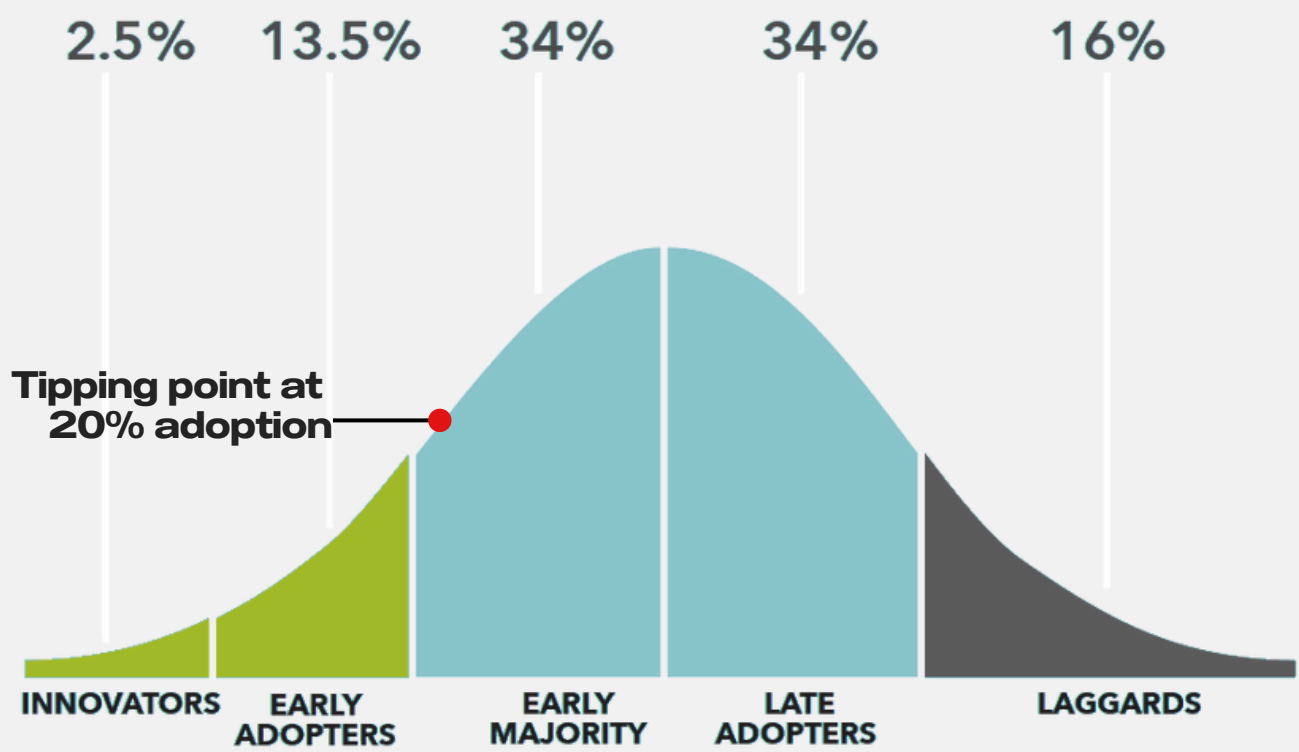
Aggressively engaging with consumers and behavior change methods in order to kick off a reinforcing feedback loop of consumer behavior change and corporate behavior change. When consumers change their behavior, corporations will follow to meet the demands of the new changed behavior.

(Boylston, 2025)

Inside mainstream appeal we see diffusion of innovation. In order for ideas and design solutions to be successful we must always look at comparing it with diffusion of innovation.

If your idea ticks all five diffusion of innovation points, then your innovative idea is likely to take off. Diffusion of innovation are the five traits of over the last one hundred years which have proved to be successful and innovative ideas.

Something that is also important in diffusion of innovation is looking at adoption rate of new innovations. According to Michael Gladwell in his book Tipping Point, for innovations to be adopted by the majority of the public you have to reach the 20% adoption rate. Once the 20% adoption is reached the innovation is likely to take off and spread to all other consumers. In the figure next page you will be able to see the 20% adoption compared to the percentage of adoption groups. It is important to not that Laggards are a group we as designers should not focus as it is a group that will hardly change their posture unless everybody else has adopted.



(Based on Boylston, 2025)

CBSM APPROACH

As we saw in our green giants section, a new behavioral contract can be triggered by change consumer behavior. Striving for consumer behavioral change is an important part of transforming the sustainable future we desire.

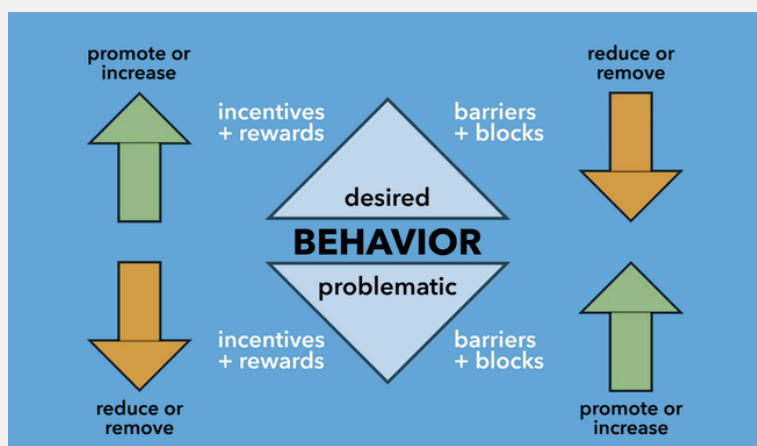
Community Based Social Marketing was founded by Doug McKenzie and it is a framework for developing environmental behavior change programs. The CBSM approach uses tools that social science research has demonstrated to be effective in fostering behavior change. It is based on behavior science and cognitive psychology. The methods of the CBSM approach work within the meso or community level.

Currently traditional the best marketing campaigns out there are 7% successful. Working within the meso level with actual people can have a greater impact in behavior change. We as designers fight against competing behaviors such as unconscious actions and actions like

randomly dumping one bag of trash instead of two or three. The main idea is to remove the barriers limiting the desired behavior and enhance the benefits. The figure below shows us how when dealing with a problematic behavior we must work the opposite way by reducing the benefits of the problematic behavior and increasing the barriers of the behavior.

In the CBSM behavior approach there are certain tools that can help us designers inject behavior change in our work.

- **Commitment:** Help people view themselves in positive light.
- **Prompts:** Close in time and space to target behavior good with repetitive tasks such as using attractive recycling bins.
- **Norms:** Modeling new behaviors is powerful.
- **Incentives:** Closely pair incentive with desired behavior and make them visible.



(Based on Boylston, 2025)

Behavioral change is at the core of transforming our societies. By using the CBSM approach and its tools we designers can come up with better solutions that are more effective in fostering the behavior change we desire to attack. In the world of sustainability there are many problematic behaviors relating to our consumption patterns. Helping people understand the negative impacts of these behaviors through barriers, incentives and behavioral approach tools we can offer solutions that fight against doom.

CAPABILITIES

Another approach we as designers should adopt is the capabilities approach. As designers it is extremely important for us to also consider human capabilities. Thinking about human capabilities and capabilities approach to design thinking means taking into consideration justice, equity, and human agency from an individual perspective.

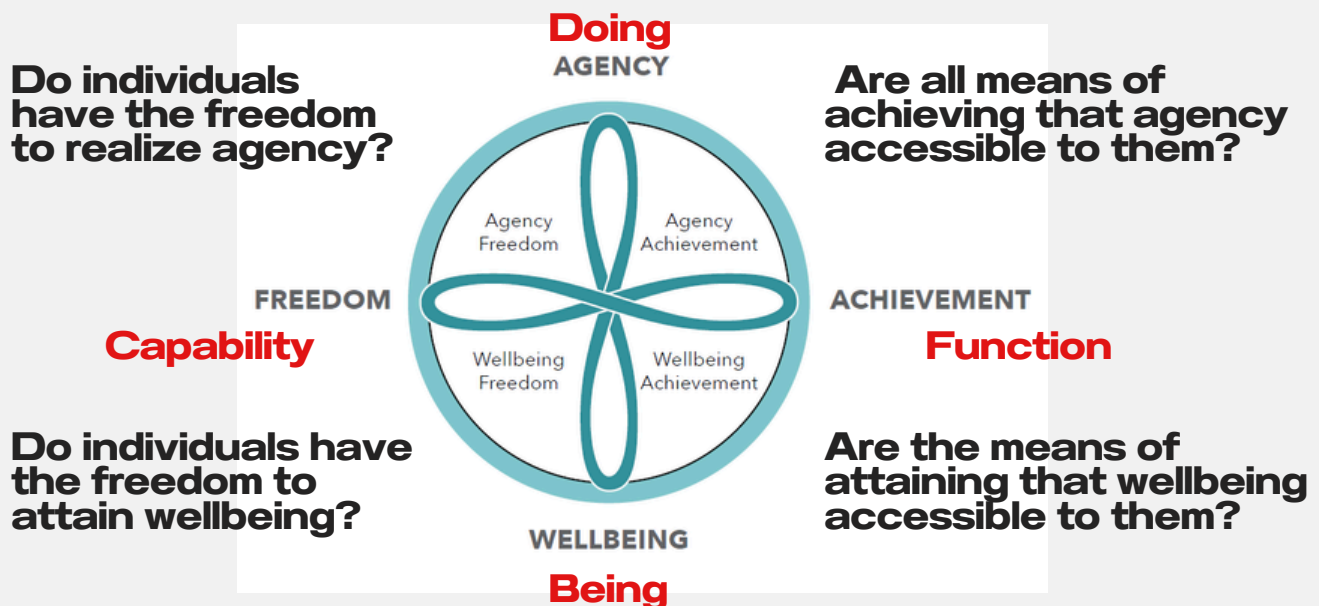
Amartya Sen defines capability as a real possibility of being or doing of value; he also makes the distinction between capability and function in referring to functioning as a realization of a capability. Sen, speaks about four concepts of relative advantage. He talks about advantages in the sense that you can take advantage of your present conditions, your personal advantages in life. If we better understand the concepts of advantage as designers we can build creative solutions to help others explore their capabilities.

4 Concepts of Advantage

- **Freedom** (Capability)
- **Agency** (Doing)
- **Wellbeing** (Being)
- **Achievement** (Function)

Which are all interconnected but is important to make the distinction between freedom and achievement and wellbeing and agency, the freedom to, not necessarily the act of achieving, or, as they say, the functioning. While well-being equals being, and agency equals doing. In the next figure we can see how the four concepts of advantage relate together. In recognizing their relationship we understand that a change in one will cause change in others.

Four Concepts of Advantage



“Design is an attitude everyone should have; namely the attitude of a planner”

-Lazlo Moholy-Nagy

“Designers occupy a dialectical space between the world that is and the world that could be.”

- Victor Margolin

Everybody can be a designer, and by adopting this mentality you put yourself in a position where you can make the world a better place.

PART 3:

Collaboration

TOGETHER

“Without integrative disciplines of understanding, communication, and action there is little hope of sensibly extending knowledge beyond the library or laboratory in order to serve the purpose of enriching human life.”

-Richard Buchanan

When we start thinking in systems we start to understand how important multi stakeholder collaboration is, one of the most critical parts of the solution is being able to understand every stakeholder's concerns. We must learn what motivates a stakeholder in a system and how we can work with other stakeholders to bring forth greater and more holistic solutions. “Designers can balance power and help groups talk, imagine, and act together” (Irwin, 2018). Collaborating with different stakeholders opens up our view of the problem and helps us map out the system properly in order to identify leverage points or areas which need attention. When working with different stakeholders we designers have to be the mediators and the ones responsible to ask the correct questions, look beyond the narrow view of stakeholders, and facilitate collaboration with others. We must “enable stakeholders to adopt collaborative (as opposed to confrontational) postures which aid in transcending differences” (Irwin, 2018).

The concept of Co-design, where stakeholders and designers meet to formulate solutions together should be at the heart of every design solution, Multi stakeholder engagement and collaboration will cause dialogue, and drive systems forward. To be effective the designer must work as a facilitator knowing when to step back and when to step in.

In the short documentary Overview directed by Guy Raid, Astronauts are interviewed regarding their experience of looking at planet Earth from outer space. Most astronauts speak about this unity and oneness of life that they experience when looking down at the Earth. This allowed astronauts to transcend paradigms and understand the planet as our shared home.

Similarly, Buckminster Fuller coined the idea of Spaceship Earth, and treating the planet as a space that we all share. Some astronauts were unable themselves to articulate and put into words what they felt during this overview moment. Thanks to historians and researchers they were able to find a hindi word which encompassed what they were feeling: Savikalpa samadhi. Savikalpa Samadhi can be described as a deep level meditation state where the individual merges consciousness with a higher reality. As designers we must seek for deep states of connection with the system.

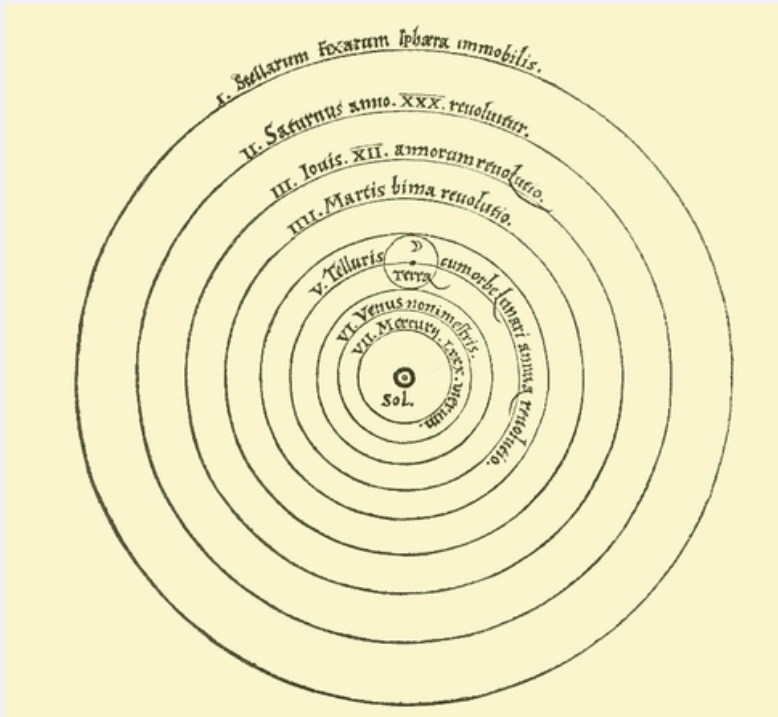
When acknowledging our limited understanding about the complexity and beauty of our universe which is beyond human comprehension we have to “Let go into not-knowing into what buddhist call enlightenment.” Spirituality is greatly connected to the concept of oneness. Designers should always be aware of this oneness of the universe, the planet, and our societies. We will never be able to comprehend the complexity but in recognizing oneness we can start to look at our interactions with others and with the system differently. Systems thinking helps us see the interconnectedness of systems. It makes us realize that without all the stakeholders necessary true holistic innovation isn't possible. The climate crisis deals with a planetary system, one in which everyone is involved, one where we have commons to share between regions and nations. The problems are wicked and radical transformations are needed to change behavior and transcend our paradigms, “No nation can achieve this on its own; but together we can - in a global partnership for sustainable development.” (Our Common Futures, 1987).

Conclusion

Conclusion

By depicting the sun not earth at the center of the universe Nicolaus Copernicus started a revolution that would reshape the way we think of our place in the universe as part of a greater system.

Today I would argue that the Copernicus theory has not yet permeated into our notions of operating within this planet. By realizing that our planet is not the center of the universe, we must also acknowledge that we humans are not the center of this planet. We have become detached from it and created our own world with our own illusions. By bending nature to our will, to power our growth and consumption, we have come to believe and act as if we are the highest power and center of this planet.



We are becoming aware "through an emerging collective consciousness that our relationship to our world is not what we might have once

thought it to be." (Walker et al, 2013)

Times are changing and understanding how we should move forward we need to adjust our clocks. We live in a fast world with short attention spans, quick deliveries, and short term economic goals. As systems thinkers we must the importance of time and our relation to it. We have now come to see life only through our individual time, how much time we have left and based on that we will act. This short term thinking differentiates with North American cultures who "actively spoke of and considered in their decisions the effects on the seventh generation to come." (Meadows, 2008)

Moving forward we must have "Infinite gratitude for the past. Infinite service to the present. Infinite responsibility to the future" (Brand, 1999,)

It is clear that our current models are old and outdated. We live in a system "with rules designed by corporations, run by corporations, for the benefit of corporations." (Meadows, 2008) We designers are complicit to this and work in corporate environments where the design kitchen is overshadowed by sales, marketing, and revenue growth bending and shaping design outcomes to their will and driving the nature of design solutions through briefs and low costing high profiting goals. For designers this is an overwhelming situation.

However we must learn to let go and "dance with the system." To be able to flow and dance with a system we must let go of our control, listen to the beat of the system, and observe how it behaves in order to insert yourself in the dance. (Meadows, 2008) Thinking in Systems). Dancing not only requires our physical senses but it also involves our spirit and intuition.

**“Remember, always, that
everything you know,
and everything everyone
knows, is only a model.”**

Donella Meadows

It is time to rewrite our script and transcend our paradigms as humanity. “Decoloniality is about shattering the familiar.” (Khandwala, 2019) Learn to admit your ignorance and celebrate the complexity and diversity that the world has to offer. Dance with the systems and design against doom.

Rewrite the script
Design against Doom
Collaborate

The future is now... Transcend your paradigms.

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