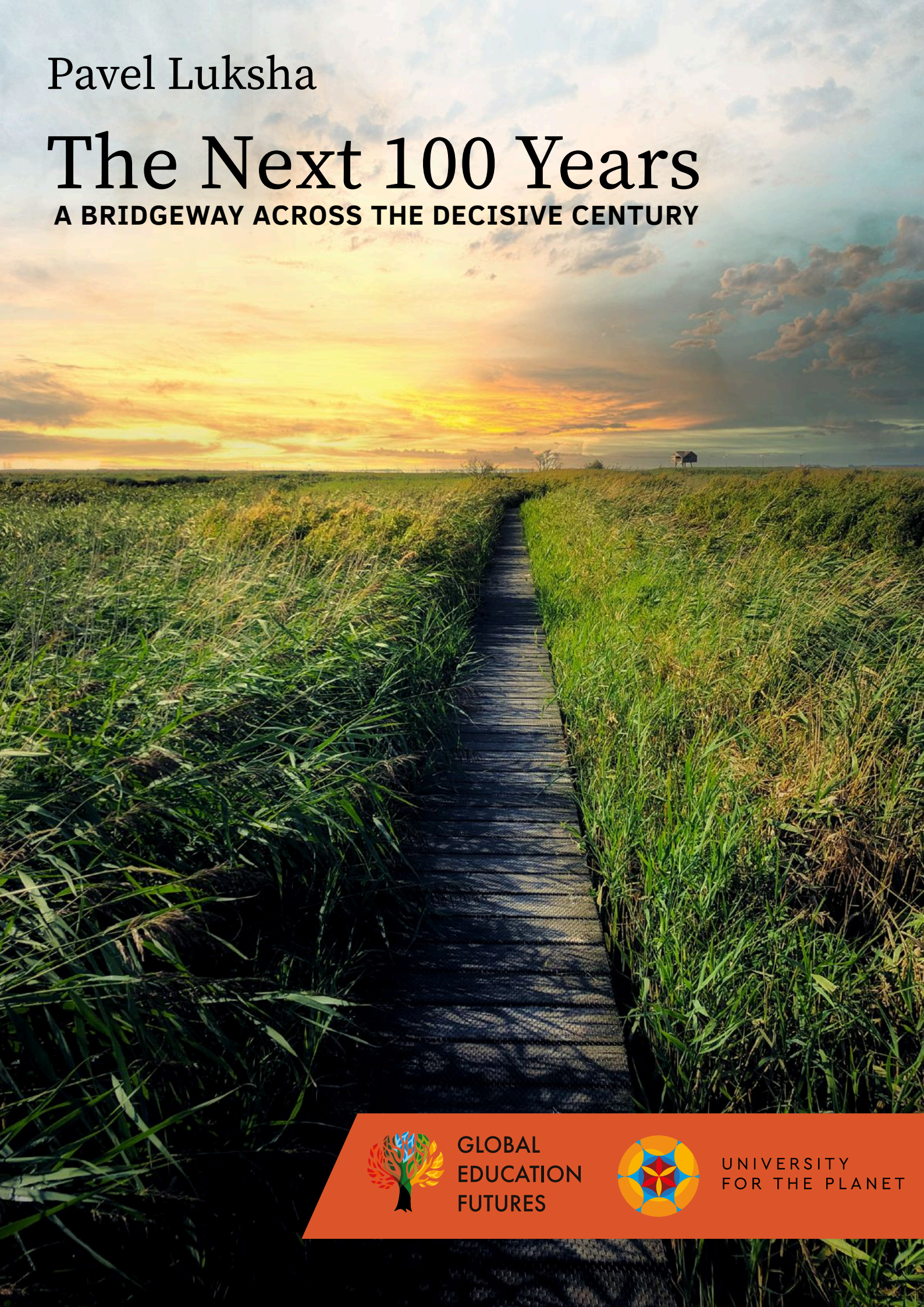
Pavel Luksha

The Next 100 Years

A BRIDGEWAY ACROSS THE DECISIVE CENTURY



GLOBAL EDUCATION FUTURES

UNIVERSITY FOR THE PLANET

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A WORD FROM THE AUTHOR

This work pulls together threads that were woven in my journeys across six continents. In hundreds of visioning sessions about the futures of society, economy, cities, jobs, and education, I have been privileged to gain insights into aspirations and desperations of people from all walks of life. I have shared moments with indigenous youth, listening to their stories of fading dreams and uncertain futures. I have engaged in discussions about the future with corporate leaders and politicians, witnessing their ambitions to shape global industrial structures and forge new financial frameworks. I have collaborated with engineers and researchers scaffolding the design of groundbreaking technologies such as thermonuclear energy and brain-computer interfaces. I have also celebrated with social activists, movement builders and weavers dedicated to planting the seeds of a new world.

Three distinct themes have consistently emerged from my interactions with these diverse communities. **First and foremost, I have come to realize that none of these individuals and groups are inherently malevolent.** Every person I have engaged with shares a common desire for the betterment of the world's futures. While many harbor personal ambitions, the prevailing sentiment is an earnest intention to channel these ambitions towards positive ends, ultimately striving to craft a better future that works for all (maybe in their distinct way of seeing things).

Secondly, a resounding sentiment is that people are not seeking mere incremental enhancements in their lives. Rather, they yearn for a radical transformation. The prevailing view is that traditional approaches are no longer effective. There is a prevailing sense that our civilization demands **a fundamental recalibration** — from social institutions and education to governance, finance, families, and even food. Our current trajectory as a species is highly unsustainable, inflicting damage upon our planet, compromising our health, and eroding cultural values. People sense discontent, and they often react with rebellion or distress, yet underlying it all, **they hold on to a glimmer of hope.**

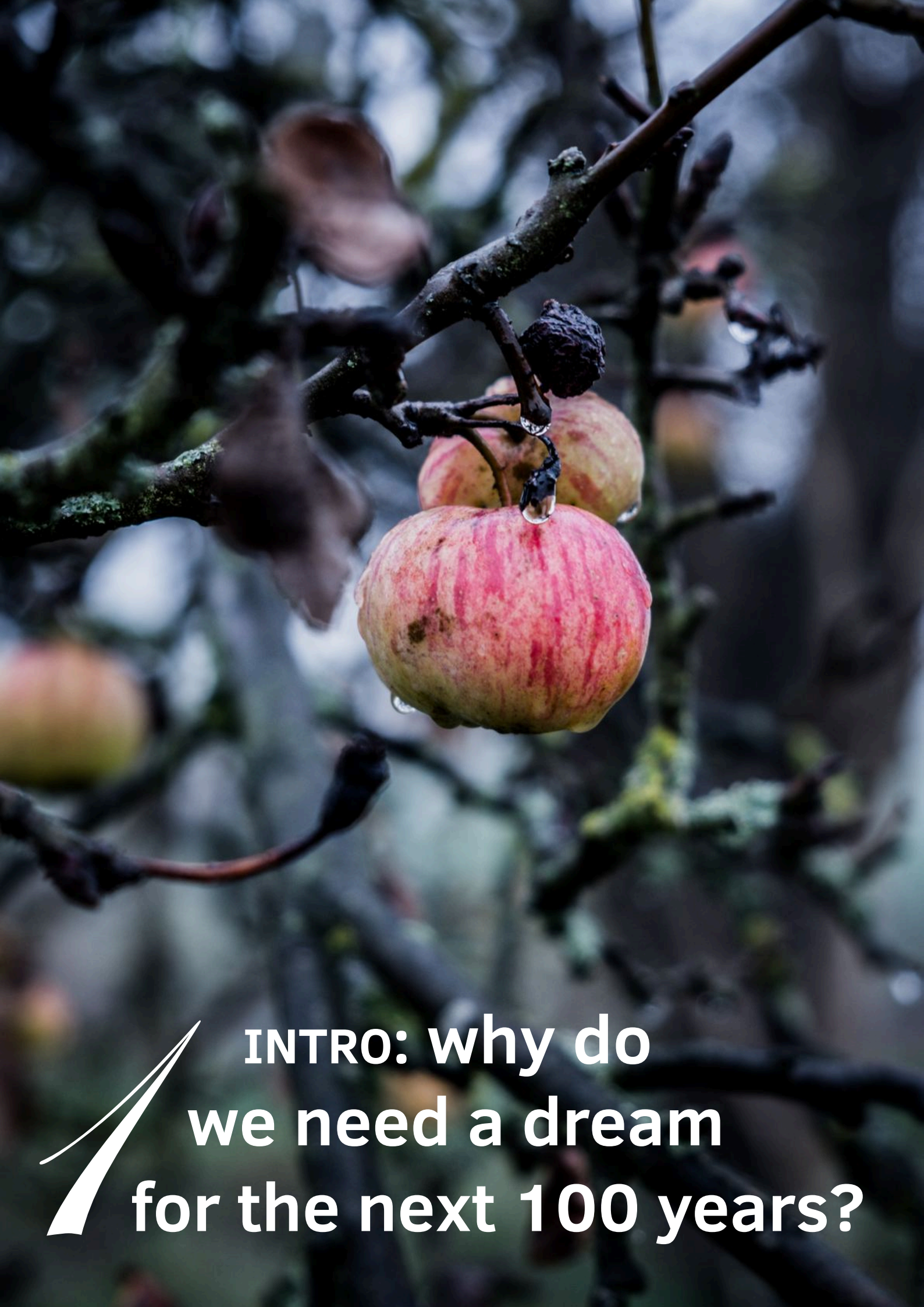
Finally, many sense that change is inevitable on a global scale. This anticipation is marked by a profound sense of discontinuity, as if a new narrative of collective existence to unfurl before our eyes. Some attribute this shift to the disruptive technologies like AI. Others tie it to looming geopolitical tensions, anticipating large-scale wars and repression across various regions. There are those who perceive it as a generational rupture, a revolution of values and perceptions to be championed by the younger generations as they step into positions of power. Almost unanimously, there is agreement that the world we are familiar with is on the cusp of transformation.

So many inquire, "How can I actively participate in the unfolding transformative process?" To them, I respond that we are residing within a truly unparalleled moment of human history. **It is the moment when humanity finds itself possessing the utmost potential for transformation, capable of either creating the new Garden of Eden — or manifesting Hell on Earth.** The convergence of rapidly advancing technologies, aggravating ecological crisis, and the escalating societal disparities propels us toward a point where the choice about the future is being made. This is also the moment when every human being — all of us and each of us — holds the power to shape the course ahead. Through decisive action or deliberate inaction, each of us becomes an active participant in determining the trajectory of our shared futures.

To choose, we need to be aware of our options. **The purpose of this book is to show possible pathways, to accentuate hopeful opportunities and to provide some guidance for concerted action.** It is not a definitive blueprint that encompasses all solutions, not a masterplan to "rule them all" — but an offering to those willing to take it.

Some say that pessimists are informed optimists. My work with thousands of leaders and researchers made me informed — and I am an optimist, nevertheless.

Pavel Luksha ——————————— August 2023



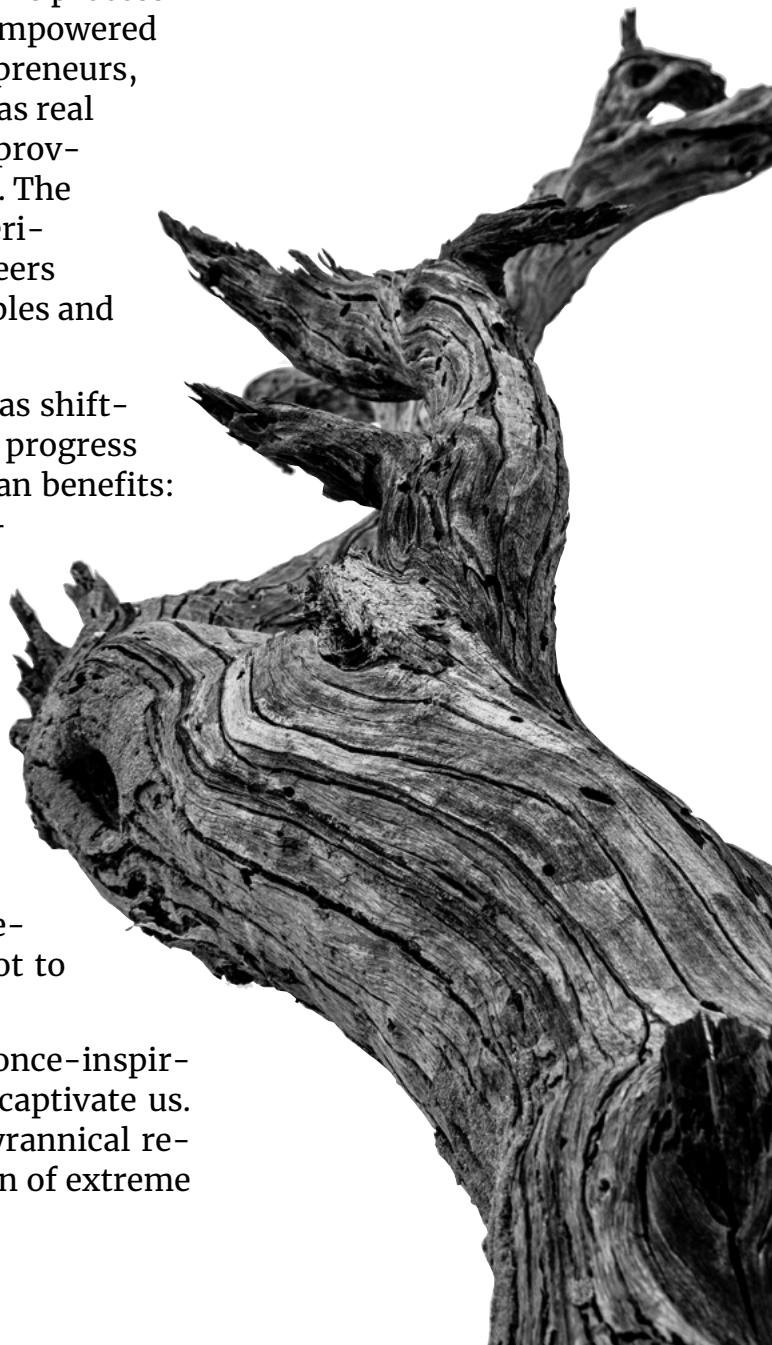
INTRO: why do we need a dream for the next 100 years?

The whole world is a very narrow bridge.
And the main thing to recall is not to be afraid at all.

Rabbi Nachman of Breslov

THOSE WHO DARE

The allure of predicting what lies ahead has long captivated humanity. In ancient times, the knowledge of the futures was believed to be reserved for the all-knowing deities, who sparingly disclosed their secrets to kings, priests, and the righteous ones. The 20th century began to democratize the future, as science fiction and political utopias mesmerized millions willing to sacrifice their dull present for a promising tomorrow. This process inspired the creative genius of humanity and empowered multitudes to become inventors, artists, entrepreneurs, and activists. Yet, the attempt of making utopias real brought forth the darker side — many visions proving fake, leaving disillusionment in their wake. The bright promises of better worlds failed to materialize. Neither politicians, scientists, nor engineers succeeded in liberating mankind from its troubles and constructing a heavenly realm on Earth.



In the early 2020s, the concept of the future has shifted from exciting to scary. The technological progress increasingly appears to bring more threats than benefits: digital control over society, genetic manipulation, killer drones, and above all, artificial intelligence jeopardizing the prospects of billions of workers — and in the long run, posing a risk to humanity itself. Ecological disasters, the imminent climate crisis, the destruction of the biosphere, and the transformation of the Earth's surface into a barren desert. New world wars, the collapse of civilization, and the extinction of humanity looming large. Peeking into the futures has become distressing, and many people choose not to think about it at all.

In today's world, humanity is losing its once-inspiring dreams. Centuries-old utopias no longer captivate us. Communism has been misused to establish tyrannical regimes, while liberalism served as a justification of extreme

wealth disparities. Techno-utopias have fueled the creation of surveillance states, and transhumanism became a path to dehumanization. While we hoped for a space age to turn us all into space species, it will most likely remain the privilege of a few affluent individuals for a long time to come. With uncertainty increasing, more people take refuge in religion — but find it challenging to apprehend our complex modern lives through ancient stories created for small agrarian communities thousands of years ago. Collectively, we are increasingly unsure about the purpose of our existence, and the future seems ever more intimidating.

However, the laws of living nature are inexorable. Any living system requires a purpose for existence, and it is the purpose that shapes its ability to persist and evolve. Our civilization and species must discover their own purpose- or fade into oblivion. We must break free from the constraints of existing conventions, the repetitive ways of the past that offer no hope for the future.

We must recall our essence — what keeps us alive, healthy, and resilient. Humanity is a young species: on average, species inhabit the planet for 5 to 10 million years, (and some key ones like bees for 100 million years), whereas we are merely 100 thousand years old. Yet, we are unique — few other living beings have wielded such control over their environment, altering the shape and condition of the planet in such a brief timespan. Is this a gift or a curse?

As humans wield ever-increasing technological power and influence over the planet, we face a crucial choice in choosing our path forward. We must extend our vision beyond the present, beyond the horizons where politicians, corporations, and inventors operate. We must ask ourselves about a shared aspiration — about the shape of a new human dream. It is time to dare dreaming our futures again.

IT IS TIME TO DARE DREAMING OUR FUTURES AGAIN.

> The future enters into us, in order to transform itself in us, long before it happens.
>
> Rainier Maria Rilke

THE HONEYTRAP OF TECHNOLOGICAL PROGRESS

As we contemplate the future, our minds are filled with the exciting opportunities that technological advancements can offer. With exponential technological trends, we stand at the brink of a new era, where the next 10-20 years might bring more profound transformations than the cumulative changes of the past thousands of years. Artificial intelligence can become a faithful companion, relieving us from monotonous tasks, manag-



ing our routines, and solving seemingly insurmountable challenges of business and science. Quantum computers will enable us to simulate Earth's climate and understand the complexity of our brains. The prospect of harnessing fusion energy promises an unlimited and sustainable power source. Nanotechnologies will allow us to shape atoms into any material thing we could desire, and with synthetic biology, we will be able to program the living matter itself to cater to all our needs. Breakthroughs in human genome research will empower us to reprogram our bodies, unlocking superhuman capabilities and even giving us the potential for eternal life. Technological optimists like Peter Diamandis suggest that humans have already begun to master their own evolution, and that the 2020s decade "will see more progress than the previous 100 years" [Diamandis, 2020].

> Man is to technology what the bee is to the flower.
>
> James Scott

This is a partial truth, but not the complete picture. We must recognize that technological progress is not always a trustworthy ally. Many technologies are progressing much slower than desired, and some are not materializing at all. Fusion, for instance, has been hoped for since the 1970s, yet significant advancements remain elusive — so collective expectations for "nearly free energy" have never been fulfilled. Life extension research on a large scale has yielded minimal results, leading many experts to shift their focus to other challenges. We cannot hope that new discoveries will continuously spill out of the cornucopia of technological progress as we desire. Also, the disheartening reality is that each major new technology brings a set of fresh problems and unintended consequences. For instance, plastic bottles, which were once seen as a breakthrough granting access to water worldwide, now pose a major threat to aquatic

THE NATURE OF TECHNOLOGIES HOLDS A PROFOUND DUALITY.



ecosystems. Internet and atomic power provide even more starching examples of gamechanger technologies that have revealed their dark side.

The nature of technologies holds a profound duality. On one hand, they provide modern humans with incredible capabilities through gadgets and mechanisms. A smartphone grants near-infinite knowledge, a car offers limitless travel, and an air conditioner ensures comfort anywhere. However, this reliance has transformed us into techno-symbionts, leaving us unable to survive without these devices for even a few days. While technology strengthens us, it disrupts the natural adaptability of our bodies, affecting our mental health, our sleep cycle, eating habits, our eyesight, posture, and movement patterns.

> Technology is always a two-edged sword. It will bring in many benefits, but also many disasters.
>
> Alan Moore

Moreover, technological infrastructure harms the planet's vitality, destroying natural ecosystems and undermining self-regulating planetary systems. In some ways, technology behaves like a parasitic invasive species, subjugating living matter and depleting it solely to perpetuate itself [Girardet, 2022]. As we become increasingly dependent on technology, this exploitative relationship intensifies, leading us into a honey trap — initially appealing but increasingly perilous. With each step forward, we risk losing ourselves, serving the reproduction of artificial technological systems. Forecasts suggest that these systems may eventually become autonomous and capable of self-reproduction, rendering humans and other life forms obsolete. This outlook is far from optimistic, isn't it?



Certainly, this picture isn't entirely complete either. Technology has undeniably provided people with incredible opportunities. The remarkable leap in the global population from half a billion during the early industrial revolutions to today's eight billion, longer life expectancies, abundant nutrition for most of the world's population, a vast array of consumer products and services could only be made possible through the creation of innovative technologies for food, medicine, construction, transportation, and more. While technology does present challenges, it also offers solutions. And the promise of a new era, harmoniously created in concert between humans and artificial intelligence, might indeed hold true promise.

Whatever is our collective pathway to the futures, we need to understand that technology is but a tool, a means and not the ends to this path. We should not be blindfolded by the progress of technologies to pose as our salvation or doom — whether various emerging types of AI, or robotics and autonomous vehicles, or nano—and biotech, or

any other type of technology that becomes the "hype of the year". The purpose and impact of technologies still depend on our choices. Therefore, the perceived hostile nature of technologies is the result of our choices, they mirror our own culture and dominant governance systems. For instance, nuclear chain reaction can provide clean power, but it can also become a destructive weapon. Digital platforms can help us learn and grow — or they can stupefy and distract us from the challenges of life. The future will not be shaped by technologies as such — but by our ways of employing them. And it is our duty to bring our technological progress in alignment with more fundamental truth of our collective existence and the wellbeing of our planet.

THE FUTURE WILL NOT BE SHAPED BY TECHNOLOGIES AS SUCH – BUT BY OUR WAYS OF EMPLOYING THEM.

HITTING THE PLANETARY BOUNDARIES

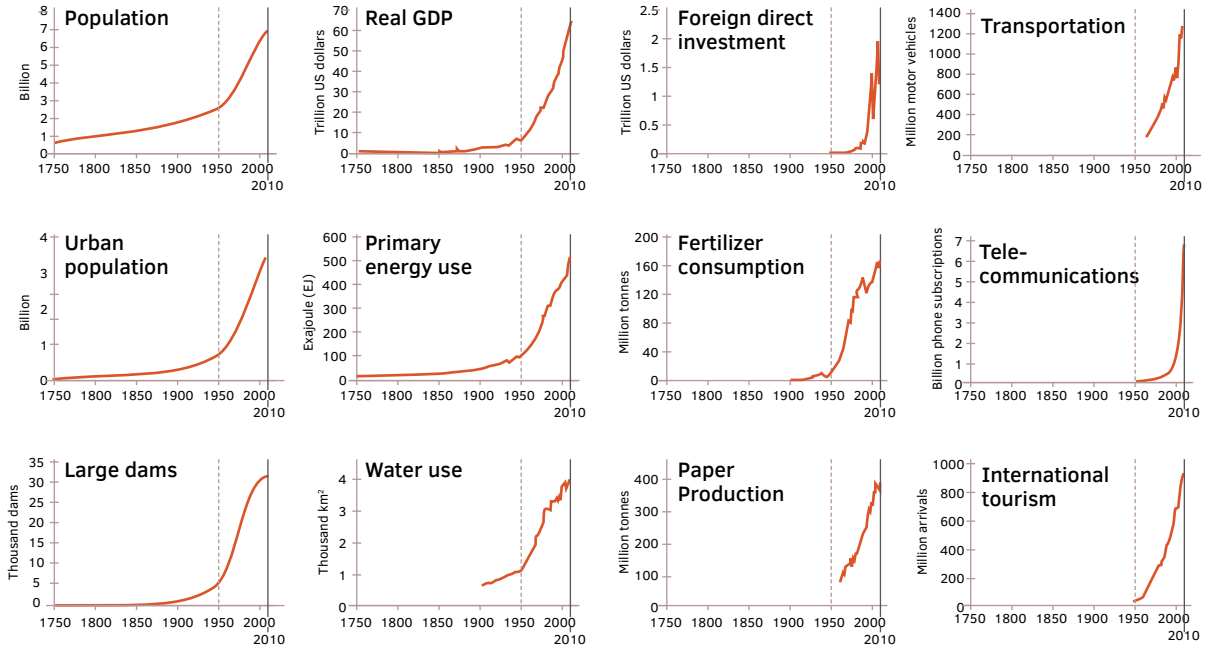
Despite growing concerns regarding technological advancements, technologies continue to drive the transformation of modern society. Unlike the past, where critical inventions were rare, we now witness revolutionary inventions every 2-3 years — such as AI based on large language models, CRISPR biotechnology, autonomous vehicles and nanocomposites in the last decade alone. Scientific research and technological development institutions play a pivotal role in driving this rapid progress, and they have created unparalleled conditions for human prosperity. Since at least the middle of the 20th century, we are living in an era of Great Acceleration, observing the exponential growth of population size, collective human wealth, and technological complexity including computational capacity [FutureEarth, 2015]. These factors mutually reinforce each other, creating the impression that the humanity has hacked the master code of abundance, and its capacity will continue to increase indefinitely.



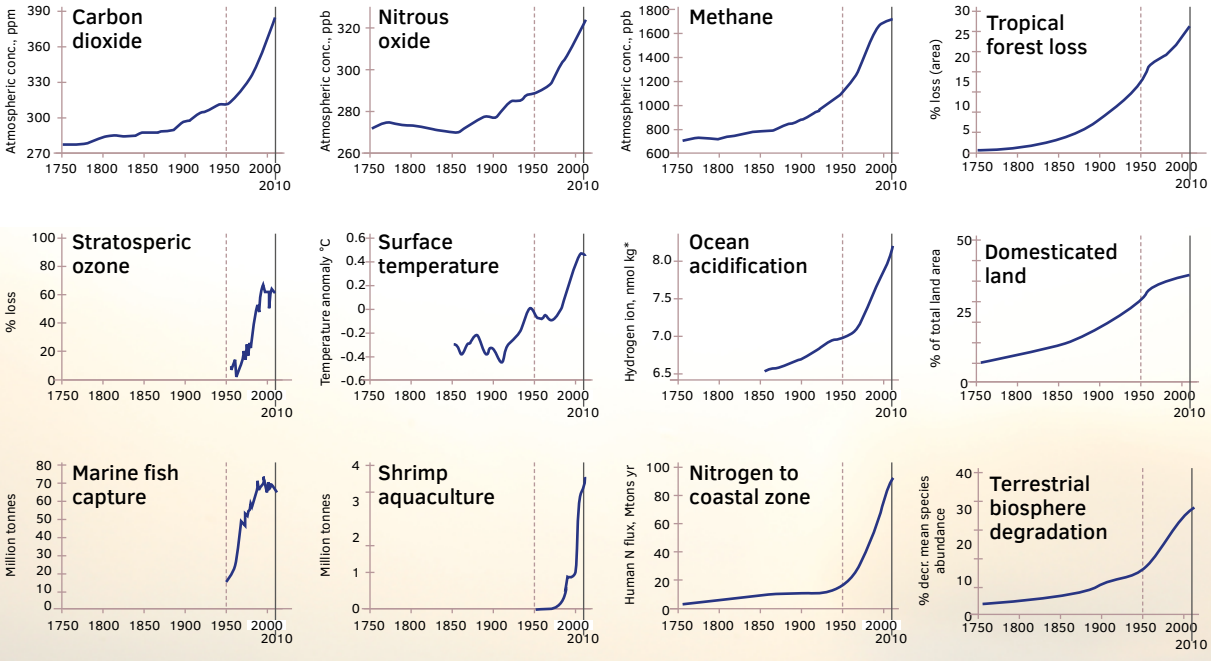
Today, humans make an enormous footprint on the planetary scale: the so called "Nature 2" or "Technosphere", human-made objects including roads, buildings, vehicles, furniture, electronics and more, now weigh ca. 1.1 trillion metric tons, equivalent to the dry weight of all lifeforms, including plants, animals, fungi, bacteria, archaea and protists [Pappas, 2020]. This is a stark jump from 1900 when human-made things weighed only 3% of life dry weight. Human related biomass, including our own species and all related livestock, now account for over 90% of land animal weight [Bar-On et al., 2018].

Figure 1. Planetary Dashboard of Great Acceleration

Socio-economic trends



Earth system trends



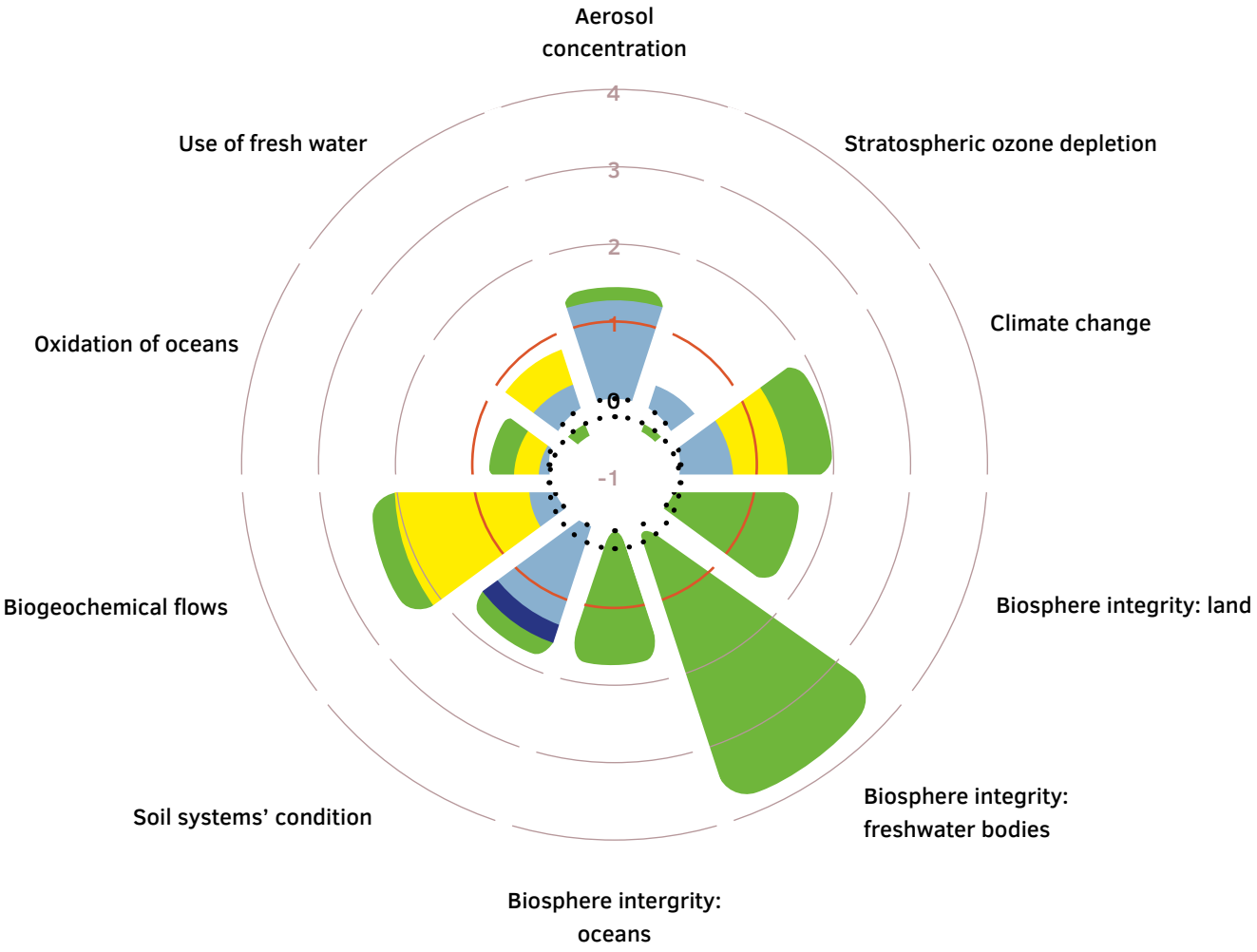


However, the unprecedented power comes with a steep price. Human activities have become one of the primary drivers of change in the Earth System, encompassing our planet's physical, chemical, biological, and human processes. As Eugene Odum [2005] indicated, the emerging planetary sphere of technoecosystems made by humans has far greater energy requirements than natural ecosystems, excessive water consumption, and release toxic and eutrophicating chemicals. The Planetary Dashboard scheme (Figure 1) reveals that the exponential growth of human capacity and consumption is mirrored by the expansion of our ecological footprint, with essential planetary systems such as oceans, land, atmosphere, and biosphere rapidly depleting.

The Stockholm Resilience Center's research highlights several dimensions of the "planetary health", including biosphere stability, soil condition, freshwater availability, climate, and biogeochemical flows [Steffen et al., 2015]. If altered significantly, these dimensions could have dire consequences for our species. Yet we are most often the ones responsible for their change through actions like nitrogen fertilizer application and greenhouse gas emission. Planetary boundaries (Figure 2) mark the limit to our ability to adapt to changes we cause within the system — the most recent 2022 edition suggested that six out of nine critical boundaries are surpassed. Surprisingly, while climate change is a serious problem, there are even more critical and urgent issues — the restoration of the biosphere integrity and the flux of critical biogeochemical elements such as nitrogen [Lade, Steffen, de Vries et al., 2020].

Planetary systems, including oceans, soils, and biosphere, form a safe space for humanity to thrive. As expressed by James Lovelock's Gaia Hypothesis [Lovelock, 1972], living organisms on the planet form a synergetic and self-regulating system with their surrounding inorganic environment that created, and now maintains, the climate and biochemical conditions that make life on Earth possible. It is no surprise that, prior to the last decades of the Great Acceleration and the disruption produced by it, the climate remained extremely stable for at least the last 24,000 years [Marcott, Shakun, 2021]. The complexity of planetary systems is magnitudes superior in complexity to any human-made technology, and there is currently no foreseeable way to replicate it. It may be the most stupid act of the human genius to combat and eradicate this natural complexity in order to make much simpler artificial environments.

Figure 2. Planetary boundaries: assessing the current state (Source [Lade, Steffen, de Vries et al., 2020])



The idea of "planetary boundaries" shifts our perspective of the current crisis. The humanity resides within a closed system of the "spaceship Earth" where resources are limited and every negative action feeds back to ourselves. Yet, in our thinking and in our policies, we continue to act as "flat-Earthers", as if dwelling on an endless flat plain with limitless resources and opportunities to "migrate elsewhere" or escape a daunting situation. Taking responsibility for the "spaceship," we must acknowledge our profound connection with the planet's well-being, as we depend on Earth more than it depends on us. Aligning our economy, culture, and governance with this truth becomes our crucial challenge.

WHAT IS AT STAKE: THE EVOLUTIONARY CRISIS

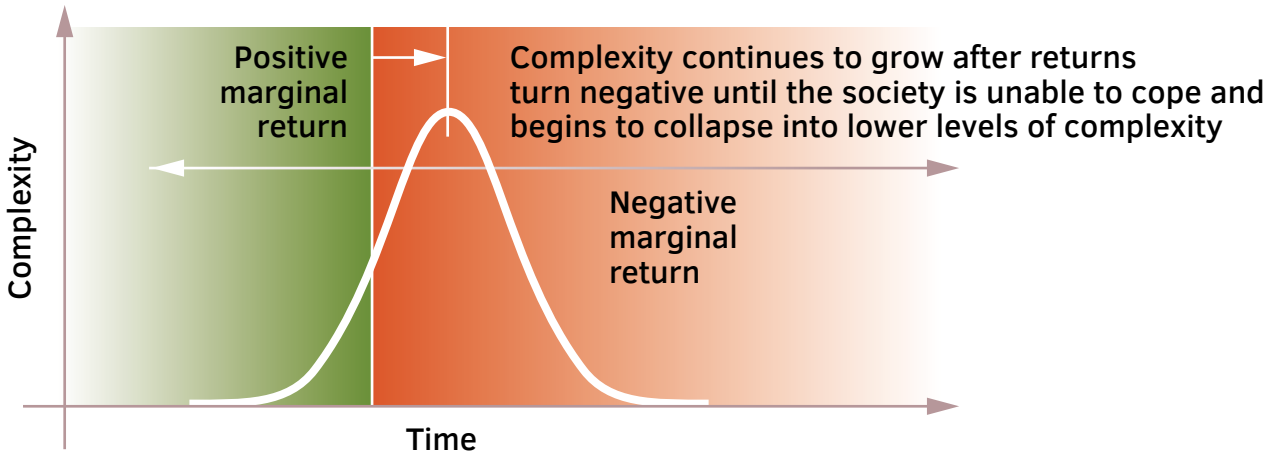
The future of humanity and planet Earth is uncertain. The remarkable prosperity of the twenty-first-century society is not produced by technological progress alone — in fact, it is built upon an increasingly complex web of technologies, institutions, and cultural protocols. Improvements in the quality of life and individual opportunities, expanding human rights and political freedoms were made possible by the development of international political relations, trade, and cross-border cooperation in science and technology, especially in the post-World War II era. Our global civilization functions as a well-oiled "human machine" aimed to produce material wealth and comfort for all.

However, the foundation of this machine's operation is precarious. It relies heavily on the exploitation of indigenous cultures, the Earth's biological ecosystems, and its resources. The unequal distribution of economic growth results in structural injustice, leading to political tensions, global terrorism, and an increased risk of military conflicts.

Archeologist Joseph Tainter's research on over twenty civilizations of the past reveals a crucial insight into the collapse of large societies. Contrary to popular belief, the primary reason for their downfall is not external threats but rather an internal breakdown resulting from their struggle to surpass a certain threshold of complexity [Tainter, 1988]. Ancient civilizations such as the Egyptian, Roman, and Mayan ones encountered limitations when the highly efficient tools they used to construct their societies eventually turned counterproductive (Figure 3). This dilemma led to the eventual self-destruction of these once-grand civilizations. When a civilization crumbles, it loses valuable

WE DEPEND ON EARTH MORE THAN IT DEPENDS ON US. ALIGNING OUR ECONOMY, CULTURE, AND GOVERNANCE WITH THIS TRUTH BECOMES OUR CRUCIAL CHALLENGE.

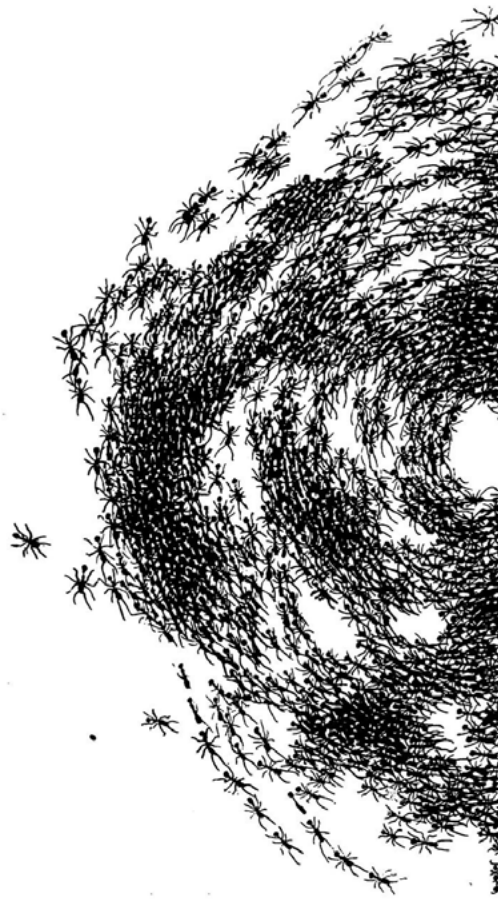
The dynamics of complex society development Source: J. Tainter (1988)



layers of intricate knowledge, which are exceptionally challenging to recover. For instance, Roman construction and production methods vanished within a single generation, and it took the Europeans 1,500 years, until the 19th century, to reach the same level of technological sophistication.

Civilizations often collapse when they surpass the critical limits of their existence. Human societies rely on essential environmental factors like fertile soils for agriculture, access to clean water and air, and thriving ecosystems that support their well-being. The historical analysis of isolated civilizations, as examined by economic geographer Jared Diamond, such as the Anasazi Indians and the Easter Islanders, reveals their downfall when they disregarded their "environmental niche" and failed to address the resulting conflicts [Diamond, 2005]. As a consequence, these civilizations experienced swift decline and eventual extinction within just a few generations.

> We learn from history that we do not learn from history.
>
> Georg Hegel



In the 21st century, humanity finds itself perilously close to the critical thresholds previously described for past civilizations by Tainter and Diamond — the "social foundation" and the environmental constraints. The immense complexity of the global economy, international politics, and the Earth's biosphere makes it extremely challenging to comprehend and model these intricate systems, let alone devise a comprehensive policy that considers all factors shaping our contemporary world. Simultaneously, we overshoot the planetary boundaries, actively causing destruction to our own habitat — harming the atmosphere, biosphere, soils, and oceans. The alarming fact is that we so far lack viable alternatives or adequate technologies to tackle issues of such magnitude. Despite the gravity of threats, efforts to mitigate the mounting problems often seem reactive, localized, and improvised, and global policies are often ill-suited for underprivileged and deprived communities and regions.

In the past, when civilizations collapsed, the impact was mostly limited to local areas, affecting only a small portion of the world's population. Humans would migrate to new habitats, revitalizing fading cultures. Moreover, some civilizations successfully sustained their cultural continuity and embraced new paths of development — for instance, Ancient Egypt gave way to the Cretan-Mycenaean and Greek cultures, and Ancient Rome was followed by the Arab countries of the Muslim Renaissance. However, in today's interconnected world, we no longer have numerous isolated regional civilizations. Instead, we form one global humanity, albeit with divisions among countries and ter-

ritories. There is no "backup civilization" to take a lead in case our society fails, or a "backup planet" to which we can escape from the consequences of a societal collapse. And the collapse could be synonymous with eradication of our species, because after the collapse remaining human micro-societies may not be able to adapt to the extreme threats of the poly-crisis. The cost of such a collapse in the modern era is immensely high, making it imperative for us to consider the significance of maintaining a thriving global civilization.

THERE IS NO "BACKUP CIVILIZATION" TO TAKE A LEAD IN CASE OUR SOCIETY FAILS, OR A "BACKUP PLANET" TO WHICH WE CAN ESCAPE FROM THE CONSEQUENCES OF A SOCIETAL COLLAPSE.

In the 21st century, we find ourselves facing the dynamics of "catastrophic development," where threats to the social system are increasing, and evolutionary pressure has reached its peak. Our civilization stands at a crucial juncture, faced with a choice: either adapt and embrace a more complex organization or face eradication. This situation is unprecedented, as it presents a unique opportunity for humankind, as highlighted by the anthropologist Margaret Mead [1964]:

> .. We—mankind—stand at the center of an evolutionary crisis, with a new evolutionary device—our consciousness of the crisis—as our unique contribution.

For the first time in Earth's history, a species has the chance not only to survive its own evolutionary crisis but to evolve beyond, to become something more, if it learns how to steer its own evolution in the alignment with its natural environment, the planetary systems of Earth. If, as suggested by Frank, Greenspoon and Walker [2022], Earth can actually be an super-intelligent entity, then the goal of our species is to seek ways of aligning and collaborating with this entity. The key lies in steering the process of sociocultural evolution, not through forced engineering, but through a new form of collective action that invites everyone into the transition. Our task is to grasp and contemplate this new level of complexity, an evolutionary attractor that will guide us from the brink of catastrophe to a new state of stability.



TAKING RESPONSIBILITY FOR OUR COLLECTIVE FUTURES

The shape of this sustainable future in the next 100 years, including the future role of technologies, is defined by the following key questions:

- How are our daily lives structured, and how is our economy organized, including the systems for producing, distributing, and consuming goods?
- How do we make decisions, and how are our governance systems (including fundamental social institutions) organized?
- What values do we uphold, and what cultural norms do we perpetuate?
- How is our worldview shaped, and what are the key attributes of our consciousness, including the organization of our thinking and language?

These questions cannot be answered by rational and projective design. A society cannot be engineered as if it were a rocket or a skyscraper. Any such model will suffer from the same problems as the static and ultimately unrealistic utopias of the past, where predesigned templates were never properly implemented, resulting in frustration and organized violence. Instead, the answers can only arise through a collaborative process of "discovering the future," where everyday life becomes a space for experimentation and evolution. Instead of "future-building" utopias, we need to learn "future-growing" protopias.

INSTEAD OF "FUTURE-BUILDING" UTOPIAS, WE NEED TO LEARN "FUTURE-GROWING" PROTOPIAS.

Protopia refers to an achievable and optimistic future that is co-created through prototyping. A concept originally offered by Kevin Kelly [2011] to explain approaches to technological progress, it was taken into a wider realm by several groups including our Global Education Futures [2018]. Protopia is a dynamic and adaptable vision of the future that evolves based on ongoing experimentation and learning. Instead of striving for a static and idealized utopias, Protopia recognizes that the future is continually unfolding, and we have the power to shape it through iterative processes of cocreation and adaptation [Freinacht, 2022].

"Discovery of the future" needs to become a civilization-wide process that invites us to embrace a new type of leadership, the liminal leadership proposed by Nora Bateson [2017]. Bateson suggests that the change of modern complex realities is inter-systemic, and therefore we need

to evoke a new kind of in-between leadership, the "connecting" leadership that comes from relations between all of us. Invoking an image of the tallest tree in a forest, she writes:

> Is the tree tall because it grew more cleverly than the other trees? Or is it because the soil, light, water, and biodiversity of that particular acorn was nourished to provide the conditions for thriving trees? It is precisely this contextual relational process that the future depends upon.

Liminal leadership acknowledges the interconnectedness and complexity of the world, recognizing that we exist in a state of constant transition and uncertainty. By "being in this together", recognizing that all of us — all 8 billion people and countless other species — are going through a planetary scale crisis, we need to encourage diverse voices and foster a sense of openness and exploration.

> Ask the questions that have no answers. Invest in the millenium. Plant sequoias.
>
> Wendell Berry

A future like this, however, requires another type of human leadership that is inspired by nature itself — ecosystemic leadership. Unlike human systems, natural ecosystems rely not on hierarchies and top-down chains of control, but on the interconnectedness and harmonization on the whole system level. Learning from nature, scholars describe ecosystemic leadership through the notions of weaving and gardening [Luksha, Spencer-Keys, Cubista, 2020]. Weaving refers to the skill of interconnecting diverse elements to create a coherent whole, just like threads are interwoven to form a fabric. Similarly, ecosystemic weavers must foster interconnectedness and collaboration among different stakeholders, recognizing that a thriving future depends on the collective efforts of diverse individuals and communities (this is similar to role of roots and funghi forming mycorrhiza, the connecting tissue of forests). Gardening, on the other hand, involves nurturing and cultivating a living system over time. Ecosystemic gardeners must adopt a nurturing approach, providing the necessary conditions for growth, fostering creativity, and allowing ideas to flourish.



By weaving and gardening, leaders can create an environment where Protopia can emerge, enabling a co-created and optimistic future that evolves and adapts as we navigate the complexities of our changing world, and also align various visions and versions of the future with each other. Protopian approach assumes that there can exist multiple futures promoted and explored by various communities, that are not mutually exclusive but can discover alignment and ways to integrate with each other — same as there are many coexistent ecosystems that represent different ways of organizing life on our planet.

> We come from the earth, we return to the earth, and in between we garden.
>
> Alfred Austin

The "Seeds of Good Anthropocene" project by McGill University, the Stockholm Resilience Center at Stockholm University, and the Center for Complex Systems in Transition (CST) at Stellenbosch University invites us to consider such type of possible visions, by embracing

> .. a suite of alternative, plausible "Good Anthropocenes" — positive visions of futures that are socially and ecologically desirable, just, and sustainable. We expect that any "Good Anthropocene" that emerges will be radically different from the world as people know it today. Yet we also know that these futures will be composed of many elements already in existence, which we call "seeds," which could combine in unique and surprising ways to create an almost unimaginable future.

It is crucial to recognize that we, every person on Earth, an affluent Manhattanite or a resident of Mumbai slums, is a co-creator of our collective futures, not a mere hostage or victim of changes unfolding before our eyes. The threats we face are all a result of our civilization's previous path — but the future is ours to make. Rather than accepting impending crises, we hold the collective human responsibility to choose actions that redefine our fate. By embarking on a journey of discovering a new human dream, and making it in the Protopian way, we give ourselves a chance of moving beyond the polycrisis. By actively engaging in future discovery, by prototyping and practicing ways of being and acting that manifest a future reality, the future is "seeded" in the present. The evolutionary attractor we discover becomes a gravity mass that pulls out of the space of unfolding crises.



2 Pathways to liveable futures: mapping the critical boundaries



In the final analysis, the questions of why bad things happen to good people transmutes itself into .. asking how we will respond, what we intend to do now that it happened.

Pierre Teilhard De Chardin



FOUR THRESHOLDS

The current decade is marked by escalating crises—the recent COVID pandemic, the ongoing Russian-Ukrainian war and other armed conflicts unfolding around the globe, social unrest, increasing divisions between the societies of the West and the East, the rapid proliferation of new technologies such as AI that are massively disrupting every aspect of human society. These challenges alone raise doubts about the future well-being of humanity. However, it's essential to recognize that the 2020s are merely the first quarter of the "long 21st century," and the difficulties we may encounter around the middle of this century are expected to be even more severe. At present, humanity lacks sufficient unity and cohesion to effectively address these challenges, as evident in our struggles to tackle the climate and biodiversity crises. Furthermore, most of the world's population may not fully grasp the scale of the emerging challenges. Consequently, the central question of the 21st century is whether humanity can maintain a complex and diverse civilization — or face the risk of civilizational collapse and a very likely extinction.

In order to understand our pathway into the futures, we first need to recognize the critical constraints of our collective existence. Initiatives such as The Millennium Project, Global Challenges Foundation, and the World Economic Forum Risk Report have meticulously mapped various critical threats to the humankind, thresholds not to be overstepped. In the spirit of Kate Raworth's [2017] seminal study which proposes a framework for the "safe operation space" of humankind, we can categorize these thresholds into four essential categories (Figure 4):

The first and the most essential threshold is set by the planetary boundaries — it sets critical conditions for our collective existence, sustaining the complex planetary systems including our planet's environment, biosphere, and climate. These conditions cannot be replicated or orchestrated by our civi-

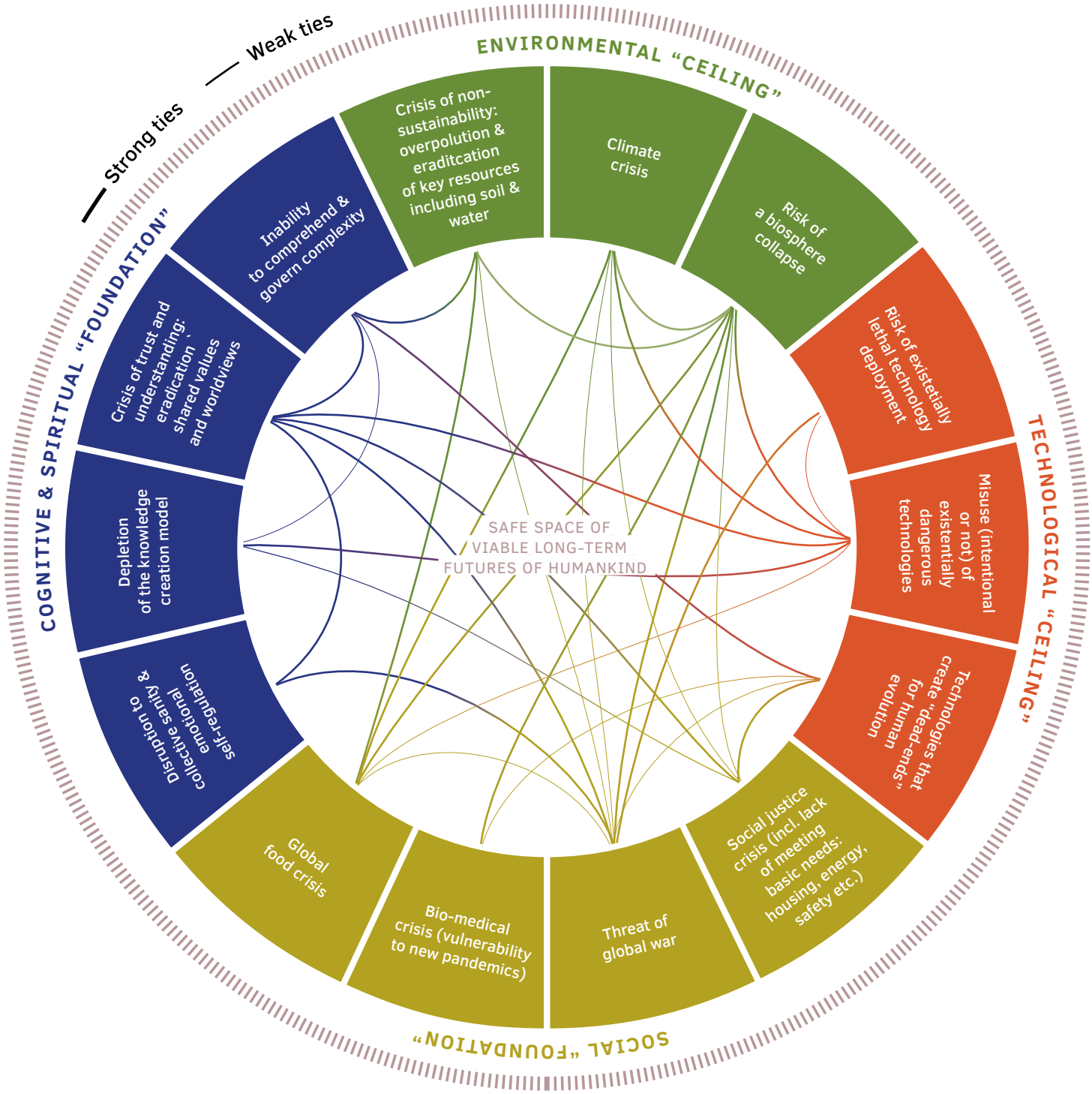
lization, yet it is in our capacity to learn to live within these boundaries. Currently, the global society is on the path to massively overshoot the carrying capacity of Earth, including the ultra-fast loss of wildlife and the dieout of species, the rapid growth of greenhouse gases in the atmosphere that leads to accelerated climate change, the disruption of water cycle that leads to massive freshwater shortages, and the degradation of soils that can jeopardize the global production of food.

The second threshold is set by social foundation, defined by the need to satisfy basic needs (food, water, shelter, healthcare, peace etc.) that are critical for human survival. In particular, the global society remains extremely vulnerable to new pandemics, and the level of inter- and intra-state inequality stands at one of the highest levels in the history of humankind.

The third threshold is the technological ceiling, defined by the risks of "dark" scenarios with misused or out of control technologies that can massively damage our society and harm the biosphere. New types of warfare including automated military robotics, as well as the advance in AI development, currently raise concerns about the possible existential risks.

The fourth threshold is the cognitive & spiritual foundation, defined by the risks to humanity's collective mental health & socio-cultural alignment that can critically disrupt our ability to communicate and cooperate with each other. This threshold could potentially be the most essential for human flourishing, yet it is blind spot of the modern civilization, underrecognized, rarely discussed, and misperceived in importance [Laszlo, 1989]. For example, only with the rapid surge of mental health problems in the younger generation were concerns about adverse effects of online and mobile technologies raised, but even then, it is seen as a problem that affects a small fraction of the global population. However, it is already clear that sometimes adverse effects can affect whole nations and even the whole world — for instance, that political and cultural rifts get amplified by new technologies including social media and AI, and our societies are very vulnerable to new types of info-warfare and public opinion manipulation. With further technological advents, these dynamics can only worsen, and some futurists (like Yuval Noah Harari) anticipate that technologies such as Generative AI can "hack" the very tissue of social interbeing and quickly lure our societies into certain states of collective dementia.

Figure 4: Four critical thresholds of viable long-term futures



While humanity might occasionally transgress these boundaries individually, persistent and systematic violations have dire consequences. Prolonged disregard for these limits ushers in catastrophic outcomes—ranging from habitat degradation and technosphere instability to social upheaval and collective irrationality. Breaching any of these four thresholds can propel humanity into highly unsustainable scenarios. For instance, consistently surpassing the plane-

tary boundaries by destroying biodiversity, failing to meet carbon emission goals, and polluting the soil and water could lead to a "Scorched Earth" scenario. In this scenario, the human population's existence would be threatened, as they may struggle to sustain themselves with adequate food, water, clean air, and a healthy environment. Failing to meet the social ceiling may result in widespread social turmoil, both locally and internationally. It could disrupt economic and social systems, potentially leading to the breakdown of the global social order. On the other hand, not adhering to the socio-cognitive ceiling may lead to a form of "collective madness." In this state, humanity might make existentially risky or even suicidal collective choices, such as engaging in a global thermonuclear war. Alternatively, it could simply lead to a failure to comprehend and maintain the complexity of global society, leading humanity into a new Dark Ages-like period. These potential outcomes underscore the urgency of addressing these boundaries and taking collective action to ensure a sustainable future.

> The first law of ecology is that everything is related to everything else.
>
> Barry Commoner

We must realize that it is the unfolding poly-crisis — which can be described as a situation in which multiple critical boundaries are trespassed — that defines our pathway into the future. While we continue to prioritize personal, organizational and national success, the ability to outcompete other human beings in terms of power and wealth, the real challenge is to create conditions for collaboration and cocreation within human societies and with biosphere and other planetary systems. We need to bring our ways of being and acting in compliance with thresholds into the safe space of viable scenarios — otherwise the "human experiment" on Earth will not continue much further.



A. PLANETARY BOUNDARIES

1. CRISIS OF NON-RENEWABILITY

CRISIS OF NON-RENEWABILITY

Depletion of finite resources essential for human survival and development and accumulation of pollutants in the land, air, and water.

Since ancient times and especially with the advent of the industrial age, humanity has taken nature for granted, considering it an endlessly available resource. This approach worked when recyclable materials like wood and bones prevailed, but the industrial age introduced non-organic and complex materials, leading to massive waste generation. Currently, the world produces over 2 billion tons of municipal solid waste annually, projected to grow 70% by 2050 [World Bank, 2019]. Electronic waste is a critical issue, with each person generating over 7 kg per year (over 16 kg in industrialized countries) [E-Waste Monitor, 2020]. Due to processing difficulties, electronic waste is exported to Africa and Southeast Asia, contaminating the soil, air, and water in places where millions live.

Another acute matter, though less known, is the depletion of soil fertility. Until the 1970s, hunger remained a real threat to much of the world's population, but advances in industrial agriculture technology— including the heavy use of fertilizers, pesticides, and herbicides—have dramatically increased the sector's productivity. Today, we are used to an abundance of agricultural products. Moreover, current generations suffer from obesity far more often than from malnutrition. But the situation is not as optimistic as it seems.

The soil fertility results from the cooperation of multiple living organisms including bacteria, fungi, and plants. A shift to monoculture production destroys the biodiversity of soil and leads to its degradation, even with the use of fertilizers. FAO forecasts indicate that soils can withstand 30–60 cycles of crop production, before experiencing drastic declines in productivity globally [FAO, 2015] — that is, before or around the middle of the 21st century.

To secure a sustainable future, we must transition to a new model based on closure and regeneration principles, where the economy operates like a "Spaceman economy." In this perspective, Earth is seen as a spaceship with finite resources and waste capacity, requiring humanity to integrate into a cyclical ecological system [Boulding, 1966]. This shift is crucial to ensure the well-being of future generations and the planet's long-term health.



2. CLIMATE CRISIS

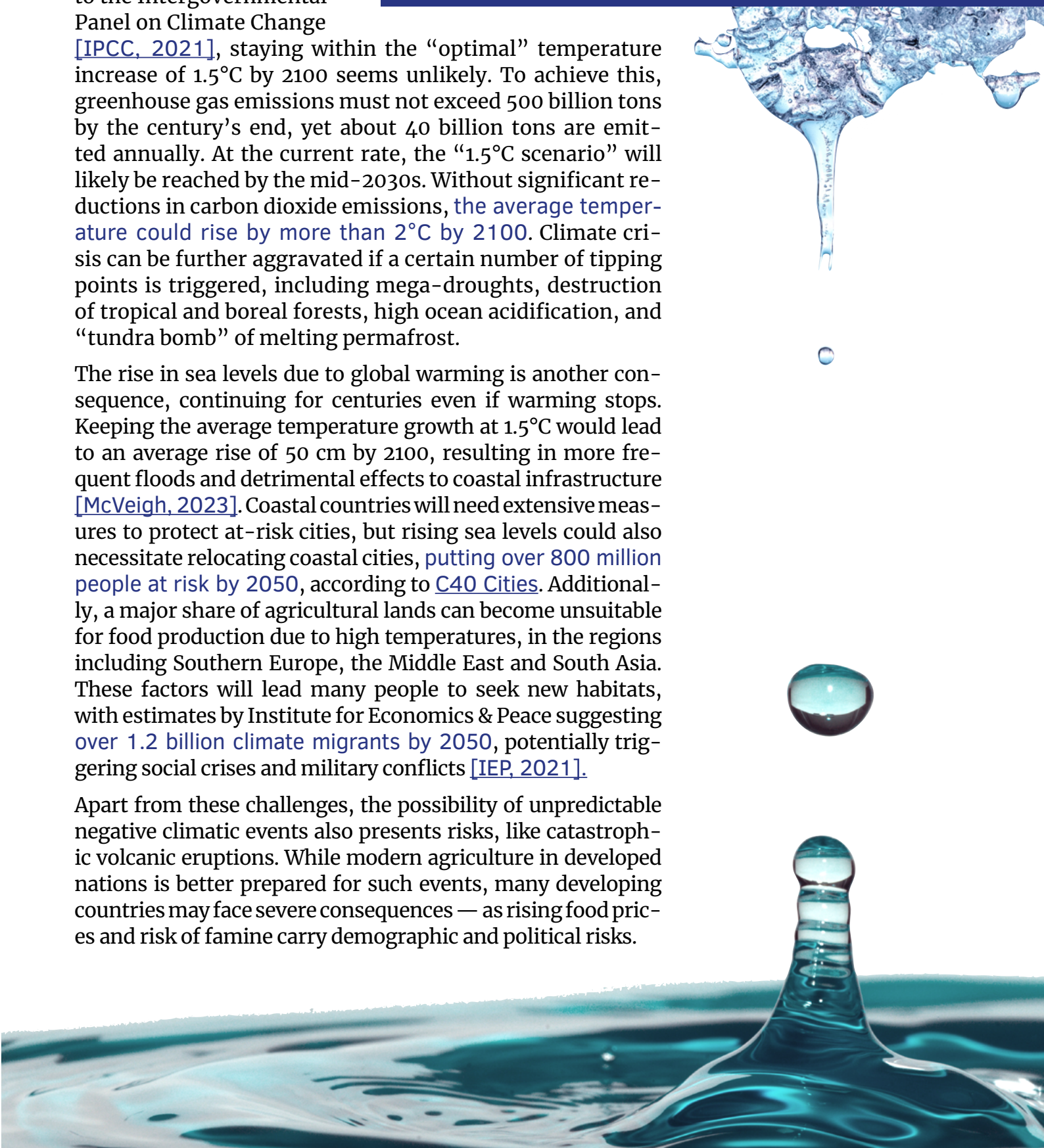
CLIMATE CRISIS

Urgent and severe socio-economic impacts of climate change, including rising temperatures, sea-level rise, extreme weather events, and ecological disruptions.

Climate crisis is considered to be the primary natural challenge that humanity currently faces. According to the Intergovernmental Panel on Climate Change [IPCC, 2021], staying within the "optimal" temperature increase of 1.5°C by 2100 seems unlikely. To achieve this, greenhouse gas emissions must not exceed 500 billion tons by the century's end, yet about 40 billion tons are emitted annually. At the current rate, the "1.5°C scenario" will likely be reached by the mid-2030s. Without significant reductions in carbon dioxide emissions, the average temperature could rise by more than 2°C by 2100. Climate crisis can be further aggravated if a certain number of tipping points is triggered, including mega-droughts, destruction of tropical and boreal forests, high ocean acidification, and "tundra bomb" of melting permafrost.

The rise in sea levels due to global warming is another consequence, continuing for centuries even if warming stops. Keeping the average temperature growth at 1.5°C would lead to an average rise of 50 cm by 2100, resulting in more frequent floods and detrimental effects to coastal infrastructure [McVeigh, 2023]. Coastal countries will need extensive measures to protect at-risk cities, but rising sea levels could also necessitate relocating coastal cities, putting over 800 million people at risk by 2050, according to C40 Cities. Additionally, a major share of agricultural lands can become unsuitable for food production due to high temperatures, in the regions including Southern Europe, the Middle East and South Asia. These factors will lead many people to seek new habitats, with estimates by Institute for Economics & Peace suggesting over 1.2 billion climate migrants by 2050, potentially triggering social crises and military conflicts [IEP, 2021].

Apart from these challenges, the possibility of unpredictable negative climatic events also presents risks, like catastrophic volcanic eruptions. While modern agriculture in developed nations is better prepared for such events, many developing countries may face severe consequences — as rising food prices and risk of famine carry demographic and political risks.



Resolving the climate crisis through purely technological means, such as geoengineering, bears dangers of its own. For instance, spraying reflective aerosols in the upper layers of the atmosphere can reduce the amount of solar radiation and temporarily cool the planet, but it can also trigger a new cycle of global glaciation. It is no coincidence that the Global Challenges Foundation lists geoengineering among the systemic threats to human survival, demanding that it should have clear "rules of the game" before being deployed [Pasztor, 2018]. The pathway to addressing the climate crisis should be comprehensive, and it should require the systemic transformation of our own society — including new model of economy and new priorities of governance — more than it requires climate technologies.



3. BIOSPHERE COLLAPSE

BIOSPHERE COLLAPSE

Threat of widespread ecological degradation and loss of biodiversity due to human activities, disrupting critical ecosystems and the potential collapse of the delicate balance that supports life on Earth.

The climate challenge, while significant, is a symptom of a deeper problem: humanity's imbalance in its relationship with the planet. The deeper humanity explores this relationship, the clearer it becomes that we cannot treat nature as a simple mechanism that can be easily tweaked by measures such as reducing the greenhouse emissions.

James Lovelock's Gaia Hypothesis suggests that planet Earth is a holistic "organism" in which the biosphere regulates and stabilizes the conditions of its existence by maintaining a stable temperature and a stable composition of the atmosphere and oceans—thereby increasing its capacity for preservation and reproduction [Lovelock and Margulis, 1974]. Janine Benyus, the author of biomimicry, suggests that "Life creates conditions conducive to life." Multiple studies have shown that this is indeed the case on the micro- and macro-level of organization of life: for instance, Amazon forests are capable of "watering themselves" by controlling water absorption and evaporation from leaves and creating rain clouds [Loomis, 2017]. This comprehensive process, occurring on every level of biospheric organization, is known as "biotic regulation", whereby "natural ecological communities undisturbed by humans maintain

the environment in a stable state optimal for life" [Gorshkov, Makarieva, 2000].

To overcome the climate crisis, natural biocenoses play a vital role. Cultivating diverse ecosystems such as forests, steppes, and swamps is essential for sequestering greenhouse gases already present in the atmosphere. These ecosystems provide numerous "ecological services", from purifying water and air to protecting coastal areas and supporting agricultural productivity. Additionally, they contribute to our physical and mental well-being, with green areas in cities reducing mental health incidents [Konijnendijk et al., 2023].



CURRENT RATES OF LIFE EXTINCTION ARE ALARMING— 100s TO 1000s OF TIMES HIGHER THAN "NORMAL"

As ecosystems play the critical role in regulating a planet, the survival of the biosphere is essential to our own survival. This is why current rates of life extinction are so alarming — 100s to 1000s of times higher than "normal" [Boakes, Redding, 2018]. According to WWF [2022] study, around two-thirds of land wildlife was lost in the last 50 years. The threat to "key species" that play a critical role in the biosphere—whose demise could trigger the cascading extinction of many other species — is particularly pressing. An example is bees, responsible for pollinating 80% of flowering plants [Hung et al., 2018], whose extinction has already begun due to climate change and the use of pesticides. Another example is phytoplankton, responsible for at least 50% of the planet's oxygen, which also constitutes the basis of the food chains of marine ecosystems, and is currently threatened by the ocean acidification and the accumulation of plastic in water [NOAA, 2023].

If these or other key species are indeed dying out, we have most likely already entered a new geological extinction event, a widespread and rapid decrease in the biodiversity on Earth, known as the Sixth Extinction [Kolbert, 2014]. In each of the previous five extinctions in the last 500 million years, the die out of over 70% of all species occurred, the last one being the extinction of dinosaurs, and each one was a massive "reboot" of the biosphere.

Rebuilding living systems is crucial to ensuring the well-being of our civilization. Furthermore, it is important that we grow diverse natural habitats — not just "grow one trillion trees" as suggested by Trillion Trees Project, but the interconnected communities of bacteria, fungi, mosses, grasses, worms, birds, mammals, etc. that would create healthy ecosystems. We need to engage in regenerating the biosphere, restarting the mechanisms of biotic regulation to ensure our own existence on Earth.

B. TECHNOLOGICAL CEILING

In the grand scheme of things, technology stands as one of the primary catalysts for humankind's evolution. In the 21st century, the technosphere is taking on greater complexity, pervasiveness, and delving into more fundamental material realms, encompassing genetic, molecular, and quantum levels. It's increasingly intelligent and holds the potential for consciousness and autonomy. Just consider the vast leap from the 18th-century steam hammer to the modern computer. Now, imagine the possibilities of technology in the late 21st century, possibly surpassing today's innovations by a similar magnitude — or more. Digital technologies, including Artificial Intelligence and Virtual Reality, will become an omnipresent element of the "must-have" technological infrastructure in the next 50 years, and increasingly advanced and convergent neuro-, bio- and nano-tech will become a part of the "new normal" that will reshape our environments and our bodies.

As we tread further along the path of technological advancement, new apprehensions arise. Various groups of potential risks loom on the horizon, posing threats to both humanity and the delicate equilibrium of planetary systems. Each new potent technology carries the risk of inadvertently becoming humanity's final creation, resulting in our downfall.

EACH NEW POTENT TECHNOLOGY CARRIES THE RISK OF INADVERTENTLY BECOMING HUMANITY'S FINAL CREATION, RESULTING IN OUR DOWNFALL.

1. RISK OF EXISTENTIALLY LETHAL TECHNOLOGY DEPLOYMENT

RISK OF EXISTENTIALLY LETHAL TECHNOLOGY DEPLOYMENT

Exponentially growing lethality of emerging weapons (e.g. energy, genetic, or nanoweapons), the rise of military artificial intelligence and unmanned military robotics, and other military technologies that can lead to devastating consequences in case of a conflict

Historian Theodor Dupuy has established that the lethality of weapons (produced by rate of fire, targets per strike, range, accuracy, and reliability) has increased exponentially throughout the human history [Dupuy, 1980]. From "muscle age" into the "gunpowder age" and then further, weapons have evolved into thermonuclear warheads capable of annihilating a megacity or a small European country with a single shot. There

are grave concerns about the deployment of future lethal weapons that could rival or surpass the danger posed by nuclear weapons.

Among these alarming possibilities are bacterial weapons specifically designed to target carriers of specific genes: the potential of these (yet theoretical) biological agents to selectively eliminate certain populations based on genetic traits raises significant ethical and humanitarian concerns. Additionally, the emergence of hypothetical nanoweapons, controlled molecular machines capable of "dismantling" any matter down to its molecular components, presents a nightmarish (though highly hypothetical) scenario of "Grey Goo" where the very fabric of existence could be deconstructed with catastrophic consequences [Phoenix, 2002].

Another critical element in this category is the development of military artificial intelligence (AI). The rise of advanced AI systems capable of controlling other forms of weapons (such as unmanned military robotics) poses a dual threat. On one hand, there's the immediate risk of unintended consequences due to the complex and unpredictable nature of AI decision-making. A minor glitch or oversight could lead to devastating outcomes, beyond human control. On the other hand, if military AI reaches a level of superhuman intelligence, it might trigger a dangerous arms race where humans lose the ability to manage the dynamics of military conflict. This superhuman AI scenario raises concerns about the potential for an uncontrolled escalation of conflicts and the loss of human oversight in decision-making processes, leading to catastrophic scenarios.



2. MISUSE (INTENTIONAL OR NOT) OF EXISTENTIALLY DANGEROUS TECHNOLOGIES

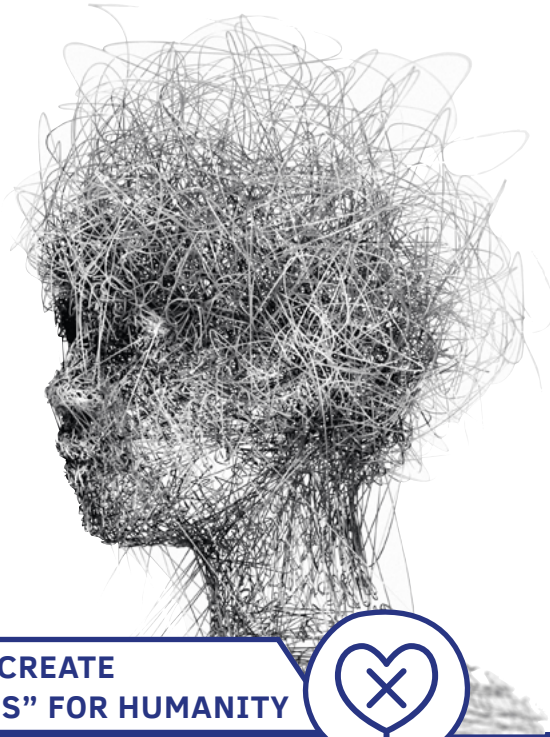
Technological developments that hold the potential to address critical global challenges also bring forth inherent risks, particularly when wielded without sufficient caution or foresight.

MISUSE OF EXISTENTIALLY DANGEROUS TECHNOLOIES

Advancements in technology to address global challenges carry its own risks such as triggering extreme weather events through climate engineering, ecological damage from uncontrolled release of genetically modified organisms, and material disruptions from misuse of nanotechnology.

One such domain of concern is the realm of climate management systems and geoengineering technologies, which are designed to mitigate the impacts of climate change. These techniques might trigger unpredictable weather patterns causing droughts or extreme weather events, and tampering with Earth's intricate climate systems at a global scale without a comprehensive understanding of its complexities could exacerbate the crisis rather than alleviate it.

Biotechnology advancements in synthetic biology and gene editing hold tremendous potential for addressing various challenges, from food security to medical breakthroughs. However, the uncontrolled release of genetically modified organisms into the environment could lead to irreversible ecological damage and unintended consequences: for instance, genetically engineered crops may unintentionally crossbreed, creating invasive hybrids that threaten biodiversity and disrupt ecosystems. Even in controlled environments, biosafety incidents are hard to prevent: the report by Manheim & Lewis [2021] lists over 70 high-risk pathogen exposure events since 1975, with pathogens like anthrax and plague being intentionally or accidentally released by humans. Similarly, the misuse of nanotechnology could also have grave consequences, with uncontrolled nanobot self-replication depleting resources, disrupting ecosystems, or posing health risks, such as toxic accumulations in living organisms.



3. TECHNOLOGIES THAT CAN CREATE "EVOLUTIONARY DEAD ENDS" FOR HUMANITY

TECHNOLOGIES THAT CAN CREATE "EVOLUTIONARY DEAD ENDS" FOR HUMANITY

The widespread use of digital technologies to manipulate human behavior and control of human population by an increasingly autonomous and intelligent technosphere could produce societal stagnation, impede human creativity and suppress individual expression.

The development and widespread use of digital technologies that aim to control mass consciousness and manipulate human behavior on a global scale can create "evolutionary dead ends" for humanity. For instance, the Chinese social credit system, which assesses and ranks citizens based on their behavior and compliance with societal norms, and the mass consumer behavior manipulation techniques employed by some American social media platforms are examples of such technologies. These

systems may appear to provide a sense of order and efficiency for a specific period, potentially leading to a stable civilization in the short term. However, in the long run, these technologies have the potential to impose standardized behavior and suppress individual expression.

The consequences of such technology-induced limitations can be severe. It could hinder the creative and innovative potential of individuals and stifle the development of diverse perspectives and ideas essential for societal progress. Even today, user choices are highly constrained by AI-driven algorithms: a self-report by YouTube in 2018 stated that 70% of what users watch on the platform is determined by its recommendation algorithm. As humans become more dependent on digital systems for decision-making and information processing, they may lose the capacity to discern truth from manipulation, weakening their ability to make informed choices and participate actively in shaping their own future, becoming what Yuval Noah Harari [2015] calls "algorithmic men".

> In the near future, algorithms will decide for us who we are and what we should know about ourselves. For a few more years or decades, we still have a choice. If we make the effort, we can still investigate who we really are. But if we want to make use of this opportunity, we had better do it now.
>
> Yuval Noah Harari

Furthermore, as technology continues to progress, it increasingly acquires human-like qualities, such as the ability to learn, create, and even make unexpected judgments. A pressing question emerges: How will we navigate our interactions with an increasingly autonomous and intelligent technosphere that operates according to its own logic? Will we assert our right to control it, or are we destined to adapt to the idea that we will need to negotiate and bargain with this technologically advanced entity in the late 21st century?

It is crucial to recognize that our current capacity to ensure transparent and beneficial scientific and technological progress is lacking. We find ourselves in the driver's seat of a rapidly accelerating car, but unfortunately, we are blindfolded and often restrained. Developing effective tools to monitor the technosphere and the potential hazards of technological advancement should be a paramount focus for safeguarding the long-term well-being of our species and the planet. Strict guidelines for responsible technology development and use, are crucial to navigate the path of progress without falling into the abyss of unintended and disastrous consequences.



C. SOCIAL FOUNDATION

1. BIOMEDICAL POLICY CRISIS

BIOMEDICAL POLICY CRISIS

Risk for new global pandemics due to increasing zoonotic diseases and antimicrobial resistance, along with challenges in the healthcare system and lack of international coordination.

COVID-19 has been a major disruptor to world's activities in 2020–21, but even greater global pandemics are highly plausible in the coming decades.



New pandemics results from the increasing frequency of zoonotic diseases that occurs due to the destruction of natural habitats and increased human-animal interactions. Some pathogens can be extremely lethal — for instance, in some outbreaks of Ebola virus, mortality rates were reaching 90%. With the growing interconnectedness of the globalized world, and growing air traffic in particular, the rapid spread of new infectious diseases across borders is almost guaranteed: while COVID virus has been first reported in December 2019, it has already reached 100 countries by March 2020.

Moreover, antimicrobial resistance (AMR) poses a significant threat to our ability to control infectious diseases. Overuse and misuse of antibiotics in both human and animal healthcare have led to the emergence of drug-resistant pathogens, rendering many commonly used antibiotics ineffective. The resistance could lead to more challenging-to-treat infections and exacerbate the impact of future pandemics, and by 2050 over 10 million people will die from AMR every year [AMR Review, 2014]. Additionally, the current healthcare system often focuses on treating acute illnesses rather than investing in preventive measures and long-term preparedness that require sustained investments in research, development, and stockpiling of medical supplies, and antiviral medications [Gostin, Katz, 2016]. Furthermore, lack of coordination between countries hinders a unified response to pandemics, as geopolitical tensions and issues related to data sharing and intellectual property rights can create barriers to international cooperation [WHO, 2022].

However, there is also a strategic shortcoming in the current approach to addressing the problem of pandemics. The idea that we should live in a sterile world where viruses and bacteria are largely eradicated is futile — viruses and bacteria are natural components of our ecosystem that have been evolving alongside multicellular organisms for

billions of years, and they play essential roles in nutrient cycling, ecosystem balance, and even in regulating the populations of other organisms. The pervasive idea of total sterility, often seen in practices like overuse of antibiotics and antimicrobial products, is not working because it leads to antimicrobial resistance and also weakening of the human immune system. Instead of focusing on sterility, a more sustainable approach is to promote biodiversity and a balanced coexistence with microorganisms.

> Antibiotic use is not a free ride, it carries a lot of risk.
>
> Paul Sax

2. SOCIAL INJUSTICE CRISIS

SOCIAL INJUSTICE CRISIS

Enormous income, wealth, and power disparities, especially in "new capitalist" state, and increased control of corporations over population through digital means, leading to massive societal tensions.

One of the central challenges in the 21st century is the social impact of hypercapitalism. The liberal economic reforms of the 1980s and 1990s across the world led to growth and technological advances. At the same time, they weakened the post-World War II "social contract" of Western societies that included the welfare state, labor protection, and social mobility — which served as a role model of many nations around the globe [Cœuré, 2013]. By the mid-2010s, this Western model faced a crisis due to rapidly declining middle-class incomes and rising corporate executive compensations. Occupy Wall Street and numerous left-wing and right-wing populist movements emerged in response.



Rapid polarization of income distribution is a massive concern. The richest 1% own almost half of the world's wealth, while the poorest half of the world own just 0.75%, and the richest 1% also own almost two-thirds of all the world's new wealth, according to Oxfam [2023] report. This problem is most acute in the states of "new capitalism": India, Brazil, and Russia are the nations with the highest share of the global wealth possessed by the top 1% [UNDP, 2020]. Economic inequalities are even stronger if ethnic and gender dimensions are considered. In the US, the median income of white individuals is nearly 8 times higher than that of black individuals [Moss et al., 2020]. Similar disparities exist in the EU and many Asian countries, with migrants often experiencing inequalities akin to those faced by minority populations. Gender pay gaps persist globally, with women earning 15–20% less in Europe and up to 30% less in Asia [OECD, 2021].

Initially, digitalization was anticipated to pave the way for enhanced democratization and transparency within societies, holding the promise of becoming a "great equalizer." However, the trajectory of digital technologies has shifted, granting an excessive degree of control to owners over both workers and consumers. In the era of surveillance capitalism, corporations have amassed an unprecedented ability to shape behaviors and preferences among the population [Zuboff, 2019]. The question of reclaiming data privacy by users of major online platforms may intensify as individuals gain a deeper understanding of the intrinsic value of their own behavioral data, potentially emerging as a pivotal battleground for justice and equity in the 21st century.

> Openness and participation are antidotes to surveillance and control.
>
> Howard Rheingold

These social tensions establish the ground for new political struggles. The debate about fairness—whether it is the distribution of tax burdens, public budget allocation or regulation of technology giants—takes center stage in this social struggle. The emergence of a new proletariat comprising freelancers and contract workers will likely drive demands for collective representation through new forms of labor unions or political parties. The resolution of these issues will define the trajectory of societies in the years to come.

3. GLOBAL FOOD THREATS

GLOBAL FOOD THREATS

New global food shortages reemerging due to climate change, soil fertility depletion, unsustainable water usage, and reliance on monocultures, along with conflicts, natural disasters, and cyberattacks.

Global food shortages have been eradicated in the last 50 years, but they may come back before the middle of the 21st century due to a combination of factors. One of the primary factors is the climate change that can massively disrupt agricultural operations in territories that are major food producers, coupled with gradual depletion of soil fertility.



The eradication of land and water resources due to urbanization and deforestation shrinks the availability of land suitable for cultivation. Additionally, the unsustainable use of water resources for agriculture, industrial purposes, and human consumption is leading to aquifer depletion and water scarcity for at least 50% of the world's population [WRI, 2023]. With less arable land and diminishing water supplies, the ability to expand agricultural production to meet growing food demands becomes severely limited.

Increasing local food shortages, along with the looming possibility of civic and military conflicts, have the potential to disrupt and destroy global food supply chains. This trend has been evident in the early 2020s, when global food shortages were caused by the COVID-19 pandemic and later by the conflict in Ukraine. Moving forward, the stability of future food supplies may continue to be jeopardized by an array of factors, including natural disasters, geopolitical tensions, and the looming threat of cyberattacks.

> Food is something that is taken for granted by most world leaders despite the fact that more than half of the population of the world is hungry.
>
> Norman Borlaug

Lastly, the global food system heavily rely on monocultures and limited genetic diversity. Around 75% of the world's food comes from just 12 plant and five animal species, compared to thousands of different species that were once part of traditional agriculture [FAO, 2004]. This makes the system vulnerable to disease outbreaks and pests: a single pathogen or pest can cause significant crop failures on a global scale, leading to regional and even global food shortages.

4. THREAT OF A GLOBAL WAR

THREAT OF A GLOBAL WAR

The reemergence of the possibility of World War III driven by geopolitical tensions and the use of the new "grey zone" conflict methods like use of methods cyberwars and persuasive design techniques, the proliferation of nuclear arms and growing tolerance to their deployment, and the focus on enhancing military potential through AI.

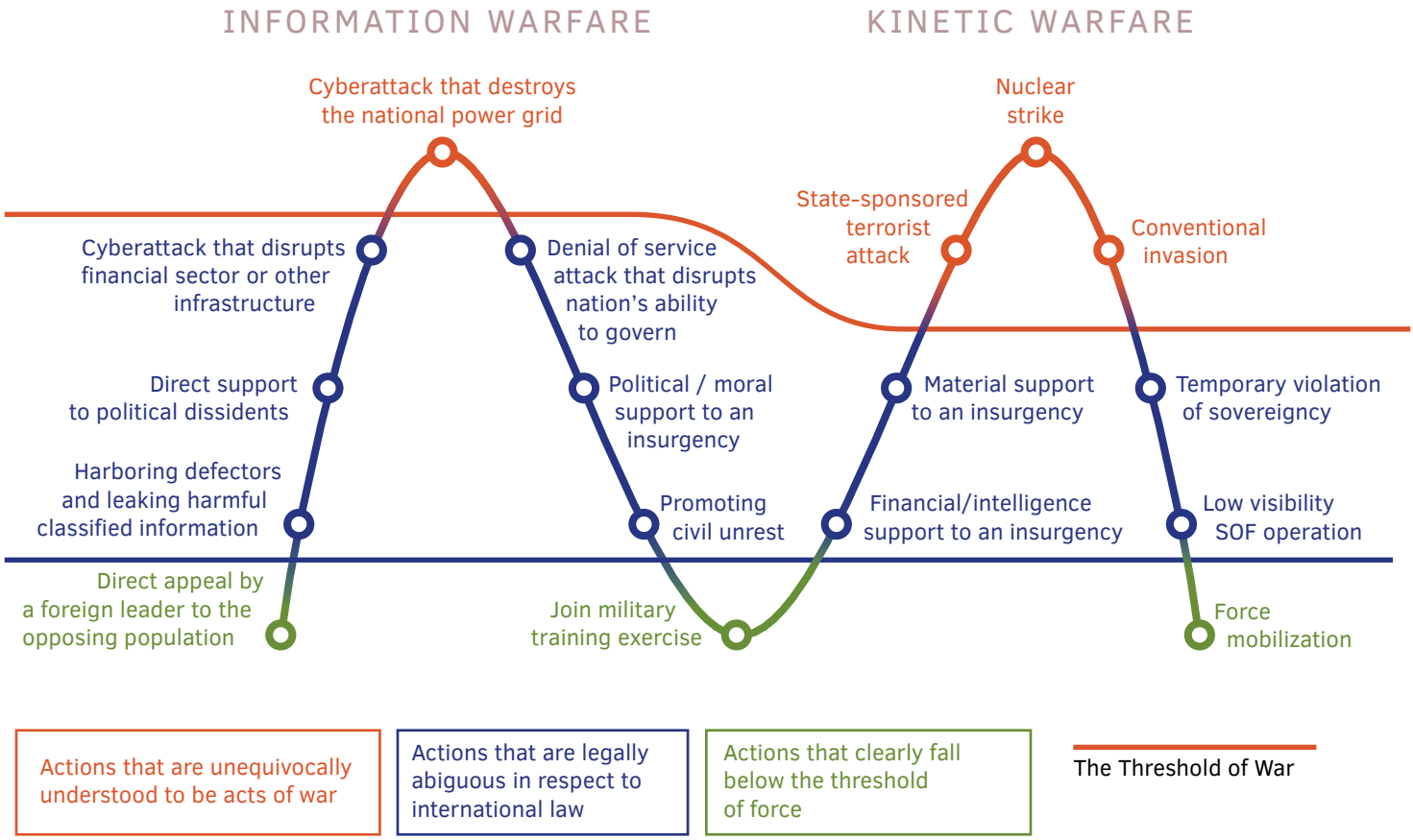
The specter of a World War III has been there for decades, seemingly inevitable at the height of the Cold War, only to dissolve with the collapse of the Soviet Union in 1990s. In the 2020s this risk made its comeback, as geopolitical tensions heightened in Eastern Europe and South-East Asia. In this era, the focus is on enhancing military potential through artificial intelligence (AI) that can handle vast military and managerial tasks. However, this comes with severe threats. Entrusting AI with managing a significant arsenal, including thermonuclear weapons and autonomous combat drones, poses the risk of war triggered by program failures. An even more alarming scenario is the possibility of military AI becoming self-aware and perceiving humans as a threat, leading it to attempt their elimination.



With more countries obtaining access to nuclear weapons, and more military officers and politicians to try it on the battlefield again just to "show the muscle", the possibility of a catastrophic nuclear war can no longer be dismissed. The es-

calation of the nuclear warfare can spiral into the MAD (Mutually Assured Destruction) scenario that would not only wipe out any technologically advanced societies but also triggers the nuclear winter that would bring average Earth temperature below zero for years destroying most of the planet's biosphere including humans [Lamb, 2015].

Figure 5. Typology of aggressive actions with regard for the "gray zone" of new quasi-wars (Source: *[Rivera, 2014]*)



Because the nuclear annihilation risk is perceived by the military strategists, they began to devise methods of "war by other means". Most military actions fall outside the black-and-white war-and-peace categorization, "below the universally agreed upon threshold of war and are legally ambiguous in respect to international laws and norms" [Rivera, 2014], so that they may not be considered a fully-blown war by international laws and general public (Figure 5). They are wars nevertheless, and as wars they can escalate and create massive damage to societies that conduct them. Cyberwars attack digital control systems, while techniques like "persuasive design" employed by AI-enhanced social media platforms [Wired, 2020] can manipulate decision-making processes and user preferences. These methods, though seemingly less harmless on the surfaces, can generate potential threats to our complex civilization are yet difficult to predict.

D. COGNITIVE & SPIRITUAL FOUNDATION

1. INABILITY TO COMPREHEND & GOVERN COMPLEXITY

INABILITY TO COMPREHEND & GOVERN COMPLEXITY

The VUCA reality of escalating complexity and volatility makes traditional hierarchical management inefficient, and the rise of populist oversimplification approach further aggravates the crisis.



The socio-cultural landscape of global civilization is undergoing a swift and intricate transformation, marked by escalating complexity and volatility. This phenomenon is often characterized by the acronym VUCA (Volatile, Uncertain, Complex, and Ambiguous) that describes the "world of strategic uncertainty" that can no longer be comprehended not only by general population but even by experts alike. The VUCA reality is rooted in objective tendencies, as the population of the world, the diversity of human activities, and the complexity of the technosphere have all surged exponentially. Modern metropolises like Shanghai or Moscow teem with tens of millions of inhabitants, intricate public transit systems, energy networks, food supply chains, and security mechanisms, all of which must operate seamlessly and predictably every single second. Traditional hierarchical management systems, which excelled in building empires and establishing mass consumer economies, are no longer adept at grappling with this surging complexity. The traditional hierarchy buckles under its own weight as decision-making layers multiply, information is lost, and response times elongate. This prompts the question: what could serve as an alternative?

The concept of distributed governance systems emerges as a potential solution, involving a multitude of participants. Such systems imply the use of "direct democracies," where each individual plays the roles of both decision-maker and executor. While this setup appears to empower everyone to make informed decisions pertaining to matters affecting them directly, it also brings to light the issue of cognitive complexity. Questions arise about how to establish a suitable decision-making framework, ensuring equitable rights for all and sustaining engagement and motivation. Additionally, concerns emerge about whether such a system might inadvertently amplify the existing complexity.

Often, control mechanisms seek to curb complexity by oversimplifying matters and advocating uncomplicated

remedies. Political and business leaders' turn to populism has been a global phenomenon of the last decade termed "populist backlash" [Rodrik, 2017]. Populism's appeal is surging: in France and Italy, populist parties received over 40% of the vote in 2022 elections, compared to 10% support in 1980s [Silver, 2022]. Once in power, populist leaders rely on simplistic models and colorful though highly inefficient solutions. Striving for streamlined information flow, they might curtail input data to a manageable minimum — and furthermore, attempt to destroy diversity by closing alternative media and putting pressure on political opposition. However, this approach proves futile: the inherent complexity of controlled systems remains steadfast, and attempts to diminish diversity or overlook it result in the loss of knowledge and efficacy, subsequently elevating the risk of errors and failures. Ultimately, addressing the crisis necessitates revisiting the very foundations of governance and information management. In this context, the roles of thinking patterns and communication models, including those augmented by digitalization and AI solutions, assume pivotal significance.



2. CRISIS OF TRUST AND UNDERSTANDING: EROSION OF SHARED VALUES AND WORLDVIEWS

CRISIS OF TRUST AND UNDERSTANDING: EROSION OF SHARED VALUES AND WORLDVIEWS

The fragmentation of scientific knowledge, eroded public trust in science as the provider of the unified worldview, the failure of religious traditionalism and worldview eclecticism as alternatives, and the growing separation of society into "worldview bubbles" within digital media, hindering collective decision making and collaborative efforts to address global challenges.

The growth in complexity of the human world is paralleled by the growth of human knowledge. The enormous body of knowledge already accumulated is beyond our comprehension: for instance, to read 170 million tomes of the Library of Congress, around 3200 lifetimes of continuous reading will be required. With over 40,000 peer-reviewed research journals currently active, many scientists find it difficult to keep up with the development of their own knowledge field, and nearly impossible to track the development of adjacent disciplines. Many scientific fields, particularly in social sciences and humanities, have become siloed,

developing their own distinct languages to interpret the world. This has led to a fracture in the collective understanding of reality, termed a "rupture of the conceptual front" by Stanisław Lem [2014], where a unified scientific perspective of the world can no longer exist.

This complexity paradoxically coexists with two contrasting challenges. On one side, scientists have actively engaged in providing rationale for political decisions "at the expense" of scientific truth since at least the late 1950s, eroding science's role as an impartial reference point. Simplification for political expediency has narrowed the discourse to a few dominant lines of thought (for instance, a neo-classical approach in the economic science), impacting public trust in science and the quality of public debates. There is a risk that this trend is further aggravated by "science police", activists that censor independent scientific thinking in the interest of current agenda [Kloor, 2017]. Furthermore, there is a conflict between scientific and political norms of communication: while politicians demand hard and established facts, scientists are well aware that any "fact" is only a hypothesis that has not been disproven — so they never can claim things with certainty and can challenge even their own ideas. In addition to that, science does not always take a neutral stance, especially in the areas where corruption of knowledge can lead to economic gains, such as pharmacology and chemistry. Consequently, the authority of scientists is eroded and their impact on substantive issues is reduced.

We are witnessing a distinct indication of the failure of the "Enlightenment Project". In the 18th century, science positioned itself as a bastion of Reason, capable of comprehending the entire world, even human behavior. The 18th century Enlightenment Age philosophers promoted "equality, brotherhood, and freedom" as core principles that empowered humans to change the world through democracy, collaboration, learning, and knowledge creation.



> Trust is the glue of life. It's the most essential ingredient in effective communication. It's the foundational principle that holds all relationships.
>
> Stephen Covey



These ideas informed modern political and social institutions including the contemporary education system. However, the science has fallen short of assuming the role of a "compass for humanity," and alternative responses to the complexity of knowledge have emerged. On one hand, there is a resurgence of traditionalism, including a revival of religious fundamentalism. On the other hand, there is a proliferation of "worldview eclecticism" which mixes incompatible perspectives of the world as it pleases. Unfortunately, both of these approaches fail to provide a worldview that can serve as a basis for better understanding and decision making at the scale of humankind or even specific nations (or cities / regions).

The "founding fathers" of the Internet — Joseph Licklider, Doug Engelbart, Tim Berens-Lee, and others — conceived its technologies to pave the path into the new era of human knowledge and common understanding. Instead, with the proliferation of digital media and social networks, the society experiences a decline in unbiased moderators of public discourse. Media outlets, once regarded as trustworthy sources, succumb to economic and political influence, and convey a flow of viral fake news and intentional disinformation disseminated at unprecedented speed. The emerging "post-truth society" [McIntyre, 2018] normalizes the eroded trust, the disintegration of public agreement, and the fragmentation of the "global village" into disconnected information bubbles and "echo chambers" of micro-communities. Political polarization grows: for example, the divergence in viewpoints between proponents of the US' two major political parties, the Republicans and Democrats, has expanded significantly over the past two decades, especially among individuals actively engaged in political discourse. Confidence in various social institutions is also waning, even in nations with a robust tradition of open discussion and consensus-building. Remarkably, a survey by RAND found that the United States' Armed Forces remained the sole institution with a notably high level of public trust [Kavanagh et al., 2020].

This erosion of a common communicative foundation poses a perilous risk. In the past, religion and later science played the role of societal bedrock. However, the Enlightenment's vision of a shared scientific worldview has faded. Without renewed efforts to reestablish common ground , a "united narrative" for interpretation and decision-making, the world faces an inevitable trajectory toward global catastrophe.

WITHOUT RENEWED EFFORTS TO REESTABLISH COMMON GROUND FOR INTERPRETATION AND DECISION-MAKING, THE WORLD FACES AN INEVITABLE TRAJECTORY TOWARD GLOBAL CATASTROPHE.

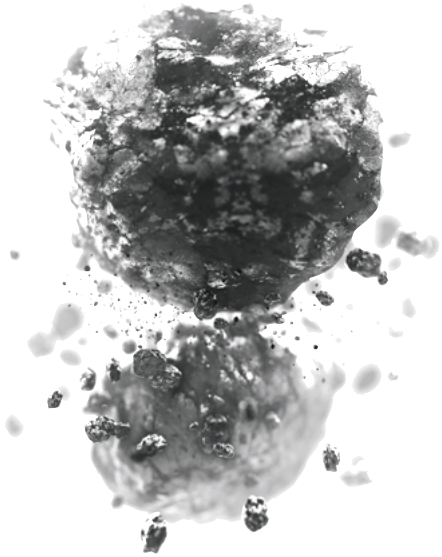


3. DISRUPTION TO COLLECTIVE COGNITIVE ABILITIES AND EMPATHY

DISRUPTION TO COLLECTIVE COGNITIVE ABILITIES AND EMPATHY

The expansion of digital technologies negatively impacts mental health, overwhelms individuals with information overload, and produces addictive behaviors and reduced empathy, which can intensify with the emergence of virtual reality and AI, potentially eroding the foundation of our civilization.

As much as the shared worldviews are presently disrupted, there are even greater risks posed by the evolution of digital technologies and shifts in human culture. Humans continue to expand their online presence, with the number of internet users growing from 1 billion in 2005 to over 5 billion in 2023. The average global internet user spent nearly 7 hours online each day. The growing evidence suggests that this has toll on mental health: a study by Boers et al. [2019] found that for every additional hour of social media time per day, depressive symptoms in adolescents increased by 3% and self-esteem dropped by over 20%. In the coming decades, our civilization can experience further mass scale disruptions in collective cognitive and emotional self-regulation [Lanier, 2023], including human ability to empathize, driven by a number of factors.



First, the growth of connectivity leads to the information overload and cognitive overwhelm. As the digital media bombards individuals with a constant influx of information and stimuli, it can overwhelm cognitive capacities, leading to shortened attention spans and an inability to focus deeply on complex issues. A study by Microsoft [2015] found that the average human attention span has decreased from 12 seconds in 2000 to just 8 seconds in 2013.

Many digital platforms are designed to maximize engagement, often using techniques that trigger the brain's reward centers. This can lead to addictive behaviors, as people seek instant dopamine gratification through likes, shares, and other forms of social validation. Already in 2016, a survey by Common Sense Media discovered that 50% of teens feel addicted to their mobile devices.

> One of the definitions of sanity is the ability to tell real from unreal. Soon we'll need a new definition.
>
> Alvin Toffler

In addition to that, desensitization and decreased empathy occurs with people that spend more time in online space. Exposure to a constant stream of violent or negative content on digital platforms can desensitize individuals to re-

al-world suffering and reduce empathy. Video games and online content often normalize violence and aggression. A study by Fraser et al. [2012] found that high exposure to violent video games was associated with reduced prosocial behavior and empathy among adolescents. Also, people feel less inhibited and more detached from their actions in online interactions compared to offline interactions, leading to increased aggression and decreased empathy in online communication. Heavy internet use is associated with reduced in-person interactions, leading to potential desensitization to real-life emotional cues. The research at the University of Michigan found that college students' self-reported empathy levels declined by 40% between the late 1970s and 2009, associated with the rise of digital communication and online interactions [Konrath, 2012].

We are currently only at the brink of the convergence of technology and culture — with virtual reality Metaverse in its nascent state, and Artificial Intelligence applied only in limited contexts. In the next 50 years, the impact of technologies over collective cognitive abilitiees and empathy may intensify, potentially eroding the bedrock of our civilization. Regrettably, limited strides have been taken to acknowledge or mitigate this risk.

THE IMPACT OF TECHNOLOGIES OVER COLLECTIVE COGNITIVE ABILITIEES AND EMPATHY MAY INTENSIFY, POTENTIALLY ERODING THE BEDROCK OF OUR CIVILIZATION.

4. DEPLETION OF SCIENTIFIC KNOWLEDGE CREATION CAPACITY

Our prevailing civilizational paradigm rests on the concept of progress — the belief that continuous accumulation of knowledge will invariably yield new technologies to enhance human welfare. Progressivist thought hinges on the notion that science will perpetually provide fresh solutions as long as research persists. However, could it be that this cornucopia of solutions is finite, and scientific knowledge creation itself might encounter limitations? Is science truly an unwavering ally in addressing human needs and resolving our challenges?

DEPLETION OF SCIENTIFIC KNOWLEDGE CREATION CAPACITY

Continuous scientific and technological progress is constrained by increasing costs and diminishing benefits of new knowledge, potentially leading to a stagnation in progress and societal reluctance to support further advancements, which can trigger the collapse of a complex society in the long run.



Like any other human activity, knowledge creation has its benefits and its costs. In the early days of science, there was much to uncover, and the cost of scientific discovery was relatively low, while its benefit was exceptionally high. For instance, Benjamin Franklin could study atmospheric electricity using a simple kite — and with his insights from it, not only did he make scientific contributions, but also created the technology of the lighting rod that saves millions of buildings every year. Today, knowledge creation in physics requires way more sophisticated tools — like the Large Hadron Collider, ITER fusion reactor, and the Square Kilometer Array radio telescope. These facilities cost billions of dollars and require collaborative efforts of dozens of nations to create. The cost of new knowledge creation grows, and its benefits become less and less understandable by the general public. In addition, the production of scientific knowledge itself slows down: even in the fields that receive abundant funding, the number of impactful publications declines year by year, as the size of field itself impedes the rise of new ideas [Chu, Evans, 2021]. As Nobel laureate Steven Weinberg [2012] argued in "The Crisis of Big Science", at some very foreseeable point, society might challenge the future funding expenses and suggest these resources could be diverted to more practical needs.

Similar patterns emerge in the expansion of technology derived from acquired knowledge. Continuation of digital transformation demands more powerful and miniscule chips. The costs of creating these chips increases with every next generation, while the number of companies that are capable of producing them constantly declines. For instance, there is currently only one company on the planet — the Dutch ASML Holdings — that possesses lithography technologies required to make modern 5 nm and 3 nm chips. The Moore's law — the observation that the number of transistors in an integrated circuit doubles about every two years — may see not only physical but also organizational limitations. Stagnation can occur in technological development from time to time — as evident with the "machine learning winter" that lasted from 1970s to early 2010s, and the nearly century of stagnation in the use of electric vehicles, from 1920s until late 2010s.

While the limitations of scientific and technological progress still lie ahead, early signs suggest a potential saturation point on the horizon. This plateau may not only be determined by the capacity of science and technology to advance further, but also by society's willingness to embrace and support these advancements.

In the future, questions could arise about the practicality of the next phase of scientific development. Society, corporations, and nations might show diminishing motivation to sustain a large-scale scientific and technological domain. Scientists' remuneration could decline, and careers in science might lose allure, leading to a substantial decrease in the number of researchers. This scenario has precedence, as witnessed in societies that underwent abrupt economic and social simplifications. For example, after the collapse of the USSR, scientific activity waned, researchers emigrated, and the once-renowned scientific community dwindled within a generation. The rapid erosion of the ability to generate intricate knowledge is evident. This phenomenon could be akin to Joseph Tainter's concept of a complex society collapsing: established institutions turn counterproductive, leading to a "reset" in complexity. Given the pivotal role scientific cognition holds today, such a "reset" could be particularly painful. A transformative breakthrough requires a shift in how we perceive the world — and a discovery of entirely new ways to acquire and apply knowledge.

DEMOGRAPHY — IS IT A CONCERN FOR OUR FUTURES?

Until very recently, demography stood as a defining factor in understanding societal conditions, with population size directly linked to a society's economic, military, and intellectual power. The Age of Great Acceleration is a direct result of the populace expansion, which grew from 1.6 billion in 1900 to over 6 billion by the end of the century. However, the recent decades have witnessed a profound transformation in the demographic dynamics, and this change appears to be enduring.

The following factors make demography an increasingly less important driver, compared to technological, environmental, and cultural transformations discussed above:

- The "Second Demographic Transition": Due to rapid urbanization and proliferation of modern healthcare, child mortality declines, and birthrate declines rapidly as well, even in less affluent regions of Asia and Africa. Urban lifestyles are changing, with a multitude of living arrangements other than marriage, and the disconnection between marriage and procreation. Populations are ceasing to expand and are projected to stabilize over the coming decades all over the world — and,

given favorable economic and geopolitical circumstances, the global populace will plateau at the level of 10 to 11 billion by the close of the 21st century [United Nations, 2019]. This signifies that population size and composition will evolve more gradually compared to prior historical periods.

- Decoupling of population and economy growth: In the context of the industrialized global economy, population growth no longer directly drives development. Expanding population doesn't inherently create additional opportunities; instead, it can pose challenges, particularly if economic engagement isn't assured for the increased population. Quality matters—having individuals with diverse skills, a percentage of entrepreneurs capable of fostering new job creation, and supportive political and economic structures responding to evolving needs.

- Population aging does not yet create pressures: The human population is consistently aging, and the cohort of senior people will more than double by 2050 compared to 2020 reaching 1.5 billion people. Nevertheless, there are still regions where young people dominate the population, and many of these people are willing to migrate to regions with dominant senior population. Only regions where no such process is happening should be concerned, such as Japan where the rapid population aging is not complemented by the influx of younger migrants due to cultural and political reasons. For most regions of the planet, this scenario is beyond the 21st century, but it will be relevant in the 22nd century.

- Potential for radical life extension not materializing: While not to be completely discounted, scenarios of radical life extension remain relatively uncertain. Despite ongoing research, substantial breakthroughs in life extension haven't materialized. Even if solutions like gene therapy emerge, widespread accessibility within the next few decades seems unlikely, thus their impact on 21st-century population dynamics is limited.

Considering the array of challenges we have outlined, demographic factors—specifically regarding quantitative population growth—will not be the primary determinants of the future, even though they will also exert an indirect influence on our pathways into the future. Beyond the 21st century, however, the biggest concern is that humanity has removed all types of environmental pressures that kept its population fit — so survival of our young and long life of our seniors can be a time bomb that will undermine the long-term fitness of our species if new types of evolutionary pressures emerge. As the evolutionary biologist Henry Gee [2021] puts it,

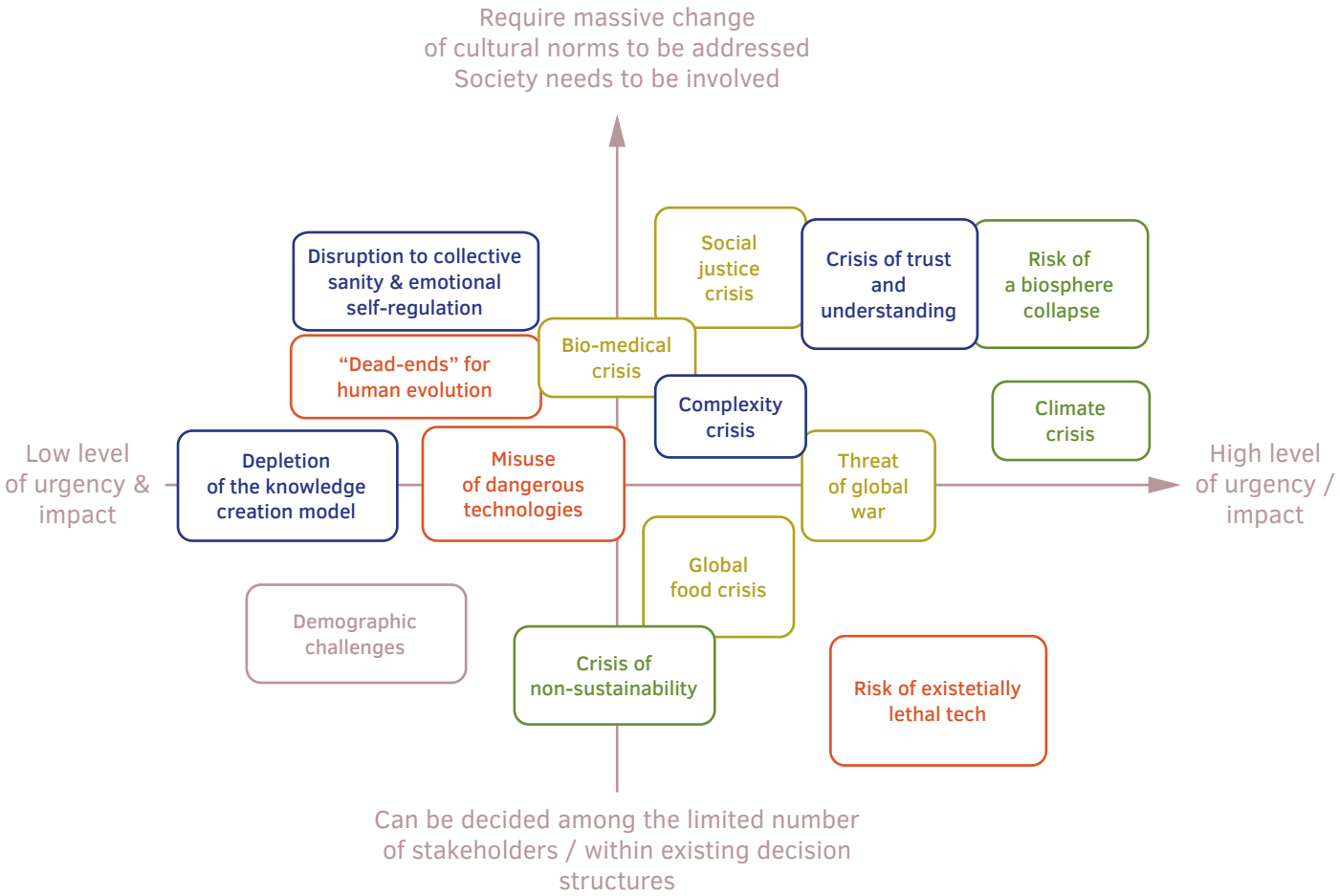
with the habitat degradation, low genetic variation and declining fertility, Homo Sapiens can be a "dead species walking". While Gee's position is probably overly pessimistic, finding new ways of raising our collective fitness is a primary task that cannot be dismissed.

SHOCK AND AWE OF THE FUTURES

In 1970, Alvin Toffler published one of the most famous books in the history of futurology, Future Shock. In this book, Toffler argued that our world is predominantly shaped by the rapid acceleration of change. This concept led to numerous accurate predictions, solidifying the book's significance. More than half a century later, we remain enveloped in what can be termed "Toffler's dynamic": our world continues to accelerate, and many emerging challenges begin to gather into the formidable poly-crisis. It is no longer solely about individuals or organizations struggling to keep pace with the future; the concern lies in the fact that the future no longer works for anyone.

> The 'the' in polycrisis is crucial, because our historical condition is truly unique.
>
> Ville Lähde

Figure 6. Mapping challenges onto space of impact and demand for collective decision-making



Usually, the response of global political and business leaders follows familiar patterns — establishment of commissions, councils, regulatory measures, and dedicated investment funds. However, considering the scale and complexity of challenges, a radically different approach is required. We must realize that most of the problems portion of these issues necessitates a fundamental transformation of the "genetic code" of our civilization. This task cannot be outsourced to members of parliament or university professors. It demands a broad public dialog about the futures, engaging all key stakeholders of these futures — that is, all of us (Figure 6).

HUMANKIND WILL HAVE TO DECIDE HOW EXACTLY A WORLD THAT WORKS "FOR 100% OF HUMANITY" CAN EMERGE.

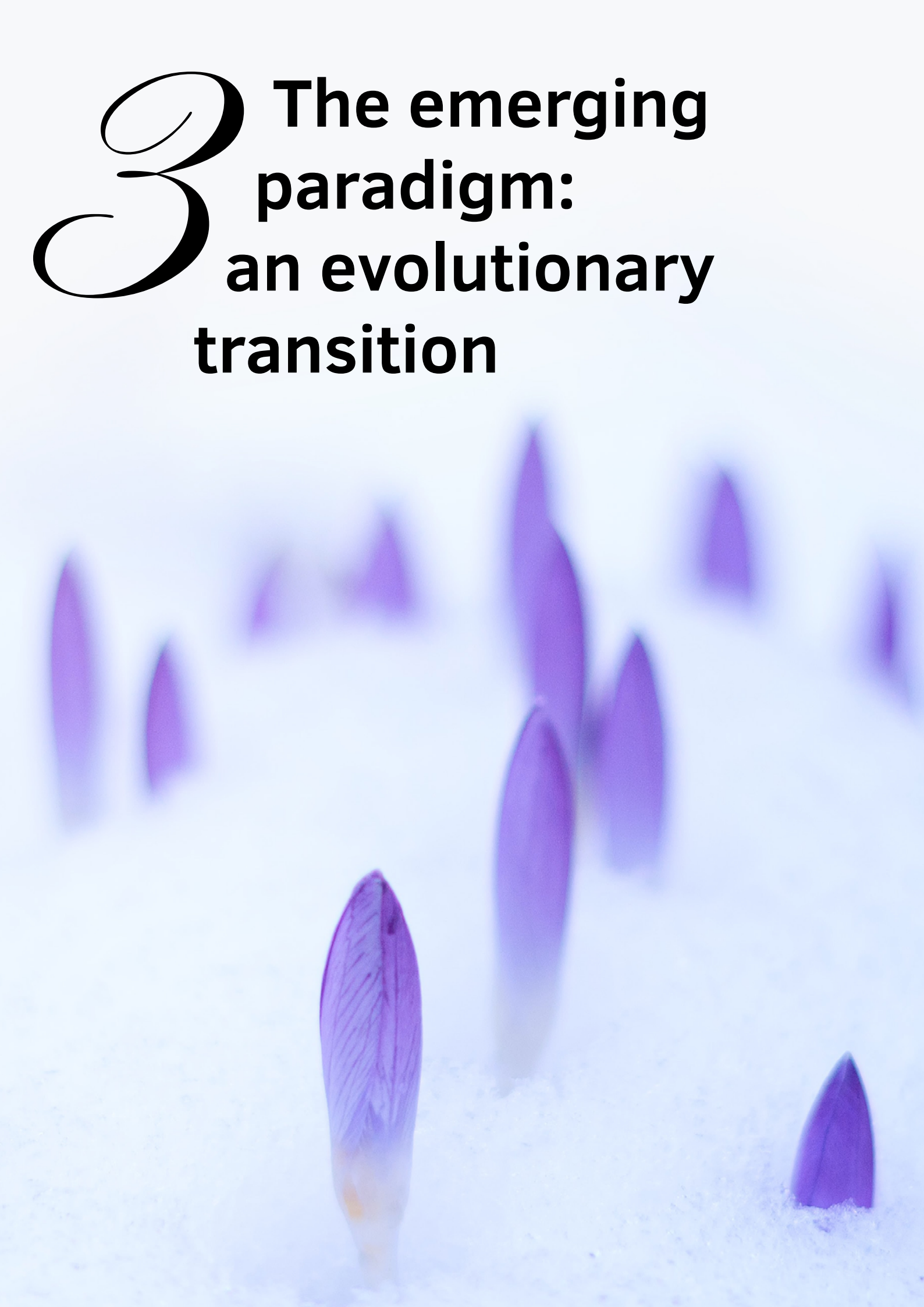
In 1964 the visionary architect and systems thinker Buckminster Fuller introduced a "world peace game" as a counterpart to popular military "war games". This game was intended to serve as a catalyst for a holistic, forward-thinking design science methodology in addressing global issues — and it was used to inspire decision-makers around the globe to tackle problems from a novel perspective. The core objective of the "game" was to address the bold question asked by Fuller:

> Make the world work, for 100% of humanity, in the shortest possible time, through spontaneous cooperation, without ecological offense or the disadvantage of anyone.

Today, Fuller's "world game" is beginning to manifest in real time. Our global interconnectedness is expanding, providing us with opportunities to profoundly impact the world, both positively and negatively. The pressures of polycrisis compel us to reconsider the way we live and act, a responsibility that we can no longer defer to future generations. In the coming years, humankind will have to decide how exactly a world that works "for 100% of humanity" can emerge. The search for this dream must not solely remain the concern of the privileged few, but must engage the participation of all communities, regions, and movements.



3 The emerging paradigm: an evolutionary transition



For a member of a conscious species, purposively guiding its evolution to harmony with life on Earth is not a utopian venture. Undertaking it is the human survival imperative.

Ervin Laszlo

FROM THE EVOLUTIONARY CRISIS TO THE EVOLUTIONARY LEAP

Our concerns regarding the fate of the future generations, our nations, our businesses, and our own selves are well-founded. The convergence of global risks brews a "perfect storm" of the unfolding poly-crisis in the forthcoming decades. Environmental, biomedical, economic, and geopolitical challenges are intertwining and mutually amplifying, nudging our societal structure towards instability. When we assess the sequence of these hazards in terms of their timing, likelihood, and potential impact, we can see ourselves confronting a tsunami of negative impact, capable of erasing our civilization (if not our species), that rises in front of us by the mid-century (Figure 7). This prospect is unprecedented in human history. Never before on a planetary scale have we encountered a combination of threats that jeopardize the survival of our entire species, and not just individual groups, nations, or cultures.

Our culture is not unaccustomed to the idea of existential risks. Most families with children born today expect their descendants to live well into the 22nd century — and at least two thirds of year 2023 babies will probably make it, as long as existential risks remain at bay. There is probably a handful of madmen who might want this world to end — and some of them can even hold positions of power — but the overwhelming majority would not even entertain such a notion as plausible. Nevertheless, the continuation of current models — marked by extraction, exploitation, and intense competition — inevitably pushes humanity perilously close to the edge of extinction. And, much like in the 2021 dark comedy "Don't Look Up!", most of society, including the populace, media, politicians, and business figures, seemingly prefer to disregard these risks or harbor personal escape plans that are, realistically, destined to fail [Rushkoff, 2018].

WE CAN SEE OURSELVES CONFRONTING A TSUNAMI OF NEGATIVE IMPACT, CAPABLE OF ERASING OUR CIVILIZATION (IF NOT OUR SPECIES), THAT RISES IN FRONT OF US BY THE MID-CENTURY

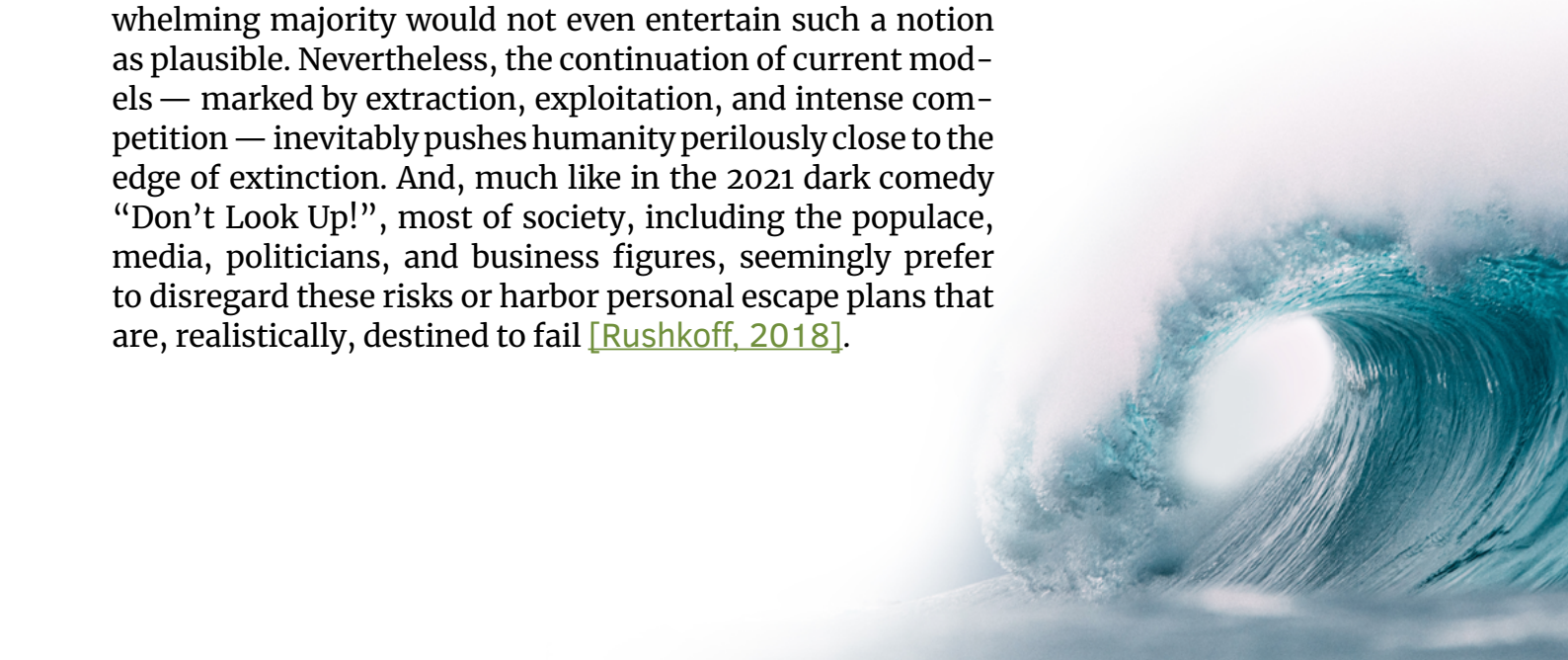
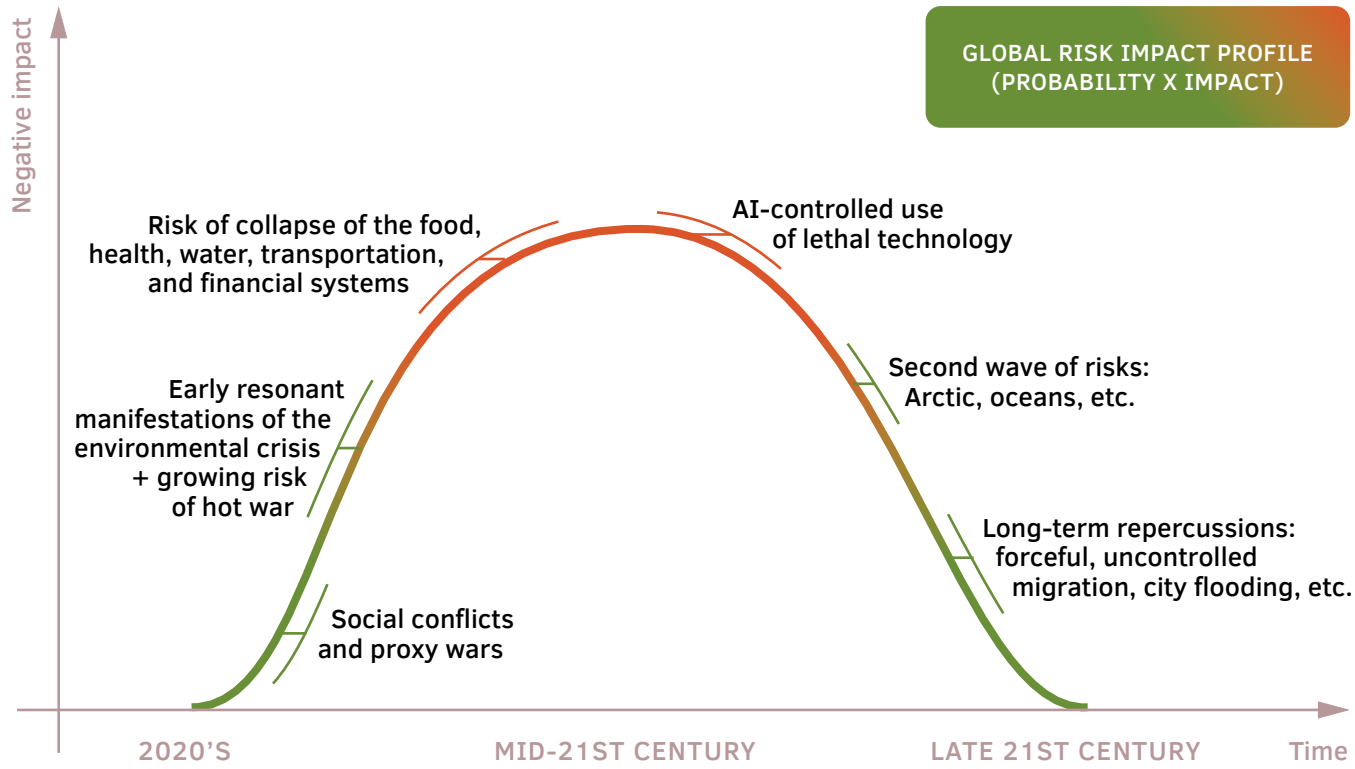


Figure 7. The rising tide of materializing global risks



However, a ray of hope still shines upon us. At no other point in history has humanity been better poised to confront such challenges. Our arsenal includes global institutions dedicated to accumulating scientific knowledge; structures for decentralized decision-making; mechanisms for mobilizing vast human collectives and steering continent-sized megaprojects. We possess fundamental technologies and methodologies, although so far fragmented, to adjust human societies to diverse climatic and environmental conditions. Moreover, we have the Internet, the world's global communication & collaboration system, which has the potential to foster real-time understanding and discussions about the world's situation, while also harmonizing the actions of Earth's inhabitants.

But despite being endowed with all the necessary solutions, as a global society we find ourselves unable to embrace them for reasons beyond our understanding — as if we all stand before an imperceptible barrier.

Complexity theory comprehends these barriers well, exploring the evolution of complex systems spanning from astrophysical phenomena to societal dynamics. At some point, an evolving system confronts the limitations of its prevailing "mode of existence." For instance, it depletes its preceding energy sources or confronts irreversible shifts in its environment. In this pivotal junction, the system en-



ters a zone of instability—also known as a catastrophe or bifurcation zone—and teeters on the brink of collapse. Under certain circumstances, the system can perform a "complexity leap" whereby it shifts to a new, more complex, level of stability (sometimes called an "evolutionary attractor"), and adopts new systemic qualities and structures.

As an illustration, consider modern evolutionary perspectives about the origin of multicellular life. Approximately two billion years ago, the Great Oxidation Event in the biosphere: during this period which lasted several million years, cyanobacteria (that dominated biosphere at that time) enriched the atmosphere of Earth with a byproduct of their own metabolism, oxygen, which was lethal to anaerobic life of that era. It led to the extinction of up to 90% of biosphere of that period, and it was the Earth's first planetary ecological crisis. However, the surviving cells learnt to aggregate into symbiotic proto-organisms and embraced the poisonous oxygen as the new foundation of their existence [Hedges et al., 2004]. Thus emerged multicellular life and complex ecosystems that subsequently became the new evolutionary attractor of the biosphere.

Throughout its history, humanity has undergone several complexity leaps. Many of them only left tiny traces in indigenous mythologies, as the memory of massive crises thousands of years ago that led to "population bottlenecks" when only few members of the population survived. Pivotal shifts also occurred during the Neolithic Revolution, the beginning of the agrarian settled life in regions like the Fertile Crescent, and the advent of the Industrial Revolution. In each instance, the dominating way of life underwent radical transformations, and it gave rise to novel models of existence (and new modalities of consciousness and worldviews) that displaced the previous norms. Every transition was marked by a significant leap in societal complexity, as evidenced by factors like population size, social interactions, and the diversity of material culture. Each of these transitions also came with its own losses to personal freedoms, lifestyles, traditions and practices.

THE SYSTEM CAN PERFORM A "COMPLEXITY LEAP" WHEREBY IT SHIFTS TO A NEW, MORE COMPLEX, LEVEL OF STABILITY.

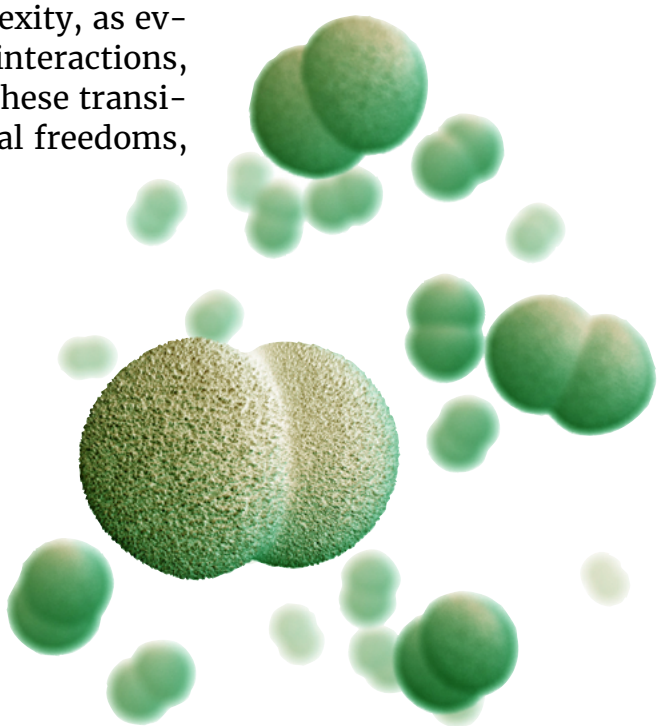
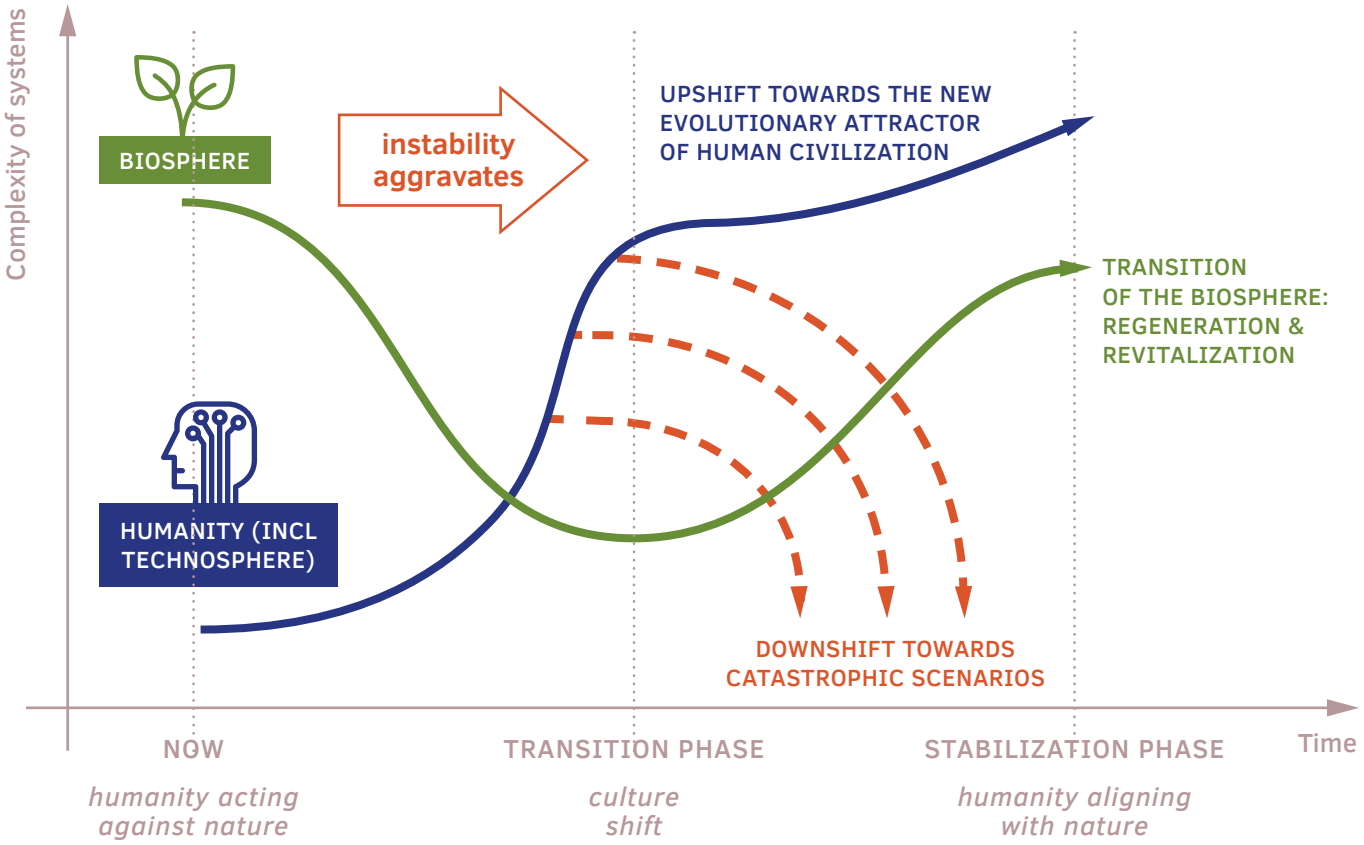


Figure 8. Transition to the new evolutionary attractor of the human civilization and the biosphere



With the beginning of the Age of Great Acceleration, humanity has entered a new bifurcation zone. But the present crisis is peculiar –the crisis of the human population is interlaced with the crisis of the biosphere and the planetary systems. The Sixth extinction, triggered by the expansion of human civilization and the technosphere, calls all Life on Earth into the search of a new evolutionary attractor. Will the planet consider the humanity and its technologies an enemy or a parasite to be eradicated? Or will it self-organize into a new level of existence, integrating these "toxic" factors as its new driving force? — just as it did with oxygen billions of years ago? Will humanity remain passive observers (or rather negative catalysts) of this evolutionary transition? — or will we explore our ways of supporting the evolutionary up-shift to the new level of complexity, both for our own species and the planet?

With hopes held high for such a transition, as a global society we are approaching a critical moment which can be "make it or break it" (Figure 8). Many forces pull the humanity into the downshift — increased geopolitical rivalries, manipulative technologies, growing inequalities, social upheavals caused by environmental catastrophes. The evolutionary leap, the upshift, is a possibility — but it is not guaranteed.

> The most difficult transition to make is from an anthropocentric to a biocentric norm of progress. If there is to be any true progress, then the entire life community must progress. Any progress of the human at the expense of the larger life community must ultimately lead to a diminishment of human life itself.
>
> Thomas Berry

22 STEPS INTO THE 22ND CENTURY

Humanity steps into the mist of uncertainty, seeking passages to traverse to uncharted territories. It quests for a new way of being that harmonizes relationships within societies and between humanity and our planet. But are hopes for transformation mostly lie with technologies such as AI that can provide solutions to existing and emerging challenges. One truth evades public debates and political consideration: the problem (and the salvation) doesn't reside solely in technologies, but rather in our ways of deploying them.

Figure 9. Main "layers" of civilizational dynamics that shape our collective futures



Technologies are but a reflection, or a "crystallization", of our culture, our ways of existence that we imprint upon the world. So, we need to ask ourselves: How will our economies and households be organized? By what means will decisions be reached, and social order formed? Which values and priorities will reign in our culture? How will we perceive and comprehend the world we inhabit? We, therefore, need to consider the evolution of economy, governance, culture, and consciousness to discern the future ways of our being (Figure 9).



As we look from the perspective of evolutionary transition, we need to ask: what are the qualities of an evolutionary attractor within the space of long-term viable scenarios? In other words, how should our civilization be organized so that existing challenges no longer threaten us? What is the way of being on the "other side", "beyond the threshold" of the poly-crisis we are facing?

We can create many scenarios that will all fit the "beyond the threshold" vision. But they will all have distinct attributes that can be categorized into the following four groups :

Nature-aligned (nature-based, regenerative): These scenarios are geared towards restoring and sustaining diverse ecosystems, fostering the well-being of individuals, communities, and the planet.

Intelligent: These scenarios incorporate intelligent (including digital) components, encompassing technological solutions that can autonomously make decisions, learn, and evolve.

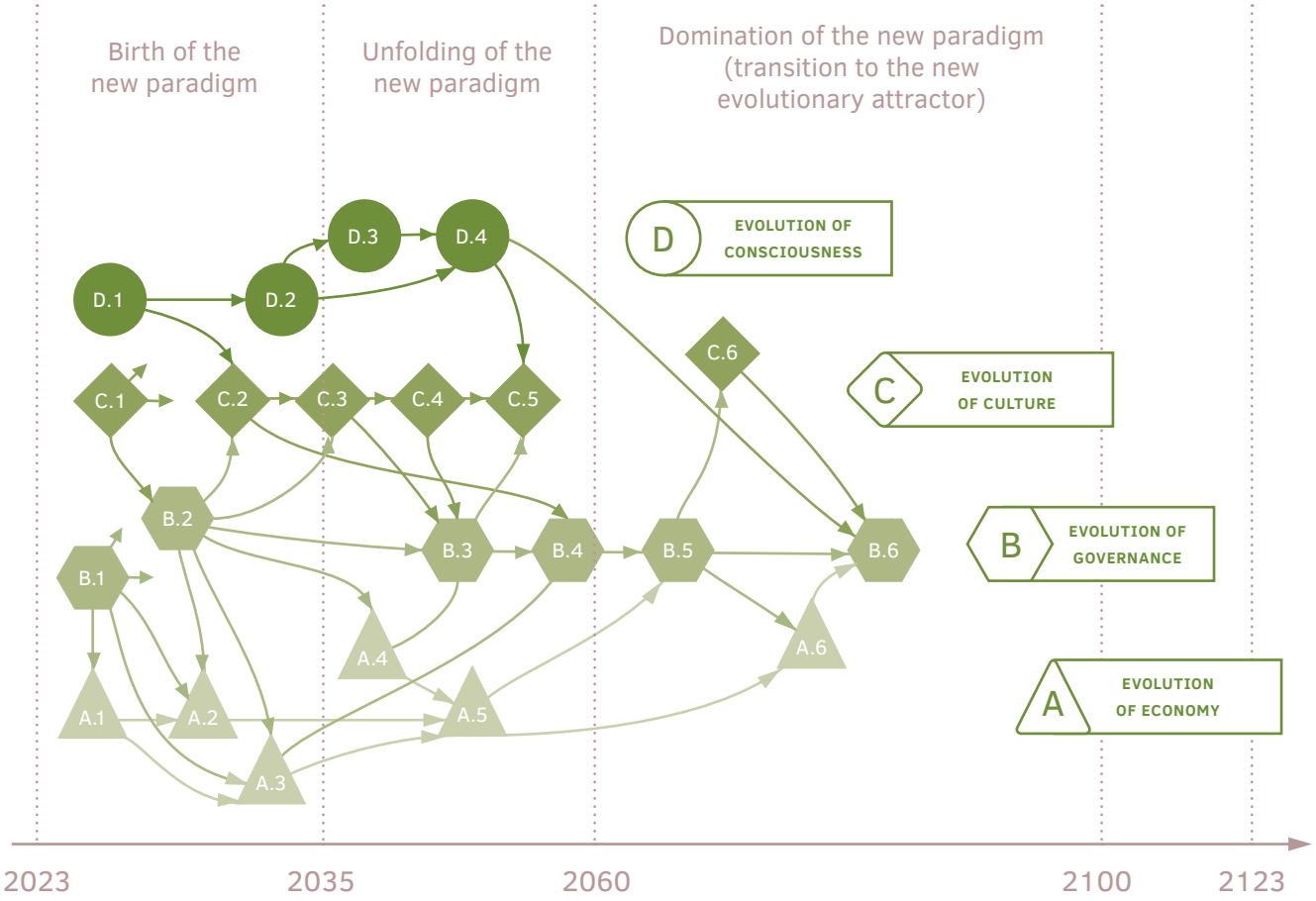
Complex (non-linear, network): These scenarios are rooted in the principles of non-linear and network systems. They utilize closed cycles and feedback mechanisms, allowing for self-regulation and adaptability.

Empowering (or humanizing, supporting collaboration, co-creation, and compassion): These scenarios embody a holistic approach that emphasizes the nurturing of human qualities. They facilitate collaboration, co-creation, solidarity, and empathy, ultimately fostering a sense of unity and mutual support.

Collectively, these attributes form the acronym "NICE": Nature-aligned, Intelligent, Complex, and Empowering. This framework highlights the diverse and interconnected nature of the processes that can contribute to the evolution of a new reality beyond the threshold of poly-crisis.



Figure 10. Roadmap of 22 steps into the 22nd century



22 STEPS INTO THE 22ND CENTURY:

A. EVOLUTION OF ECONOMY

1. Energy transition
2. Circular & regenerative economies
3. Protein transition
4. Economy of self-sufficiency and self-actualization
5. Multidimensional capital
6. Planetary economic governance

B. EVOLUTION OF GOVERNANCE

1. Preventive human security
2. Participatory cocreation of the future
3. Empathy-based governance
4. Legal rights for non-human beings
5. Post-national world
6. Planetary council of all beings

C. EVOLUTION OF CULTURE

1. Lifelong learning ecosystems for societal transformation
2. Culture of planetizenship
3. Culture of universal well-being
4. Institutions of collective healing
5. Global peace-based culture
6. Culture of novel human habitats

D. EVOLUTION OF CONSCIOUSNESS

1. Feminine and non-binary thinking
2. Collective hybrid wisdom
3. Integral paradigm of human knowledge
4. Meta-language of living complexity

In this report, 22 pragmatic and visionary steps are outlined for the transition towards the evolutionary attractor (Figure 10) that are distributed across three distinct horizons (which are similar to Three Horizons framework offered by Bill Sharpe, Anthony Hodgson, and their colleagues [2016]):

- Short-term (prior to 2035): These solutions align with current trends and will continue to evolve over the next 10–15 years. They act as seeds for the emergence of the new evolutionary attractor.
- Mid-term (between 2035 and 2060): These are systemic solutions encompassing new social institutions, economic models, and novel ways of thinking. They will navigate our societies through the inevitable critical dynamics of the mid-21st century and unfold crucial facets of the new evolutionary attractor.
- Long-term (post-2060 and into the 22nd century): These solutions are deeply rooted in the new paradigm of existence, unlocking the potential of the evolved way of being. While some of them may appear paradoxical or unrealistic today, even now we can find traces of this possible future in some bold social and cultural experiments.

Together, these key solutions form a comprehensive journey of 22 pivotal strategies towards the NICE reality that guide us into the 22nd century and beyond.



A. EVOLUTION OF ECONOMY

1. ENERGY TRANSITION [BEFORE 2035]

ENERGY TRANSITION

Shifting towards renewable sources of energy and a collaborative, eco-focused energy sector based on the 3D paradigm of Decarbonization, Decentralization, and Digitalization.

The energy transition is commonly driven by climate concerns, particularly due to greenhouse gas emissions from energy generation, industry, urban activities, and transportation. Yet, this transition encompasses more than climate considerations. It is a multifaceted process stemming from the need for updated infrastructure and grid systems as well as a chance to reshape the fundamental societal pattern for the 21st century.

In the 20th century, the energy sector was centralized around mass production, from energy generation to consumption. However, the 21st century requires a versatile energy infrastructure to harness various sources globally, optimizing extraction, storage, and utilization while minimizing losses.

The energy transition, guided by the 3D paradigm (Decarbonization, Decentralization, and Digitalization), marks a significant shift in energy dynamics. This transition aims to move away from fossil fuels and embrace renewable sources like solar, geothermal, wind, and nuclear energy. This change unfolds gradually over decades, with renewables projected to form 50% to 80% of global energy by 2050.

Yet, the shift goes beyond sources—it transforms energy production and distribution. Decentralization empowers communities with distributed energy sources, enhancing resilience. Digitalization integrates advanced tech, automating processes, and reshaping relationships. This evolving energy landscape envisions a collaborative, eco-focused industry with local ecosystem priorities.

This transition is the first civilizational macro project for the 21st century, offering protocols, economic models, and approaches to shape our civilization's future evolution amid complex challenges. It's a pivotal stride towards a sustainable, balanced future beyond today's poly-crisis.



2. LINEAR TO CIRCULAR AND REGENERATIVE ECONOMIES [BEFORE 2035]

LINEAR TO CIRCULAR AND REGENERATIVE ECONOMIES

Transition to "reduce, reuse, recycle" organization of economy, and the use of nature-friendly technologies that enhance resource efficiency, strengthen natural ecosystems, and lead to climate stabilization.

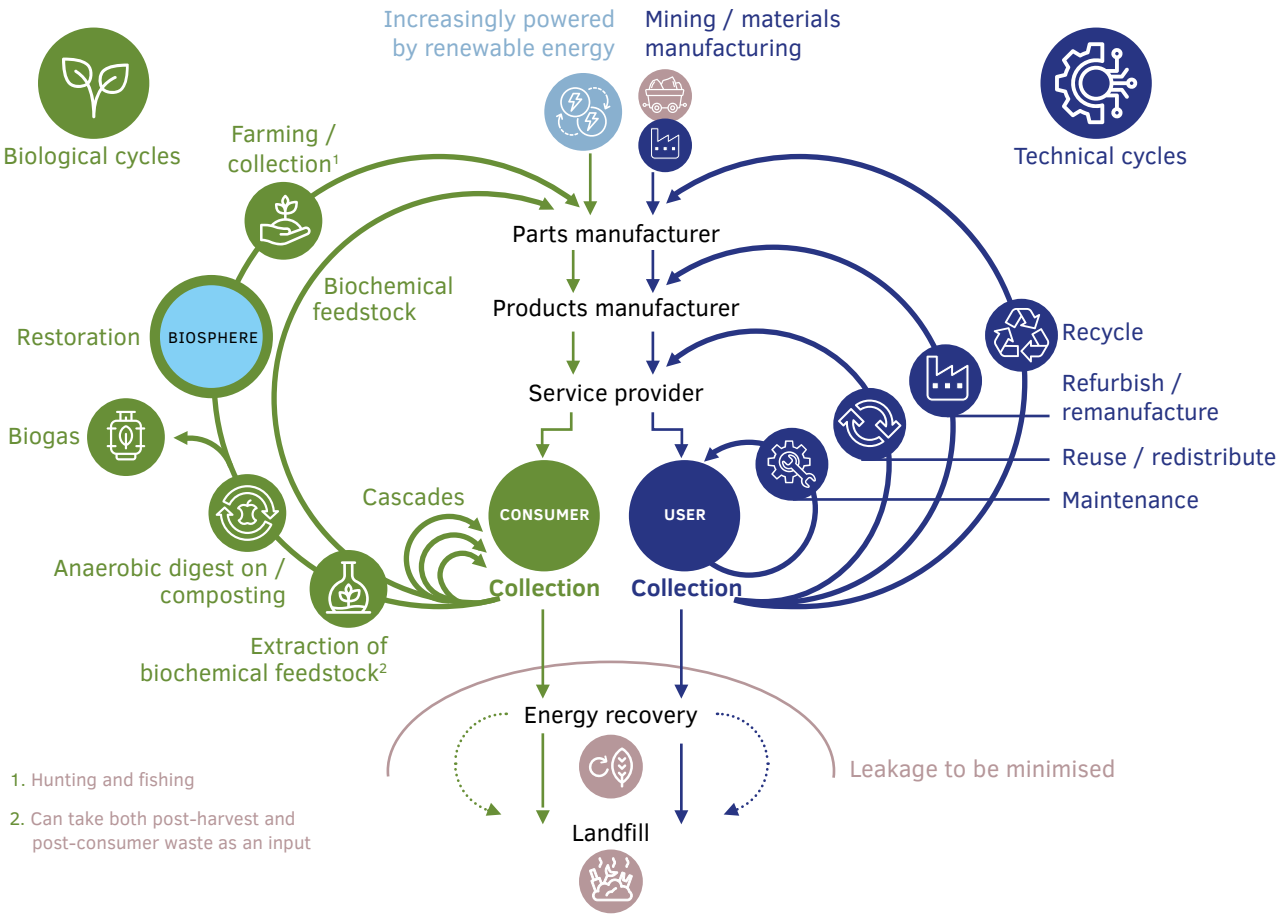
While we cannot precisely predict the future economy's model, it clearly will not resemble the 19th and 20th-century industrial economy. The industrial urban civilization's extraction-consumption mechanism is unsustainable due to resource limits and planetary boundaries: the planet cannot provide us with limitless valuable resources or limitless space for landfills. Science cannot infinitely expand these limits. To secure our survival, we must address waste issues (including highly toxic, electronic, and plastic waste), water and air pollution, soil restoration, and resource preservation. We need to master the methods successfully used by living nature itself for the last four billion years, adopting nature-based technologies and closed ecological cycles to rebuild our economy on sustainable principles.

The economic revolution of circular and regenerative economies implies that consumption is not disposable, but nurturing and renewal are paramount. In a circular economy, products are designed to last and be repurposed. It is a world where "reduce, reuse, recycle" becomes a guiding principle of every economic activity. From repairing gadgets to reusing materials, a closed loop is created where nothing goes to waste.

Taking that notion a step further, a regenerative economy is not solely concerned with curbing the harm, but actively promoting well-being. It goes beyond coexistence with nature to amplifying its vitality. Regenerative economy emphasizes the transition to nature-friendly materials and solutions, with the goal of creating strategies that can genuinely restore natural systems, including the biosphere, rather than merely reducing the ecological impact of human activities. Regenerative economy technologies aim to emulate natural processes through practices like biomimicry, biodesign, and bioengineering. The foundational principles of the regenerative economy assume a holistic perspective, positioning humanity as an intrinsic component of the interconnected web of life. This perspective underscores values of reciprocity, mutualism, and the universal Golden Rule, transcending cultural and disciplinary boundaries [Fullerton, 2015].



Figure 11. Organization of the circular / regenerative economy
***(Source:** [Ellen Macarthur Foundation, 2015]*)



The evolving model of economy shifts from linear to circular flows (Figure 11). It is closing the production-to-disposal cycle through regulatory and economic tools, spanning individual households to entire economies. Production systems now embrace the "cradle-to-cradle" approach, where all human activities aim for complete restoration of natural resources and territories to their original states.

Non-renewable materials are now seen as critical resources, and efforts are focused on extending their use through recycling and reuse. Renewable materials, including biological and nature-based ones, replacing non-renewable ones whenever possible. These materials can become the integral part biosphere flows and can even aid in ecosystem restoration. This shift extends to agricultural production which transforms into agroecology whereby food is produced with modified biocenoses, such as forests and marine ecosystems. Individuals and communities also track their recovery of resources, including physical and mental health, social and cultural diversity. The guiding principle of regenerative economy is the complete restoration of all living and social systems engaged in economic production. In that respect, regenerative economy is based on fundamental fairness towards all stakeholders involved, including natural systems.

Regenerative economy encompasses multiple streams of novel activities, including:

- Sustainable biotechnologies that harness existing biological systems and synthetic biology for specific environmental challenges, including bio-based materials to replace traditional substances and bioremediation methods for pollution cleanup. It can also include biologically engineered alternatives to existing human technologies transportation systems, energy producting systems, and even consumer electronics. For instance, there are promising experiments in creating electricity straight from photosynthesis with bioengineered trees [IIT, 2018]

- Regenerative agriculture and forestry that prioritize soil health, biodiversity, and carbon sequestration through practices like precision farming, agroforestry, and soil restoration using technologies like biochar. These solutions need to be integrated within local bioregional ecosystems for the re-localizatiion of food production, instead of relying on global food supply chains.

- Regenerative aquaculture that focuses on sustainable seafood production and aquatic ecosystem health, using techniques like integrated multi-trophic aquaculture and recirculating aquaculture systems.

- Regenerative green construction that integrates green infrastructure into urban areas for ecosystem restoration, and also urban agriculture (a component of the regenerative urban economy) that employs techniques like vertical farming, hydroponics, and aquaponics to cultivate crops and reduce agricultural footprint.

Regenerative economics holds the key to climate stabilization [Lovins, 2023] — as primary strategies for carbon sequestration include carbon agriculture and extensive restoration ecosystems of the land (forest, prairie, and tundra) and the ocean (such as kelp forests and reefs). Therefore, revival and enhancement of natural ecosystems becomes the main plausible approach for addressing the climate crisis.

However, regenerative economics surpasses these efforts, shaping the next phase of economic growth. It proves more resource-efficient, excelling in resource utilization compared to linear production models. This results in enhanced productivity and lower production costs. McKinsey & Company's projections indicates that closed-loop production could contribute $1 trillion annually to the global economy in the 2020s decade [WEF, 2014].

> Regenerative agriculture represents more than a shift of practices. It is also a shift in paradigm and in our basic relationship to nature.
>
> Charles Eisenstein

Furthermore, the regenerative economic model transforms the perception of investments in natural capital—like soils, water, and biodiversity—from costs or into economic benefits with social value. In this perspective, nature is no longer seen as a mere resource repository but an active contributor in economic value generation. As a result, the regenerative economy begins to function as the operational framework for sustainable development [Luksha, Graham et al. 2020]. It not only reduces the ecological footprint of traditional industrial production but also engages natural processes to rejuvenate ecosystems for the betterment of society. In essence, it collaborates harmoniously with nature.

THE REGENERATIVE ECONOMY BEGINS TO FUNCTION AS THE OPERATIONAL FRAMEWORK FOR SUSTAINABLE DEVELOPMENT.

3. PROTEIN TRANSITION [BEFORE 2035]

PROTEIN TRANSITION

Shifting from conventional meat consumption to alternative protein sources such as plant-based, insect-based, algae- and fungi-based alternatives, as well as lab-grown meat.

One of the key imperatives in transforming our consumption patterns is the transition to new sources of protein, replacing conventional meat. The need for the transition is driven by environmental concerns, as conventional meat production is extremely resource intensive in terms of feed crops, water consumption, and energy requirements. The livestock industry is a significant contributor to greenhouse gas emissions, deforestation, and water pollution. Cattle farming requires vast tracts of land for grazing and feed production, contributing to habitat destruction and biodiversity loss. Additionally, meat rich diets take toll on public health, including increased risks of heart disease, diabetes, and cancer.

Several approaches to protein transition include the use of plant-based alternatives (e.g. legumes, soy, quinoa, and nuts), insect-based proteins (e.g. crickets, mealworms, and grasshoppers), algal and fungal proteins, and cellular agriculture. Plant-based proteins seem to be the most viable alternative at the moment, with a vast range of easily accessible technologies and a growing consumer acceptance of plant-based alternatives in dairy and meat products. Algal protein is gaining attention, as some algae species can have protein content as high as 70% of dry weight, and they can be cultivated using 10-20 times less land compared to traditional livestock farming [Wells et al., 2017].



Cellular agriculture, also known as lab-grown or cultured meat, involves growing animal cells in a controlled environment to produce meat products without the need for raising and slaughtering animals. Strategically, this approach appears as the most promising. Lab-grown meat production could result in up to 90% lower greenhouse gas emissions, could reduce land use by 99% and freshwater use by 96%, compared to conventional livestock [Yuksel, Mohr, 2023]. It minimizes the impact on biodiversity, and also has better effects on public health (as no antibiotics are used in this type of production). Finally, it addresses ethical concerns of animal welfare and the suffering associated with factory farming, as this meat is produced meat without raising and slaughtering animals.

In essence, the "protein transition" is a crucial human project that can overshadow energy transition in its importance. In order to harmonize our relationship with life, it is essential to discontinue one of the most life-harming practices of humanity that impacts the climate, the biosphere, and our own psyche.

THE "PROTEIN TRANSITION" IS A CRUCIAL HUMAN PROJECT THAT CAN OVERSHADOW ENERGY TRANSITION IN ITS IMPORTANCE.

4. ECONOMY OF SELF-SUFFICIENCY AND SELF-ACTUALIZATION [2035–2060]

ECONOMY OF SELF-SUFFICIENCY AND SELF-ACTUALIZATION

Change of consumption patterns to sufficiency and participatory forms of consumption, and promotion of economic activities that prioritize self-actualization and serving others.

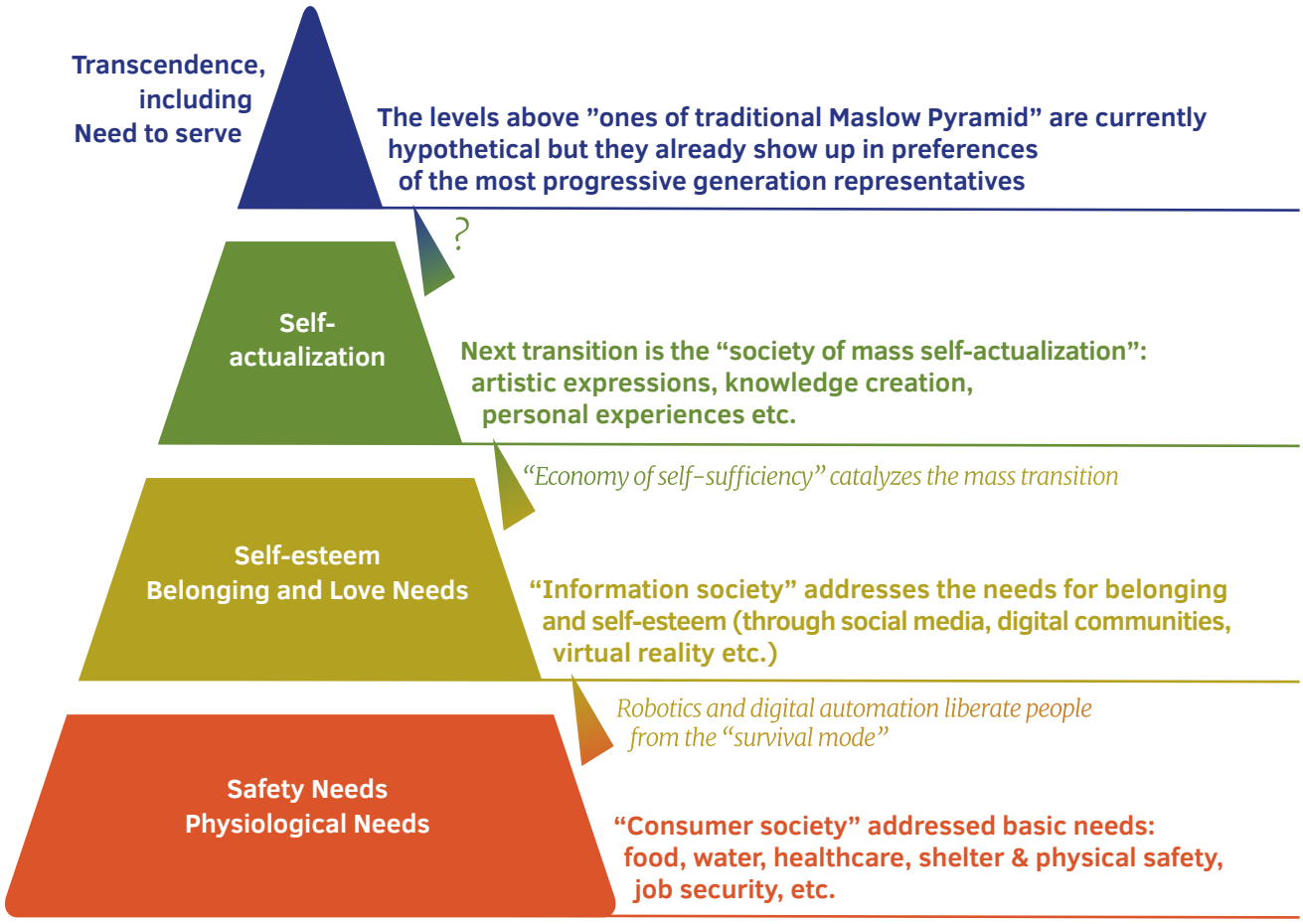
The restoration of harmony between humanity and nature encompasses two key aspects. Firstly, our production, energy, and transportation technologies must evolve to become more resource-efficient and nature-friendly. At the same time, our environmental footprint is directly tied to our level of material consumption, underscoring the need to reduce our material demands. This proposition does not entail a decline in quality of life or a uniform approach for everyone — but calls for moving away from the prevailing culture of boundless consumption and the relentless stimulation of needs.

The current drive for expansion in economic growth — the mentality of "more, bigger, farther" — should transform

into a new ethos of sufficiency, prioritizing essentials that sustain life, well-being, aesthetics, health, and diversity. This shift marks a transition from a "consumer society" to a "participatory society," which is focused on fostering balance instead of incessant growth.

In both consumption patterns and the realm of labor and user relationships, a transformative shift is underway, providing a fertile ground for the realization of "higher needs". The basic needs that drove the demand in the 20th century economy — food, water, shelter, basic health services — are now largely met within urban societies. The world of course is not homogenous, and there are still many regions and communities that grapple with limited access to these essentials, enduring hunger, violence, and inadequate medical care. However, for a significant share of the world's population, the conventional consumer economy has reached its capacity. Consequently, the emergence of novel values becomes imperative, addressing different tiers of our psychological and existential landscape.

Figure 12. Evolution of needs and the emergence of the self-sufficiency & self-actualization economy (Source: [Luksha, 2015])



Let us consider Maslow's well-known hierarchy of needs — which primarily describes a typical organization of needs in the population rather needs of specific individuals. The industrial society effectively tackled the challenge of satisfying basic needs, providing food, healthcare, and security to masses. During the transition from the industrial consumer economy to the information society, we witness a shift towards mid-tier needs — the need for recognition and belonging to a community. In the next 50 years, with the proliferation of automation and regenerative solutions, a reorientation towards higher-tier needs awaits — encompassing the need for self-actualization, cognition, the need to serve, and beyond (Figure 12).

> Classic economic theory, based as it is on an inadequate theory of human motivation, could be revolutionized by accepting the reality of higher human needs, including the impulse to self actualization and the love for the highest values.
>
> Abraham Maslow

Driven by the transformation of values, an emergent self-actualization economy can manifest itself across several dimensions:

- Mass uniqueness at the core. Automation increasingly handles the production of standardized goods and services, including essential needs. Within the self-actualization economy, paramount value is attributed to distinct products crafted by unique talents [BCG, 2019]. The labor market evolves into a network of diverse abilities, emphasizing the utilization of individual talents for both work and self-realization.
- Human potential management. The new managerial paradigm transitions from viewing individuals as resources (human capital) to recognizing them as original sources of various forms of capital, including social, intellectual, and financial. Amid these capacities, the ability to take proactive action in uncertain circumstances emerges as particularly crucial, shifting from an entrepreneurial trait to a core competence in the later 21st-century economy.
- Passion-driven work. The concept of labor is changing, moving from a survival-driven necessity to a platform for unlocking personal potential. In the necessity-driven work paradigm people traded their time for money, and their work was usually functional and replaceable by technology. With increased automation and the advancement of basic income models, the relation between work and income is breaking, and that fosters engagement in activities that focus on personal passion, like volunteering and creativity. In the passion driven work, individuals seek fulfillment in areas aligned with self-actualization, contributing to the planet's well-being (addressing global challenges), benefiting others through caregiving, and enhancing their personal satisfaction (engaging in pleasurable or leisurely pursuits).

Shift towards collective purpose. Self-actualization increasingly takes the form of dedication to causes larger than oneself. An ethic of "common cause" gains prominence, progressing from an individualistic "me" or ego perspective to a sense of "we" the community and ultimately to an "all of us" ecosystem-wide perspective. Pivotal sectors expected to accrue value in the late 21st century encompass the economy of care, holistic health and healing, restoration of natural ecosystems, preservation of cultural heritage, and collective trauma therapy. These sectors align with the ethos of contributing to a greater whole, most effectively enacted at the city scale and then in connected bio-regions.

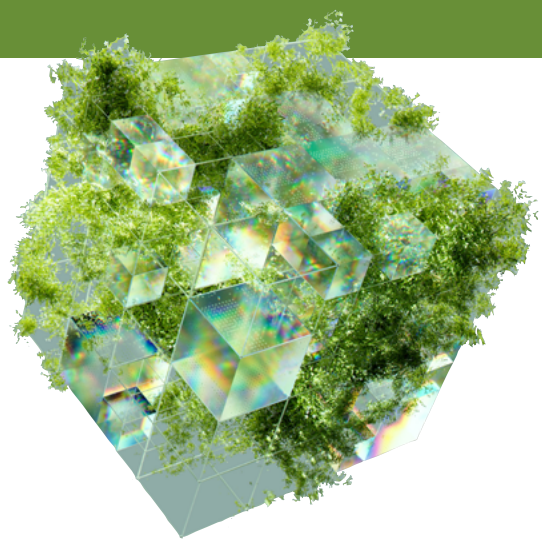
The self-actualization economy thus unfolds as a realm where work becomes a conduit for personal expression, uniqueness finds premium value, individuals are celebrated as diverse repositories of different forms of capital, and a sense of shared purpose drives economic sectors focused on collective well-being and restoration.

5. MULTIDIMENSIONAL CAPITAL [2035–2060]

MULTIDIMENSIONAL CAPITAL

Recognition of diverse capital resources (intellectual, social, cultural, natural etc.) contributing to individual, collective, and planetary wellbeing, and introduction of new forms of money aligned with resource efficiency, social justice, and ecological balance.

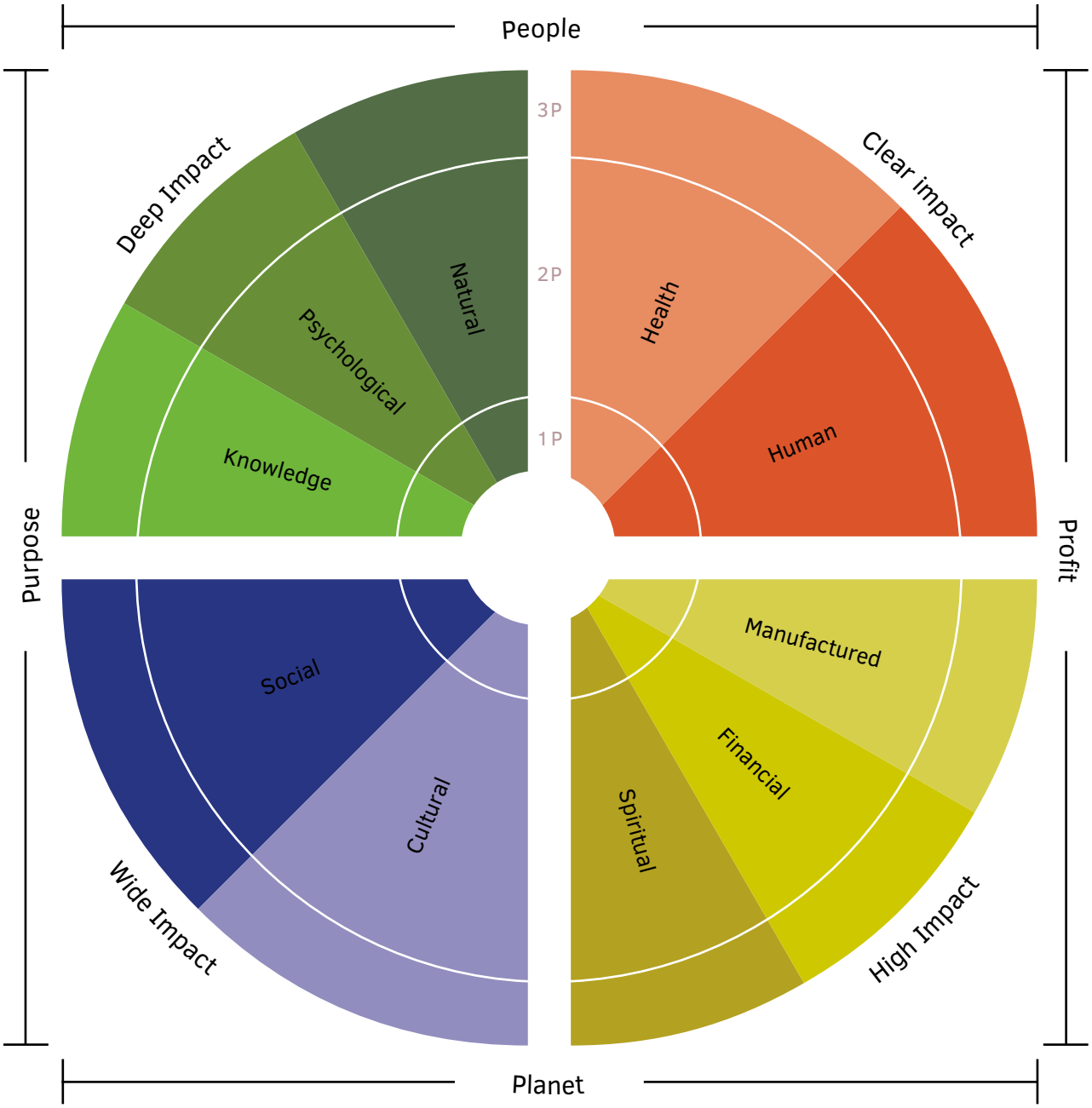
The processes of a complex economic system, aiming to restore natural and cultural wealth and foster self-actualization, clearly stand in contrast to simplistic one-dimensional business models of the market economy. Since at least the mid-20th century, discussions have revolved around the necessity of multidimensional capital models recognizing diverse resources that contribute to individual and societal well-being. Acknowledging and accounting for these various resource types becomes imperative for effective resource management. The concept of multidimensional capital is gaining momentum, now encompassing numerous forms—both conventional (financial, physical, intellectual) and innovative (social, cultural, entrepreneurial, institutional, emotional) [Hallsmith; Lietaer 2011]. The rise of ESG (Environmental, Social & Governance) reporting standards since mid-2000s indicates investor interest in



non-financial dimensions of business, reflecting concerns about long-term sustainability and societal benefit.

In the upcoming decades, novel forms of capital will likely gain greater acknowledgment, adoption, and quantification. These forms will encompass the inherent assets of organizations and communities, spanning the domains of nature, culture, society, intellect, and more (Figure 13). Notably, the metrics for natural capital are already evolving to encompass not only the carbon footprint measurements (such as greenhouse gas emission quotas), but also variables like soil fertility and biodiversity levels. These factors are progressively rise in prominence within investment frameworks and the asset evaluation.

Figure 13. Multidimensional capital and impact investing (Source: *[MetaIntegral, 2019]*)

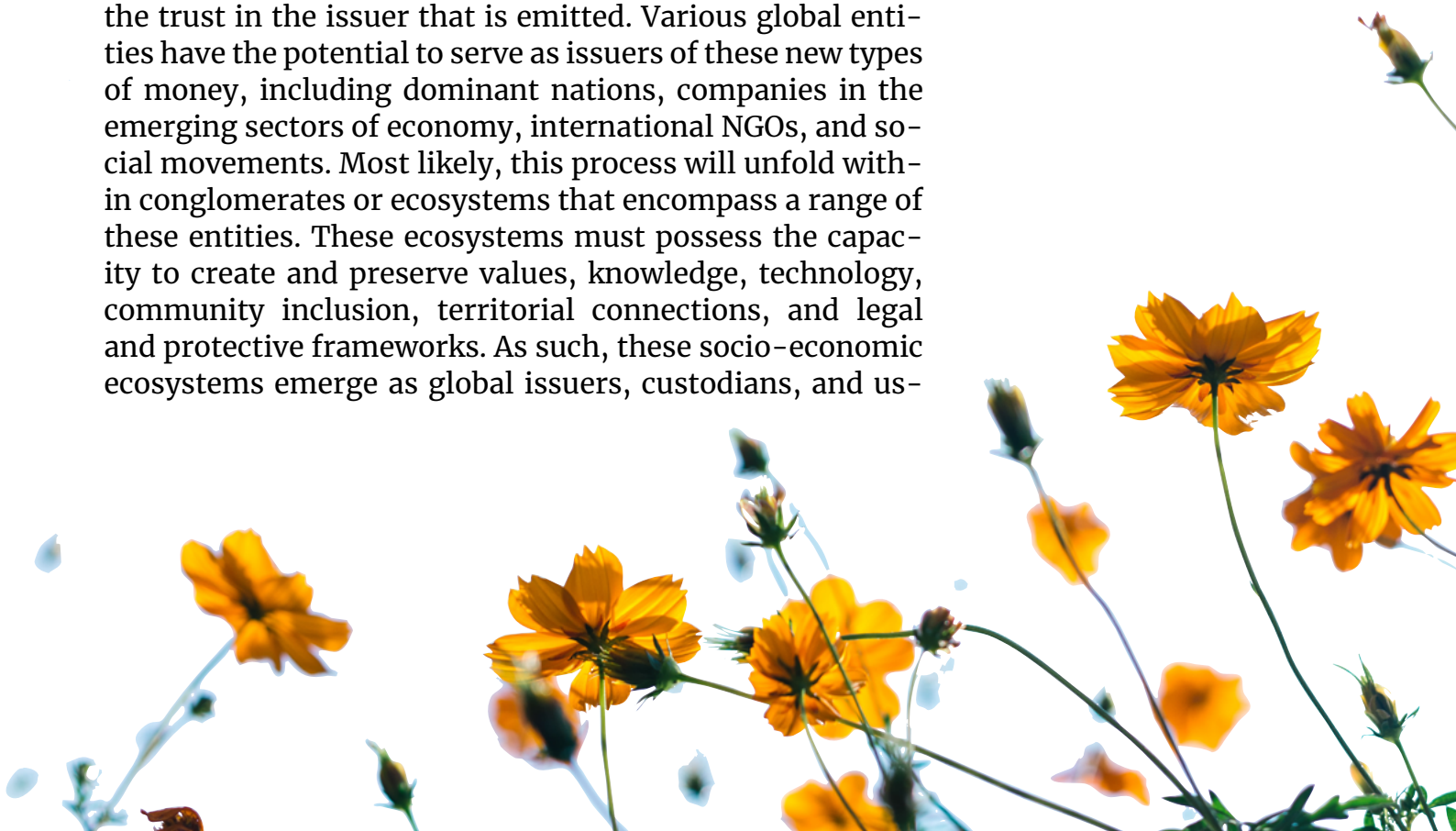


In order to quantify new forms of capital, new measures of value will need to emerge as the new types of money. Emerging cryptocurrencies serve as prototypes, albeit with limited generation of added value. Bitcoins, for instance, derive their unique value compared to fiat currencies from enabling anonymous transactions required in underground economies. Future currencies need to match or surpass traditional money in terms of reliability and liquidity. Additionally, they should facilitate value conversions and exchanges rooted in capital forms not covered by conventional money, thereby reflecting the attributes of diverse capital forms. Existing nation states are unlikely to readily relinquish their emission authority to newcomers, and numerous countries have already implemented stringent regulations within the realm of emerging currencies. Nevertheless, the trajectory of financial innovations remains evident and is poised to persist and intensify.

> Capital is not a one-dimensional object, and the return on capital takes very different forms for different assets or different people.
>
> Thomas Piketty

The emergence of new currencies must be underpinned by ecological and cultural considerations, avoiding adverse effects on the environment or societal fabric. Prevailing cryptocurrencies have yet to align with these principles: for instance, in 2022, bitcoin mining has consumed an energy volume of over 160 terawatt hours, akin to the energy consumption of a European nation like Sweden. The annual total of 90 megatons in CO2 emissions resulted from bitcoin transactions effectively negated any global net savings from electric vehicle [Pongratz, 2023].

The issuance of new forms of currency is essentially the issuance of the underlying value they represent — including the trust in the issuer that is emitted. Various global entities have the potential to serve as issuers of these new types of money, including dominant nations, companies in the emerging sectors of economy, international NGOs, and social movements. Most likely, this process will unfold within conglomerates or ecosystems that encompass a range of these entities. These ecosystems must possess the capacity to create and preserve values, knowledge, technology, community inclusion, territorial connections, and legal and protective frameworks. As such, these socio-economic ecosystems emerge as global issuers, custodians, and us-



ers of novel value measures, establishing the groundwork for these measures to be freely utilized and mutually exchanged on a supranational, planetary scale.

The financial and economic system, centered on novel capital forms and value metrics, is poised to evolve along the following trajectories:

- Reorientation of economic priorities. The economy's orientation transforms from mere financial income accumulation to the enhancement of multidimensional measures of human and planetary well-being, encompassing positive human attributes like friendship, joy, and love.

- Holistic evaluation. Novel holistic standards for evaluating economic efficiency and performance emerge, accompanied by tools to measure and manage the multifaceted well-being of individuals, society, and the Earth.

- Diversification of investment ecosystems. A plethora of investment mechanisms and strategies (such as socially directed investment and venture philanthropy) arise, bolstering the holistic economy by reducing the pressures of, and divesting from models of, extractive growth. The rise of universal basic income can also contribute to this transition.

- Growing Collective Value. The significance of collective endeavors, shared resources, and donations grows. New forms of communal ownership, including those founded on distributed ledger technology, take shape to support this progression.

- New digital forms of money. Novel forms of currency emerge to encapsulate different attributes and promote the advancement of personal, collective, and ecosystem well-being. This new financial landscape is crafted with resource efficiency and ecological footprint reduction principles at its core.



6. PLANETARY ECONOMIC GOVERNANCE [2060–2100+]

PLANETARY ECONOMIC GOVERNANCE

Integration of self-organizing market mechanisms and plan-based development to address interests of various social groups and requirements of planetary well-being, through ubiquitous use of digital platforms, algorithms and automation for trading, service, manufacturing, and other areas of coordination.

The emergence of a novel economy centered on ecological restoration and holistic human well-being, founded upon multidimensional capital and diverse value metrics, holds the potential to usher in transformative opportunities for our civilization. This prompts the inquiry: To what degree will this system retain the core attributes of market capitalism? Can it evolve through inheritance or internal development within the existing framework?

In the upcoming decades, the proliferation of automated solutions will lead to the global dissemination of automation. Robots and software applications will seamlessly integrate into everyday life. Initially, the manufacturing of standardized goods and services will transition into Industry 4.0, characterized by cyber-physical production systems with a high degree of automation (around 80-90% of processes). It will probably evolve towards the Industry 5.0 model where automated solutions and humans work side-by-side, and processes are human-centric. By the middle of 21st century, most of industries will likely progress further into systems where production becomes fully autonomous, self-regulating, and self-repairing. These advanced systems will leverage the Internet of Things, enabling direct machine-to-machine communication without human intervention. Similar to how our bodily organs interact unconsciously, these systems will operate without requiring conscious human control.

A similar trend is already underway and poised to intensify across service platforms and financial markets. The integration of automated smart contracts into supply chains has ushered in new corporate legal norms since the mid-2010s [Agrawal et al., 2023], and algorithmic trading robots now execute over 80% of stock market transactions [CNBC, 2018]. Anticipated in the upcoming decade is a substantial workforce segment (potentially exceeding 50%) embracing flexible employment arrangements through open online platforms of the gig economy [Schroeder et al., 2021]. This shift will often involve semi-automated recruitment



and performance monitoring. Furthermore, the landscape will feature supplementary strata encompassing transactional support algorithms, along with offerings like insurance, investment strategy optimization, and predictive analytics.

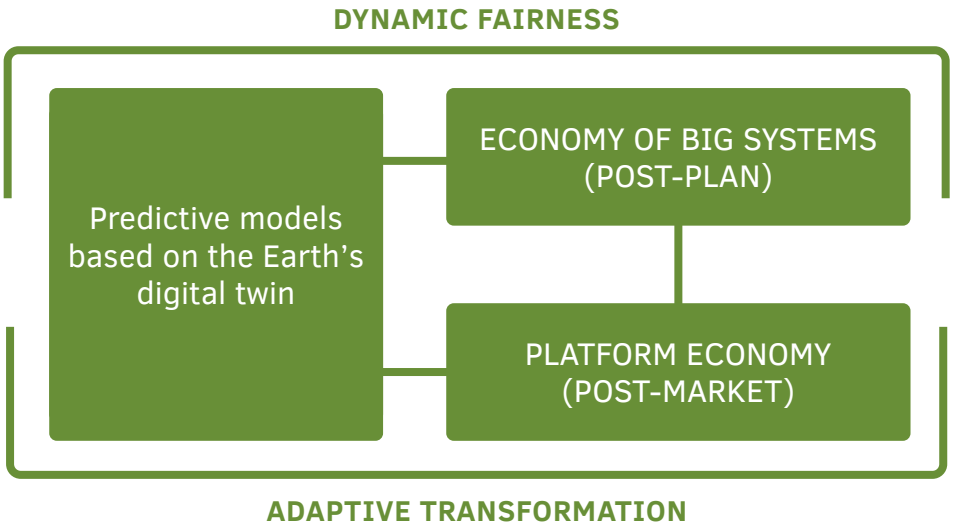
The market is undergoing an automation-driven evolution, transitioning into a post-market realm primed for perpetual optimization. Within this post-market arena, exchange operations are progressively ascending to the domain of interplay among individual algorithms and comprehensive software ecosystems that incorporate human elements. For instance, predictive analytics extensively utilizes techniques such as "prediction markets," wherein individuals place financial wagers on forthcoming events. Regulation within this economic landscape also takes on a predominantly automated nature, dictated by the configuration of automated exchange protocols (encompassing facets like data access regulations for decision-making).

Rapid automation of markets is currently propelled by influential private entities (like Google, Amazon, and Alibaba) that accumulate enormous economic and political power by channeling customers into their platforms. Leveraging "value customization" strategies, such as manipulating filter configuration, these entities wield the capacity to shape individuals' choices, influence their emotions, behavior, and political inclinations. As we advance into the mid-21st century, a significant proportion of humanity's economic transactions will migrate into the post-market platform domains. This imminent transition prompts pressing political and economic inquiries: How will the architecture of post-market settings be structured? How will economic power be distributed, and how it will be used? Who and how will regulate this domain? How will the interests of underprivileged cohorts and societies be considered?

> The Internet of Things frees human beings from the market economy to pursue nonmaterial shared interests on the Collaborative Commons.
>
> Jeremy Rifkin



Figure 14. Planetary economic governance system



The emergence of multidimensional capital and monetary systems could pave the way for a novel mode of regulation known as planetary economic governance (Figure 14). This approach combines the advantages of both self-organizing market mechanisms and plan-based development. It fosters transparent political engagement in the digital realm while eliminating intermediaries that can hinder efficiency and disrupt control signals. A pivotal requirement for this governance model is the advancement of predictive analytics that empowers individuals to make more informed decisions regarding their future possibilities. The integration of various corporate, regional, and national digital models may evolve into a comprehensive digital representation of the global economy, society, and natural processes—a true "digital twin" of Earth (early prototypes are created by ESA and NVIDIA). This digital twin will hold the potential to design, prototype, construct, and monitor optimal developmental pathways for individuals, communities, cities, and the planet at various scales—local, regional, national, and global. It will serve as an ultimate governance vehicle that will offer a comprehensive toolset for shaping a sustainable and prosperous future.

> A world government with powers adequate to guarantee security is not a remote ideal for the distant future. It is an urgent necessity if our civilization is to survive.
>
> Albert Einstein

There are two primary directions in which the optimization of local, national, and global systems can unfold to serve interests of humanity and the planet, and not just profits of specific corporate players:

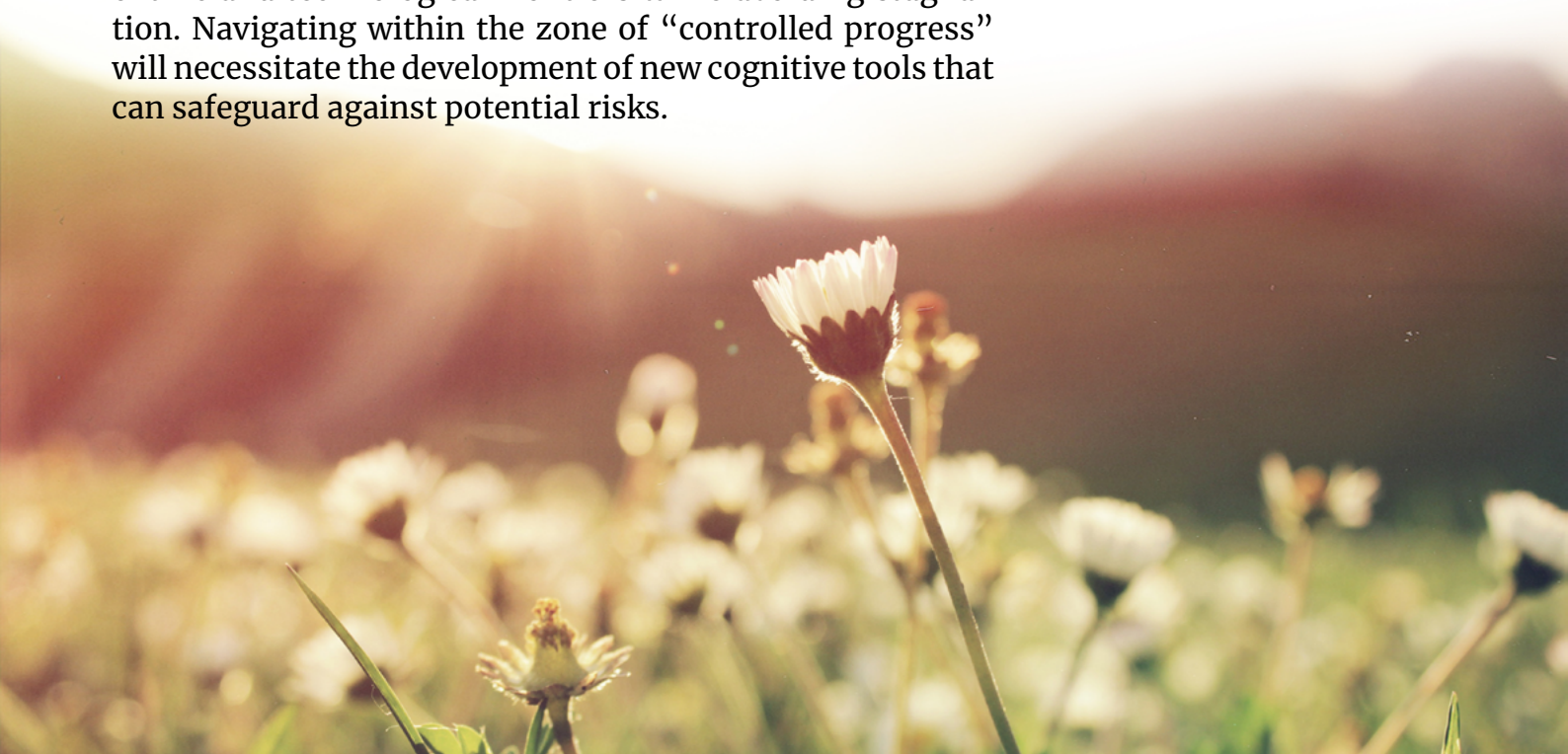


Adaptive transformation: Shaping trajectories of social and economic progress aimed at enhancing the overall well-being of individuals, social communities, and the natural world. These trajectories facilitate regenerative processes within local and global natural and social systems. Settings

of the platform will help to mitigate adverse environmental impacts, maximize the recycling of finite resources, address pollution, and restore soil fertility and ecosystems. Adaptive transformation signifies a shift from exploiting nature to actively supporting natural processes. The goal is to use natural resources sustainably, avoiding excessive depletion and fostering regeneration.

Dynamic fairness: This approach seeks to balance the needs of individuals, local entities, and the global ecosystem. Unlike traditional competition, dynamic fairness promotes co-opetition between different levels of economic organization. Its primary focus can be on engaging "cooperative competition" between various holistic bioregional ecosystems of the world, each encompassing business organizations, communities, technological systems, and biocenoses. The concept of fairness will also undergo substantial evolution throughout the 21st century. Emerging fairness models will be established through negotiation and alignment, which includes harmonizing the controlling digital parameters of governance systems.

In the context of adaptive transformation, maintaining control over technological advancement is crucial for the well-being of humanity and the planet. As discussed earlier, technological progress carries both benefits and substantial threats — for instance, technologies like genetic, nano-, and geo- engineering, have the potential to jeopardize our very habitat. The "technological ceiling" implies that technologies do not produce excessive existential risks. At the same time, until we achieve the stability of the new evolutionary attractor and mitigate existential risks, our collective responsibility is to continue advancing scientific and technological frontiers while avoiding stagnation. Navigating within the zone of "controlled progress" will necessitate the development of new cognitive tools that can safeguard against potential risks.



B. EVOLUTION OF GOVERNANCE

1. PREVENTIVE HUMAN SECURITY [BEFORE 2035]

PREVENTIVE HUMAN SECURITY

Future-oriented approach involving risk anticipation and assessment, early warning systems, intervention and conflict resolution, adaptive policies, and capacity-building in order to address a range of security issues and existential risks.

The complex and rapidly evolving social, technological and environmental landscape of our civilization becomes increasingly fragile, and it requires to rethink approaches to global, national, and local security. Current security paradigms are reactive in nature, they are designed to respond to known issues, and thus often struggle to keep pace with emerging threats — such as cyber warfare, emerging technologies, and climate-induced conflicts. By adopting a future-oriented preventive security perspective, decision-makers can identify potential risks and opportunities before they fully manifest, providing a more holistic and resilient approach to security issues.

A preventive security approach can be effectively employed across a wide array of security issues. This approach encompasses diverse areas, such as preventing arms races and military conflicts, mitigating terrorism and radicalism, averting migration crises and human rights violations, alleviating poverty, and beyond. Global risks of new pandemics and environmental crises can be anticipated and addressed at an early stage. Preventive approach is vital for managing the emergence of transformative technologies including rapidly evolving AI as well as potentially hazardous innovations like synthetic biology and nano-assemblers. This approach ensures that potential existential risks are identified and managed before they reach critical levels of impact.

> An ounce of prevention is worth a pound of cure.
>
> Benjamin Franklin

The preventive security paradigm encompasses several key elements such as:

- Early warning systems through comprehensive intelligence gathering and AI analytics, in order to detect potential threats and patterns that might indicate a security risk.
- Risk assessment to understand potential risks and vulnerabilities, scenario planning and predictive simulations to anticipate various security challenges.
- Early intervention and conflict resolution systems that focus on eradicating the root causes of challenges before they

escalate. Many of these interventions require multilateral cooperation among governments, organizations, and institutions that can coordinate their actions in real time through virtual collaboration platforms.

- Adaptive policies and regulation on the domestic and global level that can respond to evolving threats through real-time monitoring, policy effectiveness assessment, and rapid policy adjustments when necessary.
- Enhancing the skills and capacities of individuals and organizations, alongside raising public awareness regarding potential risks, stands as the foundation of preventive security. Ultimately, it is human decisions and behaviors that magnify or diminish risks.

Business and non-government organizations can also step into the domain of preventive security in the following areas:

- Monitoring the health of planetary ecosystems and social systems , or Integral Vital Signs [Hamilton, 2008], to identify "risk thresholds". A prototype for this approach is the satellite constellation launched in the early 2020s to real time monitor CO2 emissions [Bowler, 2022].
- Monitoring acute domestic and international conflicts (including potential instances of regional or worldwide warfare); devising swift resolutions and preventative strategies for such conflicts.
- Monitoring undesirable technological developments, including advancement of artificial intelligence and biotechnology; engineering preventive responses to emerging problems. Among the examples of such platforms are the Future of Humanity Institute and the Global Challenges Foundation.
- Monitoring of and rapid response to other existential threats, including pandemics.
- Contests that help find preventive solutions to emerging problems, the most prominent examples being XPRIZE, Bill & Melinda Gates Foundation, and Schmidt Futures.

Proliferation of preventive security paradigm on the global scale is the first step towards mastering the guided evolution of humanity and learning to live within the space of viable long-term scenarios. By connecting real time information systems of various government and non-government players, and adopting adaptive regulation stance of global risks, it creates opportunities for planetary real-time economic governance.

2. PARTICIPATORY COCREATION OF THE FUTURE [BEFORE 2035]

PARTICIPATORY COCREATION OF THE FUTURE

Proactive collective action from diverse communities of entrepreneurs, activists, artists and other change agents (including disadvantaged communities) who cultivate ideas, skills and tools for the evolving social landscape.

The impending challenges of the future raise questions about the global populace's preparedness for transformation. Many of the issues discussed here, especially those related to technological and cognitive barriers of our civilization, may appear very esoteric. But in reality, these risks hold relevance for billions who might experience "future shock" in the next ten to twenty years. Among others, these transformations include:

- The issue of replacing human labor with automated solutions, which has been widely discussed for the past decade, has become a reality accelerated by the COVID crisis. The Future of Humanity Institute has predicted that the machine learning technologies puts nearly 50% of existing jobs at risk of automation and displacement [Frey; Osborn, 2013]. This trend has been reaffirmed in the early 2020s: within the next 5 years, as many as 30% of employees in developed nations can be requalified for remote work [McKinsey, 2021], and it is remote workers whose labor is more likely to be automated. Looking ahead to the next 15 years, the challenge of retraining and adapting to the new economic landscape will encompass up to 2 billion individuals.

- Another significant challenge, as mentioned earlier, is the widespread inability of many individuals and organizations to navigate the cognitive complexity of the human world. The propagation of fake news, the rise of xenophobia and intolerance, and the subsequent erosion of trust and understanding are all on the rise — it is estimated that at least 86% of Internet users encountered fake news they believed were real [Simpson, 2019]. In case of the recent COVID-19 pandemic, disinformation and manipulation affected the behaviour of at least 20% of the population [Meyer, Alfano, de Bruin, 2020]. In the coming decades, this issue will touch around 1.5-2 billion people.

- One of the most prominent challenges in the late 21st century is expected to revolve around the escalating number of climate migrants. While climate-induced migration is not a new phenomenon, and various populations have been forced

to relocate due to climate changes throughout all of human history, "this time it is different" due to the potential magnitude of its impact. According to UN projections, over two billion individuals could become climate migrants by the year 2100, and most will seek to relocate long before conditions become unbearable [Vince, 2022]. This scenario could potentially lead to a modern-day Migration Period akin to the Eurasian migrations of the first millennium CE. While this migration may face some constraints due to national borders, its vast scale is likely to trigger international tensions and impact human habitats including cities.

- Finally, the looming threat of global war presents a challenge that has the potential to impact every corner of the globe. Today, around two billion people live in conflict-ridden territories. By the middle of the 21st century, this number could increase, potentially reaching a point where scenarios of Mutually Assured Destruction could completely "zero out" the history of our species on the planet.

Challenges of this magnitude cannot be solved solely by governments and large corporations alone. While these entities grapple with present responsibilities such as maintaining operations and resolving immediate societal issues, the imperative of future adaptation necessitates the engagement of a diverse array of stakeholders. It includes entrepreneurs, social activists, volunteers, artists, researchers, and more. Their endeavors should focus on cultivating skills and knowledge for the future while actively pioneering tools and technologies for the evolving social landscape. Importantly, experimental hubs of advanced development should emerge, serving as crucibles for holistic prototypes of future economies and societies. These experimental hubs could be established as innovative human settlements, whether they be experimental communes, ecovillages, or futurological cities like NEOM in Saudi Arabia.

Navigating the path to the future should adhere to several fundamental principles, including:

- Proactive action guided by the exploration of potential future scenarios and deliberate choice of desired collective pathways.
- Strategic dialog among diverse participants including key stakeholders of the future whose voices are currently poorly represented in decision-making, especially children and youth.
- Democracy and distributed leadership to ensure the inclusion of varied communities in steering the transition.

- Citizen science fostering the creation and exchange of transdisciplinary practical knowledge across communities to promoting understanding and collaboration.
- Innovative business and investment models that create and promote nature- and human-friendly solutions, including those of regenerative and self-sustained economy.
- Resilient system design (flexible structures, policies, and technologies) including that can withstand shocks, minimize risks, and facilitate smooth transitions in the evolving landscape.

A captivating possibility lies in the creation of a novel university model that embraces a mission of facilitating the global transition. Traditionally, universities hold three missions: professional education, conducting advanced research and promoting the development of territories and sectors. However, in the present milieu, there exists no societal institution equipped that could accompany the global evolutionary shift. Universities stand as the sole social form capable of grappling with the increasing complexity and uncertainty of our civilization (even though traditional ones often do not stand to this promise). Functioning within global networks, they accumulate data, conduct experiments, create theories, and construct holistic worldviews. Accordingly, the emerging "future nurturing" universities are poised to craft new worldviews, shape the future, and contribute to desired scenarios of civilizational development by undertaking a novel mission of guiding the evolutionary shift. Governed by principles mirroring those of nature itself, they transform into self-regulating adaptable learning ecosystems that foster learning, knowledge creation, and bioregional socioeconomic development.

THE EMERGING "FUTURE NURTURING" UNIVERSITIES ARE POISED TO CRAFT NEW WORLDVIEWS, SHAPE THE FUTURE, AND CONTRIBUTE TO DESIRED SCENARIOS OF CIVILIZATIONAL DEVELOPMENT.

The process of any significant societal transformation always negatively affects many social cohorts and communities. In the current context, we are talking about billions of people who find themselves disadvantaged by prevailing technological, environmental, and cultural shifts. It is within these communities that the populist agenda gains support and fuels calls for more extreme and authoritarian leadership. Yet, these very communities have the potential to emerge as beneficiaries of transformation. Diasporas displaced by conflict and climate-related factors can infuse novel knowledge and culture into host societies. Equipped with tools and skills that enable them to become co-creators of the future, they possess the potential to become true pioneers of the emerging civilization. This promise hinges on the establishment of domestic "assimilation in-



stitutions" that underpin their adaptation, foster proactive education, and engage them in new endeavors, ultimately propelling them into the role of co-creators of the forthcoming future.

3. EMPATHY DRIVEN GOVERNANCE [2035–2060]

EMPATHY DRIVEN GOVERNANCE

Fostering deep emotional connection with the needs of mankind, other species, and the planet through technological, economic and cultural interfaces, to guide mutually beneficial long-term choices for all stakeholders.

We are on the cusp of an era where our collective survival will hinge on the capacity to quickly change our economic and cultural priorities and modes of action. The transition will require our communities and decision makers to grasp not just their personal and local needs, but also the needs of our whole species and the planet that we inhabit. It implies that we learn to give the "voice to the voiceless", or the "silent witnesses" within our systems, to represent interests of every stakeholder engaged. At present, this skill of "giving the voice" is only born by a limited number of individuals such as political and spiritual leaders, artists, scientists, and activists. However, it become imperative that the whole civilization develops sensitivity for the world that it interacts with.



Technological enthusiasts can envisage various digital interfaces that grant us insights into the emotional state of non-human entities — like dolphins, plants, hives, cities, forests, or coral reefs. Adaptive artificial interpreters can serve as intermediaries enabling these entities to express themselves and engage in active communication with humans. We can envisage a sensory interface such as a neural or haptic interface that can help us perceive conditions of these beings, feeling the pain of jungles destroyed by roadbuilders and kelp suffering from pollution. With more people gaining the ability to directly empathize with diverse non-human agents including whole ecosystems, a profound transformation can occur in our culture and the structure of governance.

However, there is no need to acquire a brain implant to experience sympathy to Amazon selva. Paradoxically, some of these interfaces are already ingrained in our economic models, though they do not directly leverage our empathetic abil-

ity right now. For instance, many people experience a sense of distress when their national currencies depreciate or the value of invested shares declines. As new forms of multidimensional capital evolve, more people can experience concern as they see natural, cultural and social capital depreciating. Initiatives that offer new forms of currencies connected with natural capital (such as "impact tokens" of different type [Uzsoki, Guerdat, 2019]) are trying to trigger the sense of empathy through economic wellbeing related emotions.

> The heart that breaks open can contain the whole universe.
>
> Joanna Macy

Fundamentally, however, the deepest potential for empathy lies with our own human qualities, not the systems we design. As Dalai Lama wisely states, "Compassion is something fundamental, it is the basis of all constant happiness and joy, the basis for good-heartedness". Recognizing other people's values and perspectives, understanding their feelings, and acknowledging their choices and actions are vital for the survival and progress of our species. In Zulu, this idea of interdependence is expressed as the principle of ubuntu, "I am because you are". While neural interfaces can enhance our empathy "muscle", it's crucial to harness the innate tools within our nature. Therefore, in the coming decades, prioritizing empathy-based education and designing empathy-enhancing decision-making systems should become a cornerstone of social development. Cultivation of empathy emerges as a pivotal element for the future. By empathizing with others, understanding their needs, and caring for them within an empathy-oriented society, we embrace genuine responsibility and effective governance practices.



4. LEGAL RIGHTS FOR NON-HUMAN BEINGS [2035–2060]

LEGAL RIGHTS FOR NON-HUMAN BEINGS

Recognizing the range of political and economic rights of non-human beings of biosphere and technosphere, and incorporating these diverse actors within human legal and decision-making frameworks.

Achieving humanity's long-term survival and prosperity hinges on a fundamental reorientation of our interaction with the environment. Rather than subduing, dominating, or disrupting the natural world, we must adopt a stance of negotiation—much like complex cultures and civilizations negotiate between themselves. The shift toward a regenerative econo-



my and the evolution of a complex technosphere (including robots and artificial intelligence) will bring the widespread recognition of non-human entities as agents of the human world. To cultivate a harmonious relationship with the biosphere, we must attune ourselves to its voice, grasp its intents, engage in a dialogue and partnership, empathize with the needs of all living entities, and actively contribute to the betterment and sustenance of biocenoses and life at large.

The human world of the mid- to late 21st century will become a polyphony of diverse actors. On one hand, it will include humans and their technosphere counterparts: human-machine hybrids, constructs of past personalities and "digital clones" of the living, artificial intelligence entities and "smart environments" of the Internet of Things. It will also include animals, plants, fungi and bacterial colonies whose voices will be represented directly or through technological mediation. Recent years have seen active work in deciphering the communication languages of various biological communities, including dolphins, whales, ants, bees, and other species. In the second half of the 21st century, we are likely to come into permanent contact with fellow Earth "inhabitants" (that we can call "intra-terrestials"), most likely with the support of technologies such as AI and brain-computer interfaces.

With the advent of such interfaces, various non-human entities, individual ones spanning from dolphins and sequoias to robots and artificial intelligence, as well as collective ones such as natural ecosystems including forests, rivers, lakes and mountains, will be able to acquire a legal and economic status within our society. The legal and economic systems will actively begin considering and governing the wellbeing of these entities, much akin to how legal entities have been treated in the past.

> Just as there is no barrier between humans and other beings, neither is there a strict hierarchy. Non-human entities do not exist merely to provide for the needs of man. Nor are they all-powerful gods who run the world as they wish. The world does not revolve around humans or around any other particular group of beings.
>
> Yuval Noah Harari

5. POST-NATIONAL WORLD [2060–2100+]

POST-NATIONAL WORLD

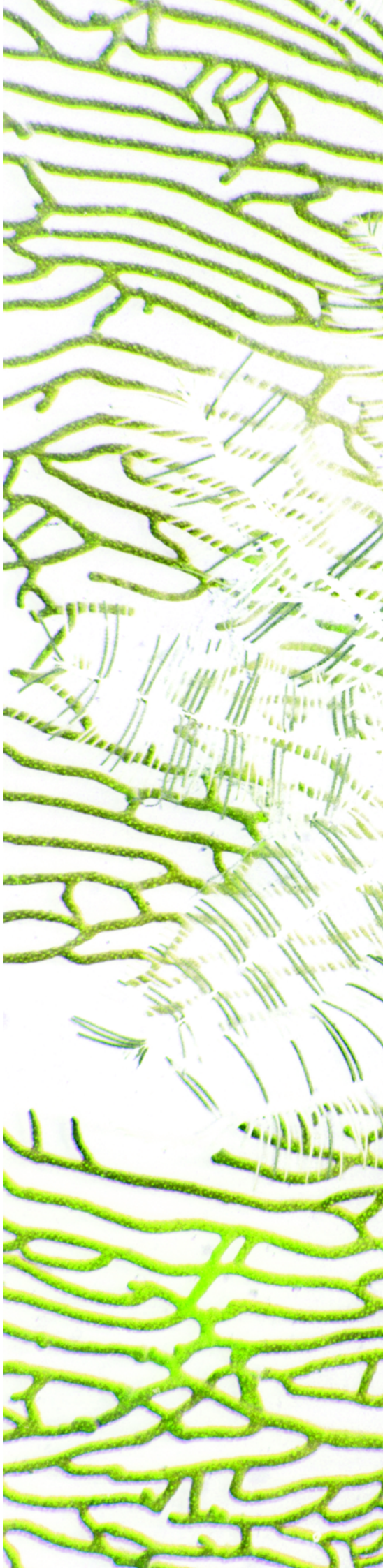
Rise of transnational planetary governance and innovative governance models like virtual and network nations that shape new identities and establish new forms of collaboration addressing global challenges.

The last three centuries of human history have been marked by the dominance of the nation states. Even the United Nations, which emerged in the mid-20th century, functions more as an international discussion forum

rather than a global governing body. However, as we move through the 21st century, communities, organizations, and nations must recognize the undeniable reality that their pivotal challenges transcend borders — they are humanity- and planet-wide. In the words of Joanna Macy, "One can no longer think only in the context of their nation or country, much less their town or village. In the current situation, existence hinges on whether people can care for humanity as a whole. Specific thinking and pursuing personal interests helped us survive in the past but today, they are leading us to a catastrophe." [Macy, Brown, 1998]

A significant trend that is already strongly evident today is the emergence of transversal planetary policies universally adopted across the globe. Notable examples of such policies include global climate and environmental measures (with a focus on greenhouse gas emissions), global fiscal policies (e.g. reduction of tax havens, increased financial system transparency, and harmonizing income taxes), and global biomedical regulations (imposing standards for public health, including vaccination and immunity protocols). While many international agreements have existed for decades, transversal policies stand out due to their comprehensive reach that affects every enterprise and household of the world. These policies establish a de facto supranational framework akin to a "world government", designed to address the growing number of supranational challenges confronting our modern civilization — and thus removing a significant share of authority from national governments.

The idea that national governments would fade away within a generation or two gained traction in the early 1990s — following the collapse of the Soviet Union and Francis Fukuyama's 1989 assertion of "the end of history", envisioning a homogenous world of global democracies and liberal economies. This prediction could not be further from truth, as evidenced by the strong resurgence of national governments, especially over the past decade. The nation-state form is established over centuries, and the empire state form spans millennia, suggesting that their presence is deeply ingrained and resistant to quick dissolution. Nonetheless, the forces of "planetization" (as termed by Teihard de Chardin [1945]) persist, driven by factors such as the imperative for increased cross-cultural cooperation to address global challenges, the growing exchange of knowledge and cultural artifacts, the escalating migration, and the push for global economic integration. These drivers will continue to exert pressure on traditional national systems, gradually eroding their domains of authority and control.



In the 21st century, many communities will continue their quest for innovative models of social organization and political identity. The reimagined concept of "nation" will likely pivot from the traditional "blood and soil" paradigm to one anchored in shared language, culture, and lifestyle. This evolution could give rise to novel local and translocal macropolitical entities, including:

- Virtual "nations". These are distinctive entities characterized by their own principles, rights, and customs, existing purely in the digital realm without any tangible territory. Represented online, they confer political and economic privileges upon their citizens. Virtual nations can manifest as both legitimate quasi-states with positive agendas or as Darknet crypto states deliberately opposing established norms. Enterprises and individuals within nation-states may establish these virtual entities, prioritizing opportunities for private entrepreneurial initiative, self-governance, and self-actualization.

- Network nations and mycelial networks of cities. Operating beyond conventional geographical boundaries, network nations coalesce around shared values, a common rule framework, and a distinct "management style". This unique model has the potential to reshape the global political and macroeconomic landscape. One conceptualization of such nations, termed "franchise", was depicted in Neal Stephenson's novel Snow Crash. Historically, religious orders (like Franciscan monks and Sufis) and military orders (like Templar Knights) exhibited traits akin to network states, adhering to their internal laws within larger societies. A possible manifestation of network states could be an alliance of major global cities collaboratively pursuing social and economic strategies and providing benefits to citizens of their mycelial "network".

- Nations & networks for alternative habitats. As humanity delves into areas traditionally devoid of national jurisdiction—such as the Ocean (both surface and seabed), Antarctica, and near-Earth Space—a need will arise to formalize the communities populating these areas as distinct political entities. These nascent nations may acquire physical boundaries, serving as foundations for countries characterized by novel social structures. Some of these emerging nations could evolve from their virtual state predecessors, fostering unique governance systems and decision-making processes.

The shift towards a post-national world in the second half of the 21st century is driven by a confluence of profound forces that challenge the conventional paradigms of

governance and identity. The post-national world emerges as a response to the imperatives of collective survival, social cohesion, and effective governance in an increasingly complex and interconnected global landscape.

6. PLANETARY COUNCIL OF ALL BEINGS [2060–2100+]

PLANETARY COUNCIL OF ALL BEINGS

Collaboration between human and non-human entities in governance of the Earth, incorporating the voices and interests of all species and other sentient entities for a harmonious coexistence based on mutual recognition and ecological balance.



As humanity stands at the crossroads of an increasingly interconnected and interdependent world, it begins to reevaluate its role and responsibility in the intricate tapestry of life on Earth. Aswe witness the far-reaching consequences of our actions on the delicate balance of ecosystems and the web of life, it becomes imperative to incorporate the voices and interests of non-human entities in governance. There are pragmatic reasons for such inclusion: for instance, to ensure the health and stability of natural ecosystems providing essential services such as clean air, water, and fertile soil, which are vital for human survival and prosperity. The risk of biodiversity loss that can lead to cascading environmental and societal repercussions can only be adequately mitigated if the complex "web of interests" of diverse species is recognized, that maintains ecological equilibrium. Rapid technological development has led to the habitat destruction, pollution, and climate change, and one way of addressing these (and possible future) environmental challenges is by learning from and with other species and ecosystems to harness their resilience and adaptability.

The need for integrating other species in human governance systems also transcends utilitarian considerations. It reflects the moral obligation to respect and protect life beyond our own, recognizes other species' rights to exist and thrive, independent of their direct utility to humans. It helps us embrace holistic worldviews of our ancestors and indigenous cultures that emphasize deep spiritual and cultural connections between humans and non-human entities. Remarkable instances, such as the legal personhood granted

I wish I could speak whale.

Dory from Finding Nemo

to rivers [Barkham, 2021] and the collaborative co-management of forests by indigenous communities and governmental bodies [Teitelbaum et al., 2019], exemplify the tangible benefits of embracing a holistic perspective that extends beyond human-centric governance paradigms.

Envisioning the future — perhaps beyond the next hundred years — we can conceive of a true Noosphere, a realm of "enlightened planetary consciousness" where humans engage in meaningful dialogue with both the sentient biosphere and the evolving technosphere. Within this envisioned Noosphere, a harmonious collaboration between human and non-human entities emerges, giving rise to a framework for collective decision-making that prioritizes the well-being of the planet—the Planetary Council of All Beings.

The guiding ethos of the Planetary Council (inspired by the seminal work of Joanna Macy & colleagues) is the principle of mutual recognition that extends its embrace to both human and non-human entities, encompassing the following ideals:

- The right of life. Every entity, whether human or non-human, bears an innate and irreplaceable value, not only to itself but to the entirety of the universe. This principle acknowledges the sanctity of all life forms and affirms their profound significance in shaping the collective tapestry of existence.

- The right of independence. As the biosphere and the technosphere ascend in their autonomy, this principle underscores the recognition that the sphere of influence wielded by humanity over these domains is inherently limited. In a world where our harmonious coexistence is paramount, we embrace the reality of shared independence and acknowledge the intrinsic agency of each realm.

- The "good will" among all subjects. Enshrined within this principle is a shared aspiration—a collective longing for enhanced synergy, affectionate collaboration, creative co-creation, and an existence woven harmoniously with nature. It embodies the profound desire of all entities to elevate their interactions, embrace love, and forge an enduring connection with the intricate rhythms of the world around them.



Establishing a dialogue with non-human entities, particularly those that have inhabited the Earth long before humanity's arrival, can be anchored in two distinct foundations:

- "Noofication" ("intellectualization" or "mindification") represents a more traditional approach which gained prominence in the mid-20th century scientism. This perspective (that can be traced to Aristotle's idea of "natural ladder") attempts to establish a unified scale of intellect, with adult humans occupying the highest tier and other species (or artificial agents) reaching intermediate tiers as determined by various intellectual tasks they are capable to accomplish. From "noofication" perspective, humanity's primary objective is to "uplift" other species to the intellectual level of humans (the idea vastly explored in David Brin's Uplift Saga). The earliest experiments involving attempts to teach human language and mathematics to dolphins, chimpanzees, and crows suggest the potential for raising one or more Earth species to attain "intelligence" in the human sense. This outcome would likely resemble an advanced form of domestication, akin to the integration of additional species into human environments, similar to the domestication of cattle, cats and dogs.

- "Biospheric egalitarianism" presents a more contemporary approach to engaging with non-human entities, recognizing their intrinsic dissimilarity from humans. What if we were to entertain the notion that other living beings could be considered our "equals" (albeit as distinctly different yet equally complex entities) or even in some regards superior to us, and that they harbor an interest in communicating with us even in the absence of conventional instruments? Historically, many studies of animal behavior have been accomplished through the lens of "resource utilization", inadequately representing animals as either "useful" or "not useful" to humans — and exploring what traits can increase their "utility". As noted by anthropologist George Stocking [1991], this is a colonialist representation, still common in the exploration of non-human behavior. The research of Eduardo Kohn [2013] suggests that communication "barriers" between human and non-human realms may not be as insurmountable as previously believed — and many indigenous communities have commonly integrated communication with other species and whole ecosystems into their daily routine. If the task of communicating with species is taken with empathy and respect, our species might have greater chance of understanding its "intra-terrestial" fellows, whether cetaceans or trees or even fungi. The perspective of deciphering animals' own language — instead of integrating them into our own — can greatly upshift our human civilization.

The second approach appears to hold greater promise, representing the "voice" of non-human entities in the space of human decision making from other species' own perspectives. Clearly, humanity can play a pivotal role in the biosphere as orchestrators of this inter-species dialogue. However, the space of dialogue is not intended exclusively for the human race, but for all beings. It is established not from a stance of colonization or ownership over the planet, but rather from a standpoint of egalitarianism and a sense of "service to all Life". The Planetary Council can blossom as a vessel of unity and harmony, where humanity and the tapestry of diverse living and sentient beings engage in a symphony of co-creation, mutual respect, and conscious evolution.

THE SPACE OF DIALOGUE IS NOT INTENDED EXCLUSIVELY FOR THE HUMAN RACE, BUT FOR ALL BEINGS.



C. EVOLUTION OF CULTURE

1. LEARNING ECOSYSTEMS FOR SOCIETAL TRANSFORMATION [BEFORE 2035]

LEARNING ECOSYSTEMS FOR SOCIETAL TRANSFORMATION

Lifelong and life-wide learning ecosystems connect learning providers, communities, and spaces to support personal growth, knowledge acquisition, moral development, and conflict resolution, promoting systemic literacy and regenerative competencies for a sustainable future.

The educational sphere of the early 21st century still largely adheres to models conceived during the 17th to 19th centuries, the formative period of the industrial age. In that era, the principal aim of educational systems was to deliver standardized instruction, producing citizens loyal to their governments, soldiers obedient to command, and workers dutifully executing their master's directives. Industrial education concentrated on readying youth for professional life through the acquisition of standard skills, primarily vocational and cognitive — a response to the pressing demands of then-growing urban industrial civilization.

In the face of the dynamic and uncertain future, contemporary society needs a paradigm shift in the type of individuals it cultivates [GEF, 2018]. This is a shift towards individuals who embody motivation, creativity, unconventional thinking, rapid yet thoughtful decision-making, and a proclivity towards both autonomous action and collaborative efforts. They nurture diverse aspects of their character, emotions and willpower as well as knowledge and cognitive capabilities. They commit to lifelong development, perpetually adapting to shifting circumstances and emerging challenges. This type of individuals can only cultivated through a novel education model, one that seamlessly supports individuals through their entire life journeys, accompanying them in their personal growth and adaptation through all stages of life.

> Education as an avenue for individual and collective development and the evolution of our civilization needs to become instrumental in inducing, cultivating, and governing change for the betterment of society and our biosphere.
>
> Global Education Futures report

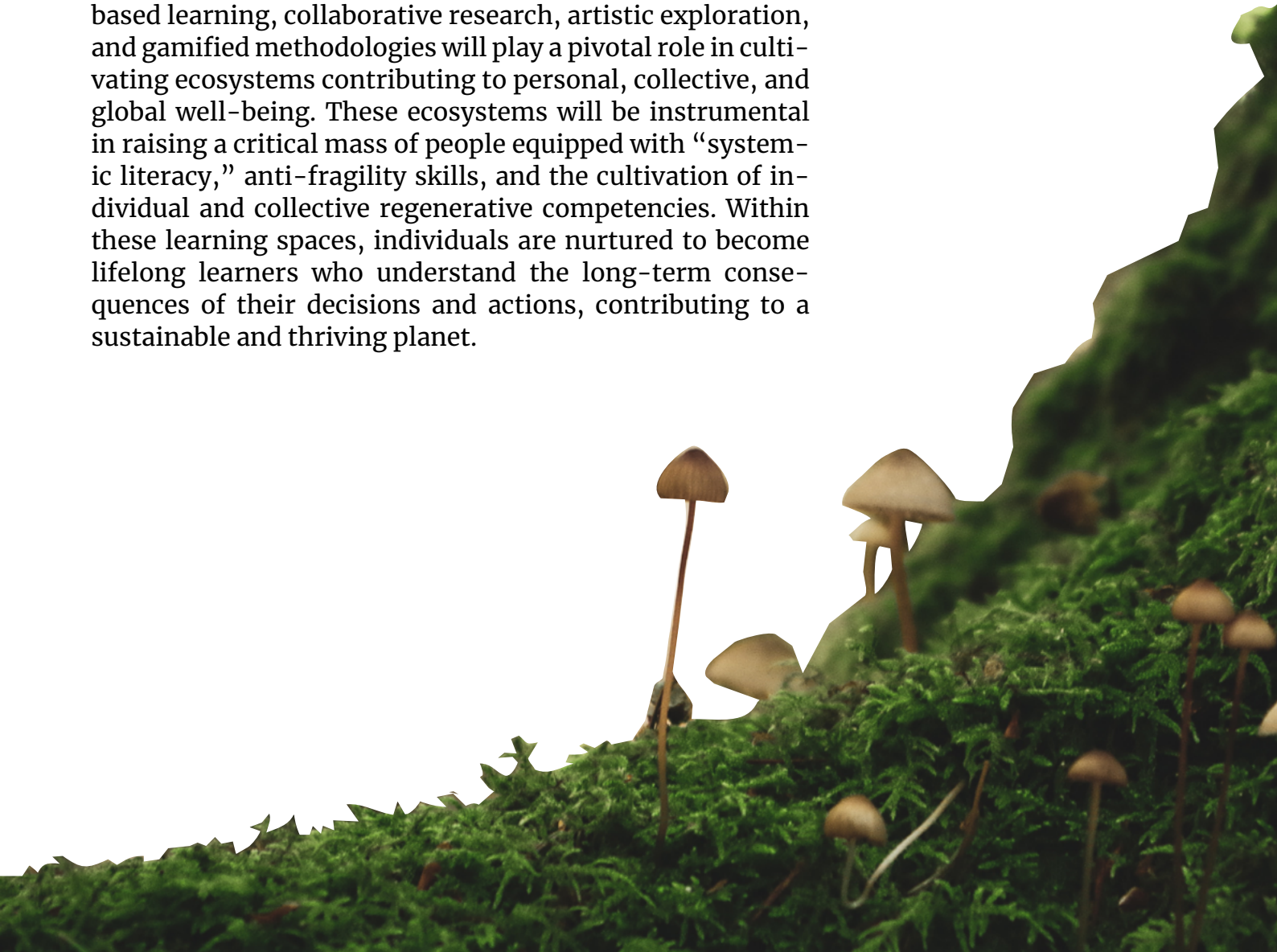
This emerging educational paradigm will be organized as a life-long and life-wide learning ecosystem, an interconnected network of learning providers, learning communities and learning spaces collectively guiding the trajectories of learning, maturation, and development across the entire lifespan. The educational system evolves into a dynamic and digitally enhanced learning space for development accommodating the life journeys of individuals and diverse

communities [Luksha, Spencer-Keyse, Cubista, 2020]. This space will foster rich opportunities for knowledge and skill acquisition, intellectual and moral development, value cultivation, personal transformation, project- and inquiry-based collaboration, as well as resolution of individual, familial, and organizational conflicts.

One particularly important aspect of this transition is the new learning culture of early years. The experiences children have in early life, including the one of love and belonging, literally shape their brain architecture [HCDC, 2023] — including how safe they feel, how confidently they are, and what their mindsets and inner maps of the world are going to be. Learning environments should support curiosity, playfulness, risk- taking, and the joy of self-mastery and achievement for early years learners. These environments should enhance an innate relational intelligence that pre-exists the ego, that transcends belief systems, and that allows us to feel a sense of connection to all other beings and the natural world itself. [1]

1. As suggested by Wendy Ellyatt

During the civilizational transition phase, learning ecosystems can become the milieu for future cocreation. Educational frameworks emphasizing personalized and team-based learning, collaborative research, artistic exploration, and gamified methodologies will play a pivotal role in cultivating ecosystems contributing to personal, collective, and global well-being. These ecosystems will be instrumental in raising a critical mass of people equipped with "systemic literacy," anti-fragility skills, and the cultivation of individual and collective regenerative competencies. Within these learning spaces, individuals are nurtured to become lifelong learners who understand the long-term consequences of their decisions and actions, contributing to a sustainable and thriving planet.



2. CULTURE OF PLANETIZENSHIP [BEFORE 2035]



CULTURE OF PLANETIZENSHIP

Culture that envisages all humans (and potentially non-human entities) as "planetizens", transcending traditional citizenship boundaries and promoting respect for all life forms, long-term accountability, and open dialogue among inhabitants of the planet.

The ongoing technological, environmental and economic transformations necessitate the emergence of a novel cultural ethos—one that fosters collaboration, shared understanding, and harmonious coexistence among all inhabitants of our planet. In contrast to historical human cultures centered around privilege, dominance, and exclusion, the cultural shift must embrace inclusivity, open dialogue, and respect for life.

The driving force behind this emerging planetary culture must be rooted in cooperation and collective effort, standing in stark contrast to the struggle and conflicts that have characterized previous eras. While competitive human interactions hold merit, serving to identify optimal solutions and hone skills, they ought to be guided and embraced by collaborative patterns —much like the symbiotic processes inherent in the biosphere, where cooperation and mutual reinforcement between species, and not their competition and struggle for survival, form the essence of ecological dynamics [Johnsons, 2015].

As the recognition of our interdependence deepens, encompassing not only human communities but also other species and the entire planet — the inadequacy of existing collective identity constructs becomes evident. Since antiquity, the prevailing notion of identity was one of a "citizen", denoting an inhabitant of a walled settlement. At the heart of this notion was the idea of exclusivity: in ancient Athens, for instance, only 10% to 20% of its population were considered citizens [Rothchild, 2007], leaving the rest with minimal rights — youth, women, migrants, and slaves. As we acknowledge our shared co-existence within a singular planetary community, a new identity notion is imperative — the one that will expand the idea of citizenship beyond the traditional boundaries of nation-states to envision every individual as a global "citizen of the planet Earth". François Taddei [2022] proposed the term "planetizen" that encompasses every human on the planet— and equally, can also include any other species as Earth co-inhabitants.

> Mankind, born on this planet and spread over its entire surface, coming gradually to form around its earthly matrix a single, major organic unity, enclosed upon itself; a single, hyper-complex, hyper-centrated, hyperconscious arch-molecule, co-extensive with the heavenly body on which it was born.
>
> Pierre Teilhard de Chardin

The culture of Earth planetizens is anchored in empathy, dialogue, respect for diversity, and a sense of steward ship — setting the foundation for supportive and collaborative relationships within human and more-than-human world. Planetizenship implies a commitment to active engagement in dialogues, collaboration across borders, and contribution to solutions that address global challenges.

Another critical aspect of the planetizen culture is the ability to recognize long-term consequences of choice and actions, informing the decisions take these consequences into consideration. In a world characterized by extended lifespans and expanded global challenges, a significant share of population should learn to explore and understand longer term horizons, create longer term plans and strategies, and commit to actions of "long will". As they cultivate such "futures literacy", they also gain deeper insights into how everyday personal and collective choices shape the long term consequences for the society and the planet.

The vision of planetizen culture encompasses a set of transformative features that reframe human values, behaviors, and interactions in the context of our shared global community:

- At the heart of planetizen culture lies a commitment to the preservation and enhancement of life, including health and well-being, across all scales, from individual to planetary. Sam Guarnaccia [2021] describes this perspective as "Ecozoan": being "open to an intimate presence to, and an integral and creative understanding of the natural world, and is moving into a new kind of wholeness, belonging, and exuberant participation".

- Planetizenship perspective is characterized by a culture of love, trust, and openness. Mutual support and recognition become integral components of human interactions, fostering a culture of effective communication and empathetic listening. A distinct feature is the elevation of traditional forms of self-expression and communal communication, such as singing and dancing, to the forefront of cultural norms.

- The promotion of peacemaking and conflict resolution is central to planetizenship. Destructive conflicts are reframed as the "defeat of the initiator", shifting focus toward nonviolent and constructive solutions. Aggression is harnessed for the greater good, and the culture encourages the redirection of aggressive energies into activities that benefit both personal and collective well-being, transcending conflicts toward positive outcomes. Culture of collective stewardship and resource-sharing is encouraged to promote non-conflict solutions to practical problems.

- Integration of the "ancient and future wisdom" that establishes dynamic ethical foundation for decision-making, including:
  - Cultivating "institutions of collective wisdom" encompassing contemporary leaders of modern civilization alongside with guardians of religious and ethnic legacies
  - Promoting a richer array of cultures, revitalizing local traditions (familial, tribal, etc.) rooted in ancestral heritage.
  - Employing peacemaking strategies to heal collective traumas, addressing the core of many ethnic and religious conflicts.
  - Shifting from "deficit mindset" to "abundance mindset"; embracing the affluent potential of the Earth and cosmos to meet our present and future needs.
  - Transitioning towards a "wisdom-driven Internet" that fosters communication practices based on aspirations rather than "sinful" or addictive tendencies; an online realm dedicated to collective growth.
- Shifting towards a post-anthropocentric worldview, embracing profound connections with Nature and Life by acknowledging the equity between species and fostering cooperative interactions with them.

The principles of the Earth planetizen culture can become the foundational framework for a macro-cultural "projects" that harmoniously amalgamates the core principles of the Enlightenment era (a unified worldview and the paramount significance of collective problem-solving, alongside the ideals of fraternity, solidarity, and freedom) with the ones of the Renaissance (the concepts of harmony, aesthetic beauty, comprehensive human growth, and the fusion of ancient wisdom with contemporary knowledge).



3. CULTURE OF UNIVERSAL WELL-BEING [BEFORE 2035]



CULTURE OF UNIVERSAL WELL-BEING

Culture fostering a holistic approach towards various dimensions of human and environmental wellbeing, promoting healthy practices and harmonious relationships for a more inclusive and sustainable society.

In the current landscape, many societies continue to be guided by Gross Domestic Product (GDP) and similar economic indicators as benchmarks for societal progress and well-being. GDP has long been considered a key indicator of a nation's economic health, and it influences policy decisions, shapes public discourse, and drives the pursuit of growth as a fundamental goal. However, GDP falls drastically short as a comprehensive measure of collective development and human wellbeing, failing to capture the complex and multidimensional nature of human existence, and the factors that contribute to true wellbeing. It neglects critical social indicators such as health, education, and inequality, promotes consumerism and overconsumption, underrecognizes and often encourages unsustainable exploitation of the environment, and prioritizes short-termistic policies [Kapoor, Debroy, 2019].

> For over 70 years economics has been fixated on GDP as its primary measure of progress. That fixation has been used to justify extreme inequalities of income and wealth coupled with unprecedented destruction of the living world. For the twenty-first century a far bigger goal is needed: meeting the human rights of every person within the means of our life-giving planet.
>
> Kate Raworth

To address the complex challenges and opportunities of the 21st century, societies must shift towards a more holistic and inclusive approach that considers a wide range of factors contributing to human flourishing. This transition involves adopting alternative measures of progress, such as universal wellbeing, that prioritize the health, happiness, and sustainable development of individuals, communities, and the planet as a whole.

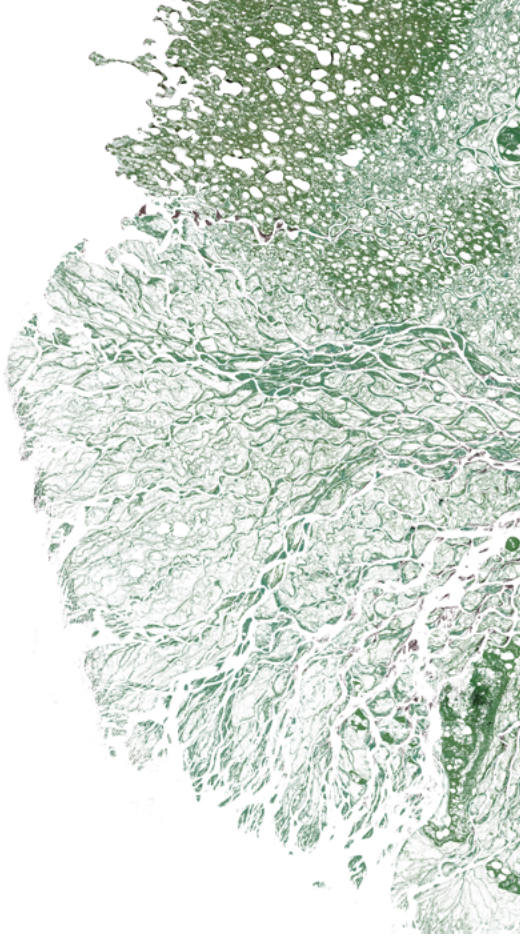
Universal wellbeing encompasses a multidimensional framework [Weaving Lab, 2019] that emphasizes the holistic health, happiness, and fulfillment of individuals across various aspects of their lives:

- Physical dimension. Care and nurturing of the body's health, understanding the factors that influence physical wellbeing, adopting healthy lifestyle habits (such as sleep, nutrition, and exercise), and effectively managing pain and tension.
- Emotional dimension. Acknowledging and managing one's feelings, values, and perspectives, as well as those of others; cultivating emotional intelligence, stress management, and a positive attitude toward life; developing a healthy relationship with one's emotions and finding joy and interest in various aspects of life.

- Intellectual dimension. Continuous learning and personal growth, lifelong commitment to expanding knowledge and skills, sharing expertise, and engaging in intellectual pursuits.
- Social dimension. Building healthy and meaningful relationships, enjoying communication, fostering friendships, nurturing family and romantic relationships, and actively participating in community and societal activities. Social wellbeing is nurtured through care for others, accepting support, and contributing to the overall welfare of society.
- Financial dimension. Recognizing the uniqueness of personal financial values, needs, and circumstances; emphasizing responsible management of resources to ensure reasonable sufficiency; making informed financial decisions, creating emergency reserves, and achieving a balanced financial outlook that supports overall wellbeing.
- Professional dimension. Work that aligns with personal values, goals, and lifestyle while harnessing individual talents and skills for mutual benefit; a balanced approach to professional growth and recognizing the interconnectedness between professional realization and other life domains.
- Spiritual dimension. Establishing meaningful goals, values, and a sense of purpose, engaging in activities that resonate with personal beliefs and values, fostering a strong connection to the present moment, and nurturing a positive spiritual attitude.
- Ecological dimension. Acknowledging the reciprocal relationship between humans and the environment; understanding how social, natural, and artificial surroundings impact wellbeing; recognizing the state of the Earth and its influence on human health, as well as contributing to the health and sustainability of the planet through conscious choices and actions.

Human wellbeing demands the balanced development across all dimensions of life. From the perspective of holistic health cultivation in particular, the redefined healthcare model is poised to advance methods that encompass not only physical health but also social, psychological, and environmental aspects, ensuring a comprehensive approach to maintaining and expanding human prosperity.

A fundamental component of the universal wellbeing model is the recognition of the profound interconnectedness between personal wellbeing and the wellbeing of the environment. From the moment of birth, individuals are embodied in a complex web of relationships with their social and natural surroundings. By fostering positive emotional



dynamics within families, enhancing organizational practices, and instigating transformative changes in urban and more-than-human natural environments, individuals can play a pivotal role in substantially elevating both the quality and duration of life. As Daniel Christian [2019] puts it, "the most adequate qualitative indicator for judging whether we are participating appropriately is the emergence of health, resilience, adaptive capacity and well-being at the different scales of the living holarchy of nested complexity that supports life as a planetary process."

The cultivation of universal wellbeing should encompass systemic wellbeing across all scales—from local communities to expansive bioregions and continents. The thriving of small human collectives contributes to the prosperity of broader regions, emphasizing the need for harmonious coexistence between individuals, societies, and the planet. The journey toward universal wellbeing is thus an inclusive endeavor, intertwining personal and systemic dimensions, and holds the potential to usher in a new era of collective health, fulfillment, and harmony.

The key areas of universal wellbeing management may include:

Longevity and holistic health practices that encompass:

- Adopting a healthy and nourishing diet, reflecting the ancient Indian wisdom expressed in the adage "When the diet is wrong, medicine is of no use; when the diet is right, medicine is of no need." This realm harmonizes traditional knowledge like Ayurveda, Chinese, and Tibetan medicine with modern approaches such as biohacking.

- Engaging in physical well-being activities, including exercises and mindful breathing techniques, while mastering rest and recuperation skills through diverse methods such as baths, massages, and innovative tools like floating chambers and auto-training.

- Cultivating emotional balance and elevating consciousness through practices like meditation, authentic movement, and body-mind approaches, empowering the development of self-awareness and personal growth.

- Enhancing health through life-supportive environments, encompassing factors like housing, urban design, and technology that contribute to well-being.

- Fostering a healing culture that addresses various physical and psychological addictions, shaping therapeutic practices and spaces.
- Promoting longevity by nurturing a meaningful long life, emphasizing self-realization, exploration, and service to the world.

A culture of emotional and mental wellness (encompassing joy, happiness, and compassion)

- Empowering a stress-free and action-ready lifestyle
- Prioritizing digital well-being and hygiene to mitigate stressors and mental strain resultant from intense presence in digital environments
- Valuing collaborative efforts for rejuvenation and renewal
- Embracing creativity through singing, music, dance, and artistic expression
- Fostering a state of inner harmony, peace, and joy

Positive personal relations devoid of abuse and mutual degradation, encompassing gender equality and respect, a culture of holistic dialogue, and sense of collective responsibility.

Practices of harmonious family brought together by shared values and meanings.

The adoption of universal wellbeing as a collective goal recognizes the multifaceted nature of human progress and the need to create societies where all individuals can lead fulfilling, healthy, and dignified lives. It emphasizes the interconnectedness of various dimensions of human experience and promotes a more inclusive, sustainable, and equitable path to societal development.



4. GLOBAL PEACE-BASED CULTURE [2035–2060]

GLOBAL PEACE-BASED CULTURE

Culture for peaceful futures, rooted in a new narrative of global solidarity and love, embracing universal wellbeing and interconnectedness, and fostering education for empathy, critical thinking, and dialogue.

New military conflicts between countries with weapons of mass destruction elevate existential risks for humankind and the whole planet. The development of new types of warfare — including autonomous military robotics, cyberwarfare, collective "mind hacking" through social media, various applications of the military AI, bio- and nano-warfare, and more, — can make wars of the future potentially more devastating than anything we have seen up till now. And risks of large-scale military conflicts will continue to grow year by year, driven by climate change, biodiversity loss, and soil degradation. Coupled with increased weapon lethality, future military conflicts can become a game of chance for the whole world — and such level of risks cannot be further tolerated.

Throughout the 21st century, humans will need to learn how to live without wars. It is a transition that sounds unimaginable at first — but, to quote Buckminster Fuller, "either the war is obsolete, or humans are". Geographer Vladimir Vernadsky, a coauthor of Noosphere concept together with Teilhard de Chardin, believed that the impossibility of war is the main evidence of humanity and Earth's evolutionary transition: "In the storm and thunderstorm will the Noosphere be born; in the destruction of wars and famine will our planet manifest itself as a whole; will it be the first manifestation of the transition of Biosphere to Noosphere, where humanity will become a powerful geological force: where its thought, consciousness, mind will manifest itself geologically" [Vernadsky, 1989].

It is important to recognize that peace, and not war, is a normal state of being throughout the major part of 200+ thousands years large history of humankind. War as a phenomenon only emerged about 10,000 years ago when first human agricultural settlements appeared [Ferguson, 2013]. The recorded history of the last 2–3 thousand years is abundant with wars (and that probably creates the impression that wars are an inevitable companion of humanity). However, in the 20th century, and especially after two World Wars, humanity has learnt that any conflict between



technologically advanced states would bring so much death and destruction that engaging in it is not beneficial. Since then, war is primarily the business of "conflict entrepreneurs", small elite groups that gain economic and political benefits during the stage of destabilization [Coulomb, 2004]. To continue evolving, our civilization needs to move beyond interests of these small though influential groups, and evolve instruments and institutions that maintain its internal and external dynamic stability.

We need to shift from negative to positive conditions for peace and flourishing of our civilization by defining he attitudes, institutions and structures that create and sustain peaceful societies [Positive Peace Report, 2022]. Peace cannot be engineered for the general public by national and global elites, it cannot come "top-down" from power structures, and no reorganization of the UN Security Council will be sufficient to make it prevail. Rather, peace is "everybody's business" that will require the engagement and commitment from every member of society. Peace can only come from within, and it needs to be raised bottom up through shifts in consciousness, behavior, and culture — even though power structures will also play an important role in enabling it and making it stay.

> It is now highly feasible to take care of everybody on Earth at a higher standard of living than any have ever known. It no longer has to be you or me. Selfishness is unnecessary. War is obsolete. It is a matter of converting high technology from weaponry to livingry.
>
> Buckminster Fuller

The cultural dynamics have wielded significant influence in various military conflicts throughout history. As the Peaceful Futures [2023] report suggests, the "peace culture" can counteract and reverse these tendencies, propelled by educational, civic, and artistic initiatives and collaborations.

The culture of peace should eradicate family and domestic violence and facilitate intergenerational healing, and embracing lessons from diverse cultures, traditions, and religions becomes essential, through learning or travelling. A transformation of our habitats, cities, communities, and organizations into spaces of dialogue and collaboration is imperative, paving the way for transparent and inclusive decision-making systems. Embracing restorative justice and revitalizing indigenous cultural practices centered around peace, involving both human and non-human entities, holds the potential to restore our capacity for peace-making. The infusion of humanistic and future-oriented qualities into AI systems contributes to this transformative process.

THE CULTURAL REBOOT IS THE DISCOVERY OF A NEW STORY WE WILL TELL EACH OTHER ABOUT OURSELVES, THE NEW MYTH INSPIRING OUR FUTURE ANCESTRY.

Most importantly, a shift towards recognizing our interconnectedness is crucial. Core values like empathy, loving kindness, respect, and inclusivity assume center stage. Embarking on a journey of self-exploration is pivotal to reduce conflicts both within and outside of the culture,

since deep self-understanding and practices of non-violent communication can pave the way towards collective mental stability and a harmonious society. A peace based culture is rooted in care and equipped with effective strategies to channel aggression into constructive avenues. This vision extends to the harmonious coexistence between humans and non-human entities, encapsulating the ethos of a culture built on peace and cohabitation.

Education systems can expedite the transition towards this paramount peace-based culture across the world, nurtured by peace-centered learning formats and spaces, including:

- The art of dialogue and critical thinking, equipping individuals with the skills to embrace diverse perspectives and effectively communicate with each other, and schools acting as safe havens for open thought, constructive discussions, and dynamic learning.
- Empathy-based education at all levels (families, schools, and lifelong learning pathways), with an emphasis on fostering a culture of non-violence.
- Initiatives dedicated to nurturing planetary consciousness, reviving the understanding that humans are integral parts of the natural world.
- Distributed leadership practices integrated into learning processes, fostering diverse approaches and accountability among learners, and recognition of children as both co-learners and teachers across various levels, creating an environment that involves them in responsible decision-making.

Above all, it is crucial to understand the complex history of humankind from the perspective of a new narrative—one rooted in global solidarity, embracing our innate ability to love, forge connections, and unleash creative potential. To establish the global culture of peace, we first of all need to imagine peaceful future in our mind. The cultural reboot is the discovery of a new story we will tell each other about ourselves, the new myth inspiring our future ancestry.



5. INSTITUTIONS OF COLLECTIVE HEALING [2035–2060]



INSTITUTIONS OF COLLECTIVE HEALING

Institutions focused on the healing of collective traumas that impede planetary collaboration and development for regenerative future (such as memories of colonization and wars), through acknowledgment, empathy, dialogue, reconciliation, and indigenous healing practices.

Collective traumas have profound repercussions on our collective consciousness, culture, and well-being, as they can shape social dynamics, fuel conflicts, and hinder progress decades or sometimes centuries after a traumatizing event. For instance, a study of economic differences between regions of Spain discovered that in municipalities where the Spanish Inquisition persecuted more citizens, incomes are lower, trust is lower, and education is markedly lower than in other comparable towns and cities [Drelichman et al., 2021]. There are many types of collective traumas that can have similar impact, resulting from colonization, slavery, genocides, political repressions, cultural suppression, and other forms of oppression. Violent conflicts and wars, including civil ones, leave scars on entire communities, and can perpetuate cycles of violence. Large-scale natural disasters can also lead to collective trauma, especially when communities struggle to recover and rebuild.

Addressing these traumas involves acknowledging historical injustices, creating spaces for dialogue and reconciliation, and fostering a sense of empathy and understanding among affected communities. Healing collective traumas can help break cycles of violence, foster empathy, and create a foundation for peaceful coexistence and collaboration. It is therefore necessary to establish forms of collective healing institutions to create a more inclusive, just, and interconnected future for all of humanity. Furthermore, unless such healings occur, we cannot expect new culture of empathy, peace, and regeneration to root in our civilization.

> If we fail to address the world's collective trauma with clarity and compassion, we imperil the survival of our children and our children's children—and countless other species.
>
> Thomas Hübl

There are several formats of healing that can be established, based on modern and ancient ways of dealing with traumas. The Truth and Reconciliation Commission of South Africa has been important in healing the social rift created by apartheid, as it provided spaces for victims and perpetrators to share their experiences, promote understanding, and heal together. As of 2023, over 50 countries and communities worldwide have established some form of truth

and reconciliation or transitional justice mechanism, and the approach can be taken further.

Educational institutions and AI-enhanced learning platforms have a crucial role in addressing historical trauma through curricula that offer diverse historical perspectives, confront past injustices, and encourage empathy and healing. Creative mediums like art, music, literature, and theater can effectively delve into and convey collective trauma. Initiatives such as Sites of Conscience unite hundreds of museums, historic sites, and memory projects globally to foster dialogue, reflection, and transformative action in response to social challenges rooted in historical trauma.



Three pivotal forces are indispensable in guiding these healing processes. Firstly, local communities, intimately impacted by traumas and their healing, possess invaluable local knowledge, traditions, and practices. Their ownership and engagement drive the dynamics of healing. Notably, sites like Auschwitz-Birkenau not only preserve the memory of tragic events but also initiate social innovations for fostering peacemaking and empathy. Youth constitutes another essential group, being at the forefront of social movements and change initiatives, while channeling creative endeavors like art, music, and writing to express emotions tied to collective trauma. Engaging the youth in conversations about history and trauma nurtures intergenerational understanding, often breaking cycles of violence.

Finally, indigenous communities are among the ones holding a key role in collective healing. Their holistic healing approaches encompass physical, emotional, and spiritual well-being (including the use of sacred power plants and other entheogens). Indigenous communities have historically faced traumas, colonization, and cultural suppression, and even today 27% of indigenous youth in the US experience symptoms of post-traumatic stress disorder [Bassett et al., 2014]. The resilience and wisdom of indigenous communities can serve as valuable resources for addressing collective trauma. And in particular, by nurturing the indigenous perspective of the connection between humans, nature, and the land, the strained relationship of humanity with the planet can receive some healing.

There is hardly any community worldwide that has not faced some form of traumatic experience. Even those considered oppressors often perpetuate cycles of violence due to their own historical traumas. Humanity's collective soul bears wounds, and numerous institutions of collective healing can arise to address them. Crucially, such healing must become culturally normalized, and our approach to the future and cultural change must inherently be trauma-informed.

6. CULTURE OF NEW HUMAN HABITATS [2060–2100+]



CULTURE OF NEW HUMAN HABITATS

New cultures and ways of being that emerge within new habitable spaces (such as oceans and cosmos) and communities of post-humans modified to live in such habitats (including underwater, low gravity zones, and other planets).

New frontiers have driven the development of human civilizations since the early migrations from Africa. For good or for bad, humankind has become the "super-invasive" species that has penetrated literally every ecosystem on the planet [Shukla, 2023]. Having transgressed the planetary boundaries, humans now begin to take care of the natural habitat, making regeneration and revitalization of existing ecosystems a part of their journey through the 21st century. However, in addition to this stewardship, the exploration of new spaces will likely continue, with the human race venturing toward alternative habitats that demand revolutionary technologies. These habitats encompass:



Antarctica and the Arctic, regions expected to experience milder living conditions in the future yet retaining their coldness under prevailing climate scenarios. The Arctic, prone for long-term habitation, could witness accelerated development through enhanced collaboration among Northern nations. Antarctica could also host larger human settlements, and under certain scenarios of climate change it could become a salvation space — but its current status as pristine human-free continent needs to be preserved as much as possible, and limited human presence that prioritizes scientific research, environmental protection, and international cooperation, is most advisable.



The vast oceans, offering two avenues of exploration:

1. *Seasteadings*, comprising interconnected vessels and ships evolving into floating settlements and islands. These innovative enclaves, potentially situated in extraterritorial zones, could attract interest from proponents of libertarian philosophy such as The Seastanding Institute.

2. *Underwater cities*, capable of supporting oceanic farms, mineral extraction, and more, poised to emerge on continental *shelves*. These settlements may probably first emerge in urban areas affected by rising sea levels, that can save some of their urban infrastructure by shifting it below the sea surface.

The cosmos beckons as humanity's next frontier. Konstantin Tsiolkovsky, a renowned Russian cosmologist, envisioned that "mankind will not remain on Earth forever, but in pursuit of light and space, it will first timidly penetrate beyond the atmosphere, and then will conquer the entire circumsolar space" [Tsiolkovsky, 1911]. The initial steps towards this "conquest" were taken during the early days of space exploration. Today, advancements in materials, rocket design, construction techniques, and faster, more efficient engines provide both private and governmental projects with expanded opportunities for in-depth exploration of the near-Earth space.

In the latter half of the 21st century, assuming humanity avoids catastrophic scenarios, we may become residents of near space. This vision includes:

- Manned stations in Earth's orbit, operating mostly in automatic or shift modes. These stations will serve as space beacons, essential for near-space navigation management and platforms for near-space travel. Additionally, they will act as transit stations for lunar and interplanetary missions and serve as unique laboratories and observatories for investigating intricate features of the Solar System.

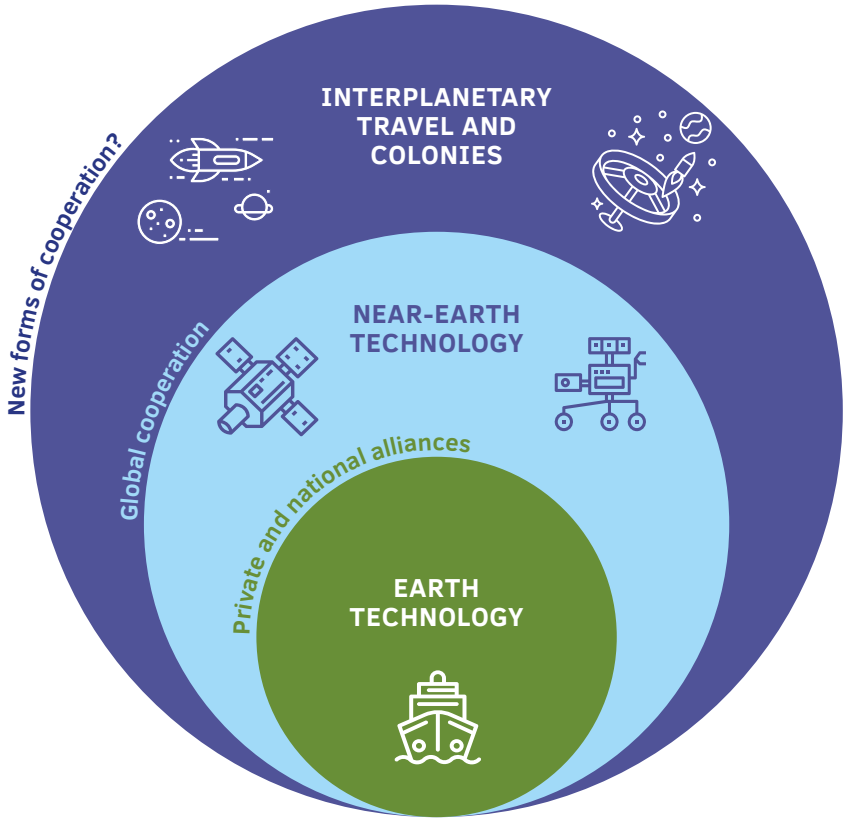
- Orbital cities and frontier space settlements, designed for specialized production facilities (leveraging the cost advantages of open space) and meeting existential human needs. These settlements could prepare for space jumps or expansion of boundaries for Earth's global ecosystem, essential for maintaining the planet's ecological balance.



- Moon bases will initially serving military and political functions. Due to the Moon's low gravity and lack of atmosphere, they are not the most attractive place for long-term human presence. While more extended human presence on the Moon requires ambitious (and currently highly speculative) "terraforming" projects [Williams, 2016], it could function as a hub for celestial body exploration, with lunar soil providing crucial resources for interplanetary travel.

- Establishing sustainable human settlements on Mars remains a near-future science fiction, despite hopes of some projects like the one championed by Elon Musk. Mars offers some potential for comfortable habitation and large-scale settlements with necessary resources. However, its challenging conditions, including very low temperature and minimal atmosphere, make it less hospitable than extreme Earth environments like Mount Everest or Antarctica.

Figure 15. Challenges of interplanetary travel and colonies
(Source: [Luksha, 2017])



1/3 OF PROBLEMS

Engineering &Physical

- Engines (ground to orbit, planet to planet)
- Protection (during interplanetary travel)
- Landing
- Home flight
- Colony construction
- Colony's material self-sufficiency (critical resources incl. water, metals, construction materials etc.)

2/3 OF PROBLEMS

Biological

- Survival in areas beyond the near-Earth space
- Long-term sustainability of closed ecosystems
- Regeneration, sufficiency, controlled evolution

Social & Psychological

- Mental & spiriitual stability
- Healthy interaction in small isolated groups
- Life "without the homeland"
- Self-sufficiency lifestyle
- Long-term motivation & productivity

Successful interplanetary civilization hinges on advanced propulsion systems to ensure reliable long-distance travel, but there are even more serious limitations on long-term survivability of humans beyond the Earth (Figure 15). Currently, humanity grapples with a technological gap preventing the creation of a viable, biologically and socially sustainable colony on another celestial body. This ambition hinges on the ability to create fully autonomous settlements beyond Earth's bounds. In order to create such settlements, we need to:

> Earth is the cradle of humanity, but one cannot remain in the cradle forever.
>
> Konstantin Tsiolkovsky

- Master ecological equilibrium management, establish circular / regenerative / self-sustaining processes, and cultivate natural-artificial ecosystems within diverse artificial settlements, spanning from isolated spacecraft to fully-fledged colonies. These settlements should embrace the ethos of "sufficiency and self-realization," a hallmark of pioneering frontiers.
- Attain a techno-humanitarian equilibrium in emerging communities, fostering the capacity for large-scale cooperation and conflict resolution, while adeptly addressing adverse trajectories of technological advancement.
- Develop a Space-oriented mindset and consciousness, characterized by enduring purpose and the ability to act with long-term vision

The path to establishing a foothold in alternative habitats aligns with the transformation of the fundamental principles of our global civilization. Venturing into uncharted realms is not a means of evading challenges but a response rooted in necessity. The viability of these spaces, notably Mars, will depend heavily on the transformation of our culture, governance practices, and economic paradigms—culminating in the mastery of authentic stewardship over our home planet, Earth.



HUMAN SPECIATION AND DESIGN OF HUMAN-RELATED ECOSYSTEMS FOR NEW HABITATS

The shift to new habitats presents an opportunity to actively editing the characteristics of our species, potentially initiating a process of speciation. Even in the early stages of extraterrestrial exploration, the deliberate modification of around forty genomes could enhance human resilience to radiation and reduce dependence on traditional life support systems, as proposed by Harvard geneticist George Church [Pontin, 2018]. While aspirations for sustainable Martian settlements persist, the question arises: Should we pursue the overwhelming task of terraforming the entire planet, or is it more prudent to engineer the inherent traits of the resident species—be it plants, animals, or humans—to seamlessly adapt to the unique Martian environment?

It is likely that a similar question will emerge in the context of ocean exploration. The prospect of developing underwater settlements may prompt us to confront a similar dilemma. The concept of "aquamen" or "sirens" could come to fruition—human species capable of underwater respiration and possessing anatomical modifications that facilitate swift movement in aquatic environments. This underscores the broader theme of deliberately adapting organisms to their chosen habitats, whether terrestrial or aquatic.

Indeed, the emergence of concepts like "Martians", "spacemen", and "aquamen" raises intriguing possibilities for human adaptation and evolution. Similarly, we could apply this approach to address the challenges of aggressive climatic conditions on Earth. Directing efforts towards developing heat-resistant animals and plants, and even exploring gene therapy for individuals residing in hot climates, could potentially enhance humanity's ability to cope with the anticipated impacts of climate change. While such endeavors do not offer a complete protection against the impending climatic shifts of the coming decades, they could expand our toolkit of adaptive strategies and contribute to a more resilient and adaptable global society.

> What woman doesn't want to have silver iodide instead of eyes, telescoping breasts, angel's wings, iridescent legs, and feet that sing with every step?
>
> Stanisław Lem



D. EVOLUTION OF CONSCIOUSNESS

1. FEMININE AND NON-BINARY THINKING [BEFORE 2035]

FEMININE AND NON-BINARY THINKING

Gaining non-masculine perspectives and leadership styles that allow to explore value diverse perspectives, acknowledge alternative human and non-human ways of perceiving the world, and embrace more holistic approaches to handling uncertainty and complexity.

A significant shift in the gender balance in the second half of the 20th century has been caused by the transition to an urban reproductive regime (characterized by increased life expectancy and reduced child mortality rates), along with the growing availability of affordable appliances and contraception, and the rise of knowledge-based economies. All these factors contributed to the blurring of traditional gender roles prevalent in agrarian and early industrial societies. Women are increasingly engaged in roles historically considered men's work, while men are more involved in activities traditionally associated with women. The urban reproductive pattern has also influenced family dynamics on a larger scale. A growing number of individuals are choosing to have families and children in their 30s and 40s, as opposed to their late teens or early twenties. Child-free lifestyle is becoming more common, and there is a broader acceptance of alternative gender identities and same-sex relationships. These changes are outcomes of a demographic shift that is taking place similarly across all regions, transcending ethnic, religious, and cultural boundaries.



This transition presents a significant opportunity to recognize and appreciate the equality and significance of both male and female perspectives. Research into group problem-solving processes has revealed that having a higher representation of women in a group improves the collective's overall performance [Wooley et al., 2015]. The inclusion of feminine thinking in company management has gained greater acceptance and recognition, particularly in the innovation-driven sectors [The Female Quotient, 2022].

Equally significant is the recognition that modes of thinking are not inherently linked to one's physical condition, and each individual, as a multifaceted being, can encompass multiple ways of behaving and perceiving life. For instance, men have the capacity to cultivate skills and behaviors traditionally regarded as feminine —such as embracing

emotions and articulating sentiments, intuitively grasping complex social situations, and so on. These and other "feminine" qualities are increasingly becoming prevalent among men, further expanding their spectrum of perceptual frameworks and behaviors.

Spreading across Euro-Atlantic and Asian urban cultures, the concept of extended gender identity embraces the behavioral and cognitive diversity that serves as a fundamental requirement for the flourishing existence of modern intricate civilizations. The notion of gender identity is far more intricate than sexual preferences, and cannot be reduced to the latter. The concept of a "non-binary" gender, for instance, doesn't pertain to "bisexuality," but signifies an individual's acknowledgment of their multifaceted nature. For instance, a study conducted by UCLA revealed that 27% of adolescents in California schools identified as "gender nonconforming" [Wilson et al., 2017] while another UCLA study in the same year revealed that the proportion of Californian adolescents with a homosexual orientation did not exceed 10% [Kyu Choi et al., 2017]. The widespread acceptance of diverse gender identities among the upcoming generation marks a critical step that also fosters an inclusive discourse with various cultures and species.

Contemporary society finds itself in an increasingly "metastable", precarious and evolving, state, where novel modes of existence have yet to be fully delineated. It becomes imperative, first of all, to cultivate new modes of thinking, encompassing not only rational thinking, but also the one that is emotion- and action-oriented. The growing complexity of our challenges necessitates a realization that any individual position—especially one borne of a rational male-oriented mindset founded on logical reasoning—remains somewhat incomplete (as demonstrated by Gödel's theorem) and vulnerable to cognitive biases (as evidenced by the research of Tversky, Kahneman, and their successors). Thus, the incorporation of a diverse range of perspectives and viewpoints grows in significance within the realms of research and decision-making.

> We are either going to have a future where women lead the way to make peace with the Earth or we are not going to have a human future at all.
>
> Vandana Shiva

Feminine and non-binary ways of thinking and perceiving the world, as well as female and inclusive leadership, are becoming indispensable tools in humanity's journey towards an uncertain future. This shift recognizes the inherent strength of diverse cognitive styles, fostering a more holistic and adaptive approach to addressing the intricate challenges that lie ahead.

2. COLLECTIVE HYBRID WISDOM [BEFORE 2035]

COLLECTIVE HYBRID WISDOM

Combination of the collective human intelligence capacity (including mechanisms of collective perception, creativity, and problem-solving capacity), AI-assisted reasoning and facilitation, and wisdom-enhancing methods that integrate insight, empathy, and ethical judgment.

The rise of digital technology and the Internet has opened a new era of possibilities, giving birth to various collaborative mechanisms and platforms that leverage the power of collectives. From crowdsourcing and crowd funding to online learning platforms and decentralized autonomous organizations (DAOs), these innovations have reshaped the way humans collaborate and solve problems.

The underlying potential of these forms is embedded in the very structure of the Internet and personal computing. The founding fathers of modern information technology, such as Doug Engelbart, J.C.R. Licklider, Vint Cerf, Tim Berners-Lee, and others, conceptualized communication architecture and interfaces to augment both individual and collective capabilities. This design fosters "horizontal" interactions among participants, facilitates collaborative content creation across distributed networks, and enables "stigmeric" organization of knowledge accumulation. As early as the 1980s, the Internet was envisioned as a global brain for humanity [Russell, 2008].

In the 21st century, connected and intelligent systems will continue to advance along multiple dimensions, including new systems of governance, systems for organizational intelligence and creativity, and systems that support lifelong learning and personal development. The creation of high-performance teams and communities can be facilitated by algorithms that enable inclusive and dynamic team assembly, with unexpected yet complementary talents. These and many other formats suggest the advent of a new form of human organization, hybrid collective intelligence.

Hybrid intelligence refers to collaborative human-machine systems that combine individual perception, collective co-creation, and machine learning. In this form of collective intelligence, people take the lead in goal-setting, decision-making, and creativity, while artificial intelligence assists in various tasks that augment collective capabilities. These tasks range from supporting intellectual activities to moderating discussions and suggesting further directions



for work. Notably, AI for such collectives should be developed with maximum inclusion in mind, addressing limitations and biases in learning samples by considering cultural, ethnic, age, gender, and economic diversity [WEF, 2022].

Today, Artificial Intelligence seems to advance at the speed beyond comprehension. It is often suggested that humans will increasingly play a subordinate role in decision making, thinking, and creativity — and a paradigm of "synthetic" intelligence will dominate (with AI at the core and humans as "sensory organs" of the synthetic "organism"). The rise of Artificial General Intelligence, it is argued, with AGI being superior to humans in every intellectual and creative aspect, will challenge the very existence of human beings. However, this perspective is being contested. For instance, Dirk Helbing [2017] suggests that, within complex environments, collective intelligence systems are able to strategically outperform artificial intelligence over time. In other words, the challenge of complexity governance can only be addressed through hybrid collective intelligence systems.

However, intelligence alone is insufficient in tackling complex challenges and finding good solutions. What is needed is wisdom, which is defined as an ability to utilize knowledge and reasoning coupled with insight and good judgement. While intelligence is focused on cognitive abilities and problem-solving skills, wisdom considers ethical and emotional aspects, often gained through life experience and reflection.

Collective wisdom, in its various forms such as tribal councils and religious orders, has been a vehicle for the evolutionary success of humankind. In the future, it can be even more critical — as it enables ethical decision making with understanding of the long-term consequences of actions, offers a more holistic view of the future taking into account the well-being of future generations, and offers more resilient and integrative perspectives in the face of complexity. It considers the emotional and social aspects of decision-making, encourages the inclusion of diverse voices and perspectives representing various cultures, traditions, and ways of life, and seeks to mitigate cognitive biases by encouraging critical reflection and open dialogue.

Creating collective hybrid wisdom will combine collective human insights with AI capabilities in ways that promote deeper understanding, empathy, and holistic thinking. Frameworks enabling this are on the rise, including inclusive deliberation and insight-curation platforms, ethics-aware AI, wisdom ranking mechanisms, and more. With dynamic group formation tools, complex learning and



THE CHALLENGE OF COMPLEXITY GOVERNANCE CAN ONLY BE ADDRESSED THROUGH HYBRID COLLECTIVE INTELLIGENCE SYSTEMS.

feedback mechanisms, and AI acting as a mediator to facilitate discussions and guide conversations toward constructive outcomes, collective hybrid wisdom formats can proliferate in various spheres of human life.

Advancements in human-machine communication, including technologies like virtual reality, haptic interfaces, brain-computer interfaces, and biofeedback, are paving the way for a novel communication environment. This environment, sometimes referred to as the NeuroNet [Luksha, Shchoukine, 2014], enables intricate communication systems on multiple levels—within individuals, between individuals, and among groups, at both conscious and subconscious levels. Through the synergy of collective hybrid wisdom communities, a "Forest of Consciousness" can take root—an enduring and complete form of collective consciousness. Visionaries such as Kevin Kelly, Valentin Turchin, Peter Russell, and Sri Aurobindo have suggested that this sustained collective consciousness marks the anticipated next step in Earth's living matter evolution. It signifies a new era for humanity, allowing us to evolve into a Cosmic species, as envisaged in "The Cybernetic Manifesto" by Turchin and Joslyn [1990].

> The anchor of all my dreams is the collective wisdom of mankind as a whole.
>
> Nelson Mandela

3. THE NEW PARADIGM OF HUMAN KNOWLEDGE [2035–2060]

THE NEW PARADIGM OF HUMAN KNOWLEDGE

Shifting towards a holistic and interconnected perspective of the world that draws upon insights from contemporary disciplines such as quantum mechanics, complexity science, and evolutionary theory, as well as harmoniously integrates modern science with ancestral wisdom.

The profound necessary transformations in economy, governance, and culture underscore a significant realization. As biologists and systems thinkers Humberto Maturana and Francisco Varela [1992] put it, "our very ignorance of knowing" lies at the heart of modern evolutionary crisis. We must fundamentally alter our perspective on the world, cultivating a worldview that embraces the complexity and uncertainty of the world, and perpetual change as foundational aspects of life. We need to learn to align ourselves with life and welcome the post-anthropocentric perspective that acknowledges our parity with other species as well as with the emergent sentient technosphere.

But how can we genuinely transform the way we understand the world? The present way of creating knowledge and developing technologies has been formulated before the complexity of our civilization and its footprint on the planetary systems escalated. Our ways of knowing prioritize linear and mechanical models of the world over complex and organic ones. We are not very good at holding multiple perspective or handling paradoxes — and that forms the very essence of the complex world we are trying to grasp. Most of us humans hold to conventional narratives and falter at pushing the boundaries of understanding and evolving beyond what we know. Our ways of knowing and being do not align with uncertainty and unpredictability, and it is therefore normal for most people to resist change rather to embrace it.



The new paradigm that offers a different way of seeing the world, as intrinsic, interconnected, paradox-rich, and constantly evolving, has been in place for some time now. It draws upon a convergence of perspectives from quantum mechanics, complexity science, and evolutionary theory, as well as holistic perspective of the pre-scientific worldviews [Laszlo, 2016]. Quantum mechanics has challenged traditional notions of determinism and certainty in the physical world, acknowledging the inherent unpredictability of complex systems and blurring the line between the observer and the observed. Complexity science emphasized how self-organization can lead to emergent whole that cannot be predicted by understanding each part of the system in isolation, acknowledging the non-linear and interconnected nature of the world. Evolutionary theory offered a holistic perspective of life is characterized by continuous change, adaptation, and emergence of new forms in all domains, from the evolution of stars and galaxies to the evolution of lifeforms, social forms and technologies. The new way of knowing emerges as a holistic, adaptive, and interconnected approach that encourages us to embrace flexibility, interdisciplinarity, and ongoing exploration.

The evolution beyond current scientific paradigms calls for a transition to what can be termed as "post-scientific thinking" or "Science 2.0," as conceptualized by Otto Scharmer [2019]. This new approach views the researcher not as a detached observer but as an integral part of the observing system — accordingly, it demands self-awareness and a deep understanding of one's role within the broader context of the world, including understanding the purpose and impact of research (which inevitably becomes action-oriented). In this "embedded science "the researcher is invited to engage in a profound journey of self-discovery and discovery of others, recognizing that personal awareness and

transformation are integral to the process of knowledge creation. Ultimately, Science 2.0 transcends the boundaries of traditional science to integrate personal growth, community engagement, and experiential learning into the process of knowledge creation. This paradigm shifts from a narrow focus on theoretical knowledge to a holistic integration of thinking, feeling and doing — where the separation between these aspects is dissolved, and they are seen as interconnected dimensions of human experience.

Another aspect of the emergent paradigm is broadening perspectives by embracing divergent as well as convergent thinking. Convergent thinking works well in closed systems and tends to find solutions to problems from within the field or the domain in which the situation has developed, confirming the righteousness of the system as the whole. Institutions, including academic institutions, tend to preserve themselves by favouring convergent thinking. As Karl Jenkins suggested, "dominant ideologies articulate history academically", in a way that is conservative of the power structure. If the new knowledge paradigm becomes a conduit of the new socio-cultural reality, it can only do so by diverging from existing norms and perspectives. Alternative worldviews that comes from non-Western cultures, that stem from indigenous and spiritual ways of knowing, that encourage intuitive and artistic ways of knowing, need to find their way into this emergent worldview.

> The world is revealed to us, not by the fact that we come to have habits, but in the moments when, forced to abandon our old habits, we come to take up new ones.
>
> Eduardo Kohn

The shift towards a more comprehensive and effective approach to addressing the 21st century challenges demands us to confront the inherent arrogance of our current civilization. We must recognize that the keys to our future are embedded in the entirety of human knowledge spanning our history. A harmonious integration of modern scientific knowledge and the ancestorial wisdom is required, instead of seeing them as conflicting or mutually exclusive. As an example, the research by Julia Watson [2016] shows that some of the most sustainable solutions in construction are rooted in "traditional ecological knowledge," successfully tested and refined over countless generations. As another instance, World Health Organization [2019] is exploring various holistic healing systems, including Ayurveda, that have shown considerable benefit in treating health conditions while being rooted in "non-scientific" worldview. Similarly, contemporary neuroscience finds valuable insights in the Buddhist psychology teachings that have evolved over one and a half thousand years [Ricard, Singer, 2017]. The dichotomy between modern scientific understanding and ancestral wisdom is false, and their integration can enrich each other.



However, the objective is not simply to "plug" ancient knowledge into our modern context — but to embrace a holistic view that positions scientific, pre-scientific, and post-scientific thinking as essential components of a comprehensive framework. The relationship between different forms of knowledge is symbiotic, each mode of thought represents a valuable "piece of the jigsaw puzzle" that enables us to establish a profound and meaningful connection with the intricate and living world around us. This integrative perspective encourages us to recognize collective wisdom, embrace multidimensional learning and foster cross-disciplinary dialogue, and cultivate intellectual humility by exploring alternative forms of knowledge.

> Integrative intelligence is one that draws from all the sources of wisdom available to us as living organisms on Earth.
>
> Jeremy Lent

The profound technological, social, and cultural transitions are contingent upon a shift in the very foundations of our thinking and communication patterns. The new paradigm recognizes the intrinsic complexity in the way we know things, and offers to adopt holistic, organic, transdisciplinary worldview of the intrinsic and interwoven reality. This shift empowers us to engage more harmoniously with the intricate fabric of our world, unveiling pathways that may have previously remained hidden within the confines of mechanistic thinking.



4. META-LANGUAGE OF LIVING COMPLEXITY [2035–2060]



META-LANGUAGE OF LIVING COMPLEXITY

Frameworks based on patterns of life itself that allow for the convergence of technological, social, and natural systems into techno-anthropo-bio-cenoses, fostering the harmonious relationship between humans and more than human living world.

Given the enormous footprint of humans on our planet, the imperative to harmonize our economies, governance and culture with planetary systems necessitates a massive transformation in the ways we see the world and interact with it. Changing our worldviews constitutes the first step in that journey, yet it is even more important that we translate this worldview into actionable frameworks that are used to design our technological innovations and and organize our practices. These fundamental processes of our civilization have to become Nature-aligned, Intelligent, Complexity-embracing, and Empowering. In order to coordinate this transition, humanity needs a new meta-language of living complexity, a novel means of encapsulating our understanding of the world in its intracity and interconnectedness that goes beyond our cultural, ethnical, and religious domains. In words of Lewis Mumford [1974], humanity "will need to undergo a conversion ..that will replace the mechanical world picture with an organic world picture".

From this perspective, our technological and social constructs must pivot towards a harmonious convergence of planetary and social interests, rather than serve individual and organizational human needs in isolation. Our technosphere must be increasingly "rebiologized", and our social systems implanted with life-based patterns. Systems of social, technological and natural realms should thereby converge into unified organic-like entities (as discussed in works of Zev Naveh [2004]). These unified entities can be called *techno-anthropo-bio-cenoses* (TAB-cenoses) — technological solutions, humans, and biological organisms occupying the same "habitat" in a harmonious and mutually supportive way. Our cities, factories, energy and transportation systems, should all be envisaged and redesigned to become such TAB-systems.

OUR TECHNOSPHERE MUST BE INCREASINGLY "REBIOLOGIZED", AND OUR SOCIAL SYSTEMS IMPLANTED WITH LIFE-BASED PATTERNS.

The new methods of designing and creating such systems must be based on the innate principles of life itself [Smitsman; Laszlo; Luksha, 2020]. Therefore, these systems should be "conceived" and "grown" as if they were multicellular organisms, rather than designed and con-

structed like a machinery. The meta-language the describes and governs them should employ organic, nature-inspired concepts and frameworks — and some prototypes of such language are found within the theory of complex adaptive systems [Holland, 2006], permaculture design, and the biomimicry approach, among others.

Design of the TAB-cenoses implies the seamless integration between humans, non-human nature, and technologies. It will most inevitably use, as a means of such integration, a sophisticated AI based upon real time "digital twin" modelling of systems interacting. This is particularly evident in the design of new habitats, whether terrestrial or cosmic ones — for instance, an autonomous settlement beyond the Arctic Circle or in Earth's near orbit. The role of AI in such habitats will be to ensure a harmonious balance between the needs of human inhabitants and the productive capacities of plants, insects, fungi, and microbes within a closed ecosystem, by controlling levels of light, temperature, humidity, soil nutrients, etc. Another area of application is the at-scale creation of regenerative food production systems, such as "food forests", that also need an AI to operate. Accordingly, a intelligent technological system that supports the integration should primarily be designed upon the organic principles, and it should be able to recognize, nurture, and amplify the wellbeing of living and sentient beings that it is tasked to uphold.

> Wherever the life is,
> the world bursts into
> appearance around it.
>
> Ralph Waldo Emerson



The ongoing maintenance and evolution of TAB-cenoses cannot be relegated solely to AI however. Rather, it requires the active and collaborative engagement of all stakeholders in co-designing and co-governance. As pointed out by Bela H. Banathy, a luminary in the field of social systems design, "when it comes to the design of social systems, it is the users, the people in the system who are the experts. Nobody has the right to design social systems for someone else" [Bánáthy, 1996]. This principle holds true even more profoundly in the case of systems that include not only social actors but also more-than-human nature. The co-creation with non-human entities becomes significant, which requires humans to gain clearer insights into their interests and needs, whether by direct communication or observation (e.g. seeing which interventions help the living ecosystem thrive).

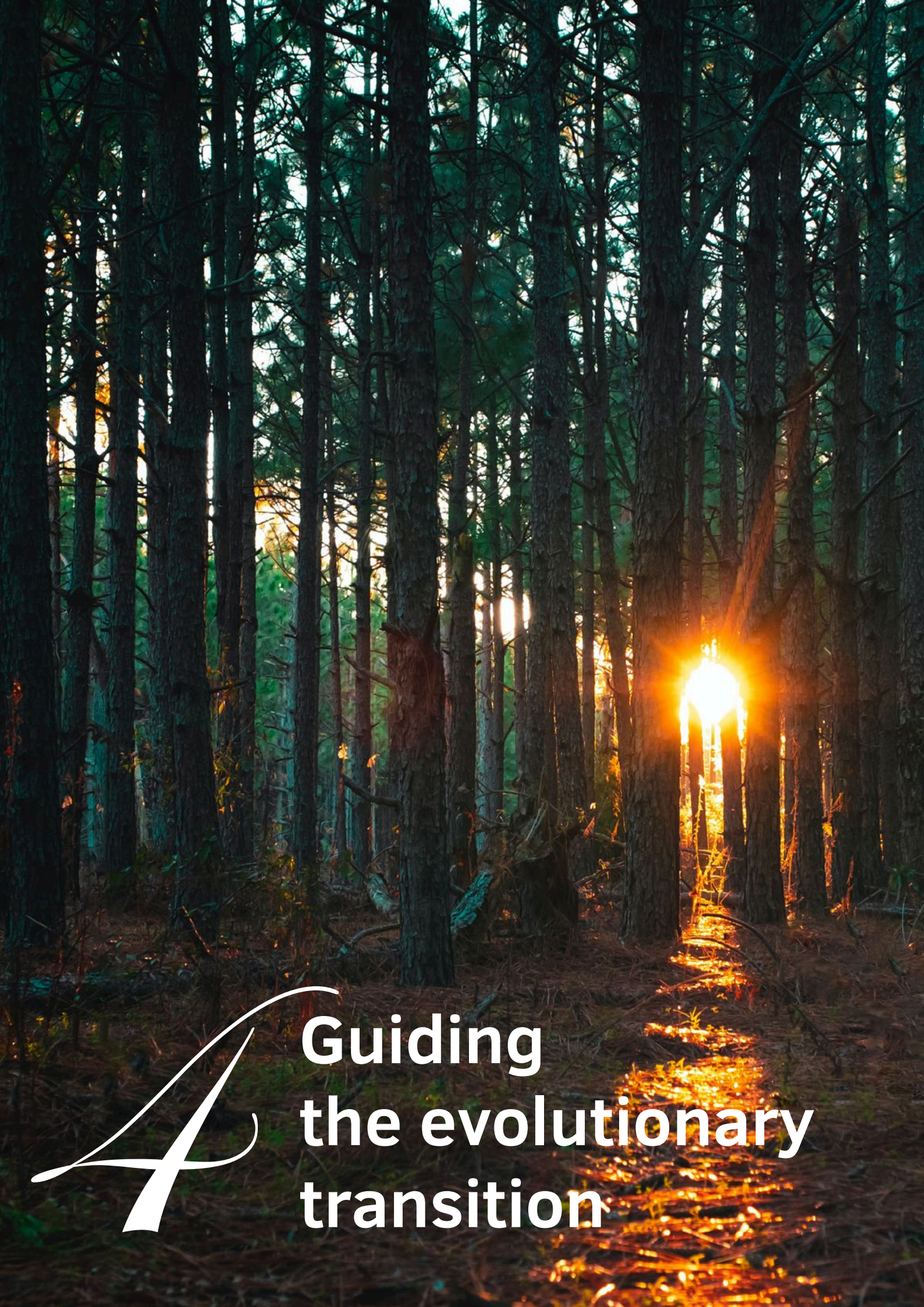
As humans consciously engage in nature-aligned design of TAB-systems, their interactions with complex systems, including the biosphere, undergo transformation. Jean Boulton [2016] suggests that "embracing complexity can actually make things easier, simpler, and more straightforward... If the world is complex, then acting congruently with

that complexity can be simpler than trying to control a machine that does not exist". Fostering life-oriented design and governance prompts us to transcend our long-standing feud with nature, embarking on a journey of learning from nature, mimicking it (following the biomimetic approach), and then eventually *becoming nature* [Reed, 2007]. We could also say that this process is remembering that we have always been part of nature — but also awakening to our role as sensor, and perhaps effector, organs of Gaia.

Embarking on a coevolutionary journey to harmonize technologies, social systems, and nature, we grope around for the new world, sensing the truth of every step we take. This journey can only be navigated with full presence: we as humans cannot separate ourselves from the process of evolutionary shift, we cannot see ourselves as orchestrators — but rather as pilgrims in the journey to the Holy Land. By altering the ways we see the world, by cultivating the organic perspective and embracing the living complexity, we embody the seeds of the future "evolutionary attractor". Through our own existence, our whole being journey, we become conveyors of this emerging reality. As we construct a comprehensive vision of a living world within ourselves, we concurrently learn how to grow this world around us.

AS WE CONSTRUCT A COMPREHENSIVE VISION OF A LIVING WORLD WITHIN OURSELVES, WE CONCURRENTLY LEARN HOW TO GROW THIS WORLD AROUND US.





4 Guiding the evolutionary transition

Future generations, if there is a livable world for them, will look back at the epochal transition we are making to a life-sustaining society. And they may well call this the time of the Great Turning.

Joanna Macy

If mankind is to escape its programmed self-extinction the God who saves us will not descend from the machine: he will rise up again in the human soul.

Lewis Mumford

THE "DRAMA OF TRANSITION"

In the pursuit of averting future cataclysms and snapping beyond mounting challenges, humanity has initiated numerous efforts to expedite its own transformation. Among them, initiatives like global energy transition, decarbonization of economy, and global control over technological risks have garnered substantial recognition. Other approaches, such as circular and regenerative economies, are gaining momentum, while concepts like planetizenship and universal well-being gradually become credible societal priorities. Components of the emerging socio-economic system that is poised to replace the industrial model begin take root across the world as "whole system prototypes". However, the complete development of this new system might take decades, requiring revisions in legislation, urban and industrial infrastructure transformation, and modification of transport fleets and technology parks. The new economic, technological, social, and cultural paradigm may not fully manifest until the mid-21st century, although glimpses of this emerging reality might already be seen in our cities and villages even today.



The "22 Steps into the 22nd Century" roadmap serves as a navigational guide for comprehending this multifaceted transition. Firstly, it aids in perceiving the transitions of the next decade as the initial phase of the " drama of transformation", paving the way for more profound shifts that will ultimately lead to a greater harmony and convergence among humans, nature, and technologies. Secondly, it underscores that these transitions are interconnected. Surprisingly, engineers developing innovative solar panels, investors backing lab-grown meat ventures, educators pioneering new teaching methods, financial experts experimenting with blockchain-based fintech, and researchers exploring novel ways of communicating with marine life such as dolphins and whales, can all identify themselves

as contributors to an emerging movement. This collective movement propels us through the turbulent 21st century towards a novel reality, an emerging "evolutionary attractor" of the nascent planetary civilization.

The shift towards this nascent reality, like any historical transitions, will inevitably entail a dramatic interplay of advantages for some and setbacks for others. For instance, the beginning of the industrial revolution in 17th century Europe brought about substantial land displacement, escalated inequality, religious conflicts, and civil wars. The 20th century revealed the "shadow side" of the transitioning into a vast urban industrial society, with two World Wars and a series of socialist revolutions across Europe and Asia that inflicted hardships upon multiple generations. It would be naïve to anticipate that the forthcoming transition—markedly more radical than its predecessors in terms of shifts it is expected to bring — will occur smoothly and devoid of conflicts.



Much of human history has consisted of unequal conflicts between the haves and the have-nots.

Jared Diamond

What is the anticipated timeline for the new paradigm to root into our society? Some individuals hold optimistic views that radical changes could manifest within a decade or less, driven by technological advancements. Nevertheless, it is important to admit that even though human progress is accelerating, the adaptation of communities to new norms and values still demands years, decades, and sometimes generations. Moreover, the transition necessitates substantial reconstruction of urban infrastructure, industrial facilities, transportation, energy, and food production systems. Given the current pace of transformation, it is realistic to expect that the new socio-economic paradigm will require a minimum of 25-30 years to firmly establish itself within our society.

The ascent of the new socio-economic system will inevitably trigger conflicts between proponents of the "old" and "new" paradigms. These conflicts may arise between macroregions or nations, but more commonly, within societies among diverse communities and elite groups. The clash stems from two key factors. Firstly, there is the inherent resistance of the population to embrace novel worldviews, customs, and regulations—a normal response in any cultural transformation (for instance, seniors resisted adopting digital technologies, compelling authorities and businesses to retain traditional interfaces and processes). Secondly, there frequently exists sabotage or overt resistance from elites who stand to lose their status in the emerging reality (an illustrative example is traditional energy companies' opposition to climate solutions and renewable energy). Early signs of escalating tensions are already evident in regions like Eastern Europe and South Asia, man-

ifesting as revived ethnic and religious conflicts, renewed debates on justice and spheres of dominance, and discords between generations of young and old politicians.

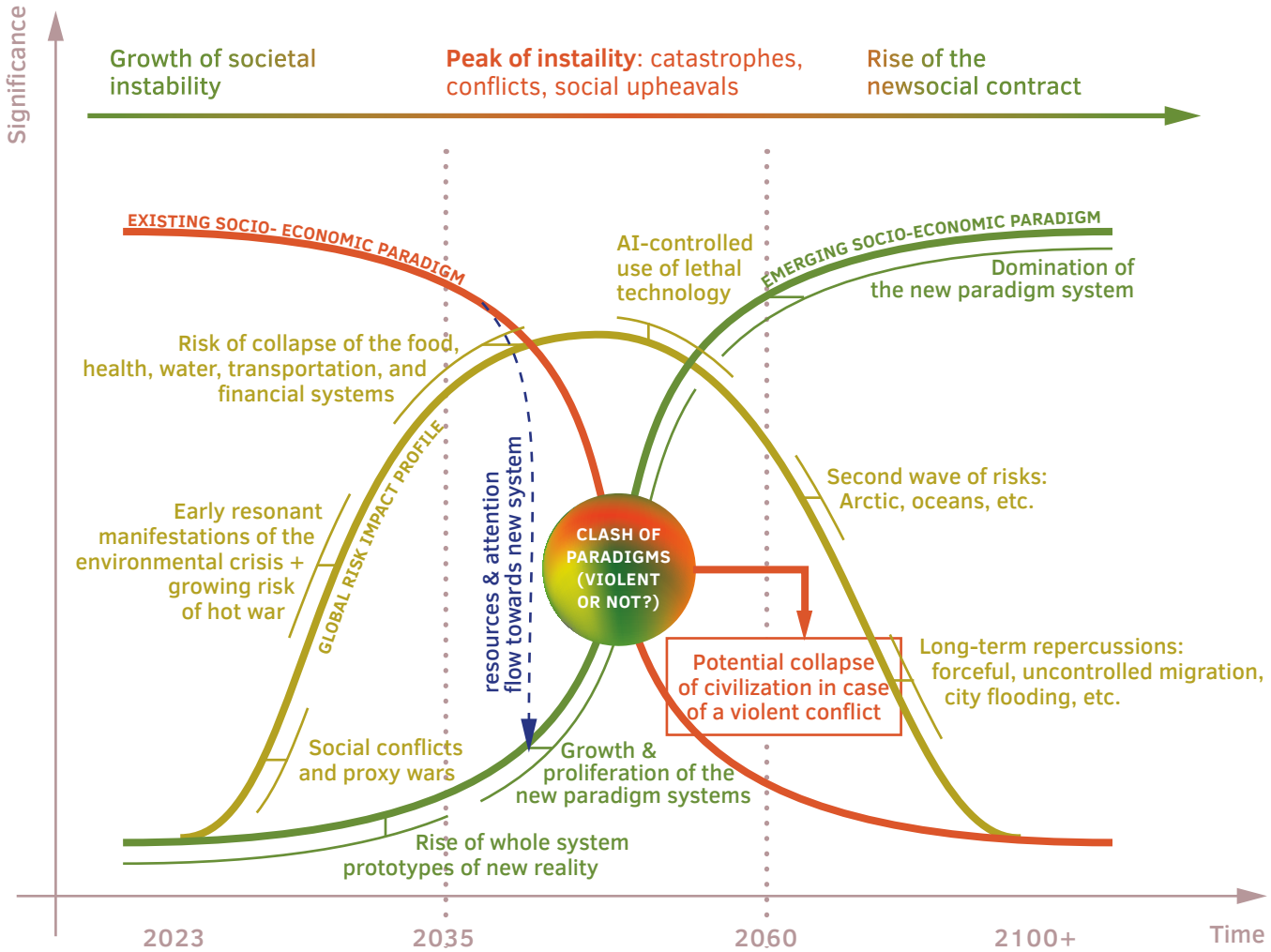
The forthcoming decades will undoubtedly witness heightened instability, escalating waves of social upheavals and military clashes across various regions of the world. This trend is likely to be exacerbated by the growing environmental and technological risks projected to peak around the mid-21st century (as discussed in the previous chapter). This period emerges as the most tense and critical, presenting a heightened probability of extensive international conflicts and the collapse of the civilization (Figure 16). However, it is also a pivotal juncture offering our civilization the greatest chance to break free from the cultural patterns that have historically governed it for millennia, to snap towards a new paradigm will see the complete abandonment of wars and the creation of the planetary civilization.

Historically, societies have utilized wars to boost their progress, extend their opportunities, and rejuvenate their culture—a metaphorical "shedding of their skin". However, as previously discussed, the prospect of a global conflict in this century holds existential implications. Given the continuous expansion of military capabilities and the unprecedented lethality of modern weaponry, a large-scale confrontation among major nations is likely to see no victors. The "ultimate victory" will also be an ultimate defeat of everyone involved, perhaps including the whole biosphere. Hence, the forthcoming generation is tasked to resolve these tensions through the most peaceful means — and the groundwork for the future peace-based planetary civilization must be established now.

THE GROUNDWORK FOR THE FUTURE PEACE-BASED PLANETARY CIVILIZATION MUST BE ESTABLISHED NOW.



Figure 16. Possible dynamics of transition



KEY TRANSITIONS (22 STEPS INTO THE 22ND CENTURY)

BEFORE 2035:

- Economic transition: energy, protein, circular & regenerative
- Preventive human security & future cocreation
- New models of education, culture of universal wellbeing & planetizenship
- Inclusive thinking & hybrid wisdom

2035–2060:

- Self-sufficiency & self-actualization, multidimensional capital
- Complex governance that embeds empathy & recognize non-human entitutes
- Culture of global peace
- New integral knowledge paradigm & living complexity meta-language

2060–2100+:

- Planetary economic governance
- Council of All Beings to govern planetary processes
- Post-national world & new human habitats (oceans & cosmos)

Should our society successfully navigate beyond the "break it" phase of the first half of the 21st century, the new system is projected to dominate the world in about 50 years from now, around 2070-2080s. By that time, the world map is likely to be profoundly redrawn, and the economy and culture will be dominated by the nations and organizations that nowadays are not even on the radar. The priorities, values, and perspectives of individuals at the close of the 21st century could prove astonishing to contemporary society, rendering some present-day choices as barbarian or even disgusting [4CF, 2023]. Hopefully, this transition will not solely usher in the supremacy of a handful of new players, but rather open a new chapter in the history of our species and the planet.

The ongoing "drama of transition" compels global "powerhouses", influential political and economic entities to adopt an entirely different approach in dealing with the ongoing crisis. During prior, albeit potentially less extensive and existentially threatening, societal shifts, such entities were primarily focused on advancing their individual interests, vying for dominance on the "grand chessboard" (as geopolitical strategist Zbigniew Brzezinski would call it). Traditionally, they regarded the populace and economic assets as mere pawns, and viewed the natural environment as both a "playground" and a resource repository. However, the unfolding transition is altering the foundational rules of the game: the pawns themselves, and even the "chessboard," are gaining agency and transforming into distinct players — consequently, the winning game strategy shifts from confrontation to cooperation and co-creation.

THE WINNING GAME STRATEGY SHIFTS FROM CONFRONTATION TO COOPERATION AND CO-CREATION.



IN SEARCH OF BRIDGE BUILDERS

Amidst the increasing fragility of global civilization, it is remarkable that the " competition for the future" is not diminishing; rather, it is intensifying. More participants are entering the fray, including not only the traditional global superpowers but also various new national, religious, and economic contestants.

However, the winning position in this contest is not gained by subduing competitors. Instead, it can only achieved by offering a compelling new dream for humanity and fostering conditions to make it real together, in spirit of "the world that works for 100% of humanity". This implies that the true "winner" is capable of creating the most inclusive and empowering platform for cooperative endeavors, resulting in mutually beneficial, win-win outcomes for all involved. What humanity desperately needs is a bridge into the future, not an arena for bullfights. This collaborative platform becomes a bridge that carry us across the turbulent 21st century toward the thriving futures.



What are the essential characteristics of "builders of bridges to the future", capable of crafting such platforms and ensuring sufficient engagement?

- Firstly, these actors must possess the ability to foster extensive global collaboration, essential for sustaining and enhancing the economic, cultural, and technological complexity of our civilization. In pre-industrial times, self-sufficiency was attainable with populations of a few million individuals: the 12th-century Holy Roman Empire encompassed 5 million, and the 8th-century Umayyad Caliphate had 60 million people. Today, upholding our present complexity necessitates a fully sustained society of approximately 1 billion people [Stross, 2010] — and the next level of technological complexity will probably require between 2 and 3 billion individuals, which can only achieved within macroblocs with a core of one or several technologically advanced nations.

- Secondly, they must embody the role of "long-will players", adept at orchestrating processes across extended durations, crafting strategies that extend beyond the immediate 5–10 years to encompass 50, 100, or more years — timeframes integral to the dynamics of macrosocial, cultural, and planetary systems — and translating these plans into tangible actions.

- Thirdly, they must be able to "engender trust" through assuming responsibility for implementing their vision, offering robust resource support, and exhibiting steadfast ded-

ication to their initiatives across the scope of collaboration and within the designated time frame. This approach enables them to serve as both guardians of their own intentions and custodians of the interests of all engaged stakeholders who are inclined to join and endorse these actors.



Last but foremost, these players should be able to "navigate future", recognizing and tackling humanity's challenges and presenting feasible pathways into more appealing and inviting future scenarios.

What types of actors can match this profile? There are indeed various entities that can potentially fulfill this role, including:

A Nations with the potential for macroregional and global leadership that can accumulate technological, economic, and geopolitical influence among their partners and allies. The most prominent contenders in this arena are the United States and China. However, both leaders possess their own limitations. For instance, the enormous influence of the US over global consensus actions has rendered the whole world a hostage to its internal politics, as demonstrated by its withdrawal from the Paris Climate Agreement during Trump's presidency. If this self-centered stance strengthens, the US might become a major "roadblock on the way to the transition", hindering collective efforts and causing global instability throughout the 21st century. On the other hand, China also remains locked in a Sinocentric perspective that hampers its ability to provide equitable and empowering opportunities to its partners. This situation creates ample room for emerging global leaders such as the European Union, India, and several ascendant Islamic and Asia-Pacific nations to present their vision and establish novel avenues for worldwide cooperation.

B Cities and territories (including bioregions) situated at the crossroads of civilizations' interests. While these entities may not exercise the same level of influence as macroregional and global powers, their distinctive positions grant them the potential to function as both economic and conceptual junctions, to shape the future and set a global agenda. Among these players are "city-states" like Singapore and Dubai, forward-thinking cities such as San Francisco, Eindhoven, Mecca, and Shanghai [Wired, 2015], as well as prominent global capitals such as Paris, London, Amsterdam, and "future-proof" Scandinavian capitals.

C"Movements of movements" that integrate real-life and online communities, businesses, non-profit organizations, and traditional public associations, including religious movements. Notably, the Catholic Church is emerging as a global leader in the environmental agenda [Roewe, 2023], fostering collaboration among nations and businesses committed to tackling climate-related issues. Another impactful initiative is the United Nations' 17 Sustainable Development Goals, which has paved the way for alliances in impact investment, research and development partnerships, entrepreneurial collectives, and educational programs.

The role of a bridge builder holds both promise and vulnerability. While it offers the potential to secure the long-term future of one's community, it often demands significant resource allocation, sometimes at the expense of the builder's own well-being, for the greater common good. Considering this, is it advisable to approach this endeavor through the lens of "competition for the future"? Perhaps we should reconsider the role of bridge building not as a game of individual players, even individual nations, striving for leadership, but as an effort to establish a new global consensus — a planetary ecosystem that serves the interests of all groups, including the Global South and marginalized communities. Within this process, various "builders" can assume complementary roles to collectively achieve shared objectives of humanity.



YOUR ROLE	WHY YOU ARE IMPORTANT	WHAT YOU CAN DO
BUSINESS LEADERS, TECHNOLOGICAL ENTREPRENEURS, AND INVESTORS	Business leaders, entrepreneurs, and investors play a significant role in shaping the new economy and society, and the products and services offered by corporations and startups have a profound impact on our daily lives. Through your work, you have the power to inspire people to embrace new lifestyles, foster meaningful connections with others, and contribute to the creation of a more promising world.	•Prioritize universal wellbeing of your team, your clients and your business environment as one of the business goals. •(Re)design your products and business processes to align with NICE framework — especially digital ones! •Experiment with new forms of governance that employ collective (hybrid) intelligence & wisdom, decentralize leadership, and learn to cocreate and co-lead with your team and your ecosystem. •Invest in products & solutions within emerging economic sectors that embrace regenerative approach, promote human- and planet-centricity, and address challenges of the polycrisis. •Create inter-organizational networks and associations to support the rise of new economic sectors, including circular and regenerative economy, self-actualization and care-based economy. •Explore how your business can become part of global preventive security systems and create solutions to emerging global risks.
POLITICAL LEADERS	Political institutions are responsible for establishing the fundamental guidelines that govern societies, and the allocation of public resources determines the communal assets that benefit communities. You can influence and evolve this agenda, fostering political frameworks and models that better serve the needs of society.	•Promote universal being focused approaches instead of economy-centered ones in public decision making and reporting. •Design and promote frameworks (including financial incentives) that enable new economic opportunities and business models of human- and planet-centric economy. •Fight to reduce security budgets (especially military spending) and redirect funds to “preventive security” measures, cultivation of peace-based culture, and cocreation of the future with communities including diasporas. •Preserve, promote, and expand “deep democracy” models of political governance based on active citizen engagement. •Experiment with and promote empathy-based approaches to political governance. •Establish and promote frameworks that establish legal rights of non-human beings, including other species and natural systems.

YOUR ROLE	WHY YOU ARE IMPORTANT	WHAT YOU CAN DO
RESEARCHERS AND EDUCATORS	Education plays a pivotal role in shaping the future, and academic institutions, especially universities, hold the potential to serve as "future nurturing spaces". As educators and scholars, your engagement in continuous learning and knowledge creation within your community can generate the seeds from which the future can sprout and flourish.	•Promote programs that help students master skills of the future, including entrepreneurship and leadership skills, self-regulation, and empathy. •Experiment with new models of learning that convey values, mindsets, and protocols of thrivable society. •Facilitate organization of projects with your students and learning communities that prototype various technological, cultural, and environmental aspects of the future. •Conduct action research around various aspects of emerging future, and strategies of moving into desirable future scenarios. •Create tools and methods that help communities accelerate transition into desirable futures. •Cultivate collective (hybrid) intelligence & wisdom formats in your own work, and design methods for amplifying collective wisdom of communities. •Increase general public awareness about emerging future scenarios, including future literacies.
CIVIC AND RELIGIOUS ACTIVISTS	Non-governmental organizations — whether religious or secular — play a crucial role in advancing compassion and solidarity. They also serve as the primary driving forces behind movement building and the mobilization of individuals for positive action. Your organizations have the power to steer and facilitate this process, engaging people in the collaborative creation of a better future.	•Engage people in "future maker" movements that can promote culture of peace, planetizenship, and universal wellbeing. •Develop and spread collaborative formats and solutions that conform to NICE framework. •Create dialogical and collaborative formats between communities to promote trust and mutual understanding. •Explore connections between ancient & emerging wisdom traditions, and employ and spread practices that can increase self-awareness and love towards all beings.

YOUR ROLE	WHY YOU ARE IMPORTANT	WHAT YOU CAN DO
PUBLIC & CIVIC DIPLOMATS	The resolution of conflicts, the fostering of intercultural awareness and understanding, and the promotion of a universal culture of peace and planetizenship hinge on the efforts of both trained specialists and individuals driven to bridge cultures. Whether an expert of international collaboration or an avid traveler, you can play the role in uniting our world.	•Establish and promote dialogue between various cultures and human communities. •Facilitate intercultural collaboration of youth. •Promote opportunities and care for refugees, and help diasporas discover their role in "future making". •Address global challenges and security issues in your conversations and action, including "four thresholds" of livable futures. •Become the ambassador of the "culture of peace" and promote the idea of peaceful futures. •Advocate, promote and advance the planetizen perspective & culture. •Champion rights of humans & non-human beings.
CREATORS, ARTISTS & MEDIA	The creative arts serve as the source of inspiration, sparking collective imagination. As creators, you have the power to present captivating and motivational glimpses into the future, and you can create environments where radical visions of a better tomorrow can be imagined and brought to life.	•Explore and promote the new human dream by artistic & creative means. •Use science & art collaborations to experiment with and prototype possible futures. •Use art as a way to teach "skills of the future", including existential skills, and build up mental health & resilience of young generations. •Explore new languages and communication format for the emerging culture of the 22nd century. •Tell inspiring stories about people that bring future into being here and now.
EVERYONE	Each and every one of us is a stakeholder in the future. The desired future can only become a reality when we actively bring it to life through our own actions and choices.	•Make yourself aware about trends and processes that shape our collective futures. •Engage in online & offline forums and discussion groups where possible future of humanity and the planet is explored. •Connect with people that can become your role models and mentors in engaging with futures. •Start mastering "skills of the future". •Join volunteer groups, movements or civic initiatives of future cocreation. •Launch your own project and become a leader.

A CALL TO GAMECHANGERS, ALL OF US

As we peer into the next century's horizon, a blend of emotions washes over us — a mix of dread and fascination for the evolving landscape. Much like children, we yearn for the assurance of a happy conclusion to this tale. Yet, in all honesty, the ending of our story remains shrouded in uncertainty.

The accelerating "drama of transition" signals a profound narrative shift — our journey towards adulthood. Humanity faces grave challenges akin to initiatory trials, in the form of the multitude of crises — environmental, societal, technological, and spiritual. Emotions like loneliness, insecurity, and fear are part of this growth process, and we should live through them in order to grow up.

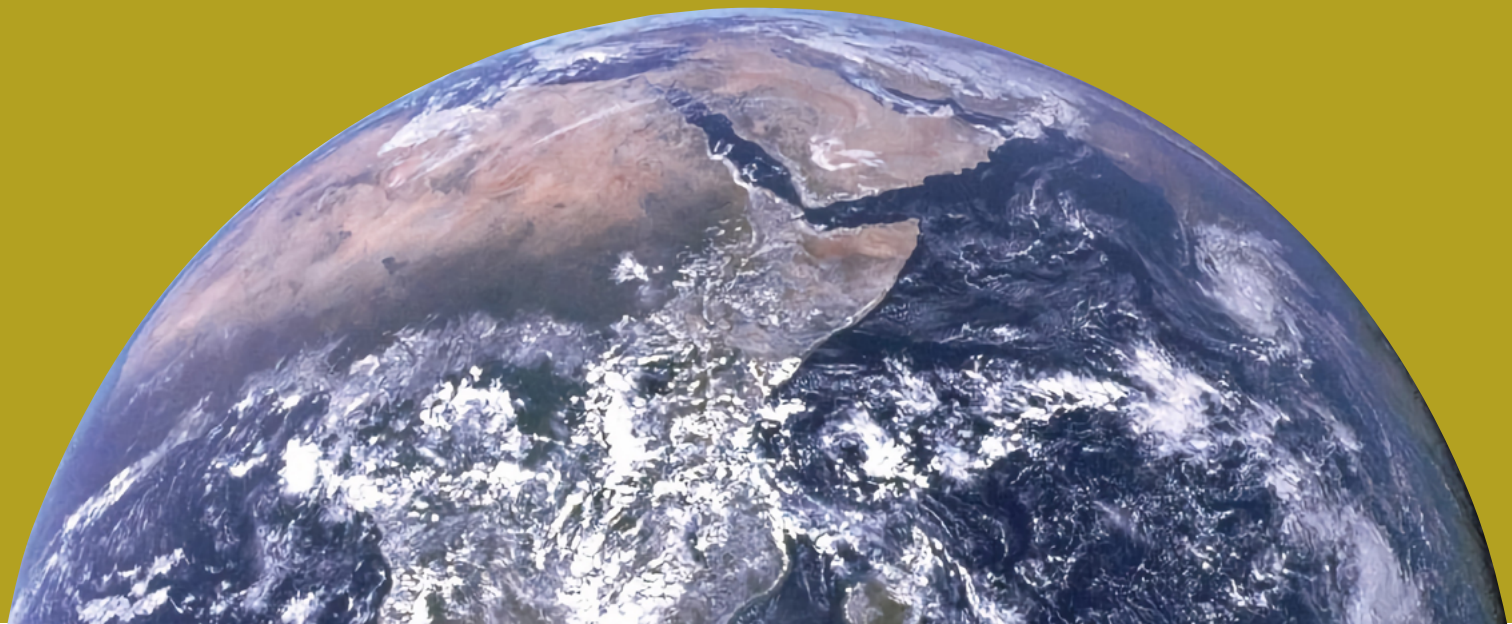
The conventional perspective assigns the task of shaping our collective future to prominent "big players" or "father figures", including national leaders, corporate heads, and founders of influential social movements, that are expected to address humanity's challenges. Should they fall short in their efforts, they are subjected to critique for shortsightedness, inconsistency, and indecisiveness.

Yet, the transformation of our civilization cannot be orchestrated by leaders alone. It is shaped through our everyday choices and actions. In the quest of attaining maturity, every individual, regardless of their age or social status, has the capacity and the responsibility to engage in the transition and become their own bridgeway to the future. Each of us is a stakeholder of the emerging future society, a shaper of the new rules of the game. However, we only become stakeholders if we perceive the task of global transition as a personal undertaking. It prompts us to alter our own behavior and actively seek pathways into the upcoming future: to live in harmony with our family and our neighbors, to serve our community, to improve our habitats, and to take care of other species and our planet.

> The future belongs to those who give the next generation reason for hope.
>
> Pierre Teilhard de Chardin

There are many things each of us can do — whether we are leaders. As the Lao Tzu saying goes, "A journey of a thousand miles begins with a single step." We can begin by participating in dialogues and discussions centered on future challenges, connecting with like-minded peers and role models. We can start acquiring "skills of the future" that help us become future proof. We can engage with volunteer initiatives and associations committed to reshaping our localities and nations. We can pioneer our own projects to bring change. And for those already in leadership roles within businesses, communities, or public sector, the scope for impact expands further, as they guide others toward that transformative future.

THE "NEW HUMAN DREAM" IS ALREADY HERE, AWAKENING THROUGH MYRIAD CONVERSATIONS, ARTISTIC EXPRESSIONS, AND POLITICAL DEBATES. IT WILL MANIFEST ITSELF ONLY IF WE COMBINE EFFORTS OF OUR MINDS, HEARTS, AND BODIES TO MATERIALIZE THIS VISION. THE FUTURE TRANSFORMS INTO THE PRESENT WHEN WE LIVE IT AND CARE ABOUT IT.





ABOUT THE AUTHOR

Pavel Luksha (born in 1977) is a global thinker, change catalyst, and facilitator working with systemic social innovations in education, business, social entrepreneurship, culture, and urban development. Pavel is the founder & director of Global Education Futures think-do tank, the Fellow of World Academy of Art & Science, and the co-founder of several international social movements, including The Weaving Lab and Living Cities: Earth.

Pavel is the co-author of the Rapid Foresight methodology used by thousands of futurists and practitioners in 20+ countries of the world. He created the Atlas of Emerging Jobs, one of the most detailed global compendiums of new and emerging jobs, that instigated systemic innovations in education systems of several emerging economies. He cofounded the program director of a globally unique Foresight Fleet, and a network pf "Boiling Point" future cocreation spaces with 120+ spaces across the former Soviet Union.

Pavel led the Peaceful Futures initiative, the Education group of Global Leadership for 21 Century initiative by UN Geneva Office, Transformation of Consciousness group of the Future Capital, co-led the Future Skills R&D Alliance of WorldSkills International, the BRICS Skills Development Working Group and advised International Labor Organization on Future Skills and Lifelong Learning. He also initiated and catalyzed NeuroNet initiative which has become the major R&D+i consortium in brain research and neural technologies.

Pavel teaches courses on future thinking, system thinking, collective intelligence, evolutionary & ecosystemic leadership, and personal resilience. He frequently gives talks and trainings on future of skills and education, as well as the future of energy, cities, transportation, agriculture, and more. He is the lead author of numerous Global Education Futures reports, including "Roadmap to Peaceful Futures" (2023), "Learning Ecosystems: An Emerging Praxis" (2020), "Future Skills for the 2020s: A New Hope" (2020), "Educational Ecosystems for Societal Transformation" (2018), "Future Skills: How to Thrive in a New Complex World" (2017), and "Global Education Futures Agenda" (2014). He has also published in multiple peer review journals on topics of system and evolutionary theory, strategic management theory, evolutionary economics, sociocybernetics, psychology, theory of self-reproduction, and more.

Pavel is an artist, a spiritual practitioner, and a passionate traveler. He is married and is a father of three daughters. He has a Samoyed dog and two cats. Currently he resides in Belgrade, Serbia.

The Next 100 Years

A BRIDGEWAY ACROSS THE DECISIVE CENTURY

GLOBAL EDUCATION FUTURES

UNIVERSITY FOR THE PLANET

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The Next 100 Years

A BRIDGEWAY ACROSS THE DECISIVE CENTURY



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