ce-manifesto-ch1-0425.docx

ce-ch2-risk-land-intro-0324-part1

ce-ch3-eco-overshoot-0324-part1

ce-ch4-hum-syst-0324-part1

latest-ce-ch5-nat-disaster-0525-part1

Chapter 6: Advanced Tech_ZAK_DRAFT

near-final-ce-ch7-violent-conflict-0324-part1

ce-ch8-two-attrct-threshold-0324-part1

Ch 4: Human Systems Failure

The biosphere-civilization relationship is facing an imminent transformation, resulting from structural misalignments between the design of civilization and the realities of the biophysical world. The underlying causes of ecological overshoot discussed in the previous chapter are aspects of the "architecture" of global civilization driving it towards the twin attractors of chaos and oppression. In addition to those contributing to the environmental crisis, there are several structural features of civilization which make it vulnerable to *human system failures*: (initially defined as) *the inability of safety-critical components of civilization to serve their basic purpose.*

When demand for a basic need (such as food, water, energy, shelter, security from violence) exceeds supply, this is a human system failure. Risks of this kind include energy grids in a blackout, food insufficiency, and overwhelmed medical systems and emergency responders. This category also includes the disruption and decay of essential social systems such as financial system collapse, corrupted courts, or congressional gridlock.

There are several fundamental systems in a civilization whose continuous operations are so basic and essential that they are often taken for granted, receding into the background of daily life[1]. A partial list may include e.g., water, energy, and food systems, material supply chains

[1] For a relatively exhaustive list of human systems, one may look to a list of federal institutions. For example, see Selin, Jennifer, L., and Lewis, David, E. *Sourcebook of United States Executive Agencies.* Administrative Conference of the United States, 2018.

such as in mining, manufacturing, waste management, shipping, and packaging, travel, communications, technology, emergency response systems, militaries, and legal, financial, and economic systems. Also included here are those institutional, cultural, and economic conditions necessary for guaranteeing basic rights and civil liberties, such as legal representation, freedom of speech, and access to political participation.

The components of civilization whose stated purpose is to prevent or mitigate catastrophic risks – government departments, IGOs, militaries, non-profits, corporations – are subject to failure from overwhelm, corruption, and decay. Under the strain of the metacrisis, systems required for the assurance of safety and the provision of basic needs and rights will be subject to several compounding pressures such as shortages of critical materials[2] and the inability to make sense of essential social issues – such as pandemics, environmental crises, and major geopolitical conflicts – due to information overwhelm, the degradation of trust in media, and escalations in culture wars.[3]

Civilization is not prepared to respond to the growing number of highly consequential threats, the rate at which we are approaching them, and the complexity of the overall situation[4]. The primary and defining concern of the metacrisis, therefore, is that this civilization will either be unable to prevent global catastrophe, or to do so power and control will centralize in an oppressive and dystopian fashion to manage an increasingly chaotic world. We consider both outcomes *human system failures* of different kinds.

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[2] Teer, J., and Bertolini, M. *Reaching breaking point: The semiconductor and critical raw material ecosystem at a time of great power rivalry.* The Hague Centre for Strategic Studies, 2022. https://hcss.nl/report/reaching-breaking-point-semiconductors-critical-raw-materials-great-power-rivalry/

[3] See the Consilience Papers.
Consilience Project. “Challenges to Making Sense of the 21st Century.” 2021. https://consilienceproject.org/challenges-to-making-sense-of-the-21st-century/
Consilience Project. “It's a MAD Information War.” 2021. https://consilienceproject.org/its-a-mad-information-war/
Consilience Project. “The End of Propaganda.” 2021. https://consilienceproject.org/the-end-of-propaganda/
Consilience Project. “An "Infodemic" Plaguing the Pandemic Response.” 2021. https://consilienceproject.org/an-infodemic-plaguing-the-pandemic-response/
A similar point was also made in Kavanagh, Jennifer, and Rich, Michael, D. “Truth Decay: An Initial Exploration of the Diminishing Role of Facts and Analysis in American Public Life.” RAND, 2018. https://www.rand.org/pubs/research_reports/RR2314.html

[4] This is discussed in the conclusion of this chapter as the “capacity crisis.” Also see Homer-Dixon, Thomas, *The Ingenuity Gap*. Vintage Canada, 2000.
Kegan, Robert. *In over our heads: The mental demands of modern life;* Harvard University Press, 1995.
Stein, Zak. *Education is the metacrisis. Why it’s time to see the planetary crisis as a species-wide learning opportunity.* Perspectiva Press, 2022.

By this definition, most (or all) of the risks discussed in this work could potentially be seen as human systems failures. Runaway ecological overshoot and threats from misused artificial intelligence are catastrophic insofar as they disrupt critical systems for ensuring safety, health and wellbeing, for example by leading to an inability to feed people or provide water, security, or medical care. Human systems failures are highlighted here as a distinct category in order to ensure comprehensiveness and to foreground certain classes of risk which are not necessarily covered elsewhere. In the sections which follow, we elaborate on the various components of civilization subject to failure and identify how human systems failures could be globally catastrophic or potentially lead to global civilizational collapse.

Human system failures vary in scale and severity[5]. Some are mere disruptions and can be responded to relatively quickly. Others can cascade with global consequences. Others still may offer the possibility of recovery but where multiple systems failures have cumulative effects which result in an ultimately, weaker, less adaptive civilization. We will look at a variety of such system failures, highlighting the most instructive aspects of this category, and foregrounding the historical novelty of risks to the human built world in the context of the metacrisis.

The Civilizational Complex

It was mentioned in chapter one that the basic dynamics of civilizations unfold within superstructures (values, beliefs, and worldviews), social structures (governance, economies, institutions), and infrastructures (technologies and material supplies). This simple three-part model (see Figure 1) has been used by several generations of social theorists to describe the different components of civilization. We are borrowing and refitting it for our purposes. It is elaborated upon below and will be referred to throughout the remainder of the book.[6]

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[5] See for example, the three distinct but complementary discussions on global catastrophic risks from Liu, Hin-Yan, Lauta, Kristian, C., and Maas, Matthjis, M. “Governing Boring Apocalypses: A new typology of existential vulnerabilities and exposures for existential risk research.” *Futures*, 102, (2018):6–19. https://doi.org/10.1016/j.futures.2018.04.009
Bostrom, Nick. “The Vulnerable World Hypothesis.” *Global Policy*, 10(4), (2019):455–476. https://doi.org/10.1111/1758-5899.12718
Manheim, D. “The Fragile World Hypothesis: Complexity, Fragility, and Systemic Existential Risk.” *Futures*, (2020):122. https://doi.org/10.1016/j.futures.2020.102570

[6] One of the primary formulations of this model that we are using with significant revisions is from: Harris, Marvin. *Cultural materialism: The struggle for a science of culture.* New York: Random House, 1979.

To begin, there is ***infrastructure***, those aspects of civilization involving physical technology deployed to meet human needs. Here occurs the transformations of energy and matter into things valued by humans. This includes aspects of civilization such as agriculture, energy, supply chains, water and sewage systems, transportation systems, waste management, military installations, communications networks, and so on. Infrastructure has changed overtime from sailing ships to spaceships, fire to fission. An exhaustive list of infrastructural components would be evolving daily in relation to the existing technology stack and materials economy innovations.

Deeply interconnected with infrastructures are structures that enable the coordination of people and collective choice making at all scales, including bureaucratic mechanisms of social integration, legal codes, economic incentives, governance processes, and contracts. ***Social Structures*** can be thought of as formal institutions like those employed for finance, economics, business, law, and governance. These are the evolving set of protocols by which we coordinate their behaviors, codify agreements, constrain disagreements, and integrate actions to achieve goals.

Interwoven with social- and infra- are ***superstructures***: those aspects of human social life involved in the creation and maintenance of cultures, belief systems, mindsets, values, and sense of identity. They form the basis of cultural epochs, philosophical and scientific worldviews, ideologies, and qualities of consciousness that characterize a civilization. Herein lies the processes of shared dialogue and enculturation which shape a population's answers to questions of truth, goodness, and beauty. Superstructures provide meaning to the individuals living within a civilization, and explain, justify (or critique) the world around them. As used here, superstructures include beliefs about what humans should value, in principle, as well as the behaviors that demonstrate what they actually value, in practice.

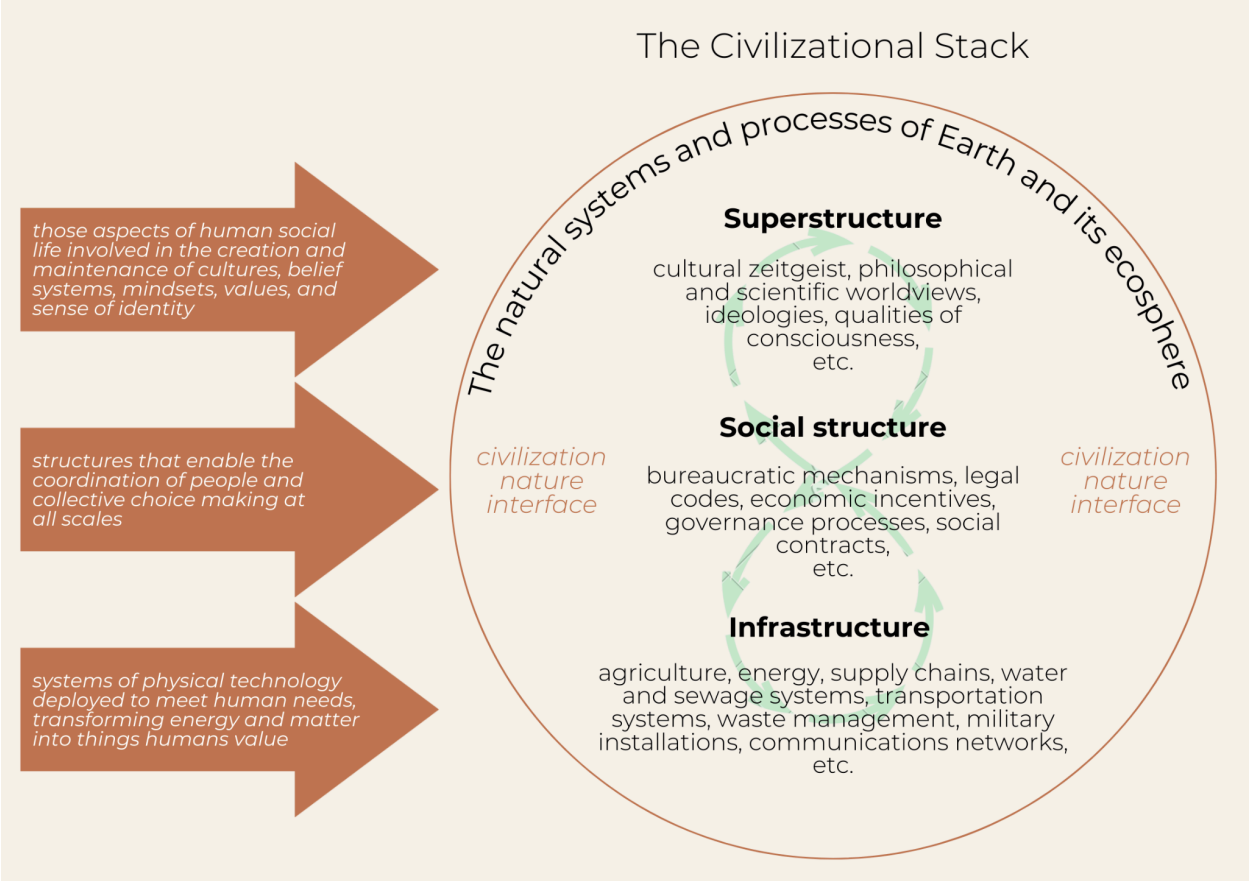

Figure 1

In discussions of global catastrophic risk, large-scale infrastructural failures – such as nation-wide blackouts or disruption in supply of essential commodities like grains and medical supplies – appear as the most obvious, existentially decisive category. Critical infrastructure failure can directly lead to mass starvation and the inability to receive medical care.[7]

As put forth here, however, the various layers of civilization are seen as necessarily interacting and co-influencing. Infrastructure, social structure, and superstructure are unique but simultaneously interconnected components of the architecture of civilization (which is itself embedded in and dependent upon the biosphere). In the previous chapter, for example,

[7] For instance, the International Energy Agency wrote, “The potential indirect impacts of blackouts … include: transport disruption (the unavailability of trains and charging stations for electric vehicles), food safety issues (risk to the cold chain), problems related to public order (crime and riots), and loss of economic activity.”
IEA. *Power Systems in Transition*. 2020. https://www.iea.org/reports/power-systems-in-transition

civilization was shown to be accelerating beyond planetary boundaries as a natural consequence of international financial systems requiring exponential growth (*social structure*) while operating on a linear materials economy with increasingly powerful industrial technologies (*infrastructure*). Simultaneously present but not mentioned were the memes and worldviews used to justify such endless growth, to reduce the value of nature to simple economic metrics, and to support humans' belief in their separation from, entitlement to, and superiority over the biosphere (*superstructure*)[8].

The social- and superstructural components of a civilization can be critical driving factors of catastrophic risk without necessarily being the direct cause of catastrophe on their own. Financial system failures, institutional decay and dysfunction, and increases in wealth inequality, for example (all social structural problems) are historical precursors to civil and inter-state war. Also consider how cultural conflict, political polarization, and the degradation of public discourse (superstructural failures) have made it nearly impossible to agree on the basic realities of a long and growing list of consequential issues like Covid, AI, and the state of the biosphere[9]. The inability to make sense of the world makes every other risk more difficult to address.

The metacrisis involves interactions between these layers of civilization: the misuse and abuse of increasingly powerful technologies (infrastructure) driven by a combination of misaligned economic incentives enabled by overwhelmed or oppressive governments (social structure), which are sourced in outdated or distorted worldviews and philosophies of life (superstructure). For this chapter, however, a comprehensive analysis of risk dynamics across these layers is beyond scope. The model has been introduced here to frame the following discussion on human systems, and to provide insight into the extent of the consideration required to

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[8] Morrison, Leanne, J., Wilmshurst, Trevor, and Shimeld, Sonia. "Counting nature: Some implications of quantifying environmental issues in corporate reports." *Meditari Accountancy Research*, 31(4), (2022):912–937 https://doi.org/10.1108/MEDAR-09-2020-1023
Gunton, Richard, M., Asperen, Eline, N. van, and Basden, Andrew et al. "Beyond Ecosystem Services: Valuing the Invaluable." *Trends in Ecology & Evolution*, 32(4), (2017):249–257. https://doi.org/10.1016/j.tree.2017.01.002
Salles, Jean-Michel. "Valuing biodiversity and ecosystem services: Why put economic values on Nature?" *Comptes Rendus. Biologies*, 334(5–6), (2011):469–482. https://doi.org/10.1016/j.crvi.2011.03.008

[9] See the Consilience Papers.
Consilience Project. "Challenges to Making Sense of the 21st Century." 2021. https://consilienceproject.org/challenges-to-making-sense-of-the-21st-century/
Consilience Project. "It's a MAD Information War." 2021. https://consilienceproject.org/its-a-mad-information-war/
Consilience Project. "An "Infodemic" Plaguing the Pandemic Response." 2021. https://consilienceproject.org/an-infodemic-plaguing-the-pandemic-response/

comprehensively understand civilization. For clarity of presentation, moving forward we will tend to use more common terms to refer to the various layers such as culture or worldview (superstructure), political-economy (social-structure), and technology (infrastructure).

Cascading Failure and Civilization Collapse

The primary focus of this category is the risk of global system failures which could fundamentally interrupt the base operations of civilization, undermining the conditions required for its continued existence. This has been discussed elsewhere in the field of "collapse studies."[10] Past civilizations, such as the Romans, the Mayans, or the Mesopotamians, have collapsed due to gradual or sudden *cascading failures,* where shocks and dysfunction in some systems lead to failure in others, creating an accelerating and escalating domino effect. This involves the

[10] Brozovic, Danilo. "Societal collapse: a literature review." *Futures*, 145, (2023): https://doi.org/10.1016/j.futures.2022.103075 ;
Quigley, Carroll. *The Evolution of Civilizations: An Introduction to Historical Analysis.* Textbook Publishers, 2003.
Tainter, Joseph. *Collapse of Complex Societies.* Cambridge University Press, 1988.
Centeno, Miguel, Callahan, Peter, Larcey Paul, and Patterson, Thayer, eds. *How Worlds Collapse: What History, Systems, and Complexity Can Teach Us About Our Modern World and Fragile Future.* Routledge, 2023.
Storey, Rebecca, and Storey, Glenn, R. *Rome and the Classic Maya - Comparing the Slow Collapse of Civilizations.* Routledge, 2017.
Homer-Dixon, Thomas. *The Upside of Down - Catastrophe, Creativity, and The Renewal of Civilization.* Island Press, 2008.
Burja, Samo. *Why Civilizations Collapse*. Palladium, 2024. https://www.palladiummag.com/2024/03/08/why-civilizations-collapse
Diamond, Jared. *Collapse: How Societies Choose to Fail or Succeed*. Viking Press, 2005.
Yoffee, Norman, and Cowgill, George, L. *The Collapse of Ancient States and Civilizations.* University of Arizona Press, 1988.
Brunk, Gregory, G. "Why Do Societies Collapse?: A Theory Based on Self-Organized Criticality." *Journal of Theoretical Politics. 14*(2), (2002):195-230. https://doi.org/10.1177/095169280201400203
McAnany, Patricia, A., and Yoffee, Norman, eds. *Questioning Collapse. Human Resilience, Ecological Vulnerability, and the Aftermath of Empire.* Cambridge University Press, 2009.
Schwartz, Glenn, M., and Nichols, John, J., eds. *After Collapse: The Regeneration of Complex Societies*. University of Arizona Press, 2006.
Faulseit, Ronald, K. eds. *Beyond Collapse: Archeological Perspectives on Resilience, Revitalization, and Transformation in Complex Societies*. Southern Illinois University Press, 2016.
Middleton, Guy, D. *Understanding Collapse.* Cambridge University Press, 2017.
Turchin, Peter, Whitehouse, Harvey, and Gavrilets, Sergey, et al. "Disentangling the evolutionary drivers of social complexity: A comprehensive test of hypotheses." *Sci. Adv.* **8**, (2022):eabn3517. doi:10.1126/sciadv.abn3517

co-occurring, concatenating breakdown of many civilizational subsystems, such as those of critical infrastructure, legal and financial institutions, and cultural cohesion.

For example, as Rome expanded, the cost and complexity of maintaining the empire grew with it, but there was a point when the profits drawn from internal economic production and external conquest decreased.[11] Returns to the middle and lower classes dwindled but taxes increased.[12] The currency was debased, inflation was rampant.[13] Popular discontent rose. Government leaders changed frequently. The citizens often couldn't keep up with who the emperor was at a given time.[14] The culture was characterized more by mistrust than support for the empire. Barbarian invasions were, at first, manageable, but by the end of the Empire, many citizens fought with the barbarians, rather than with the Romans.[15] Eventually, the empire was overwhelmed by compounding crises and collapsed[16].

Countless volumes have been written on the collapse of Rome, so this is necessarily a vast oversimplification. What is relevant for our purposes here, however, is a basic pattern in collapse dynamics, which we'll see is also applicable to the metacrisis: civilizations have life-cycles[17]. They have periods of growth and increasing complexity, and eventually, decline. At a certain point the civilization becomes more complex than is easily manageable, and it begins

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[11] Hammond, Mason. "Economic Stagnation in the Early Roman Empire." *The Journal of Economic History,* Volume 6, supplement S1, (1946):pp. 63 - 90. https://doi.org/10.1017/S0022050700052918
Jones, A. H. M. *The Roman Economy: Studies in Ancient Economic and Administrative History. Basil Blackwell.* Oxford,1974.

[12] Boak, Arthur, E. R. *Manpower Shortage and the Fall of the Roman Empire in the West. University of Michigan Press.* Ann Arbor, 1955.

[13] Jones, A. H. M. *The Later Roman Empire, 284-602: a Social, Economic and Administrative Survey. University of Oklahoma Press.* Norman, 1964.
Levy, Jean-Philippe. *The Economic Life of the Ancient World (translated by John G. Biram). University of Chicago Press.* Chicago, 1967.
MacMullen, Ramsey. *Roman Government's Response to Crisis, A.D. 235-337. Yale University Press.* New Haven and London, 1976.
Mattingly, Harold. *Roman Coins (second edition).* Quadrangle, Chicago, 1960.

[14] MacMullen, Ramsey *Roman Government's Response to Crisis, A.D. 235-337. Yale University Press.* New Haven and London, 1976.
Clough, Shephard B. *The Rise and Fall of Civilization.* McGraw-Hill, New York, 1951.
Boak, Arthur E. R. *Manpower Shortage and the Fall of the Roman Empire in the West. University of Michigan Press.* Ann Arbor, 1955.

[15] Mazzarino, Santo. *The End of the Ancient World (translated by George Holmes).* Faber and Faber, London, 1966.
https://utppublishing.com/doi/pdf/10.3138/flor.2.004

[16] For example, see Quigley, Carroll. *The Evolution of Civilizations: An Introduction to Historical Analysis.* Textbook Publishers, 2003.
Tainter, Joseph. *Collapse of Complex Societies.* Cambridge University Press, 1988.

[17] Ibid.

to decay. The costs of operating the civilization increase, but the returns slow (ie., diminishing marginal returns). There is increased corruption, institutional overwhelm, popular discontent, and an inability to respond to a growing list of challenges.

As mentioned in the first chapter, civilizational growth followed by collapse has largely been the rule, rather than the exception. Vast, complex empires have succumbed to disorder and dissolution as their infrastructures decayed and bureaucracies corrupted, leaving the civilization as a whole more vulnerable to famines, pandemics, storms, crime, invaders, uprisings, and civil war. Even the most successful and sophisticated civilizations transitioned from their phases of growth and prosperity into periods of decay, decline, and destruction. It is a recurring pattern for the once functional organs of a society to grow old, become brittle, and fail to adapt to environmental changes such as ecosystem degradation[18], increases or decreases in population, enemy advancements, or disruptive technologies.

Civilizations can collapse in a variety of ways. Some fall rapidly and suddenly, in a fit of decadent destruction. These shocking and violent examples are typically the source of our popular images of collapse; the sack of the city and the burning of the capital, as depicted in artwork, stories, and films. Of equal importance, however, is the process of slow decay. The boring apocalypse as it were[19]. States and civilizations can die of old age, where the precise cause of death may appear unclear and the harms are cumulative and hidden.

Social scientists (such as archaeologists, anthropologists, and historians) have identified several possible causes of civilizational collapse which can potentially explain the failures of many different civilizations[20]. One such example is increasing wealth inequality in the context of

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[18] Chew, Sing, C. *World Ecological Degradation: Accumulation, Urbanization, and Deforestation, 3000 B.C.-A.D. 2000.* Rowman Altamira, 2001.
Diamond, Jared. "Ecological Collapses of Past Civilizations." *Proceedings of the American Philosophical Society,* 138(3), (1994):363–370. https://www.jstor.org/stable/986741
Ponting, Clive. *A New Green History of the World: The Environment and the Collapse of Great Civilizations.* Random House, 2007.

[19] Liu, Hin-Yan, Lauta, Kristian, C., and Maas, Matthjis, M. "Governing Boring Apocalypses: A new typology of existential vulnerabilities and exposures for existential risk research." *Futures*, 102, (2018):6–19. https://doi.org/10.1016/j.futures.2018.04.009

[20] See
Middleton, G.D. (2024) 'Collapse Studies in Archaeology from 2012 to 2023', Journal of Archaeological Research. https://doi.org/10.1007/s10814-024-09196-4.
Brozović, D. (2023) 'Societal collapse: A literature review', Futures, 145, p. 103075. https://doi.org/10.1016/j.futures.2022.103075.
And the work of Peter Turchin: Turchin, Peter. *Historical Dynamics: Why States Rise and Fall.* Princeton University Press, 2003.

diminishing resources. Scarcity increases competition between political elites. Instead of acting on the basis of a shared worldview for how civilization should run, there is bitter disagreement and conflict. The lower and middle classes are then rallied as support bases for competing causes, which inevitably leads to political gridlock, civil uprisings, and other systemic failures.

By identifying such patterns, prominent social theorists have made compelling arguments that Rome collapsed for similar reasons to the Mayan empire, and that the US Civil War shared similar causes to the Taiping Rebellion (both of which may share features with the escalation of political conflict in Western states today)[21]. This chapter won't include a detailed discussion of these dynamics, and as a result, there may be a sense of incompleteness to our discussion until later in the book in Part two. For now, what is worth keeping in mind is that ***many of the dynamics which have led to the rise and fall of past civilizations are still present today.***

The critical difference is that now there is essentially only one, inescapably global civilization. Many apparently separate nations and cultures have been unified by an intricate and evolving web of communications, transportation, trade, weapons technologies, military agreements, and international law. Of course, the failure of one nation does not inevitably lead to the failure of all others,[22] but there are now global systems – such as international agricultural supply chains, transnational financial institutions and corporations, transoceanic cables, networks of orbiting satellites, and nuclear weapons installations – whose functioning affects the fates of all humans and in some cases all life on earth.

Past civilizations did not critically depend upon one another for their basic functioning as much as we do today[23]. Collapse in one did not rapidly cascade into the collapse of others on other continents. But as humanity advanced through the major phases of industrialization, and then the development of nuclear and digital technologies, the fates of every member of the human species (and the biosphere) became increasingly entangled. Cascading failures across planetary-scale systems now pose global catastrophic risks. Where famines and pandemics

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Turchin, Peter, and Nefedov, Sergey, A. *Secular Cycles*. Princeton University Press, 2009.
Turchin, Peter. *End Times: Elites, Counter-Elites, and the Path of Political Disintegration*. Random House, 2023.

[21] Turchin, Peter. *End Times*. Penguin Press, 2023.

[22] A recent, notable example here being the fall of the Soviet Union.

[23] For one overview of the process of global integration, see Grinin, Leonid, and Korotayev, Andrey V. "Origins of Globalization in the Framework of the Afroeurasian World-System History." *Journal of Globalization Studies* 5, 1, (2014):32-64.
https://www.sociostudies.org/journal/files/jogs/2014_1/032-064.pdf

used to be localized to one regional civilization, potentials now exist for globally catastrophic events (e.g., billions of people dying of starvation, a global pandemic, etc.). In its most extreme form, this would threaten the collapse of the world system (and possibly the biosphere) as a whole.

Beyond the rare, but very real, potential for imminent world system shutdown, human system failures can have a range of global consequences in a global civilization. For example, there is the possibility of a crisis, such as a pandemic, increasing oppressive regimes around the world. Crises often also lead to increasing wealth consolidation and inequality. Moreover, relatively small (not globally catastrophic) human system failures can continuously increase the cost of operating civilization, for example, through increases in debt, cost of living, and inflation. Cumulatively, this can eventually reach a point of unmanageability and widespread fragility, creating a massive house of cards upon which we all depend, requiring only a slight tremor to collapse.

The Emergence of Global Civilization

In the 20th century humanity reached a critical point, where the historical precedent of there being "separate" civilizations was largely eclipsed.[24] What we call *global civilization* is unlike any of its predecessors; itself being composed of several national and cultural blocs who appear to be functionally independent civilizations. However, today all nations are inescapably linked, despite their apparent separation by borders, language, and custom, the prevalence of conflicts and contradictions between their respective ideologies and political economies, and their seemingly separate material infrastructures.

For most of history, distinct civilizations such as those in Asia, Africa, and the Middle East, were interconnected. Complex, multi-continent trade networks, such as the silk-road, have existed for thousands of years[25]. For those traveling hundreds of miles for salt and other resources, these systems of trade were likely seen as essential. However, when trade failed, it was often possible

[24] As we'll see, this is an argument about the now inescapable interdependence of all humanity. Everyone has become mutually dependent upon systems that are intrinsically global in nature. For added nuance on this point see the competing concept of the "civilizational state" – e.g., in Maçães, Bruno. *The Attack of the Civilizational State.* 2020. https://www.noemamag.com/the-attack-of-the-civilization-state/ and Coker, Christopher. *The Rise of the Civilizational State.* John Wiley & Sons, 2019.
[25] Frankopan, Peter. *The Silk Roads: A New History of the World.* Bloomsbury, 2016.

for local systems (such as those involved in agriculture, water, and energy) to endure without a great deal of importing and coordination with other civilizations. Increasing trade and access to other resources was deeply valued, but not always an immediate, existential necessity.

Eventually, due to increases in trade and technology (for example, industrialization, telegraph, electricity, nuclear, and eventually computers and the internet), there was a shift to true interdependence. It is now commonplace for satisfaction of basic needs to genuinely depend upon complex systems of coordination spanning six continents. Here is where the concept of "separate civilizations" begins to lose credence.

One critical moment in this history was the creation of nuclear weapons, a rather sudden and decisive factor in unifying global civilization[26]. Splitting the atom was the first moment in history where humanity truly was subject to the shared fate of self-induced extinction. Prior to this there were no choices any humans could make, or systems which could fail, that would lead to the collapse of all civilizations and the death of all humans. The potential for a globally shared catastrophe essentially unified civilization. For the first time, our survival depended upon coordinated behavior between nuclear armed nations.

The advent of atomic energy was followed by deliberate attempts at economic globalization, for example, through the creation of the Global Agreement on Trades and Tariffs (GATT, later renamed the World Trade Organization, WTO), the International Monetary Fund (IMF), and the World Bank[27]. This accelerated the historical process of global economic integration present from the Silk Road to European colonization. The post-war period was marked by a radical increase in the structural dependencies and mutual influence between all nations and all peoples, effectively creating a global civilization.

There are now several interlocking global systems whose sound operation (or lack thereof) has implications for everyone on earth: energy, food, nuclear energy and defense, space-based satellites, aviation and transportation, telecommunications and cyber-infrastructure, international trade and finance. Also included here are supply chains for essential resources and

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[26] See Masters, Dexter, and Way, Katherine, eds. *One World or None: A Report to the Public on the Full Meaning of the Atomic Bomb*. New York: Whittlesey House, McGraw-Hill, 1946. This was a collaborative monograph on the implications of nuclear technology from leading scientists involved in its creation.
[27] Steil, Benn. *The Battle of Bretton Woods*. Princeton University Press, 2013.
Irwin, Doulgas, Mavroidis, Petros, and Sykes, Alan. *The Genesis of the GATT.* Cambridge University Press, 2008.

commodities spanning multiple continents like oil, natural gas, grains, metals, medicine, semiconductors, smartphones, and more.

Many of us depend on systems which are thousands of miles away to satisfy our basic needs. For example, around 74% of the facilities that produce active pharmaceutical ingredients used in the United States are imported from outside of the country.[28] Healthcare is inherently a product of global civilization. This is often also true for other essentials like food and water. For those living in water-scarce countries such as Greece, Italy, Spain, Libya, Yemen, or Mexico, for example, somewhere between 25-50% of the water consumed (mostly via food and other products which require water in the production process) may depend on import.[29] The systems we use to meet our core needs (e.g., food, water, medicine) are increasingly spread across the globe, for better and for worse.

Then there are complex goods such as smartphones, satellites, engines, and energy infrastructure, which are deeply integrated into our day-to-day lives, are somewhat inseparable from how we meet our basic needs, all of which have manufacturing processes involving multiple nations. For example, a solar panel assembled in China might be designed by engineers in the United States, using cobalt sourced from the Democratic Republic of Congo (DRC) and semiconductors manufactured in Taiwan. Around 70% of international trade is of this kind, requiring coordination across multiple continents for a finished product.[30]

Increasing economic interdependence occurs in lock-step with a corresponding trend of increasing technological dependence. Today's global civilization is interwoven with a vast and evolving network of technologies like smart devices, sensors, satellites, underwater data-centers, and large GPU clusters[31]. Modern nations depend upon sophisticated technologies for their basic functioning. Nearly all critical global systems (weapons, food,

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[28] Savoy, Conor, M., and Ramanujam, Sundar, R. *Diversifying Supply Chains: The Role of Developmental Assistance and Other Official Finance.* Center for Strategic and International Studies, 2022. https://www.csis.org/analysis/diversifying-supply-chains-role-development-assistance-and-other-official-finance

[29] Hoekstra, Arjen, Y., and Mekonnen, Mesfin, M. "The water footprint of humanity." *Proc. Nat. Academy of Sciences,* 109 (9) (2012):3232-3237. https://doi.org/10.1073/pnas.1109936109

[30] OECD. *Global value and supply chains.* Accessed June 12, 2025. https://www.oecd.org/en/topics/policy-issues/global-value-and-supply-chains.html

[31] Bratton, Benjamin, H. *The Stack - On Software and Sovereignty*. MIT Press, 2016.

finance, transportation, security, healthcare, energy, media, etc.) employ advanced technical infrastructure which can only be built through multi-continent supply chains.

At present, there are very few complex technological products such as smartphones, solar panels, and satellites whose supply chains live within a single nation. In some cases, these are technologies which are potentially essential for ensuring a safe and sustainable future for the species. Renewable energy technologies are one such example. They depend upon a suite of metals and minerals such as cobalt, manganese, nickel, and various other base metals and rare earth elements. All of which are usually sourced outside of the nation seeking to use them. For example, 70% of the world's cobalt is mined in the Democratic Republic of Congo,[32] 85% of the global supply of refined rare earth metals is produced by China, and 94% of the unrefined rare earth metals are also owned by them .[33]

Despite the reality of nation-state sovereignty, national independence is, to a certain extent, an illusion – an otherwise convincing distraction from the inescapable reality of the entanglement of all humanity. This civilization must be thought of as global due to both the possibility of self-induced extinction and the inherently global nature of how humans are meeting their needs. As we'll see this has significant implications for all approaches to civilizational analysis, public policy, and any efforts to navigate the metacrisis.

The Precarity of Global Civilization

The coupling of global systems to one another by means of trade, and digital integration has vastly minimized the constraints of time and space which once separated past civilizations. This has, in some ways, raised global standards of living[34], and allowed for near instant

[32] Campbell, John. *Why Cobalt Mining in the DRC Needs Urgent Attention.* Council on Foreign Relations, 2020. https://www.cfr.org/blog/why-cobalt-mining-drc-needs-urgent-attention
[33] Yao, Xianbin. *China Is Moving Rapidly Up the Rare Earth Value Chain.* Marsh McLennan, 2022. https://www.brinknews.com/china-is-moving-rapidly-up-the-rare-earth-value-chain/
U.S. Department of Energy. *Report on Rare Earth Elements from Coal and Coal Byproducts.* 2017. https://www.energy.gov/fecm/articles/rare-earth-elements-report-congress
[34] The question of how civilization has raised standards of living and for whom is a topic CRI has considered at length elsewhere: Consilience Project. "Development in Progress." 2024. https://consilienceproject.org/development-in-progress/

communication, live streaming, and *just-in-time* delivery. But with these victories have come several problems. For example, they created the conditions for once local crises to cascade globally, as evidenced by events like the rapid spread of Covid-19 and the near immediate supply-chain disruptions following the Ukraine war. In a deeply interdependent world, failures anywhere can become failures everywhere.

In addition to the immediate impacts of these events were the *second and third order effects* felt around the world. For example, Covid-19 was followed by the collapse of small businesses, increased food and employment insecurity, growing distrust in public institutions and escalating cultural conflict, disruption in education, increases in cost of living, inflation, wealth consolidation and exacerbating inequality[35]. These effects did more damage than indicated by the direct death tolls alone. An additional 97 million people were living in extreme poverty as a result of Covid-19, for example[36]. At the same time as much of the population was driven into increasingly desolate living conditions, massive economic returns were falling to the world's wealthiest. It's estimated that since 2020, the richest 1% accumulated close to two-thirds of all

[35] The World Bank. *COVID-19 Dealt a Historic Blow to Poverty Reduction.* 2022. https://www.worldbank.org/en/news/immersive-story/2022/10/05/covid-19-dealt-a-historic-blow-to-poverty-reduction
World Health Organization. *Impact of COVID-19 on people's livelihoods, their health and our food systems.* 2020. https://www.who.int/news/item/13-10-2020-impact-of-covid-19-on-people's-livelihoods-their-health-and-our-food-systems
Orkun, S. *The political scar of epidemics: why COVID-19 is eroding young people's trust in their leaders.* The London School of Economics and Political Science, 2021. https://www.lse.ac.uk/research/research-for-the-world/politics/the-political-scar-of-epidemics-why-covid-19-is-eroding-young-peoples-trust-in-their-leaders-and-political-institutions ;
Harvard Graduate School of Education. *New Data show How the Pandemic Affected Learning Across Whole Communities.* 2023. https://www.gse.harvard.edu/ideas/news/23/05/new-data-show-how-pandemic-affected-learning-across-whole-communities ;
May Sidik, S. *How COVID has deepened inequality - in six stark graphics.* Nature, 2022. https://www.nature.com/immersive/d41586-022-01647-6/index.html
[36] United Nations Office for Disaster Risk Reduction. *Global Assessment Report on Disaster Risk Reduction. Our World at Risk: Transforming Governance for a Resilient Future*. 2022. https://www.undrr.org/gar/gar2022-our-world-risk-gar

new wealth created globally.[37] Billionaires amassed over $3 trillion USD. The five richest men in the world doubled their wealth and are now worth more than 800 billion USD. [38]

These are examples of the “boring apocalypse.” Here cascading system failures are not necessarily globally catastrophic, nor do they lead to civilization collapse, but they do steadily increase the cost of operating civilization and displace the brunt of the harm to more vulnerable populations. Over time this lowers quality of life for those most affected, sows popular discontent, and degrades the ability of civilization to respond to emerging challenges later down the line. It is much easier to focus on one, easily observable dimension of a crisis, such as its immediate death toll. But cumulative decay is death by 1000 cuts, the product of thousands of variables, distributed across regions and jurisdictions, only observable given dedicated interdisciplinary study. Civilizational decay is the silent killer, which does not always receive the attention it is due in conversations of risk, because it is slower moving and harder to see.

Many discussions of global risk focus on threats from system failure that could cause planetary-scale catastrophes, collapse, or even extinction. Such dramatic events are real possibilities. There are *single points of failure* in systems whose functioning has an outsized influence on civilization and whose failure would be massively consequential and potentially very difficult to recover from.

Mistakes and mismanagement of nuclear systems are one clear example. Nuclear weapon systems can be quite difficult to manage and are not immune from technical malfunction. Throughout the Cold War there were thousands of “*broken arrow events*” which are where nuclear systems significantly malfunction[39]. For example, both the US’ and the USSR’s missile

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[37] Oxfam. *Survival of the Richest: How we must tax the super rich now to fight inequality.* 2023. https://oxfamilibrary.openrepository.com/bitstream/handle/10546/621477/bp-survival-of-the-richest-160123-en.pdf
Bhandari, A. *World Inequality Report 2022.* Reuters, 2021. https://www.reuters.com/graphics/GLOBAL-ECONOMY/BILLIONAIRES/klvyknddqgvg/wealth-inequalty_wealth.jpg https://wir2022.wid.world/

[38] Oxfam International. *Inequality Inc. How corporate power divides our world and the need for a new era of public action.* 2024. https://policy-practice.oxfam.org/resources/inequality-inc-how-corporate-power-divides-our-world-and-the-need-for-a-new-era-621583/

[39] Schlosser, Eric. *Command and control: nuclear weapons, the Damascus Accident, and the illusion of safety.* New York, N.Y., Penguin Books, 2014.
Conn, Ariel. *Accidental Nuclear War: Timeline of Close Calls*. Future of Life Institute, 2016. https://futureoflife.org/resource/nuclear-close-calls-a-timeline/

defense systems falsely warned military officials of imminent nuclear strikes by the other side. The fate of the species (and possibly the biosphere) was placed into the hands of individual humans under duress, forced to make hasty decisions on the basis of faulty information. Civilization has taken a shape where it is now somewhat normal for the fates of billions to become the responsibility of a few.

Near-single points of failure also exist in critical supply chains. Taiwan, for instance, is the world's largest semiconductor manufacturer and provides nearly 60% of the world's chips, 90% of the most advanced ones[40]. Their flagship manufacturer, Taiwan Semiconductor Manufacturing Company (TSMC), is highly regarded as one of the most reliable, effective, and efficient manufacturing companies in the world. Their outsized portion of the market was not a conscious design choice collectively made by a global civilization seeking to create the most resilient semiconductor supply chain. Rather, it is a reflection of TSMC's asymmetric capabilities as a company in a highly competitive sector.

TSMC's success is also widely understood to be a grave source of risk. Concentrating that much of the world's manufacturing capability in one place, in a sector that is fundamental to the success of almost every other industry and every nation, creates a major vulnerability to cascading system failure and radically escalates tensions amongst competing geopolitical powers. The sudden disruption of TSMC's operations, for any reason, including extreme weather events or geopolitical conflict, would undermine our world systems' expectation of continued growth and technological advancement. Our civilization depends upon an increasing supply of semiconductors, both from the desire to upgrade towards more advanced systems but also the need to replace degraded chips. Failure of TSMC would therefore be a major disruption to the basic operations of civilization, likely ushering in a major financial crisis and drastically shifting the landscape of power.

One way to frame the issue here is in terms of tradeoffs between efficiency and resilience, which are well known by system designers[41]. Resilient systems are able to respond, adapt, and preserve or transform themselves in the face of novel challenges and pressures. This is, in part,

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[40] Sacks, David. *Will China's Reliance on Taiwanese Chips Prevent a War?* Council for Foreign Relations, 2023. https://www.cfr.org/blog/will-chinas-reliance-taiwanese-chips-prevent-war

[41] Manheim, David. "The Fragile World Hypothesis: Complexity, Fragility, and Systemic Existential Risk." *Futures*, 122, (2022): https://doi.org/10.1016/j.futures.2020.102570
Also see the discussion of resilience in the classic Meadows, Donella H. *Thinking in systems : a primer.* London; Sterling, VA:Earthscan, 2009.

because they have redundancy and diversity with very few single-points of failure. However, designing for resilience can be costly in the short term for benefits that may only be realized in the long-term. When faced with near term competitive pressures, efficiency, cost-effectiveness, and strategic advantage can be higher priorities. A combination of market forces and government support (e.g., subsidies, tax breaks, and bailouts) will select for "economies of scale" where standardization, the scale of manufacturing, and division of labor increases[42]. This may significantly optimize company profits, provide strategic advantages to states, and potentially improve consumer satisfaction, but it can also lead the overall world system to become more fragile.

The case of TSMC exemplifies how our world system can incentivize single points of failure in its infrastructure. Selecting for economies of scale and efficiency over diversity, redundancy, and resiliency, can be a major driver of human system fragility. The bottom line of system design is often a complex act of balancing geopolitical and economic self-interest with public and environmental safety, which in the end tips the scales away from resilience and towards fragility.

Lastly, even in cases where supply chains are antifragile with redundancy and multiple suppliers, the underlying infrastructure relies upon an increasingly fragile and depleted biosphere. To maintain its current rates of growth and technological advancement, civilization is extracting from the earth far faster than it can replenish, bringing us up against *diminishing marginal returns*: expending more effort and resources for less rewards in return, needing to run faster simply to stay in place. In the global energy economy this is known as decreasing energy return on energy investment (EROI). All of the low hanging fruit is nearly gone, and we are now transitioning from once abundant, easily available energy sources to ones which are more difficult and costly to access[43]. If markets are antifragile in the short-term but are still misaligned with the biosphere in the long-term, they are merely displacing risk and fragility into the future. As global civilization pushes past planetary boundaries, the biosphere will in turn exert pressure

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[42] For one discussion of this see World Trade Organization. *World Trade Report 2006: Exploring the links between subsidies, trade and the WTO.* 2006. https://www.wto.org/english/res_e/booksp_e/anrep_e/world_trade_report06_e.pdf

[43]Kennedy, Seb. *Scraping the Barrel.* Energy Flux, 2022. https://www.energyflux.news/scraping-the-barrel/
Hall, Charles, A. S., Lambert, Jessica, G., and Balogh, Stephen, B. "EROI of different fuels and the implications for society." *Energy policy*, 64, (2014):141-152. https://doi.org/10.1016/j.enpol.2013.05.049
Mulder, Kenneth, and Hagens, Nate, J. "Energy return on investment: toward a consistent framework." *Ambio*, 37(2), (2008):74–79. doi:10.1579/0044-7447(2008)37[74:eroita]2.0.co;2
Hagens, Nate, J. "Economics for the future–Beyond the superorganism." *Ecological Economics*, 169, (2020):106520.* https://doi.org/10.1016/j.ecolecon.2019.106520

back in the form of diminishing resources, extreme weather events, pandemics, and devastating costs to human health from pollution. This will bring us closer to financial system collapse, cascading infrastructure failure, famine, pandemics, medical system overwhelm, refugee crises, and violence.

The Capacity Crisis

The world system is growing more complex, externalities are accumulating, and the consequences of system failure are increasing at an accelerating rate. There is a widening gap between the complexity and consequentiality of our problems and the response capacities of individuals, institutions, and markets. This *capacity crisis*[44] is a significant cause of human system failures and a feature shared across risk categories.

No one is able to take responsibility for the growing number of catastrophic risks facing humanity. The most concerning threats tend to fall outside of the jurisdiction of most institutions and governing bodies, and those institutions tasked with mitigating global catastrophes are overwhelmed and ill-equipped to do so. The complexity of the situation is evolving faster than our ability to respond. In part two we explore what we call *regulatory misalignment*, a generative dynamic exploring how governance processes (including through market, state, nonprofit, and other mechanisms) are less efficient, intelligent, or adaptable than is needed for the risks they seek to govern.

Everyone living within civilization is affected by the collective behavior of everyone else, and we are all dependent on the functioning of the interlocking six-continent systems that support them. In the face of global catastrophic and existential risks, we all share the same fate, but it generally seems impossible to reach shared political agreements (absent coercion) that would respond to the most pressing issues of our time. Most people, for example, would prefer to

[44] Homer-Dixon, Thomas. *Ingenuity gap*. Vintage Canada, 2000.
Kegan, Robert. *In over our heads: The mental demands of modern life.* Harvard University Press, 1995.
Stein, Zak. *Education is the metacrisis. Why it's time to see the planetary crisis as a species-wide learning opportunity.* Perspectiva Press, 2022.

avoid passing planetary boundaries, creating more weapons of mass destruction, recklessly racing to AGI, extincting countless of species, decimating the rainforests, subjecting animals to factory farms, toxifying the oceans, increasing teen suicide, forcing children into gruesome labor conditions, and murdering thousands in horrific wars. Yet all of these are generally seen as wicked problems, intractable and somewhat inevitable. This asymmetry is a major theme of this work and a driver of human system failure: *individuals, nations, and corporations all contribute to, and in some cases directly cause, global catastrophic risks, but none of them as individuals, nor the civilization as a whole, is able to address them*[45].

Today's global civilization is not the result of a representative sample of the international community who came together to deliberate and design an enduringly resilient, sustainable, and ethical civilization. The world we live in is in large part the unintended outcome of the high-consequence choices of a relatively small percentage of the population. Most of the choices made along the way were to satisfy someone's near-term strategic interests (be they economic, personal, or political) – not to support the long-term interests of the species and biosphere. And this is the self-organizing, self-interested process that created global civilization, essentially designing it by accident[46].

Civilization is creating catastrophic risks that no one wants but no one can stop or escape. ***A world that no one consents to but everyone is perpetuating***[47]***.*** Without reliable international governance and shared values, it is nearly impossible to ensure the safe development of new technologies and facilitate actual responses to global catastrophic risks. Yet simultaneously, the power of enforcement typically associated with governments, scaled to the level needed to respond to these existential challenges, itself poses the parallel concern of global autocratic

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[45] This will become a theme throughout the remainder of this text. For one discussion of it, see Bostrom, Nick, Douglas, Thomas, and Sandberg, Anders. "The Unilateralist's Curse and the Case for a Principle of Conformity." *Social Epistemology*, 30(4), (2016):350–371. https://pmc.ncbi.nlm.nih.gov/articles/PMC4959137/

[46] Bratton calls the planetary scale computational stack an accidental design in: Bratton, Benjamin, H. *The Stack - On Software and Sovereignty*. MIT Press, 2016.

[47] Using the concept of generative dynamics, part two of this monograph explains why humanity lives in a world with tragedies that nearly no one wants but no one can seem to stop. One example of this is the notion of a social trap in which *all actors pursuing their own self interest cumulatively lead to a worse result for everyone.* This concept was largely popularized in the existential risk community due to the blog post on Slate Star Codex titled "Meditations on Moloch." https://slatestarcodex.com/2014/07/30/meditations-on-moloch/ , where Moloch - the God of Collective Action Problems - is the answer to the question "'...*what does it*? Earth could be fair, and all men glad and wise. Instead we have prisons, smokestacks, asylums. What sphinx of cement and aluminum breaks open their skulls and eats up their imagination?'"

control (the subject of chapter eight). This dilemma and dialectic – of threading the needle between chaos and oppression – is at the heart of the civilizational design and navigation challenge that is the metacrisis.