Jens V. Svendsen

Can the Internet Save the World?

An Essay on Global Governance

2025

Preface

We are living in a time of profound transition, marked by a global climate crisis, explosive technological innovation, and an extreme concentration of wealth in the hands of a very few.

Two contrasting futures are already beginning to take shape in the present: a utopian scenario of a decentralized, post-industrial society, and a dystopian scenario of refeudalization and a return to a medieval power structure.

Both scenarios are built on technological innovation – and paradoxically, the very same innovations. The difference lies in who reaps the rewards: the many or the few.

In this essay, I will focus on the utopian path – the dystopian one already has more than enough powerful advocates among the techno-libertarian oligarchs who flock around Donald Trump.

I explore how the next generation of the Internet could serve as the foundation for a robust and resilient system of governance – effectively functioning as a virtual global government. Such a system could sustainably meet everyone's basic needs while ensuring a fair distribution of wealth and power.

It's often said that we overestimate the impact of new technologies in the short term and underestimate them in the long term. So forgive me

if I sound overly optimistic at times. In the long run, much of this will come to pass – quite possibly more than we can currently imagine.

Who Am I?

I am a Danish economist, architect and entrepreneur (CV). I was born in 1946 and grew up as a typical Scandinavian boomer. Thanks to the Danish welfare model, I had a safe upbringing with access to free education and healthcare, and am enjoying a secure old age. This foundation likely shaped my strong support for an equitable society.

In the 1970s, I actively participated in the youth uprising and lived in a commune. Back then, we believed political solutions could address issues of inequality. Over time, however, I grew increasingly skeptical of politicians and shifted my focus to the transformative potential of information technology.

I have taught at the Aarhus School of Architecture, worked as a physical planner in Africa, and served as director of a software company. As a side job, I have run a bar in Denmark and a real estate business in Mozambique.

www.jenssvendsen.dk mail@jenssvendsen.dk

Content

Part 1: The Real World Monopoly Game

Anyone who has played Monopoly knows that the game ends when one player amasses so much wealth that the others can no longer afford to pay rent and are forced out of the game.

Now the real world is reaching this point. Huge fortunes have accumulated in the hands of a few extremely rich individuals (source) and the wealth gap has grown so large that our institutions can no longer handle it. So, if we want to avoid the dystopian scenario, it's time to rewrite the rules of the game and clarify the modern intersection between private wealth and public power.

> *While wealth inequality is increasing and the super-rich continue to amass more riches, income inequality - both globally and within many countries - is actually declining (source).*

The Social Contract

The rules of the real world monopoly-game are laid down in a social contract, which is the narrative that regulates the relationship between social classes such as workers and capital owners.

During the post-World War II period from 1945 to1970, the societal surplus in most Western countries was divided equally between the capital owners and the laborers. As part of the social contract, the wage earners financed - via their income taxes - a state apparatus that secured the infrastructure, educated the workforce, covered social security, and paid for capitalism's negative externalities.

This contract is now broken!

This graph illustrates two post-war periods in the United States (source). In the first period, capital owners and laborers shared the benefits of increasing productivity. In the second period, real wages stagnated and capital owners got extremely rich.

A new social contract will likely be embedded in digital infrastructure, programmed into the Internet. It must be global in scope, include a broader range of stakeholders, and, at a minimum, guarantee the fulfillment of basic needs for everyone.

Nation-States

In addition to failing to address extreme wealth inequality at the national level, nation-states worldwide have shown a surprising reluctance to take effective action against climate change.

The nation-state governance model suffers from several structural weaknesses:

- Rather than cooperating, nation-states often compete.
- Their economic base is eroding due to tax evasion and declining income tax revenues.
- Migration exacerbates minority issues, further challenging social and political stability.
- National security - focused on the survival of the individual nation-state - is prioritized over global security, which concerns the survival of humanity.

Identity Politics

On a global scale we are experiencing an equalization of income and life expectancy, but culturally we are far from globalized. On the contrary, the world is becoming more and more diversified.

In liberal democracies, social classes such as workers, peasants, capitalists, etc. used to be represented by political parties which looked after their interests and negotiated the distribution of wealth. Nowadays, most voters find that politicians simply represent their own interests and keep wealth to themselves.

Class politics have been replaced by identity politics, which is a modern form for tribalism based on racial, religious, ethnic, sexual, social, or cultural values. These issues cannot be resolved through elections and majority decisions, but require tolerance, coexistence, and consensus decisions.

Climate Change

The most effective measure to combat climate change is to let the cost of greenhouse gas emissions reflect their full climate impact. However, governments around the world have done the opposite: According to an IMF Working Paper, the fossil fuel industry is subsidized with approx. $ 6 trillion (about 7% of global GDP).

My own generation in Europe came up with climate strategies like Nuclear Power? No thanks!, Degrowth, and Organic Farming; but they will likely prove to be inadequate at a planetary scale. Nuclear power kills fewer people than coal (source), de-growth is only a strategy to pursue in highly developed countries, and organic farming is an extensive form of food production that will never be able to feed a growing global middle class.

Many environmentalists paradoxically oppose green technology, advocating instead for austerity measures. They trust scientific predictions about climate change but remain skeptical of the innovations designed to combat it.

Yet, despite political gridlock, the energy sector is undergoing a profound transformation. Advances in solar, wind and battery technology are steadily driving down costs, and we may soon reach a

point where tracking energy consumption becomes obsolete. Energy will soon be priced like a subscription service, much like today's phone plans - offering unlimited access for a flat rate.

Left and right

In the Global North, we are currently undergoing a process where the traditional political divide between left and right is blurred and supplemented by a division between globalism and nationalism.

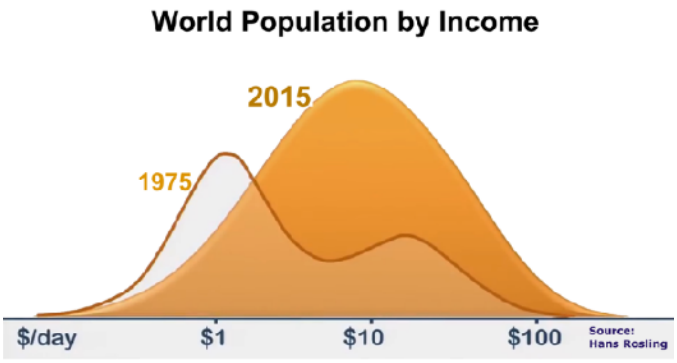
The historical left wing lacks a coherent global strategy beyond supporting national liberation movements and supplying development aid to poor countries.

The neoliberals, on the other hand, have been very successful with a globalization strategy that moved industrial production to developing countries and radically reduced poverty in the world (source).

Paradoxically, neoliberal globalization has given rise to both the ultra-rich oligarchs and the nationalist backlash that constitute Donald Trump's power base during his second term.

The New Global Middle Class

A new global middle class is emerging in low and middle income countries and therefore we are experiencing an explosion in demand for energy, goods and services. The overall food demand, for example, is on course to increase by more than 50 percent, and the demand for meat and dairy products by nearly 70 percent by 2050 (source).



The planet is no longer divided into poor and rich. The population is following a normal distribution around a daily income of approximately $10. The Swedish statistician Hans Rosling described the process as a development from a "camel world" with two humps to a "dromedary world" with just one hump.

The real challenge of this century is therefore to meet the needs of the growing global middle class while simultaneously reversing global warming.

Geopolitics

Since the collapse of the Soviet Union in 1991, the United States has pursued a unipolar strategy as the world's sole global superpower. To maintain its dominance, US has actively resisted European unification (source) and prioritized the containment of China as its primary strategic objective.

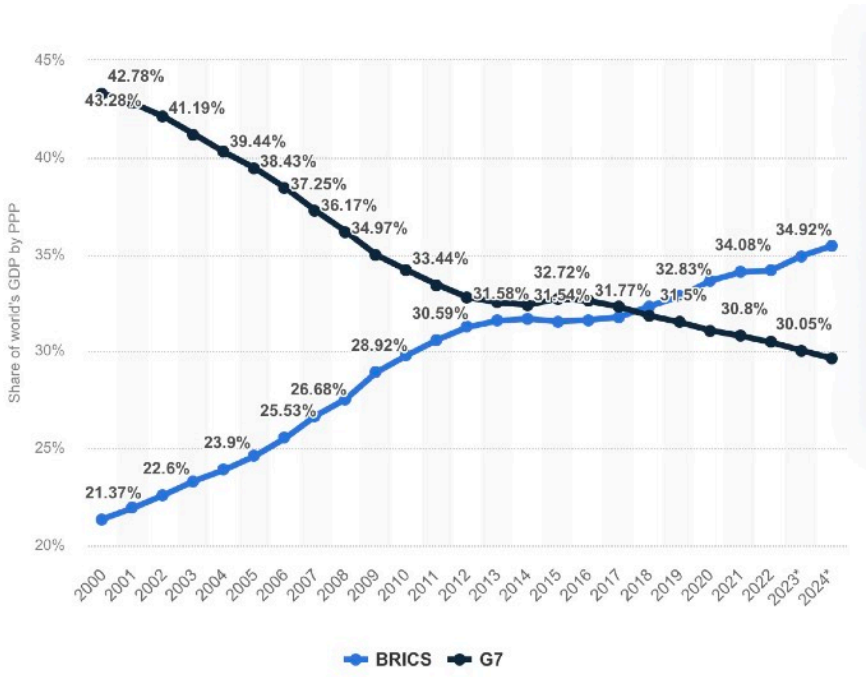
However, the US (and Europe) are losing the geopolitical power game as the Global South is steadily overtaking the Global North in shaping the emerging world order.

The Global South is rapidly adopting new technologies and has the potential to disrupt the established dominance of the Global North. It faces fewer constraints from nationalism, outdated institutions, aging populations, complex regulations, and entrenched conservatism.

> *"In the new world, it is not the big fish which eats the small fish, it's the fast fish which eats the slow fish." Klaus Schwab, the World Economic Forum (WEF)*

Additionally, the Global South is leading the green transition by prioritizing renewable energy for its cost-effectiveness (source), emphasizing micro-transportation solutions, and often favoring decentralized, informal, and agile governance models over rigid, traditional governmental structures.

BRICS and G7 countries' share of the world's total gross domestic product (GDP) in purchasing power parity (PPP) from 2000 to 2024



According to IMF estimates, the BRICS nations have surpassed the G7 in economic share when measured by purchasing power parity (PPP) Source

The new Internet gives people in the South access to the same jobs and services as people in the North. Bits will be traded instead of atoms - and bits do not respect tariffs.

> *The US-dollar has served as the global medium of exchange (reserve currency) since World War II. This allows the United States to pay foreign obligations with money it prints itself. While it costs only a few cents to produce a $100 bill, other countries must exchange $100 worth of real goods or services to obtain one.*
>
> *When trust in the US dollar erodes, the world may realize that it is little more than green paper with no intrinsic value. In recent years, countries in the Global South have increasingly engaged in trade with one another without using US dollars. This shift creates challenges for the United States in financing its rapidly growing foreign debt.*

World War vs. Global War

Although the current political wave of nationalism and populism may be reminiscent of the time between the two World Wars, history is unlikely to repeat itself in the form of another old-fashioned war. This is partly due to nuclear deterrence and partly to the fact that data is the modern source of wealth, and data cannot be conquered by force.

We live in a connected world - and connecting people can easily lead to ethnic conflicts. We are in the midst of a *global war* between tribes, ethnic groups, religions, and minorities. Nearly 100 tribal wars are being fought around the world (source). The situation is more reminiscent of the return of the Crusades than of a new World War.

Modern warfare is a hybrid combination of military, economy and technology. Wars are fought by proxy: the physical confrontation is

local, but the economic sanctions, the cyber war, the supply of intelligence, the supply of weapons, and the battle for the narrative, on the other hand, are truly global. Not only governments are involved, but also corporations, private armies, oligarchs, and NGOs participate on behalf of their stakeholders.

A Shared Global Destiny

The climate crisis—marked by rising temperatures, wildfires, rising sea levels, mass migration, regional wars, and declining biodiversity—is likely to play a role similar to that of an old-school world war. It will cause comparable levels of human suffering and destruction, killing millions of people, devastating entire countries, disrupting the energy, transportation, and food sectors, and destroying vast amounts of physical capital.

The silver lining in this bleak scenario is that the war on climate—like previous world wars—may ultimately lead to a new global consensus. The crisis is forging a shared global destiny, which will eventually focus humanity's collective efforts on the technical and social innovations necessary for our survival.

How the Internet Can Save the World

A new Internet is offering an alternative to our leaderless and fragmented world. This new digital landscape is not a dominating force supplanting existing power structures; rather, it operates as a collaborative platform empowering individuals to address their own problems, establish identities, secure property rights, access financial services, and engage in trustworthy transactions.

Part 2: The Internet

Throughout history, power has primarily belonged to those who controlled the means of production. In the agricultural age, it was land; in the industrial age, it was factories; and in the post-industrial age, it is data. Consequently, the key to a more equitable world lies in sharing data - if we can share data, we can share societal surplus. Ai

The Old Internet

The Internet is mankind's common nervous system. The protocols are not controlled by national governments - they are global, and community owned. The Internet can survive a war: If a node in the network is destroyed, data just runs another way.

Over the last 25 years, two layers of "World Wide Web" have emerged on top of the Internet:

- Web1 - a network of static documents connected via hyperlinks.

- Web2 - a network of people connected by social graphs of "likes" and "follows".

Web1 made it possible to share information almost for free and Web2 made us all creators. Anyone with a smartphone can publish text, images and sound to the whole World.

The Dark Side of Web2

Unfortunately, Web2 has centralized the Internet in the hands of tech oligarchs who harvest our personal data and monetize us as products.

Big Tech have built proprietary platforms and store our data in centralized silos - vulnerable to misuse, cyber attacks and technical breakdown. Facebook collects seven million times more data about the citizens as the secret East German police STASI did (source).

In fact, capitalism's landscape underwent a refeudalization with the emergence of Web2, transitioning from a profit-centric to a rent-centric model. Traditionally associated with payments from tenants to landlords for land use, rent has now manifested as fees paid to Big Tech overlords for access to online platforms. A notable example is the Apple App Store, where software developers surrender 30% of their earnings to Apple for the opportunity to distribute their apps on the platform (source).

Web3

Fortunately, Web3 is underway. Here, the users will be assisted by powerful artificial intelligence (AI) and be in control of their identity as well as of their data.

Web3 aligns network participants to collaborate toward a common goal. In addition to enabling users to read and write, Web3 introduces the ability to manage *ownership*.

> *To manage ownership on the Internet, Web3 must address the "double-spending problem" ensuring that an asset or utility cannot be duplicated like a digital file. This is accomplished through a decentralized bookkeeping system that securely records and verifies ownership.*

Distributed Ledger Technology

The new Internet is based on "Distributed Ledger Technology" (DLT) which is a shared bookkeeping system operated by multiple "accountants" (miners or validators) in a network. A ledger can only be updated if a majority of the "accountants" agree, and if one of them tries to tamper with data, the others will immediately detect it, and shut him/her out.

This new technology is still in development, but its potential is revolutionary. It will eliminate the need for many traditional intermediaries - no government to manage pensions, no banks to handle transactions, and no Big Tech overlords controlling social media. Powered by cryptography and a decentralized ledger, it enables secure, trust-less interactions, allowing individuals to transact and do business without ever needing to know or rely on one another.

The most widely used way of distributing ledgers is Blockchain - the technology behind Bitcoin, whose bookkeepers (miners) use a very energy-intensive method to reach consensus on who should update

the ledger. Bitcoin acts as a kind of digital gold for storing value, but does not play any particular role in the future of the Internet.

The second largest blockchain Ethereum, on the other hand, plays a central role in building the Web3 infrastructure. The bookkeepers (*validators)* on this platform use a less power consuming consensus mechanism and the technology will likely be able to secure millions of transactions per second in a few years time.

Overall, Web3 is moving toward a multi-chain internet, where users can seamlessly transfer digital assets and information across different platforms.

Digital Tokens

Web3 handles property using *digital tokens which* are units of value created and managed within a distributed ledger system. These tokens can represent various assets or utilities, such as currency (see Appendix: Token Economics) , property rights, or access to specific services.

Digital tokens have the following advantages:

- They do not wear out like metal and paper tokens,
- they are hard to counterfeit,
- they can be exchanged as easily as text messages,
- they can be programmed to perform specific functions,
- they facilitate fractional ownership, and
- they make illiquid assets liquid.

With Web3, we return to a barter economy: aided by digital tokens, anything can be exchanged for anything.

> *"Tokens might affect the financial world in the same way as email affected the postal system" - Shermin Voshmgir in the book "Token Economy".*

Smart Contracts

Web3 can be programmed using small computer programs (smart contracts) stored on the ledger and not on the user's own device.

> *Smart contracts make it possible for people to enter into digital agreements, such as:*
>
> - *A lease, which automatically pays the rent every day.*
> - *A train ticket that automatically pays out compensation if your train gets delayed or is canceled.*
> - *A testament that transfers your assets to your heirs the moment it is recorded that you have passed away.*
> - *A vehicle that automatically pays congestion charges and parking fees.*
> - *Shares that automatically pay taxes on a company's earnings.*

When a payment is enforced by a smart contract, the agreed amount will automatically be locked in a decentralized escrow service or secured by collateral.

DAOs - Decentralized Autonomous Organizations

Web3 protocols herald a revolutionary transformation in human organization, embodying a paradigm shift in our societal structures. At the forefront is the Decentralized Autonomous Organization (DAO), a

virtual community capable of encompassing anything from local cooperatives to a global institutions.

Companies are investor-owned, whereas DAOs are community-owned. DAOs represent a revolutionary shift toward efficiency and are poised to potentially replace both companies and government institutions within this century. In this paradigm, shareholders working for individual profit are transformed into stakeholders collaborating toward a common cause.

> *DAO examples:*
>
> - *A charity DAO, where a group of donors decide how to spend donations.*
> - *An UberDAO, which pairs drivers with riders and saves them from paying a fee to an intermediary.*
> - *An Insurance DAO, where a group of members share risks without a third party profiting from it.*
> - *A governance DAO, for cryptocurrencies like Bitcoin or MakerDAO.*

DAOs still leave much to be desired in terms of functionality and practical application, but when combined with AI, they will likely revolutionize how humanity makes informed, collective decisions.

As a first step, the US state of Wyoming has legalized DAOs as legal entities (decentralized unincorporated nonprofit associations, DUNAs). This model is likely to be followed by other states and countries (source).

Part 3: The Post-Industrial Era

From a resource perspective, humanity faces a dual challenge: We must stop global warming while meeting the aspirations of billions in middle - and low-income brackets for lifestyles akin to those of the global elite.

Fortunately, we are moving into a *post-industrial era* where we will be able to combine growth and sustainability and make goods and services so abundant, that everybody can afford them.

The differences between the *industrial* and *the post-industrial* era, which will be developed further below, can be summarized as follows:

The industrial era	**The post-industrial era**
Mass production	Custom production
Scarcity	Abundance
Hierarchies	Networks
Shareholders	Stakeholders
Centralization	Decentralization
Human control	Artificial intelligence
Goods	Services
Animal protein	Synthetic protein
Factory work	Distributed manufacturing
Secret recipes	Open source
Wage labour	Self-employment
Human labour	Robotics
Competition	Collaboration
Bank money	Digital cash
Inflationary	Deflationary
Extraction	Conversion
Intermediaries	Trust

The post-industrial economy (or whatever it will be called in the future) is still capitalism, in the sense that it is based on market economy and private property - even if ownership is distributed among more people.

How Can Stuff Be Abundant?

We have a resource problem on our planet - not because the globe contains only a finite amount of resources - but because our economic system is unable to consume natural resources in a sustainable manner.

If you have a hard time understanding how real stuff can become abundant, you are right in the way that potent sports-cars are not likely to become abundant. However, capitalism can be transformed to ensure that everyone's basic needs are met, making essentials like food, housing, healthcare, and education universally accessible (see more later).

We can anticipate a future in which our planet becomes increasingly dematerialized, enabling us to transform and repurpose existing materials rather than continuously extracting new resources and producing more goods. This emerging era will be defined by innovative technologies capable of replacing scarce resources with abundant alternatives, dramatically reducing our environmental footprint.

Moreover, intelligence is no longer a limited resource. With the proliferation of digital platforms and AI, expertise is becoming decentralized—no longer the exclusive domain of large corporations, but freely accessible to anyone with an internet connection.

Technological Deflation

The post-industrial economy is characterized by "technological deflation", in which technology advances so rapidly that investing in additional production remains profitable even as prices plummet. This

phenomenon confounds mainstream economists. For example, a $1,000 smartphone replaces more than 25 hardware products, including a landline phone, wallet, Wi-Fi router, watch, camera, TV, video player, radio, CD and DVD players, tape recorder, scanner, GPS, alarm clock, compass, and flashlight - products that collectively would have cost about 10 times more. However, because labor productivity is calculated as value added per working hour, economists observe an apparent decline: the produced value has not increased but instead seems to have fallen by $9,000.

The economic textbooks state that the price of goods and services will approach the marginal costs, which is the price of producing an additional unit of a product after the fixed costs have been paid. No one had imagined that the marginal cost of goods and services could approach zero - but apparently that's what is happening (source).

> *The marginal cost of labor will rapidly approach zero with the rise of robotics. Combined with the "product as a service" model, robotics is driving the creation of higher-quality products. Robots don't cut corners; they consistently deliver precision and quality without increasing costs. Additionally, when manufacturers lease their products rather than sell them outright, they have a vested interest in ensuring durability and longevity. As a result, the era of "cheap junk" is likely to become a thing of the past.*

The Future Is Not Only Digital

In the "Roaring Twenties" of the last century, oil, electricity, and the internal combustion engine had reached a point where productivity

exploded in a boom that lasted until the digital technologies arrived in the 1970s.

However, the digital technologies did not lead to a similar productivity boost in the "real economy". As impressive as personal computers, smartphones and social media are, you can not eat them, drive them, live in them, or wear them.

After this period of "digital stagnation" we are now looking into a new explosion in real world productivity. This time it will be based on a convergence of artificial intelligence (AI) and microbiology , enabling us to manufacture products that we can eat, drive, live in, and wear with very high productivity.

Microbiology

Microorganisms hold the key to solving many of the challenges we face on the planet: lack of water, malnutrition, disease control, loss of biodiversity etc.

The COVID pandemic brought us a type of vaccine (mRNA) that promises to provide extremely effective protection against numerous other diseases like flu, malaria, HIV, cancer, etc. Instead of discovering new drugs by trial and error, we can now design them.

Microbiology enables us to program genes and, as soon as something becomes information, development becomes exponential. Up to 60% of the global economy's physical inputs could one day be produced biologically (source) and fuel could be produced from atmospheric carbon dioxide.

For the first time in human history, we are now able to re-engineer life. Genome editing technologies like CRISPR offers to edit genetic material just like a spell checker. Using synthetic biology, we can program microorganisms to do what we want them to do and use bacteria as factory worker to make all the substances we want to produce.

Food Production

Proteins are the most important molecules in our food. They are the building blocks of life, but we produce them in an extremely inefficient way using macro-organisms like animals as hosts for the micro-organisms that process the nutrients. The cow is an example of a macro-organism which wastes a lot of nutrients and furthermore emits large amounts of greenhouse gases into the atmosphere.

Now, biotechnologies allow us to unplug micro-organisms entirely from macro-organisms and manipulate them directly in a much better and more cost effective manner using fermentation - a process that allows us to program microorganisms to produce almost any complex organic molecule. It's a domestication of microorganisms. As an example, the Finnish company Solar Foods is bringing to market a new protein powder derived from thin air using two of the most renewable things we have, carbon dioxide and sunlight (source). We will soon be able to download proteins designed all over the world, and produce them locally like we do Apps.

It is expected that 60% of the land currently being used for animal agriculture will be passively reforested or re-wilded before 2035 (source).

> *Existing farms could adopt hybrid models where traditional agriculture and fermentation coexist. The fermentation process requires inputs such as sugar, and crop residues could serve as feedstock, thereby creating a circular economy within the farm. Additionally, farms could utilize renewable energy sources (e.g., solar, wind) to power fermentation facilities, further enhancing sustainability.*

There is reason to believe that we will be able to feed a growing population with tasty and healthy food that everyone can afford.

Custom Production

With additive manufacturing (3D print) physical objects can be manufactured close to where they are consumed. Any physical shape can be recreated from materials like metals, plastics, ceramics, glass, rubber, leather, and stem cells.

When atoms are digitized, the "print file" is worth the money, not the physical item.

> *The Danish company "Thürmer Tools", which makes thread cutting tools, is reinventing itself as a digital company focusing on 3D printing. The digitization is so complete that they do not even expect to print their own tools in the future. Instead, they will sell digital tool designs in the form of print models that customers download to a shared printer of their own choice. If customers improve a design, they get a cut of future license payments.*

Transportation

The railroad, a 200-year-old mode of transportation, is inflexible and difficult to modernize. Over time, transport has shifted from iron

wheels to rubber wheels; from goods wagons to trucks, and from trains to buses. A logical next step could involve dedicating special road lanes - potentially repurposing disused railways - for self-driving taxis, buses and trucks.

International shipping may soon be revolutionized by autonomous shipping containers, capable of independently navigating across water, roads, and even through the air.

Private cars, whether fossil-fueled or electric, dominate urban spaces, waste time in traffic, increase traffic-related fatalities, and rob children of safe spaces to play outdoors. Given these downsides, the shift away from private car ownership seems inevitable. In the near future, urban mobility will be increasingly defined by a diverse mix of autonomous minibuses, robo-taxis, electric scooters, bicycles and other sustainable transport solutions, fostering safer, cleaner, and more efficient cities.

> *Active transport like walking and cycling saves both CO2 and health costs: Moving a commuter from a car to an e-bike saves society around USD 1 per kilometer (source).*

The way to finance the new infrastructure is road pricing. Cars pay for the costs they inflict on society, while bicycles are subject to a "*reverse road pricing*" so that cyclists are paid for every kilometer, they ride.

The Build-up Environment

Currently, the world's mega-cities are exploding, especially in Asia, and we will likely see metropolitan regions develop into modern versions of the historic city-states like Florence and Venice. They will

spread out and conquer the rural hinterland and possibly replace some nation-states.

Urban growth, however, is expected to slow down as the Internet provides many of the same advantages as cities, but at a much lower cost. People no longer need to move to urban areas to find work if they can work online—or if they don't need to work at all. Many traditional brick-and-mortar institutions will become obsolete, and algorithms are likely to replace a significant portion of government functions.

City shops and offices may be repurposed into housing, while suburbs are expected to grow increasingly urbanized, featuring new small businesses, 3D printing hubs, coffee shops, takeaway kitchens, and more. Even small towns could experience revitalization.

Homes, offices, and workshops of the future will likely be smaller and partially transportable, with some units designed to be placed on autonomous platforms for easy relocation, whether for work or leisure.

The construction and operation of our buildings and physical infrastructure account for almost 40 percent of carbon emissions (source). Most building-related emissions come from energy use in the buildings (lighting, heating and cooling), which is why electrification plays the main role in decarbonization.

In construction, cement is the big culprit, as it not only consumes a lot of energy in the manufacturing process; the chemical process itself emits carbon dioxide. Since eight percent of the world's emissions come from cement alone (source), we can expect a growing use of

bio-based building materials such as wood and waste products from agriculture.

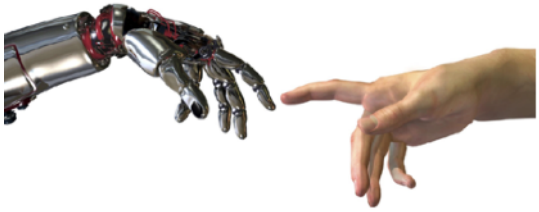
From Goods to Services

We are going to save a lot of atoms when people learn to share cars, washing machines, 3D printers, etc.

Car manufacturers are preparing to disrupt the automobile market by selling mobility as a service instead of cars, which makes perfect sense as the transport market is much bigger than the car market (source). A shared, self-driving electric vehicles can drive a kilometer at a cost many times lower than the cost of a private car parked 95% of the time.

A washing machine and a tumble dryer are used at most once a day and occupy about a square meter, which costs at least $10,000 in London, New York or Copenhagen. It is a lot cheaper to dump the dirty clothes in a self-driving laundry basket, sent by the local laundry shop. Thus, the market for washing machines can (again) become a market for laundry services.

Part 4: Man or Machine



As the world becomes increasingly data-driven, we need machines to make sense of the vast amounts of information being generated. The volume of data doubles each year, yet much of it remains underutilized —either because we cannot manage its sheer scale or because it is monopolized by Big Tech.

Machine Learning

While computers have become smaller and faster over the past 50 years, their fundamental nature remains unchanged – they are still boxes running instructions from humans. However, machine learning has revolutionized this paradigm. Computers can now perform tasks that require intelligence when done by humans, hence the term Artificial Intelligence (AI). Instead of programming specific instructions, we now define desired outcomes and let the computer determine how to achieve them. We can expect AI to be a public utility on the Internet

Generative AI

Generative AI, such as ChatGPT, refers to AI systems designed to create new content, including text, images, video and music. They are a representation of everything that has been said on the Internet and generate new text or new images by predicting the next word in a sentence or pixel in a picture through statistical analysis.

The rise of generative AI has sparked widespread excitement, but several critical challenges must be addressed:

- Generative AI is biased like the Internet and sometimes hallucinate and produce results that are completely disconnected from reality.
- These systems often infringe on copyrights, using content creators' work without consent.
- AI models trained on AI-generated content risk creating an "AI echo chamber", limiting the generation of original material.
- The technology is highly effective at producing forgeries and deep fakes.

While we need AI to compensate for human weaknesses, we must also ensure it does not exploit those very same vulnerabilities. AI is not yet reliable enough to replace humans, and it likely won't be for a long time. Instead, it should ideally be used to augment and enhance human capabilities, amplifying our intellect and boosting productivity.

AI agents

Generative AI excels at generating text and searching the web, but falls short when it comes to executing tasks. AI agents are set to change

this. They are advanced AI models not only able to emulate your personality but also to act on your behalf, carrying out a wide range of tasks—much like a human assistant. Beyond individuals, companies, buildings, vehicles etc. can have their own AI agents.

> *Imagine the transition from film cameras to digital photography — suddenly, users no longer had to understand shutter speed, aperture or film development. They simply clicked a button, and the device handled the rest. In the same way, AI agents will eliminate all steps.*

The rise of AI agents is poised to unlock advancements in cars, robots, and other autonomous systems, which have thus far fallen short of expectations.

Federated Learning

In terms of governance, the technologies driving web3 pull in different directions: blockchains inherently promote decentralization, while AI systems often rely on centralized data and processing power. However, blockchain-based data marketplaces can empower individuals to share their data while retaining ownership and control. Moreover, blockchain's decentralized and immutable nature can enable collaborative AI model training without exposing sensitive information. This approach, known as federated learning, involves training models on decentralized data. Instead of transferring data to a central server, the training occurs locally on devices, which then send anonymized model updates back to the server.

> *A promising use of blockchain to ensure transparency and accountability in AI decision-making. For example, a large language model like ChatGPT can make a decision based on complex*

> *internal computations. With Web3 tools, one can envision each step of the decision process being recorded or verified, creating an auditable trail that is logged on-chain.*

Artificial General Intelligence (AGI)

Current machine learning and generative AI systems operates by leveraging existing knowledge rather than generating entirely new insights. They excel in specific tasks but lack true understanding of the real world.

Artificial General Intelligence (AGI) - a term used for human-like cognitive abilities - requires reasoning, self-learning, contextual awareness, and some form of intentionality. Instead of merely mimicking patterns, a AGI should be capable of modeling real-world behaviors and create knowledge that humans have not created before.

There are widely divergent opinions on how quickly AGI can be developed, but given current progress, a reasonable estimate for human-level AGI is between 2030 and 2050.

Superintelligence

Eventually we will get to the final stage of AI development, which is the emergence of superintelligence that could unlock the secrets of the universe and compensate for our "stone age brain".

> *The human brain reached its full development approximately 50,000 years ago and has not significantly evolved since, largely due to the constraints of the skull's size. As a result, we are navigating the complexities of the modern world with the brain of a hunter-gatherer—a mismatch that inevitably leads to a range of*

> *challenges and problems. One problem manifests itself in our limited ability to socialize. We are only capable of cooperating with approximately 150 people (Dunbar's number) who we know personally and trust. In other words, our brains are hardwired with mistrust of strangers.*

AI is not going to replace us. Instead, the human brain and AI are likely to merge, offering a massive boost in processing power and memory. Imagine the potential of a global network of interconnected brains thinking collaboratively—a World Wide Web of collective human intelligence!

AI can be seen as a new omniscient god, which could introduce new challenges as people begin to question the narratives that bind communities together—such as beliefs in old-fashioned gods, money, and Santa Claus.

> *Ray Kurzweil, known for his "Singularity Theory", predicts that humans will merge with artificial super intelligence and create a kind of "digital divinity", where we will live eternally through technology.*

Quantum Computing

A major technological step to be taken during the coming decade will be quantum computing, that, for certain tasks, is expected to be millions of times faster than today's supercomputers. Classical computers solve one problem at a time. Quantum computers explore many possibilities at once - like solving a maze by trying every path simultaneously.

Quantum computers have the potential to process information on a scale that encompasses every single atom in the known universe. This capability could revolutionize science by enabling the creation of precise molecular-scale models for applications ranging from personalized medicine to sustainable, "green" fertilizers. Now, imagine a future where self-replicating robots can build and repair themselves using carbon dioxide from the atmosphere—paving the way for transformative solutions to climate change and resource scarcity.

A big leap forward occurs when quantum computers become capable of simulating nuclear fusion in real time and thereby enable the development of compact fusion reactors the size of a shipping container.

Labour

Robots will undoubtedly take over many existing tasks, but this becomes a problem only if there is no fair system to distribute the resulting productivity gains.

In the 19th century, the prevailing theory among economists like Ricardo and Marx was that goods and services were exchanged according to the amount of labour that was put into them.

In the 20th century, this labour theory of value was replaced by the idea that value derives from entrepreneurs and investors. Instead of slaving in the factory, many workers now sat at desks and made product design and marketing.

In the 21st century, machines will both design, produce and distribute the goods. We will be freed from work, both on the factory floor and

in the office, as there will be virtually no tasks a human can perform that a machine cannot do better, at a tiny fraction of the cost.

> *An anecdote: A trade unionist visits a car factory and observes a vehicle being assembled entirely by robots. The proud manufacturer, with a teasing smile, asks, "How do you expect these robots to pay union dues in the future?" The trade unionist calmly replies, "I imagine it will be just as difficult as getting them to buy the cars they're building." (Source: Unknown)*

Basic and Social Needs

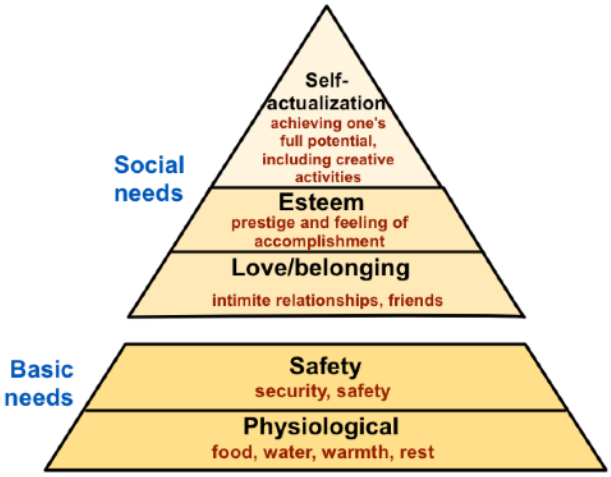
Industrialization created paid employment and absorbed labor freed from agriculture. Through wage labor, factory workers were able to meet their basic needs for food, clothing, shelter, and security.

> *Coverage of basic needs was defined by the United Nations as a human right in 1948. Meeting these needs continues to be a powerful driving force, moving millions of people from rural subsistence economies to urban jobs every month.*

We are now approaching a postindustrial stage where basic needs can be met for a significant portion of the world's population, allowing humanity to begin focusing on achieving higher goals beyond mere survival.

> *In the long run, general-purpose robots could take on a variety of forms. However, over the next decade or so, they will likely be designed to resemble humans. This is partly because our physical environment is built around the human form and partly because humanoid robots feel more familiar to us and can learn effectively through imitation.*

The American psychologist Abraham Maslow has organized human needs in a hierarchy of needs with basic needs in the bottom and social needs in the top.



The lower part of Maslow's pyramid consists of the basic needs and the upper part includes social and psychological needs like love, friendship and esteem that qualify us as humans. At the very top he placed our need to be creative and to achieve our full potential.

In contrast to basic needs, social needs are culturally conditioned and cannot be fully satisfied. These needs cannot be met by machines, and their fulfillment will continue to occupy people regardless of technological advancements. Machines are not social beings and do not form communities, so to address the needs at the upper levels of Maslow's hierarchy, we rely less on technological tools and more on human qualities such as morality, empathy, and creativity.

Learning is the New Job

Most work is invisible on the labor market: The reproductive work is completely overlooked as part of our common livelihood and more than 60% of the world's population make their living in the informal sector.

A growing part of the industrial workforce is becoming self-employed freelancers (source) who work multiple part-time jobs or start their own small businesses. Bounties networks open up the global freelance market and include people from low-income countries who were previously excluded due to banking requirements and lack of formal education.

Self-employment places greater demands on education than wage labor. Furthermore, a skill that was once relevant for 20 years now becomes outdated in 5 years (source). In the post-industrial era, we therefore need a culture of lifelong education to avoid losing citizens to passivity and ignorance.

With the advent of generative AI, many educational institutions have realized that it no longer makes sense to teach skills that machines can perform better. There is no need to focus on rote tasks such as memorization, copying, obeying orders, or following rigid routines. Instead, education should focus on skills needed to meet the needs at the top of Maslow's pyramid.

The great challenge for humanity is to maximize the potential of our own species. Therefore, we should encourage active participation in learning. Everyone must have the opportunity to reach their full potential and receive an education that aligns with their abilities. In the future, learning will likely be considered the new form of work. Rather than cooperating solely for production, we will cooperate to learn.

Part 5: From Shareholders to Stakeholders

The capitalist form of production suffers from three fundamental flaws:

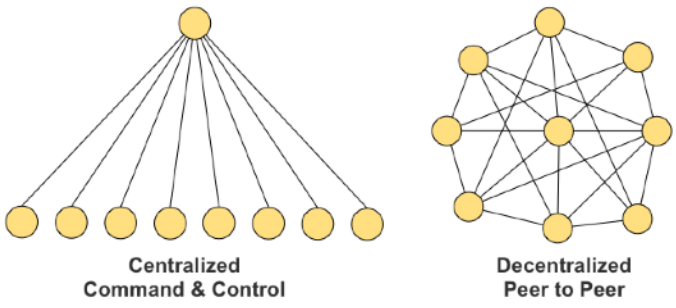
1. The social and environmental costs of production are not included in the price of the products.
2. The system promotes artificial scarcity, and monopolized platforms - like Google, Facebook, Amazon, Airbnb and Netflix - stand in the way of free markets.
3. There is no trust between market participants, so a substantial cut of the produced value is consumed by intermediaries like banks, public services, lawyer, etc.

The capitalist system is based on private property rights and is programmed to exploit greed as the driving force. From a societal perspective, this is not ideal.

Fortunately, Web3 offers a redistribution of control from a small group of shareholders to a broader range of stakeholders. By leveraging decentralized technologies, such as blockchain, Web3 enables more equitable participation and decision-making. This shift has the potential to optimize organizational performance, promote efficiency, and create a more inclusive economic system.

From Silicon Valley to the Internet

Tech giants like Google, Facebook and Amazon are children of Web1 and Web2 and have evolved into the World's largest companies in a matter of years. Similarly, Web3 will create new businesses that outperform some of the old ones.



Centralized organizations and hierarchies can be outperformed by polycentric networks where a person's power is more based on how many networks she is a part of and less on how many people are under her control.

The new network companies, however, will probably be smaller and not necessarily of American origin. Smaller businesses have access to

AI expertise and will share digital resources with everyone, including smart people from poor countries.

Software development is moving from Silicon Valley to the Internet and everybody is gaining access to a global market. Even small businesses are becoming multinationals with partners and employees worldwide.

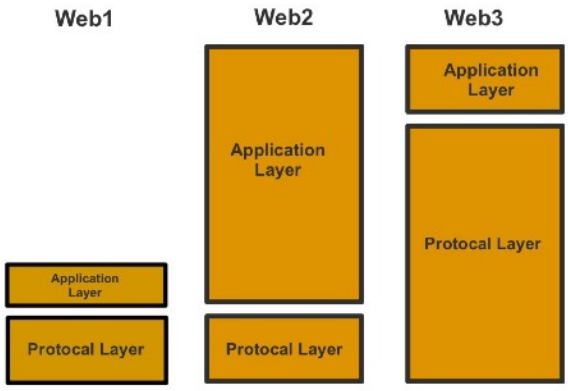
Protocols vs Applications

The Internet consists of 2 layers:

- A bottom layer made up of infrastructure protocols.
- A top layer of applications that do something useful for the users.

The original Internet consisted mainly of a protocol layer and very little money was made on the Internet during the Web1 era.

With Web2, a "fat" application layer was created by companies such as Google and Meta (Facebook) who earn a lot of money on these applications (source).



From a societal perspective, the Web2 model is far from optimal. Significant resources are wasted as companies independently develop nearly identical proprietary applications to operate their businesses.

For instance, *Uber* not only builds a website but also creates a mobile application, an identity system, a payment system, a storage system, and more. When competitors like *Lyft* enter the market, they must develop their own versions of the same components, leading to redundant efforts.

Web3 builds on a "fat" infrastructure layer of open source protocols and only needs a thin layer of applications. Everyone can share the protocols and a myriad of companies will collaborate on top of this infrastructure.

Blockchain technologies are decentralized by nature but AI technologies are not. The challenge is to prevent monopolization of AI in private (US) hands and instead ensure that open-source AI, such as the French Mistral and the Chinese DeepSeek, is integrated as part of the internet's protocol layer. At the application layer, programs like Word and Excel are likely to be replaced by a thin layer of AI agents that act on the user's behalf.

> *Linux open-source collaboration demonstrates, that it can be advantageous for companies to collaborate rather than to compete. Instead of developing their own features in an operating system, Linux users share the code and help each other with bug fixes and improvements.*

The Network Effects

The industrial economy was dominated by the law of "diminishing return" according to which, the marginal output of a production process decreases, the more of a single factor of production is put in. The textbook example is about digging a hole in the ground: If one

person can dig a hole in three hours, it will take more than one hour for three people to dig a similar hole.

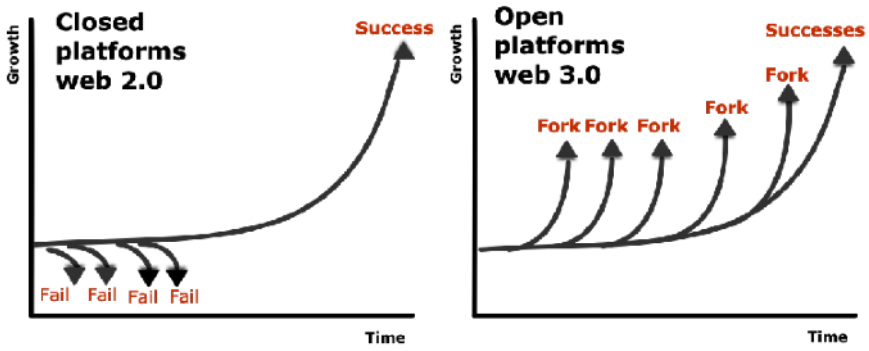
Network economy is dominated by a completely different logic: Metcalfe's Law, which states that the value of a network grows exponentially with the number of nodes. The classic example is the telephone: the more people have a telephone, the more useful it becomes to everybody.

This network law gives rise to the so-called "bootstrap problem": It is hard for a network project to get through the initial phase - where the costs are high and the application utility is low - until the network reaches a critical mass of users.

This explains why the Web2 is a "winner takes all" game. After reaching a critical mass, the winning players establish a monopoly by acquiring competitors and by staying technologically renewed through acquisition of startup companies. In recent years, we have seen the so called "sharing economy" like Uber and Airbnb follow this prescription.

Stakeholder Economy

The capitalist model of ownership is facing a radical change, but there is bad news for those who hope that markets will collapse during the post-industrial era. The Web3 economy holds market forces on steroids. Everything can be traded: If you, for example, order the fast trip in a robo-taxi, it will pay the transverse traffic to hold back, and instead of buying Internet access via an intermediary service provider, tomorrow's electronic devices will work in a mesh-network and buy capacity from each other.



As a result of the "bootstrap problem", most attempts at new networks on Web2 fail and the investors loose their money. On Web3, on the other hand, entrepreneurs don't lose their initial investment. If they are dissatisfied with the network, they can continue on a free copy - they can fork instead of fail.

The old-fashioned monopolists do not have much to look forward to either. The Web3 economy is not suited for centralization: Hierarchies are expensive to maintain and it is hard to keep secret recipes on an open network where everybody can copy them. Furthermore, 3D printing eliminates economies of scale by lowering the threshold for mass production, and monopolies do not work well without economies of scale.

Factory work during the industrial era was based on a division between capital owners and wage workers. The owners received a return on their investment, while the workers were paid for their labor. In the post-industrial era, many businesses will operate through shared open-source protocols, and the traditional roles of owners and customers will be replaced by a much larger and more deeply incentivized group of stakeholders.

> *"The tools of innovation are becoming democratized and starting a new business is less and less capital intensive. The price of bringing a tech product to market in the 1990s was 2,5 million USD. In the*

> *2000s it dropped to 250.000 USD and now it starts to look like 250 USD" - Boyd Cohen, urban strategist.*

It will be very hard for the incumbents to preserve their monopoly benefits. The number of small corporations will explode and self-sovereign workers, who fully control their own time, will replace wage workers.

Distributed Organizations

Over the last couple of hundred years, production has undergone tremendous technological development, while management has changed very little. Now, Web3 is introducing a collaborative governance model that has the potential to unlock vast social resources. Decentralized Autonomous Organizations (DAOs) can run not only companies, but all kinds of institutions and communities.

Web1 and Web2 made stores abandon their brick-and-mortar locations and move online. With Web3, it's now the turn of offices and administrative functions to migrate to the Web.

Large corporations will likely restructure as distributed organizations, applying market forces internally by introducing their own tokens. These companies will transform into networks of autonomous teams that "do business" with each other.

Even today, many large corporations neither invent nor manufacture much themselves. Instead, they put their brand on products they acquire. In the future, consumers will co-own their favorite brands and might choose to invest a dollar every time they hit the "like" button on social media.

Transaction Costs

Instead of consumers interacting with companies, they can interact directly with each other. This is already happening for house-owners on Airbnb, car-owners on Uber, and influencers on social networks.

When hierarchies become networks - and networks become markets - why not manufacture goods and services in an open market of sovereign and autonomous workers rather than within companies? Web3 will blur the lines between the market and the firm since it diminishes the costs of economic transactions.

Digital technologies have in recent times lowered the so-called transaction costs. Outsourcing, offshoring, freelancing, digital payments, etc., is moving a lot of work from corporate hierarchies to the gig economy. Web3 has the potential to bring down the cost of transactions by a factor 100 or more, just as the Web1 an Web2 brought down the cost of information.

The “many-to-many” business will out-market the “one-to-many” business.

Part 6: From Government to Governance

The rules-based global power structure, established by both small and large sovereign nation-states after World War II, is collapsing. Old alliances are disintegrating, and major powers are acting like feudal warlords, seizing land from weaker neighbors at will. Fortunately, this appears to be a transitional phase toward a new power structure that operates primarily through the Internet.

Virtual Nations

Just as companies of the future will be able to operate without a physical headquarter, nations will be virtualized and able to exist without a territory. We no longer need to live in a particular place to be part of a nation, a culture or a tribe.

Cultures flourish on the Internet and even if you move to another part of the world you can keep your identity, worship your religion, support your favorite football team, receive education in your own language, settle disputes in virtual courtrooms, etc.

> *I have friends in Mozambique who are ardent supporters of the Portuguese football club Benfica without ever having set foot in neither Portugal nor on Benfica's stadium in Lisbon. They enroll their newborns in the club, they wear the club scarf and jersey, and they never miss a match.*

The challenge is that nations and tribes must learn to share the same geographical territory.

Corporate Activism

Traditionally, corporations have not interfered in politics beyond pushing to keep costs and taxes down, but as power over corporations moves from shareholder to stakeholders, companies will likely push political and social agendas.

Corporations often prove to be more global and far-sighted than elected governments and the lines between "private" and "public" are blurring - governments are behaving like market actors, and corporations are behaving like governments.

> *Elon Musk's career as government official in the Trump administration was cut short because he worked against his stakeholders - not with them.*

Multicultural Cities

Innovation happens in cities, not in countries. Cities are multicultural - not constrained by nationalism - and are more comparable to corporations than to nation-states. If national governments did not get in their way, cities could solve many of today's cultural and environmental problems (watch the TED talk "Why Mayer's should rule the world").

In larger cities, the political majority is usually greener and more globally oriented than the rural population, which is typically more developmentally skeptical.

Rebooting Democracy

Climate change will require us to change the very subject of democracy. The subject is no longer today's population, but all of future humanity. We must reboot democracy and learn to think globally and long-term. Fortunately, Web3 introduces alternatives to "one person - one vote" or "one dollar - one vote" systems:

- Liquid democracy is a combination of a direct and a representative system where you delegate your vote to other voters, whom you trusts to have good knowledge of the issue in question. A voter can appoint an unlimited number of delegates in different domains, and the delegation can be withdrawn at any time. Delegates may pass their votes to third party voters.

- Quadratic voting (or proportional voting) is another class of tokenized governance technologies used to make balanced collective decisions instead of majority voting, which tends to underrepresent minorities. For example, to select one out of several

candidates, each voter could be given100 tokens that they can spend in the following way: it costs 1 token to give a candidate 1 vote, 4 tokens to give the same candidate 2 votes, 9 tokens to give 3 votes and so on. If a voter wants to spend all 100 tokens on just one candidate,100 tokens "buy" 10 votes. Negative votes are also allowed, so if a voter really dislike a candidate, he/she can give minus 10 votes.

Self-Sovereign Identity

Advancements in information technology have brought numerous benefits, but they have also introduced daily annoyances such as junk mail, spam calls, and online trolling. Despite various efforts to develop a unified Internet ID, it remains impossible to browse the web without repeatedly being prompted for usernames and passwords. All of this has to do with the fact that the founders of the Internet did not ensure a protocol to protect against fake profiles.

> *The TCP/IP protocol provides identifiers for machines, but not for the people and organizations operating the machines.*

But that's changing with Web3, which will allow legal persons to create Decentralized Identifiers (DID) and attach Verifiable Credentials (VC) - like ID, passports, diplomas, age verification, medical certificates etc. It is called a self-sovereign identity and is a decentralized identity system that enables secure, private, and verifiable interactions without relying on centralized authorities.

> *The EU plans to implement an European Digital Identity Wallet (EUID Wallet) based on the DID and VC standards by 2026. The*

wallet gives citizens a secure, user-controlled digital ID for accessing public and private services across Europe.

Multi-stakeholderism

The United Nations (UN) was founded after World War II on the principle of multilateralism - "one state, one vote". This system has unfortunately led to a rather ineffective institution; a situation further exacerbated by the United States increasingly acting unilaterally and gradually withdrawing from international agreements and institutions.

So, when the first Internet protocols were developed, a different approach was chosen: The Internet protocols are governed following a multi-stakeholder model which, unlike the multilateral model, is a non-hierarchical, polycentric approach with the participation of not only governments but also NGOs, businesses, civil society groups, and individuals. The governance model is still developing. For example has ICANN - the organization responsible for the Internet "phone book" - transitioned from the US government to an independent global community.

The original ambitions for the Internet were limited to creating rules for electronic mail and access to information. But now, the challenge is to create a world where rules are no longer written solely in national laws, but are instead either encoded into internet protocols or replaced by artificial intelligence.

This emerging governance system is taking shape through the efforts of numerous international organizations, government institutions, enterprises, private communities, consortia, and individuals. These

entities are competing to develop new protocols for areas such as personal identity, file sharing, supply chain management, bookkeeping, taxation, decentralized finance, property registration, etc.

While many different solutions to the same problem will undoubtedly arise, the focus is likely to shift away from endless debates about which solution is superior and toward building interoperability between them. Over time, these protocols will, hopefully, evolve into robust global institutions, managed collaboratively by stakeholders and DAOs.

The Global Ledger

Just like every legal person on the planet will have an ID on the Internet, so will physical objects. Exchanged goods - down to a single shirt button - will be accompanied by a digital certificate telling how they were produced and what their environmental impact is throughout the supply chain.

When all transactions of assets, goods and services are registered on a *Global Ledger,* there is no reason for companies to waste time on book-keeping. All economic transactions are generated automatically, all payments (including taxes) are streamed in real time, and the balance sheets are accessible at any time. Annual accounts, tax returns, and VAT-accounts will belong to the past.

The Internet of Agreements

When citizens, companies, commodities and assets are identified on the Web, we will be able to move from a world where international

trade is regulated through national laws, to a world where trade is harmonized through an Internet of Agreements.

Multilateral trade agreements, conflicting jurisdictions and overburdened courts will be replaced by a system of "smart agreements" that offers reliable dispute resolution including enforcement through online mediation and arbitration, which can eventually be powered by open source AI.

> *The agreements of the future can take the form of written legal documents with embedded smart contracts, that automatically execute the contractual promises. These hybrid agreements can be signed digitally and stored on a distributed ledgers as immutable documents (see OpenLaw).*

Taxation

National tax authorities are collapsing all over the Global North. They can no longer keep up with the internationalization of economic crime and tax fraud.

Bill Gates once suggested that robots should be taxed, just like human workers. This may not be an optimal solution, but in a world where all assets are tokenized (see appendix), it is relatively simple to imagine a system that automatically tax dividends and increased asset value. It is also a no-brainer to introduce an automated tax on financial transactions (Tobin tax).

> *One possible way to tax property is a "Harberger Tax" that works as follows:*

- *The owners themselves determine the value of their properties and pay tax on the value.*
- *To prevent the owners from setting the value too low, everybody can, at any time, purchase the property token at the valuation price.*

Welfare and Public Goods

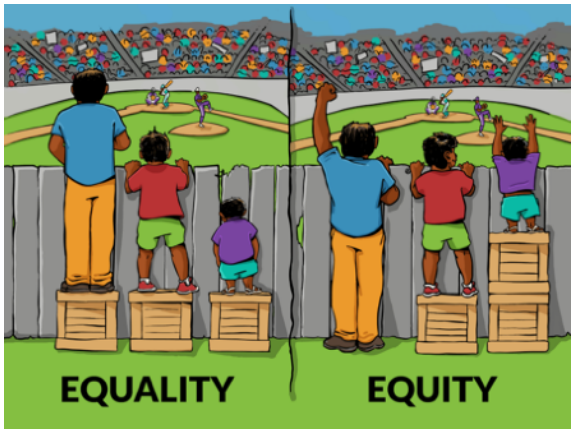
To make sure, that social welfare reflects cultural and geographical differences, it could be detached from the nation-states and organized in autonomous "*welfare funds*" i.e. virtual organizations controlled by the users and financed via automated taxation.

In a not-too-distant future, many public goods and services may be funded via token models and operated - not by governments - but by cooperatives of social workers, health personnel and teachers, or by autonomous organizations controlled by the users. Citizens can freely choose their preferred suppliers and pay with money from their own pocket, from a community insurance, or with social security tokens.

In my neighborhood, residents can purchase an annual parking permit from the municipality. However, this system is flawed because the permit cost does not reflect the true value of parking spaces. As a result, non-car owners are effectively subsidizing car owners. A more equitable approach would involve the municipality issuing daily parking tokens based on the area's parking capacity. These tokens could be distributed equally and free of charge to all adult residents, regardless of car ownership. Vehicle owners could then purchase parking days on an open marketplace, where prices would be determined by supply and demand.

Global Basic Income

Due to the significant cultural and geographic differences across the globe, achieving global equality may not be practical. However, it is entirely feasible to envision a global equity-based system, such as a global basic income. If all basic needs are met, humanity can strive for equity and fairness, fostering global diversity rather than uniformity.


EQUALITY
EQUITY

Part 7: Africa - The Continent of the Future.

Some statisticians fear that Africa's population will double by 2050 and quadruple by 2100 (source).

Sub-Saharan Africa faces significant impact from global warming, despite contributing minimally to the problem. Africa accounts for less than 3% of the world's energy-related CO2 emissions and has the lowest emissions per capita of any region (source).

Furthermore, the continent is suffering from the economic consequences of both the COVID pandemic and the war in Ukraine. Extreme poverty is growing and the African continent will experience serious problems in the short term. Many of the artificial nation-states

created by the colonial powers are likely to go bankrupt and disintegrate (source).

But the continent contains the world's biggest sources of rare earth minerals and is favored by an abundance of solar energy as well as considerable human and natural resources, that could, with the help of new technology, make Africa the continent of the future.

Basically, the future of the African continent depends on the ability to convert the abundant solar power into food, water, energy, fertilizer, communication, reforestation, and education. Africa is one big power-to-X project.

Africa is "cosmopolitan", and most of the economy is informal - neither regulated, nor controlled by a state. Africans are the most multilingual people in the world, they have a high degree of religious tolerance and are generous and hospitable to strangers.

But most of them don't have credit cards and they don't trust each other. They really need Web3 and it's ability to exchange values and build trust between people. The continent is ready to skip industrialism and go straight to a mode of production, where institution are replaced by algorithms (source).

Africa can potentially leapfrog "Western civilization".

The Networked Continent

Africans already skipped development stages with the mobile phone, and they are global leaders in bank-less digital payments (source).

Now solar energy can lead to an even bigger jump forward. Rural areas are being electrified with “mini grid” and “off grid” solar energy whereby hundreds of millions of peasants get electricity and access to the Internet.

Since Africa is not hampered by a lot of existing institutions slowing down innovation, Africans can move very quickly to Web3. When they get a digital identity and a deed on their house and land, they get access on-line loans, digital cash and e-commerce just as we are used to. Consequently entrepreneurship and local economies will flourish.

> *In 2002, my wife and I arrived in Pemba, northern Mozambique, to work on a development project. It was the day before the mobile network was launched, and all who could afford it walked around with a telephone in hand, keeping an eye on the new transmitter masts. The next morning, when the signal came on, they started calling each other. However, that turned out to be expensive, so despite a large part of the population being illiterate, they quickly learned to send text messages. Soon after, it was discovered that prepaid credit could be transferred from one telephone to another. In this way, mobile payments were invented as part of the most accelerated development process I have experienced in my lifetime.*

African Governance

As part of the colonial heritage, Africans are highly skeptical of government authorities. Instead, they rely on the extended family and the tribal elders.

And the tribes are ready to take over from the corrupt nation-states. In fact, they never truly relinquished power. The colonial powers – and later the aid organizations – simply failed to notice it.

Most African tribes coexist relatively peacefully, so there is no inherent problem with tribal-based nations sharing territories. They may well abide by common traffic laws while maintaining their own currencies, schools, health insurance systems, etc.

Carbon Farming

Traditional African agriculture contributes to global warming in two major ways: initially, through direct emissions of greenhouse gases from cattle farming and slash-and-burn agriculture; and subsequently, through deforestation, which is predominantly driven by these same agricultural practices.

If we manage to reforest the African continent, the effect on climate and biodiversity is estimated to be bigger than the effect of all the solar cells and wind turbines of the World (source).

As food gradually becomes farm-free and the amount of farmland in the World starts to decrease, carbon dioxide could become the next cash crop for African peasants, who are predominantly women. Potentially the whole continent could be reforested financed by carbon credits (market-based carbon taxes).

> *A credit token could be minted by a DAO each time a custodian satellite monitoring system - like Climate Trace - confirms that the number of cattle is reduced corresponding to the emission of one tonne of CO2 or the DAO members have planted trees equivalent to the uptake of one tonne of CO2.*

Solar Farming

E-fuels could become another cash crop in Africa. A possible model is to organize cooperatives that assemble, clean, and maintain solar panels. The investment could be crowdfunded, with Europeans purchasing panels installed in the Sahara rather than on their cold rooftops in the North.

> According to "The International Energy Agency", Africa could power the world: The continent has the potential to produce 5 000 megatons of hydrogen per year at less than USD 2 per kilogram - equivalent to global total energy supply today (source).

Solar farming can possibly be combined with an African variant of vertical farming where the plants are grown in the shade of the solar panels and drip irrigated with water extracted from the atmosphere.

How Europe Can Bootstrap Africa

As we in Europe are slowed down by old institutions resisting to change, we should bet on Africa. The alternative - not doing anything - is not attractive, as Europe will be the destination for colossal refugee and migrant flows if the climate and population crisis runs free on the African continent.

Finally we have the tools to stimulate real development: With digital cash, we can put money directly into the pockets of the poor, as opposed to old-fashioned development aid which often ends up in the wrong pockets. And when the poor get money, they spend it and create real development.

We could airdrop a "basic income" of one Euro a day to all adult in Sub-Saharan Africa (corresponding to approx. 2% of the EU GDP). Such a program will boost Web3, put an end to extreme poverty, dampen migration, reduce the fertility rate, and bootstrap African entrepreneurship.

This digital cash - for example a stablecoin (see appendix) pegged to the Euro - could outperform the dollar as the reserve currency in Africa. It should be transferred directly from the European Central Bank to people's phones, bypassing governments and other intermediaries. It could be programmed in such a way that it, outside Africa, only can be spent on purchases in the EU.

The program is a purely monetary operation, which does not necessarily lead to increased taxes in the EU. It is similar to what the Americans have been doing for the last 50 years: print a lot of money and increase the international demand for your goods without increasing the domestic money supply.

Appendix: Token Economics

Historically, commodities like gold or silver have acted as medium of exchange of value (currency) because they are expensive to extract. However, they turned out to be impractical because they lose value by wear and tear. Instead, emperors and kings stored the gold and silver in treasuries and issued *tokens* (tin coins or paper notes) to represent the precious metal. The tokens could always be redeemed for real gold or silver.

Fiat Money

After World War II, a system was established in Bretton Woods that ensured convertibility between the Western currencies and the US gold reserves. In 1971, however, the Americans abolished the Breton Woods agreement and the dollar became "fiat money" - i.e. money without intrinsic value. As a consequence, the money supply went out of control, because private banks could now mint money themselves.

More than 90% of the money in the world is now created by the banks (source). By virtue of the so-called fractional reserve banking, the commercial bank deposits are backed up by a very small fraction (2,5% or less) of central bank money. Banks lend money they do not have (source).

Fungibility

Digital tokens can be either *fungible* or non-*fungible*:

Fungible tokens are identical and interchangeable and can be used as means of payment.

> *Examples of fungible tokens:*
>
> - *Digital cash in the form of Central Bank Digital Currencies (CBDCs) or privately issued stablecoins.*
> - *Cryptocurrencies that have value because their supply is limited and people have faith in the cryptographic system that supports them.*
> - *Utility tokens that provide access to an application or a service.*
> - *Security tokens that replace the paper version of stocks, shares, bonds, etc.*

Non-fungible tokens (NFTs) are unique by nature and are not directly interchangeable. They can represent everything that can be owned and are so far used to represent digital collectibles and limited editions of digital artwork.

They can also represent real estate, vehicles, gemstones, voting rights, door keys, passes, train tickets, copyright, software licenses, certificates, etc.

For artists, one of the very interesting benefits of NFTs is that the token can be programmed to pay the artist a share of all secondary sales of a work. If the same functionality was generalized to cars and other products with built-in obsolescence, it could incentivize manufacturers to increase product durability.

Digital Cash

Digital cash like central bank money (like the Brazilian Drex or the Chinas digital Yuan) and stablecoins (like Tether) offer many additional advantages over physical tokens:

- They are stored in digital wallets (on a smartphone or the like) and not in banks.
- Properly regulated, they can replace fractional reserve banking with a financial system similar to full-reserve banking.
- They can be issued by both central banks and private actors.
- They make money transfers instantaneous and support micro-payments: a light bulb can pay for its power consumption every hour.
- They open up new tax opportunities like collecting a small fee on every payment.
- They can coexist with old fashioned physical tokens (coins and notes).

Cryptocurrencies like Bitcoin and Ethereum will never play a role as a means of payment or digital cash. They are far too volatile for that. But they have gradually been recognized as investment objects, among other things in the form of ETFs (Exchange-Traded Funds), which are pooled investment securities that can be bought and sold like an individual stock.

Stablecoins

A *stablecoin* is a privately issued digital cash token pegged to a fiat currency like the USD or the EURO. It should be collaterized by underlying assets like tokenized government bonds, wholesale CBDCs, cryptocurrencies, security tokens, or commodities.

With proper regulation and a requirement for 100% collateral, national banks could delegate the issuance of retail digital cash to private entities.

Thousands of Coins

Regardless of the geopolitical landscape, we are moving toward a world where the money of individuals, states, and corporations will coexist and compete, with all tokens being exchangeable or tradable.

> *Global companies like Apple and Amazon could reap substantial benefits by introducing their own utility tokens. These tokens could function as internal payment systems within their supply chains while also fostering deeper integration with customers and other stakeholders.*

Every town (like Bristol) and every retail chain (like Walmart) are likely to create their own coin and it is easy to imagine a revival of the national currencies in Europe

End note

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Don't forget to share this paper with others and your comments with me.

Best Regards,

Jens V. Svendsen

www.jenssvendsen.dk

mail@jenssvendsen.dk