

A Path to Meta-Nature : Automated Environment

Where Even Pencils Grow on A Tree

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ABSTRACT

The real cause of so-called natural disasters including infectious disease pandemic is that our social structure is vulnerable to threats from natural phenomena. The fundamental problem is that many people are involved in the division of labor to produce even a single pencil, and in fact that this system has expanded across continents.

However, at the far end of automation and decentralization, a new autonomous environment awaits that can be called *Meta-Nature*, which is optimized to automatically produce and distribute products using the nearest resources, creating a sustainable living and survival environment less prone to the widespread effects of epidemics, earthquakes, extreme weather events and other threats. Furthermore, the concept of labor will disappear or change drastically in the new environment, and even the concept of consumer will become meaningless, resulting in decline of monetary economy and revival of hunter-gatherer society in a new form.

1. INTRODUCTION

So-called natural disasters such as infectious disease pandemics, floods and droughts caused by climate change, wildfires, and massive earthquakes have a great impact on our lives and industries. The problem is not that nature itself is the cause of these disasters, but that our social structure based on the division of labor is vulnerable to threats from natural phenomena. This is also a factor in the global shortage of semiconductors in year 2021, where supply is so far apart in time and place from demand that there are clogging everywhere due to plant closures and layoffs caused by disasters and the hassle of rehiring workers when recovery is ongoing.

"I, pencil" [Read, 1958] is a famous essay, and is a very clever portrayal of the modern society built on top of the division of labor, through the monologue of a pencil that includes passages like *"not a single person on the face of this earth knows how to make me"*. Its points seem to be that 1) autonomous and decentralized nature of the economy, lacking a mastermind, is exactly what allows for creativity and productivity to meet human necessity and demand, and therefore 2) specialization is the cornerstone of our freedom.

However, we may want to counter that, quoting [Fuller, 1969], *"specialization is in fact only a fancy form of slavery"*. Fig.1 shows a triangle to explain this slavery situation. Specialization creates the need to obtain goods and services outside of one's own expertise and becomes the reason for the existence of money. Money is issued by the state and returned as taxes, enabling the state to obligate people to work for them. By providing security, the state forces people to

abandon self-sufficiency, and encourages specialization.

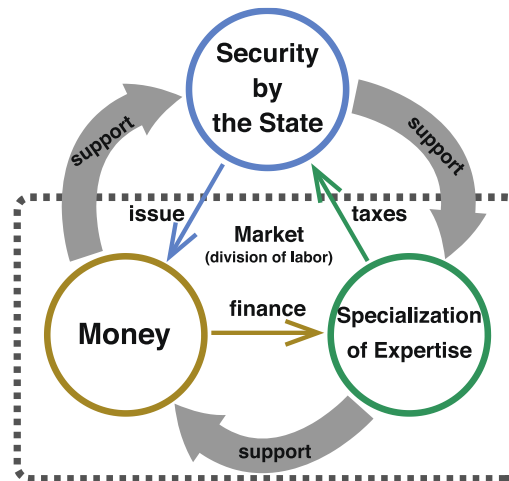


Fig.1: Three-way relations among specialization, money, and the state

Before the birth of the state, people were able to support themselves for hundreds of thousands of years, so it was unlikely that they would prefer to reduce their own chances of survival by increasing what they *cannot* do by acquiring expertise. It is thought that conquest and enslavement led to the acquisition of specialization under the protection by the state.

On the other hand, the recent trends of automation, inexpensive production equipment and sharing knowledge, all through digital technology, are expanding what individuals can do, which is the opposite of specialization.

In this extended abstract, I would like to shed some light on the kind of society that will emerge in the not-so-distant future, one that does not depend on specialization and division of labor, that is, a resilient environment to disasters and where people are truly free.

2. BACKGROUND

2.1 Laws of Media

To analyze the social changes to come, we use the *tetrad of media effects* proposed by [McLuhan and McLuhan 1988]. In media theory, everything that exists between people, including any artifacts and social institutions, is regarded as medium. The *tetrad* is a set of four unavoidable questions we can ask about any medium: *enhancement* (what does it reinforce among the aspects of society?), *obsolescence* (what does it make obsolete?), *retrieval* (what does it revive once outdated?), and *reversal* (when it goes to extremes, what does it turn into?).

2.2 Tetrad of Monetary Economy

As mentioned above, there is a close relationship between specialization and money, so let us draw the tetrad of the monetary economy (Fig.2). Let us call those items listed in each category in the figure *ENH*, *OBS*, *RET* and *REV* for convenience.

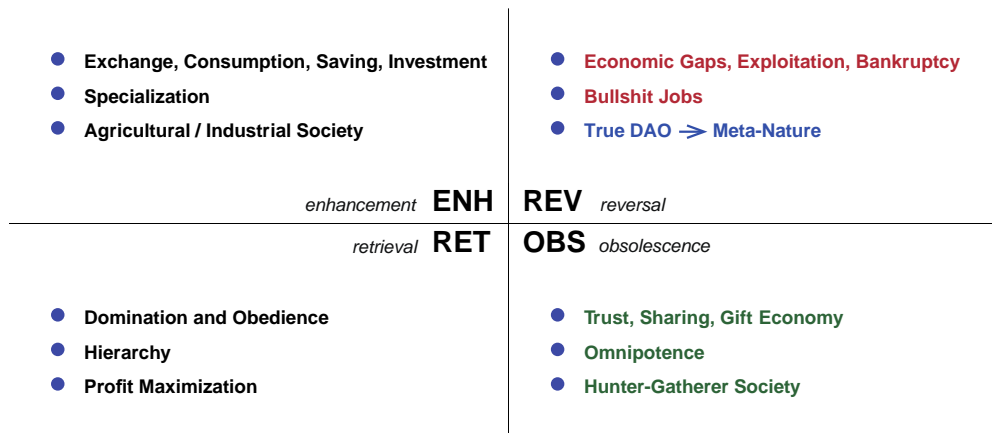


Fig.2: Tetrad of monetary economy

REV contains elements that may be unfamiliar to readers. *Bullshit jobs* [Graeber, 2018] are meaningless jobs that result from everyone having to have a job, discussed in section 5.2. *DAO* (*Decentralized Autonomous Organization*) [Buterin, 2013] is an organization without a central administrator, discussed in section 2.4. *Meta-Nature* is the theme of this extended abstract.

RET (which roughly represents characteristics of prehuman societies) was decimated when *OBS* once emerged as new media (in this case, when the human race was born), but it has been revived as *ENH* decimates *OBS*. On the other hand, as *REV* increases in strength, *ENH* declines, resulting in a resurgence of *OBS*. Therefore, the left side of the tetrad represents the current situation, while the right side represents ongoing fluctuations and changes in the future.

2.3 Insights from Anthropology

Fig.2 implies that if some new medium causes a decline of specialization and division of labor, and thus a decline of the monetary economy, then the hunter-gatherer society will be revived in a new form. That is why I believe that we need to gain knowledge from anthropology.

[Graeber and Wengrow, 2021] tells that there is a body of evidence that communities of large human population existed without a central administrative structure before the advent of the state. Such communities and hunter-gatherer society that continues to exist today are based on the principle of sharing, “from each according to their abilities, to each according to their needs”. The birth of the concept of ownership seems to be religious, meaning that *owners* were those in charge of protecting what was sacred to them in the community. These are examples of what we can learn about societies before the onset of specialization.

2.4 Blockchain and DAO

P2P (Peer-to-Peer) is about sharing and is a way to design large scale applications without relying on centralized management. This could be the technological basis for a new form of hunter-gatherer society in the digital age.

Among examples of P2P technology is blockchain, originally designed to make Bitcoin

[Nakamoto, 2008] possible. Blockchain can be defined as a ledger that satisfies the following properties: 1) self-sovereignty, 2) censorship resistance, 3) fault tolerance, and 4) tamper resistance. In a broader sense, it is a ledger that cannot be censored, even retroactively.

Ethereum is a newer blockchain that allows anyone to verify deployment and executions of a program by putting its code and data (called a *smart contract*) on such a ledger. Its original paper [Buterin, 2013] also explains the concept of DAO as organizations where stakeholders vote to change the code of the smart contracts or to spend the stored funds. However, I would like to call these *false* DAOs, because they are nothing more than stock companies on a blockchain, bringing about the exchange of tokens in place of shares and domination through the possession of many of the tokens, promoting the left side of the tetrad in Fig.2.

Meanwhile, blockchain as a reliable system of record¹ can also be used to build robotically automated systems of Internet of Things (IoT), where the authenticity of the information can be proven with the help of tamper-evident hardware [Watanabe et al., 2021]. This can be useful in realizing automated systems safely as described in the next section.

3. META-NATURE AND ITS IMPACTS

3.1 Overview

Machines and algorithms will continue to replace even many of the intellectual activities considered to be the mainstay of human abilities. Through the expansion of automation and social autonomy, a new *natural environment* will emerge in which even pencils grow on a tree, metaphorically speaking². We call this new environment *Meta-Nature* (Fig.3).

Meta-Nature is an autonomous environment where humans can collect goods and services, like hunter-gatherers do, so to speak, which are automatically produced and distributed using the nearest resources. Humans care for the environment in accordance with their own objectives, i.e., they adjust it to obtain what they wish for.

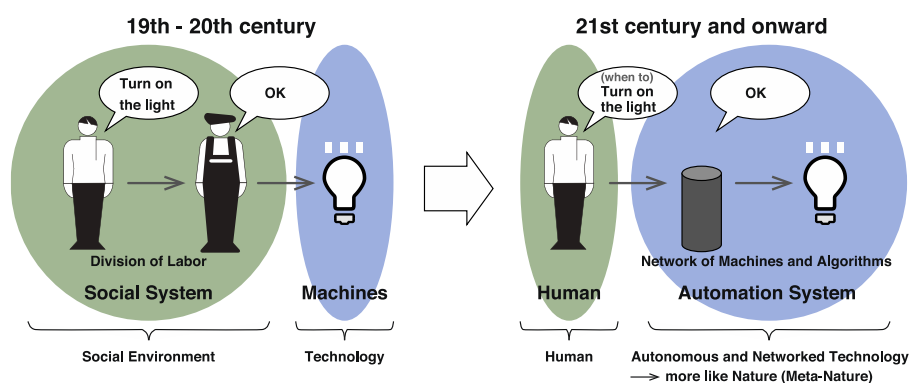


Fig.3: Concept of Meta-Nature

¹ However, the current blockchain has a problem to be solved: its strength depends on the market value of the native tokens, regardless of whether it relies on *proof of work* (overhead to write) or *proof of stake* (voting).

² In reality, an automated production facility is configured to gather nearby resources and to produce pencils or their equivalents. The produced goods may be delivered to those who need them by robots.

Since such an environment has yet to emerge, it may be better to enroll the help of science fiction to discuss its nature. In fact, there have been some works that describe automated environments as if they were part of nature.

“Code of the Life Maker” series [Hogan, 1983] [Hogan, 1995] depict the robotic spacecraft of an alien civilization that drifted to Titan, a satellite of Saturn, which built a new civilization from scratch by automatic execution. There, a forest of factories produces industrial products, and conveyor belt rivers carry resources. The expression “taming the forest” (to configure production facilities) used in the novel is strikingly close to the concept of Meta-Nature described above.

“Yokohama Station Sci-Fi” [Isukari, 2016], a more recent example, describes a world in which 99% of Honshu Island, Japan, is covered by Yokohama Station, hundreds of years after the automatic reconstruction of the station began to run out of control. The structure of the station multiplies on its own, and buildings grow out of the ground like trees. It is also symbolic of a hunter-gatherer society in which the life in *ekisoto*, the area outside Yokohama Station, depends on the resources and products flowing out from *ekinaka*, the inside the station.

We can roughly estimate that the Meta-Nature will emerge in the second half of this century, given the progress of automation technologies.

3.2 Architectural Shift

Fig.4 shows the structural changes in the architecture of society from the present to the Meta-Nature era.

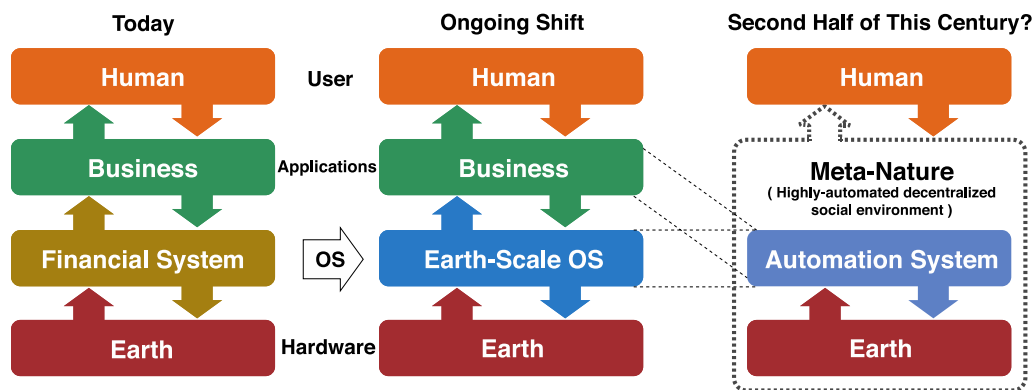


Fig.4: Architectural shift

The left side of Fig.4 shows the architectural layers of our civilization, analogous to the relationship between computers and users. What we want to do with computers is to use applications, and applications use hardware resources through management and coordination by the OS (Operating System). In our civilization, we can think in the same way about how to use the earth's resources (including human resources). However, in our civilization, the part that corresponds to the OS is the financial system, which is an unevenly distributed form that

allows those with more financial assets to use more of the earth's resources (corresponding to the problems shown in red in *REV* of Fig.2).

The Earth-Scale OS [Saito, 2011] in the middle of Fig.4 is a proposed solution to this problem by providing a mechanism to coordinate resource use. This would make finance obsolete. One way to look at blockchain like Ethereum is that it is an early prototype for an Earth-Scale OS, because you can program the business logic to run on it.

Beyond that, the era of Meta-Nature awaits (the right side of Fig.4), where the OS and applications of civilization fuse. This fusion corresponds to the NOCODE and LOWCODE movements in the computer software world, where rather than developing individual applications (businesses), the necessary goods and services are obtained through purposeful care (adjustments and configurations) and interconnections of existing mechanisms including generative tools for new mechanisms.

3.3 Impacts

With Meta-Nature, the concept of labor will disappear or change drastically, the distinction between producers and consumers will become blurred as people no longer produce, and because of the obscurity, even the concept of consumer will become meaningless, resulting in the decline of monetary economy. The realities, desires, and values of many people will inevitably change.

Abandoning the monetary system is not merely a prediction, it is what we must do. Let us say that we will still have to spend money and live as consumers, while the level of automation is constantly increasing and the opportunities for labor are being taken away. That means that many people will have to work for ever lower wages as the operating costs of machines continue to fall, while a few will monopolize the profits. Or, in a world where automation is complete and no one can work anymore, a basic income is distributed from the central administration, and people can only live freely within that range, i.e., we become de facto slaves.

4. PATH TO META-NATURE

4.1 Premises

There is a large gap between today's modern society and Meta-Nature. There are two major elements of change that make Meta-Nature possible: *automation* and *social autonomy* (thus *decentralization*). The former is self-evident, and the latter is because people facing nature, albeit extended one, are supposed to be equal. As a matter of fact, Meta-Nature would not control the distribution of food to divide people into rulers and ruled.

Our assumption is that it will take more time for automation to reach a level of perfection where human labor is no longer needed than for society to be structured in decentralized and autonomous ways. Based on these, we can backcast and consider the path to Meta-Nature. We begin with *version 3* (Meta-Nature) and work backward from there down to *version 0* (today).

4.2 Version 2 (Meta-Nature with Human Agents, or True DAO)

We reduce the level of automation from *version 3* (complete Meta-Nature), and get an environment where humans play a part in sensing and actuation as agents of Meta-Nature. This is like the situation in a short science fiction story “*Maneki Neko*” [Sterling, 1999], where people go around helping others according to the recommendations from portable human interface of networked AI (proactively behaving integration of Earth-Scale OS and the application layer that coordinates resource use and provides goods and services through human agents), and where reliance on the monetary economy is decreasing. Each community of gift economy operates without a central administration and without voting, making it a true DAO.

4.3 Version 1 (Mashup Organizations)

We reduce the level of social autonomy from *version 2*, and we get what may be called *mashup organizations*, where the functions of an organization (registered profit or non-profit business) are decentralized to the utmost limit, and various internal services are provided through combinations of existing small services, to provide what the organization means to the external world (so the business can be programmed like an application, suggesting that this environment has a working Earth-Scale OS). The existing small services are paid for but will be provided free of charge to many users in accordance with the freemium principle.

4.4 Version 0 (Today; 2020s)

We reduce the degree of deviation from the current organizational structure from *version 1*, and we get the current state, where elemental technologies are in budding use, including *web3* (blockchain-based Internet applications) and *metaverse* (spatial Internet that would help us to shift from wide-area large-scale division of labor to efficient use of nearby resources through virtualization of experience.).

5. DISCUSSION

5.1 Technological Difficulties

A common objection to the concept of Meta-Nature is that a level of automation to actualize it will never be achieved. However, we are not suggesting that we break the laws of physics. The fact that the human body and mind follow the laws of physics suggests that sooner or later automation reaches a point of perfection where human labor is no longer necessary (although the question of whether the resources for this can be properly allocated is worthy of discussion.).

5.2 Human Dignity

Some people believe that automation will take away human dignity. But what is being taken away is not dignity, but at most job. Perhaps in some of our mind, work and personality are too

tightly coupled, and we need decoupling them. Meta-Nature will allow individuals to use their time to pursue their own interests. As [Graeber, 2018] pointed out, many people in modern societies are engaged in bullshit jobs, which should be much more damaging to human dignity.

5.3 Human Desires

Some people argue that since human desires will not disappear, without fetters such as money, we will eat up resources indefinitely. But desire does not exist independently of social structure, and social shift will change what we will wish for. In the meantime, digital technology, such as the technology of metaverse, will continue to enable each of us to get what we want. Human desires have been controlled for hundreds of thousands of years anyway, while humans were exclusively hunter-gatherers. I am certain that there is much we can learn from hunter-gatherer society of the past and present to make our living more sustainable.

6. CONCLUSIONS

Towards the latter half of this century, machines and algorithms will continue to replace even many of the intellectual activities considered to be the mainstay of human abilities. It is not a question of machines taking people's jobs, but perhaps a question of people sticking to jobs machines or machine-assisted users are better at. There is going to be an inevitable social shift.

Through the expansion of automation and decentralization, Meta-Nature will emerge in which even pencils grow on a tree as a figurative speech, transforming our living environment into a new form of hunter-gatherer society.

Yet, we should believe that [Read, 1958] will continue to be correct in many aspects. No one will be able to make a single pencil (or equivalent) with their own hands. The work of trying to understand everything in the universe continues as science. Because there is no mastermind, all sorts of creativity and ingenuity will be tested, and what we can do will continue to improve. The root of our freedom, however, will not lie in specialization, but in our omnipotence, supported by Meta-Nature.

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