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Chapter 3

Technology as an Aspect of Human Praxis

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Summary

This paper proposes a specific approach to understanding the nature of technology that encompasses the entire field of technological praxis, from the making of primitive tools to using the Internet. In that approach, technology is a specific form of human agency that yields to (an imperfect) realization of human control over a technological situation—that is, a situation not governed to an end by natural constraints but by specific human aims. The components of such technological situations are a given collection of natural or artificial beings, humans, human aims, and situation-bound tools. By performing technological situation analysis, the essential form of tool making, the complex system of relationships between science and technology, technological practices with and without machines, the finiteness or imperfectness of any technology, and engineering (i.e., the possibility of the creation of technological situations) can be considered. For a better characterization of the approach to technology, the paper also presents a comparison of other philosophies of technology. Following Feenberg's comparative analysis, the so-called fundamental question of the philosophy of technology is formulated, its two sides are identified, and it is applied for clarification of our position within philosophy of technology. In our approach, all human praxis can be considered to be technological; more precisely, every human activity has a technological aspect or dimension.

3.1 Introduction

As to meet the objective of this paper, a rather special concept of technology is needed. In particular, the concept of technology must be broad enough to include technology in all its historical forms, primitive toolmaking as well as recent information technologies. No doubt this is an "essentialist" view on technology since only an essentialist view is capable of

accounting for the features that protean historical forms of technology have in common, and hence identifying the point in time when technology was born. However, instead of following in Heidegger's or Ellul's footsteps, I propose a different philosophy of technology based on a more universal concept of technology [183, 186, 184, 185].

I propose that the essence of technology is a specific form or aspect of human agency, the realization of the human control over a technological situation. In consequence of the deployment of this human agency, the course and the outcome of the situation are no longer governed by natural constraints but by specific human goals. The human control of technological situations yields artificial beings as outcomes. What is a technological situation? Technological situations are situations with a specific character. More concretely, technological situations vary and they are not homogeneous in nature, so, they can be identified on the basis of their constituents. The components that make up a technological situation are:

- a given set of (natural or artificial) beings,
- humans (human agencies),
- their aims, and
- (situation-bound) tools.

In Hegel's words, the essence of technology necessarily appears in concrete, particular technologies only, while on the other hand, all technologies necessarily embody the essence of technology. According to this view, every element of the human world is created by technologies. Even human nature and social being are the products of our technological activity, and their characteristics are determined by the specificities of the technologies we use to produce them.

In comparison with widely accepted views on technology, this view implies an extremely general and abstract conceptualization of technological praxis. In particular, all human praxis appears as technological, or better said, as having a technological aspect or dimension. The view on technology proposed above is therefore really close to a philosophy or theory of human practice. Human practice includes the—imperfect—realization of human control over a situation. Human practice is of course not identical with technological praxis, as the former has several other aspects as well, but it always and necessarily has a technological aspect too. Moreover, every human situation can be regarded as a technological situation, every human being as a technological agent, every human goal as accomplishable by a specific technology, and

every human tool as a situation-bound technological tool. The technological aspect of human practice is a response to human vulnerability and expresses the intention to gain control over the situations of our lives. Without such an—evidently partial—success we would cease to be human beings; we would take part in natural situations as natural—animal—beings. For this reason, every technology is a technology of humanity: human beings, the human world, cultures and societies are all products of technologies. Further, technology is the only way humans can create themselves.

Human beings were born together with technologies – and technology was born together with human beings. Various branches of technology can be associated with various types of life situations. Our self-creating praxis is facilitated by a range of economic, legal, psychic, social, cultural, material, mechanical, etc. technologies.

In this view, engineering is a meta-technological activity, a specific practice of handling the components of technological situations, which aims to set up controllable situations in a given, complex, infinitely extending environment.

3.2 Philosophies of technology

For a better characterization of this approach to technology, a comparison of other philosophies of technology is needed. Of course, we cannot give a comprehensive overview of the philosophy of technology here; we are satisfied by recalling the approaches and problem areas which are closely connected to the general nature of technology. There are numerous books, journals and electronic sources of information for a more comprehensive review of the philosophy of technology.[1]

Most philosophers of technology agree with the claim according to which technology is a human product. People, following certain (according to different philosophers, different) aims operate technologies in order to satisfy basic human needs. According to the traditional view about humans and technology, technology is a complex tool and an act which make the forces of nature serve humans. As a result of technological activities, we intentionally transform the physical world to make it function according to our aims and to achieve a certain result. This means that we practically have a human or social control over technologies including their construction, use and developments. However, it is possible to conceive the work and even the emergence and change of technologies as autonomous processes of which are eventually not controlled or even not necessarily con-

[1] See e.g. [148, 149, 192, 42, 93, 95, 128, 47, 49, 160, 178]

trollable by particular human or social agents. All philosophies of technology include one of these (autonomous or controlled technology) positions.

All philosophies of technology take also a stand on the question of whether technology is value-neutral or value-laden. In other words, are the goals and means which are necessarily a part of technological activities separable from each other? If we assume their separability, given technological tools can successfully contribute to the realization of the most varied aims, that is, the tools themselves do not follow any goals, therefore in a certain sense they are neutral. Obviously, we can reach the same conclusion if we note that a given goal can be realized with different types of tools. In contrast, if we assume that tools have their own values, these are unavoidably built into the value system of the aim, since they will influence the goal that can be realized. That is, technology cannot be regarded as value-neutral but it is "value-laden" and we have to take its value content into account while using it.

Adopting Feenberg's chart [47, 50], a classification of the most significant versions of philosophies of technology based on the above-mentioned relations can be presented. Four main groups of classical philosophies of technology are differentiable: determinist, instrumentalist, substantivist, and critical versions. See in the Table (the table also contains some illustrative examples):

TECHNOLOGY	AUTONOMOUS	UNDER HUMAN CONTROL
VALUE NEUTRAL	*Determinism* Traditional Marxism	*Instrumentalism* Pragmatism
VALUE LADEN	*Substantivism* Anti-utopist views Ellul, Heidegger	*Critical theory* Anti-utopist views Marcuse, Foucault

The main characteristics of the philosophies of technology classified above can be identified on the basis of what we said earlier, but perhaps the choice of the names and the typical versions of the classes might require some explanation.

The *determinist* view has high hopes about the autonomous development of technology insofar as it regards technology as the key moving force of social progress. Technological progress is crucial in creating social progress, but the direction and the characteristics of social development are not determined by the values hidden in technology (since technology is value neutral), but by the goals chosen by people. A view such as this is in complete agreement with many versions of the modernist value system, for example, the modernist idea of clockwork or the traditional views of Marxism.

The *instrumentalist* view completely eliminates the connections between (technological) tools and (human) goals, for example, the idea that technological development necessarily generates social progress, and it interprets technological tools as means which can be freely utilized by man. The philosophical assumptions of instrumentalism are usually based on the ideas of liberalism or pragmatism [160].

Substantivism agrees with determinism in that humans are not the ruler of technology but rather is at the mercy of technological progress; what is more, according to this approach this is true in a very important sense. Technology is not neutral; it unavoidably expresses its own values during its usage, that is, technology necessarily modifies the goal to be reached and even modifies man himself. In this way, through enforcing the contents in themselves, technological tools shape the life of modern society as a determining factor (think of for example the effects of cars or television). Substantivist philosophy of technology (we could also say "factual", "essential" or "content based" as well) usually notes the negative social effects of technological progress and it often predicts anti-utopist scenarios. The emblematic figures of substantivism are Jacques Ellul [42] and the famous philosopher of the 20th century, Martin Heidegger. Heidegger's late writings are especially significant (written in the 50s and 60s) [82, 83, 96].

The characteristic figures of *critical philosophy of technology* (Mumford, Marcuse, Foucault, and Feenberg) developed their point of view under the influence of Heidegger and the Frankfurt School [47, 49, 51]. They accept the fact of the connection between the value content of technological tools and social aims. At the same time, they emphasize the possibility of human control over this interconnected conglomerate. In other words, though the technological and the human spheres are inseparably interconnected and this has numerous dangers, the unfolding processes can theoretically be handled through adequate political, economical or cultural means.

However, the question of the autonomy of technology is closely connected to the question of the value-neutral or value-laden nature of technology – in fact, they are different sides of the same relationship between technology and society. While during the interpretation of technology we paid attention to the circumstances which connect and separate technology and society, in connection with the value contents we examine a certain identity of technology and society and the possibilities of their appearance in each other. Obviously, both aspects have to be revealed for a successful description of the relationship between technology and society: their differences and their identity characterize their relationship appropriately together. The existence of such a fundamental question demands that every philosophy of technology has to declare its position in the relationship between technology and society. On

the one hand, it is necessary to choose between the autonomous or non-autonomous (i.e., human-controlled) existence of technology; on the other, it is necessary to be for or against the value-laden nature of technology.

We can also express this by saying that the fundamental question of the philosophy of technology is the technology-society relationship, and it has two sides, namely the standpoints regarding the autonomy of technology and the value content of technology, which must both be found in any consistently constructed philosophy of technology – as it was demonstrated above.

3.3 Technology-society relation and human praxis

Let's consider the fundamental question of technology. First of all: how can we answer the fundamental question in our approach to technology?

1) *Human conditions as technological product.* As it is well known, Aristotle made a sharp distinction between natural and artificial beings (especially in his Physics). As he declared natural beings (they exist by nature) include in themselves the principles of motion and rest, but the artificial beings or artifacts (they exist from other causes) are products of the art of making things [87]. Based on this Aristotelian distinction the fundamental role of technologies – by definition as creators of the artificial spheres of beings – in the human world is really crucial.

Since human nature and social beings are artificial ones, technology is the only source of their emergence and existence. Every element of the human world is created by technologies. Both human nature and the social being are the products of our technological activity, and their characteristics are determined by the specificities of the technology we use to produce them. All historical forms of human nature and of social being are constructed (and continuously reconstructed) or produced (and continuously re-produced) by historical versions of technology. But technology has an ontological Janus face: it produces both "things" and "representations". For thousands of years, have people used material (agricultural or industrial) technologies where the material product was in the foreground, although the symbolic content was also present.

The last few decades have witnessed a significant technological change, in that "representations" have become dominant over the "thingly" products in the most important technologies of our age. On the one hand, new (cognitive, communication, cultural, and information) technologies have emerged; on the other hand, the representational or symbolic function of traditional technologies has become more significant. As a consequence, the most important characteristics of the social being are essentially transformed. The terms "post-industrial / knowledge / risk / information / network society" all refer to a type

of society where representational technologies are the dominant factor in the (re)construction or the (re)production of human nature and of social being.

So, the technology as a specific form or aspect of human agency, as the realization of the human control over a technological situation is the fundamental creator of the human conditions.

2) *Technology as social product.* As it is well known social (or human) beings, obviously, can have an active, crucial role in the formation and functioning of any technology: given technological and social relations coexist and interrelate to each other in a complex way and the technological products and even the technology itself is a social product. There is no room to present any details here, in this way we just remind of the development of numerous versions of constructivist ideas on (science and) technology in the sociology of scientific knowledge (Mannheim, Bloor, Collins), in the social constructivism (Shapin and Schaffer), in the actor-network theory (Latour), in the phenomenological constructivism [7], in the radical constructivism [57], and so on. However, there can be found several interesting details in these disciplines on the social construction of technologies, but the most comprehensive and convincing view is the idea of the so-called social construction of technology (SCOT) proposed by Bijker and Pinch [155, 8] in which detailed descriptions and analyses are proposed on the constructive agents and mechanisms with several well-documented illustrations.

The SCOT emphasizes the crucial contributions of social actors to the formation of technologies, and the hermeneutics of science and technology (Ihde, Borgmann, Heelan) underline and disclose the human aspects of the constructive processes.

It is an essential aspect of the constructivist views, that engineering, obviously has a crucial – but in the different theories different – role in the process of construction. However, engineering in its traditional sense is not the only one actor of the construction. For example, in SCOT the "stabilization" of the features of an artifact happens in the course of a kind of discourse between engineers and different relevant social groups. In other words in this context there is a meaning to identify different kinds of "engineering", or the engineering has a heterogeneous character [107]. So, technologies are constructed by social (human) agents in a complex process of mutual actions.

3) *Technology-society interrelationships.* However, if the human conditions are technological products, and at the same time technologies are social (human) products, how can we avoid circular reasoning in the description of their causal relationships?

Let's take into account the fact, that this is not a really specific methodological dilemma, but the well-known difficulty of the understanding of complex sys-

tems, or the nature of complexity at all. Frankly, this difficulty can be considered as a (not irrelevant at all) definition of complexity, e.g. a complex system is a collection of a high number of interacting components with mutual determinations which can be explained with circular causality (see e.g. [45]). In other words, due to the appearance of circularity in the causal order, the technology-society conglomeration should have to be considered as a complex system.

However, it is very important that in the history of philosophy there have been emerged a very effective description of complexity: dialectics. Of course, the dialectical thinking, or dialectics as a methodology of thinking about complex beings, has been constructed in different versions with different efficiency. Hegel's dialectics in his Science of Logic can be considered as a genuine understanding of the world as totality – which is another name in philosophy for complexity. In our recent dilemma, a specific "application" of the Hegelian dialectical thinking will be used, which was performed by Marx in an unpublished manuscript thinking about the relationships between production and consumption [116]. In the chapter called "The General Relations of Production to Distribution, Exchange and Consumption" Marx clearly argues that the two crucial concepts, production and consumption stand in a very complex interrelationship. Here we have no possibility to reproduce the whole argumentation, but a kind of illustration of his dialectical thinking seems to be useful:

> *"Production is thus at the same time consumption, and consumption is at the same time production. Each is simultaneously its opposite. But an intermediary movement takes place between the two at the same time Each appears as a means of the other, as being induced by it; this is called their mutual dependence; they are thus brought into mutual relation and appear to be indispensable to each other, but nevertheless remain extrinsic to each other. Production is not only simultaneously consumption, and consumption simultaneously production; nor is production only a means of consumption and consumption the purpose of production but each of them by being carried through creates the other, it creates itself as the other."*

Marx additionally emphasizes that it would be necessary to avoid a kind of "empty Hegelianism" and based on these statements wrongly declaring that production and consumption are identical. The circular causation should be not the final statement. He continued the conceptual analysis involving additional relationships to seek out the more fundamental or the predominating factor of the production-consumption conglomeration in order to reach a real understanding of this complex being. According to our views, such kind of methodology can be successfully applied for a better understanding of any kind of complexity.

In this way, it seems to be possible to adopt this Marxian methodology in the case of a technology-society complex. Based on the above-mentioned relationships a kind of circular causation was disclosed in the technology-society complex. However, it seems to be necessary to go further and to find a really fundamental, predominant component in the complex. In our view, these are the human beings. As the first principle, the following is proposed: technologies are human technologies, societies are human societies. In other words: the active, acting human beings are situated in the center of the technology-society complex. The origins of this complex can be found at the human praxis.

So, to answer the fundamental question of the philosophy of technology we would propose not to use the separated concepts of autonomy and control, but instead of them the more sophisticated concept of technology-society complex seems to be relevant.

4) *Human praxis.* Human praxis (or practice) can be found at the origin of the technology-society complex. This means that all human praxis can be considered to be technological; more precisely, every human activity has a technological aspect or dimension. Human practice is not identical with technological praxis; it evidently has many another aspects, but every practice has a technological aspect.

Of course, philosophical considerations on human praxis have been an extended history with many consequences to the recent views on it. Here we attempt to limit ourselves to study only those aspects of the problem which are closely connected to the characterization of the specificity of our proposed philosophy of technology.

One of the most important philosophical problems is the understanding the "reification" in the context of human praxis.[2] Reification certainly is a fundamental component of the human praxis, but in our view that aspect which is not crucial in the understanding the technological aspect of the praxis. The "control over a situation" aspect of the praxis can be identified as a technological one.

There can be identified a kind of proliferation of conceptual tools applied in the description of praxis (or practice) in different philosophical traditions, so, speaking about human labor, social production, agency of actors, etc. we can refer similar conceptual structures in different contexts. The sophisticated translation of the terms and meanings to each other could be a topic of another study. Here we simply declare the aspiration that the proposed techno-

[2] An excellent discussion of these problems can be found in the book [2], especially in the papers [222, 103, 112, 106, 52].

logical interpretation of the praxis practically includes and refers to the common content of the different descriptions.

Every human practice yields to an – imperfect – realization of human control over a situation; i.e. the situation is not governed to an end by natural constraints but by specific human aims. Every human situation can be considered to be a technological one. Every human being is a technological agent. Every human aim is attainable by a specific technology. Every human tool can be considered to be a situation-bound technological tool.

The technological aspect of human practice embodies human defenselessness and human commitment to the successful control over the situations of human life. Without such obviously partial success, we would not survive as human beings but return to natural situations as natural – animal – beings. Every technology is a technology of humanity, and human beings, the human world, and human cultures and societies are equally products of technologies. Technology is the only tool for human self-creation. The branches of technologies can be associated with families of life situations. Different economic, legal, psychical, social, cultural, material, and mechanical technologies serve humans' self-creating praxis. In that sense, different kinds of engineering can be considered to be a meta-technological activity at different situations: a specific practice of handling the components of the given technological situations with the aim of cultivating controllable situations in the human environment.

Notice that in this philosophy of technology the concept of situation has a central role. A situation is a (finite or infinite) collection or set of beings which includes, as an element, at least a human being. Every situation is a human situation. The concept of situation is closely related to the concept of world and the concept of system. Every world includes at least a human being, so the worlds are human worlds, similarly as it was declared in the case of situations, but the world is an organized totality around the humans, in contrast to the situation of which has no such a structure. From a structural point of view, the situation is similar to the systems. A system is a set of beings taking arbitrarily together without any given structure. However the situation is given, the system is freely chosen. So, the situation can be considered as a world without structure or a system without constitutive freedom.

Let's repeat the characterization of the technological situation. Technological situations are situations with a specific character. More concretely, technological situations vary and they are not homogeneous in nature, so, they can be identified on the basis of their constituents. The components that make up a technological situation are:

- a given set of (natural or artificial) beings,
- humans (human agencies),
- their aims, and
- (situation-bound) tools.

Based on the above comparative notes we can speak about technological systems, but it is impossible to aspire to the control over the world. In practice, the human world is disjointed into controllable situations.

For the connection of these ideas to Heidegger famous analyzes in his paper "The Question Concerning Technology", we can consistently substitute Heidegger's concept of "Gestell" (Enframing) for the concept of "technological situation" used above. In this case, perhaps we will also notice that our standpoint in the characterization of the historical forms of technology is significantly different from Heidegger's. According to Heidegger, there is a sharp difference between Ancient and modern technology (the earlier is creative, the latter is related to power). However, we believe that this differentiation is unjustified: creation and power can only characterize any kind of technology together [83].

So, in this view of technology, the fundamental question of philosophy of technology can be answered considering the technology-society complex in the context of human praxis. Technology and society coexisting and their complex is value-laden. This view of technology can be considered as a version of critical philosophy of technology.

3.4 Perspectives on the science-technology relationships

The inseparability of technological and human spheres, that is, the human values built into technological tools as well as imagining technological tools which influence human aims, have become more or less completely accepted in the endeavors of the philosophy of technology. Thus, in fact, we can say that the popular views of the philosophy of technology nowadays are either substantivist or critical philosophies of technology or a certain mixture of these. Nevertheless, they might diverge in several details. For example, if we compare the views of contemporary philosophers of technology such as Pickering, Haraway, Latour or Ihde [92], it becomes clear that the analysis of the problematic relationship between the human and the non-human is centrally important for all of them (though they use different concepts). Thus, for example, they characteristically make a stand in connection with the possibly symmetric nature of the relationship between the human and the non-

human, the nature of the activity of technological tools, the possibility of the incarnation of human intentions in non-human entities and the incarnation of non-human strivings in humans and in similar connected questions.

Notice, that the dominance of the philosophical ideas of hermeneutics, social constructivism and the postmodern point of view in the philosophy of technology is basically connected to the nature of technology. As was already discussed, technology can always be interpreted in a certain situation, that is, it is a situation-dependent entity. Entities and forms of existence of this kind are difficult to interpret for philosophical systems such as positivism or the whole tradition of analytic philosophy since these points of view precisely concentrate on researching and describing entities and knowledge which are situation-independent. However, hermeneutics, the postmodern approach, and social constructivism precisely deal with the interpretation of entities and forms of existence embedded in a situation (world, life-world, social environment), that is, as a result of their basic philosophical assumptions, they are more appropriate for describing and interpreting situation-dependent technology. Consequently, we can also say that hermeneutics, social constructivism, and postmodern philosophical systems are systems of the philosophy of technology as well since they necessarily include the possibility of interpreting technology philosophically, though of course only in an implicit form, or using a Hegelian term, in an unhappy form.

We can utilize the mentioned philosophical points of view not only for interpreting technology but also in the interpretation and description of the sciences. In fact, it is our experience that hermeneutical, social constructivist, feminist, etc. points of view have also developed in the philosophy of science. In these philosophies of science, they try to understand science (either the whole of science or some of its problems) by placing it into some kind of (human or social) situation. The consequence of this is that the methodology of interpreting technology and science is necessarily identical in the mentioned approaches. As a result of the identical points of view, the differences between technology and science might be blurred or might seem insignificant since we understand all of them chiefly as a certain being-in-the-world, as something which fits into a context. In recent years, the outlines of an independent entity called technoscience have been developing from the common characteristics of technology and science which we identified with the situation-dependent point of view described above. The interpretation of technoscience is more and more popular worldwide, and it is gradually taking over the roles of "traditional" philosophy of technology and philosophy of science which were earlier regarded as separate [154], [92].

Given the above conceptualization of technology, it is evident that technology has primacy over intellectual practices such as doing philosophy or doing

science. This is because being a human is prerequisite for being a philosopher or for being a scientist. Evidently, there is no philosophy or science without specific, historically determined technological practices. In other words: philosophy and science (as well as any other field of human culture) necessarily rely on and thus include technological components [185]. The fundamental interrelations of science, philosophy and technology can be summarized in a schematic formula: "science = technology + philosophy" [182].

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