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Broken technologies : the humanist as engineer : an Introduction

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Introduction to Broken Technologies

Introduction

The "antiquities" preserved in museums (for example, household things) belong to a "time past," and are yet still objectively present in the "present." How are these useful things historical when they are, alter all, not yet past?

Martin Heidegger[1]

There are many possible definitions of "technology" and I will discuss some of these in this book. However, in this introduction let me use a definition of Svante Lindqvist[2] who defines technology very intuitively as "those activities, directed towards the satisfaction of human wants, which produce change in the material world." He says also "the distinction between human "wants" and more limited human "needs" is crucial, for we do not use technology only to satisfy our essential material requirements." Consequently, from this perspective, a technology that is "broken" could be defined as those activities, directed towards the satisfaction of human wants that are intended to produce changes in the material world that *either do not manage to satisfy these wants or do not produce changes in the material world, or both*. Any definition of technology implies the use of terms as "activity" and expressions as "directed towards" that are very difficult to define without coming into deep philosophical considerations. We are going to see that to avoid a philosophical discussion it will become more and more impossible as we go through the different aspects of broken technologies.

We can assume that the *intentionality* imbedded in tools and machines is the same as the "effective procedures" that work beyond human capabilities. However, a tool or a machine can do worse than the human body or than another tool or machine. When tools or machines do worse than the human body does, or when they do better than the human body but worse than other tools or machines, they became *broken technologies;* otherwise they are *full technologies*. We can use this principle to define operationally what a "full technology" is and what distinguish it from a "broken" one.

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[1] Heidegger, Martin. *Being and time.* State University of New York, 1996; p. 348.
[2] Lindqvist, Svante. *Technology on Trial. The Introduction of Steam Power Technology into Sweden 1715-1736.* Uppsala Studies in History of Science I, Uppsala 1984; p. 14.

> Suppose that any two technologies can be compared in reference to a task. That which works better is a full technology the others are *broken*. The "market" decides this almost instantaneously because the market is the place in which *docking* (the "coupling" between the artefact and the world) is automatically tested. Obviously, no technology works forever and ultimately all full technologies become "broken".

Another approach to a definition of brokenness is the term "usability" which improves studying the interaction between the artefact and its user. In engineering, the usefulness of an artefact is determined by two qualities: its *utility* and its *usability*. From our perspective there is *utility* when the artefact is efficiently designed to dock with another artefact or with the world; at the other side, *usability* describes the artefact's qualities from the point of view of the user. The three goals of the engineering of usability are directed to produce artefacts that fulfil the following conditions: a) the artefact should be "more efficient to use (it takes less time to accomplish a particular task); b) it should be "easier to learn (the operation can be learned only by observing the object)" and c) the artefact should be "more satisfying to be used."[3] Usability then, is measured through: "*Learnability*: How easy is it for users to accomplish basic tasks the first time they encounter the design; *Efficiency*: Once users have learned the design, how quickly can they perform tasks; *Memorability*: When users return to the design after a period of not using it, how easily can they re-establish proficiency; *Errors*: How many errors do users make, how severe are these errors, and how easily can they recover from the errors; and *Satisfaction*: How pleasant is it to use the design."[4] In the case of broken technologies and broken artefacts their usability is broken in all or some of these aspects. Because of that, they are not more efficient to use; they are not easier to learn and they are not more satisfying to use.

As broken technological examples, we can name some that are very easy to grasp and to understand intuitively. Let us consider first the case of *old* technologies, as the steam locomotive. This technology still "works" today and it could be used in the same way that it was used hundred years ago. Why should it be called "broken"? The answer is "because of its age", we would say that it belongs to a world that does not exist anymore.

[3] Nielsen, Jakob. *Usability Engineering*. Academic Press, 1993; p. 10.
[4] *Ibid.*

Then, it could be described as "time-broken". But, what about the technologies of Leonardo's machines that are artefacts from the 16th Century? They are in some sense *old technologies too,* but we notice that they are *different* from cases like that of the steam locomotive. Which are the differences between these two cases? We know that many of Leonardo's machines were only sketches and never were constructed. We also believe that if they had been constructed, they would not have worked "properly". The differences between these two cases of brokenness can say something about the world as such. We notice that an important aspect of these two technologies is how their constitutive parts work with each other. A steam motor is an old technology but it still works properly because its constituent parts are "adequate to each other" and "adequate to the surrounding world". We name this adequacy as "congruency". We say that the steam engine and the world still "dock congruently". In the case of Leonardo's artefacts, that does not occur, because they were designed ignoring many physical laws. The fact that "old" technologies should be included in the family of broken technologies actualizes the importance of time and especially of "history" in this study. We know that the steam engine is a historic vestige of another time. That means that "with time", full working technologies of today will be converted into broken technologies too. Obviously, is not "time" itself that changes them, but what changes is the way humans wants and needs develops in history. We notice now that Lindqvist's definition above contemplated the changes that technology makes on the world but did not say anything about the changes occurring between the world of artefacts and the "human world" and how these changes affected technology. To avoid this problem we will try to ground the phenomena of technology in *praxis* with historical connotations. We will call this approach "historical phenomenalism" and present technological artefacts as the consequence of *human intentionality* imbedded in tools and machines. "Technology" for us means the development of "intentional effective procedures" that work *within and beyond the human capabilities.* In this sense, broken technologies can also be seen as the result of the situation in which intentional effective procedures of any kind, do worse than the human body does, or when they do better than the human body, they do worse than other intentional effective procedures. At the other side "technology" for us can also mean "knowing how" and in this case technology is the name of some cognitive (not intentional) act.

First-level of brokenness

Let us now consider another example, the "technologies of poverty" which for us are broken technologies too. Any materials that society discards as garbage are suitable for being reprocessed using technologies of this category. What is broken here is the *amount of forms* (noemata) that are available to be used as artefacts and tools. Using a "knife" as a "screwdriver" could be a good example of how this technology *redirects intentionality.*

The immediate question is the following: what *screwdriverhood*-qualities does the "knife" have? Moreover, what is it that is *not working here*: is the *knowledge* of the possibilities of the knife respectively the screwdriver's possibilities to "dock properly" with the world that which is wrong? Is this case, as in the case of Leonardo, a case of lack of knowledge, which causes this brokenness? Alternatively, is it the *system of beliefs*, which is not congruent with the tools? Can it be so that deprived people *believe that* a knife is the same tool as a screwdriver? The answer is simpler, deprived environments do not offer the full range of tools that match the everyday world of "regular" environments. There are no problems with the system of beliefs or with the implied knowledge, what happens is that the technical means that are for disposal are incomplete to match the world of garbage. But this insufficiency is noematic; an initial lack of "forms" demands the recourse of a redirection of intentionality. Because of this case of brokenness, it necessary to distinguish between that which *depends on knowledge* and that which *depends on praxis*.

Knowledge can be manifested as a *clear idea or form* about how the laws of the world work. I call this clear idea a "noema". To e.g. "tele-transport" a material object to a new place by decomposing its molecular structure, is a technological idea that belongs to the *fantastic*. The idea or *noema* of this technological procedure exists but not their "pragma". As *pragma*, we understand the technological procedure *itself* that permits the idea or noema to be pragmatically real. We say that fantastic technologies are pragma-broken because "they know what they want" but they do not know "how to manage" to produce these outcomes. Magical technologies at the other side are the opposite case. They have a pragmatic solution (that is the "ritual") but they have not a clear noema or cognitive base to produce this. The action of cutting a surrogate person to "cure" the disease of a third sick person, is a magical procedure that shows a "precise procedure" for the expected outcomes of this praxis, but "we" (the referent which makes the classification) know that this procedure is not congruent with the world. We say that the magician "knows how to do" but he does not know "what he wants," and that magical technology is *noema-broken*. Of course, not every case is transparent and each case is different from the others. We can certainly find cases of magical technologies that "really work".
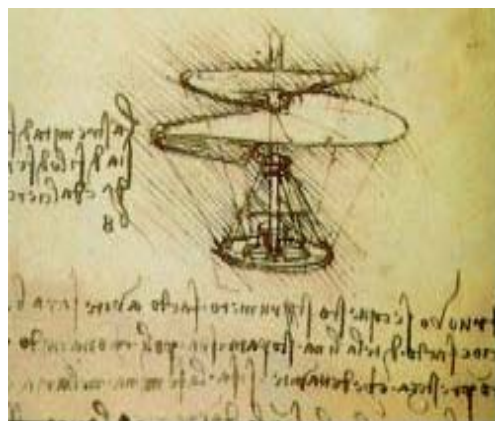
Leonardo's Aerial screw
Fruitless technologies

Nevertheless, in those cases the connection between pragma and noema will be *accidental* because "working" magic is always an exception. Other cases are more complex than this because both the noema and the pragma *are* in some degree congruent with the world. That is the situation of the technologies of Leonardo's machines, which show the presence of both noema and pragma. In any case, we can say that this presence is *weak* even if we cannot precisely indicate in *what sense* they "are weak". We deduce that their weakness affects their wholeness but *more* in respect to their pragmatic aspects than to their noematic aspects.

Then one can say then that Leonardo's artefacts are *ontological-broken* because they do not work properly in spite of having a *nearly clear* idea about how they *should* work. Ontological-brokenness is a higher level of the pragma-brokenness. It is a matter of degrees that makes the one different from the other. Leonardo's machines are *a little more* pragmatic-open than fantastic machines. Following the same path, we say that the technologies of poverty are *ontical-broken* because they are more weak in respect to their noematic aspects that to their pragmatic aspects. Noema-brokenness, pragma-brokenness, ontical-brokenness and ontological-brokenness constitute for us the first-level of brokenness.

Second-level of brokenness

In the case of outdated technologies as the steam locomotive; the problem deserves a deeper analysis because there is nothing wrong with their noematic and their pragmatic aspects. These levels work "properly" notwithstanding that these technologies, are *useless*. Time- or historical-brokenness cannot be explained in terms of noematic and pragmatic aspects nor with reference to their onticality or ontologicity.

Steam Locomotive
Hibernia AG No. 7

We identify this *second-level of brokenness* as the level in which what is broken is *dimensional*. It is a kind of brokenness that affects the dimensions of time and space, of duration and extension. Explaining that steam technology is "old" is to say nothing new; to solve this problem we need to introduce the idea of *enigma* or "historical riddle".

We mean that outdated technologies are enigmatic in the sense that they work "properly" but only in a *reconstructed scenario*. In some cases the reconstruction needs to be significant and in some cases will be impossible.

For instance if the technological procedures used during the classical time of the Incas in Peru to construct their ships are forgotten, it might be impossible to reconstruct a ship in exact the same way as they did. Another example could be that if some primitive plant used in the preparation of food become extinct, the situation makes the preparation of this kind of food impossible.

We can reconstruct the ship and the meal, but we will never manage to *restore* the authentic phenomena into our own reality. Of course, our analysis is an historical one too, and what we classify and organize depends on our perspective of the historical facts. That which for us is broken today was certainly not broken for a man in another time-scenario.

Third-level of brokenness

The idea of "praxis" is very central to our study of technologies, and we need to devote some time to secure this idea. Praxis for us is an *act* and it is always some kind of *action*. Furthermore, actions are spontaneously related to technology and *labour*. That is obvious for the case of any study of machines and tools.
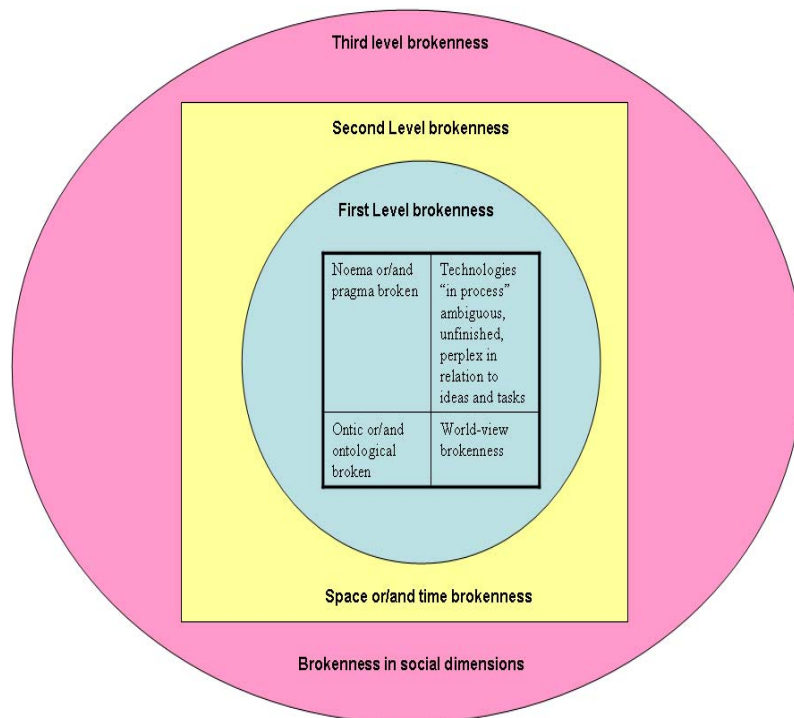
We are not trying to develop a theory of action here, but it is important to be acquainted with what "to act" means to us. We accept that the mind is split in an *intentional* sphere and a *cognitive* sphere.

These two divisions of the mind are not always separable from each other but some criteria can be used to recognize them. The intentional sphere is the place of *belief* and *action* because as we understand the divided mind's behaviour, to act supposes the recourse of some extraordinary charge of motivated energy moved into the world of ideas. This surplus of energy is what *integrates* the human body into the world of everyday life. Without the human body's engagement in the world of ideas, no action can be possible. For us actions *are directed throughout* an object and we call this the act of *animation*. For us *to think pragmatically is to act right through something* making the noema of thought a *pragma*.

On the other hand, knowledge is not demanding this engagement and the connection to the human body can remain static. The sphere of knowledge for us is the sphere of *information* too.

Another interpretation could be that the sphere of knowledge and information has the form of *fractured* intentionality, the combination of the fragments of earlier actions. In any way, this division of the mind that requires the absence of action is a state of *contemplation*. Therefore, "technology" as knowledge, is *never an action* but a cognitive state of the mind that makes action possible. Human labour uses technological means as patterns of movement, as structures of action that secures some expected results. To implement a technology is then always a special kind of action that we give the name of "labour". There may be actions that may not be implementations of technologies but if they do implement technologies, they *are labour-actions*.

In the highest level of brokenness, we find the *value-broken* technologies. This is the third-level of brokenness, in which everything happens in the social and cultural level of the "now". We say that broken technologies can be listed as performances of brokenness of the higher level if they also are *socio-cultural--broken*. We are thinking of a special kind of brokenness, which involve socio-cultural categories as e.g. "labour" connected to the problematic of technology. That is the case of *family labour*, which employs technologies that are home-adjusted, and are in some sense different from their professional correlatives. We say that these family-technologies produce a form of labour that is value-broken. "Value" in this case refers to the exchange value of an artefact on the market. Value-broken means that this artefact has not a "price". Technologies of poverty can be a case of the third level if the product of their work is not remunerated. Outdated technologies can also show a third-level brokenness if they are worthless.

Lund, November 2008