

# A PAGE IN THE HISTORY OF PRESENT TECHNOLOGY: A STRANGE ATTITUDE OF SOME SCHOLARS TOWARDS SOME HARMFUL CIVIL TECHNOLOGIES

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**ABSTRACT.** *In the light of Aristotle's theory of the **telos**, my paper presents an epistemological analysis of the direct support by some scientists of some precise harmful civil technologies. There is a social determination of this behaviour. But its transposition into the logic of these scholars is all the more interesting. The specific of technology: the know-how, the focus on technical feasibility, suggests to scholars to refrain from the interference within an exterior realm to their own expertise and to separate the domains; they arrive to not being interested about the upstream and downstream conditions of the specific technology they are working with; on the other hand, the pursuit of their precise technological goal generates a specific technological philosophy: that to realise the required technology until their know-how made it possible. But in this framework, their watchword – if something can be made, it will be – may lead them to support even harmful civil technologies. This aspect takes part from the history of the last decades and should be considered together with two extremes: the “neutrality” of scholars or their involvement in the social critical activism.*

**KEYWORDS:** *Aristotle, the fourth cause, harmful civil technologies, scholars, transition, epistemology, neo-liberal politics, hydraulic fracturing, public discourse, time of transition*

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## 1. Why would a quite new phenomenon be fit to be viewed through the lens of Aristotle?

This paper focuses on some scientists' legitimising of civil technologies and products which are not mere debatable, but quite harmful. And since the scholars' prestige lies in their professional deployment of arguments and handling of proofs and analyses, it results that the above-mentioned endorsement of harmful technologies does not base on real scientific professionalism. But in order to demonstrate this deviation, we should to deconstruct its causes. Obviously, there are social, economic, political, cultural causes. These ones are *material*, *formal* and *efficient* conditions and impulses which will not be stressed here. What is interesting for us is just the manner these conditions and reasons are transposed in the logic of these scientists.

But this logic reflects the double specific of the domains they are working in. On the one hand, the modern<sup>1</sup> fragmentation of sciences has instituted the tradition of respectable and efficient scientific results only within the framework of fragmented researches. On the other hand, the specific of technology – the know-how, the focus on technical feasibility – imposes rather a separation from the inquiry of the scientific laws and their interpretations.

As a result, in their relation with harmful civil technologies, some scholars ignore also the profound reasons of technologies.

But these reasons – in fact the ends or goals – are the ultimate cause legitimising any human action, including technology.

Aristotle has underlined, more than 2300 years ago, that every change, movement, action has not only direct and indirect substrate, configuration and external factors determining it, but also a final purpose. This is “The end, i.e. that for the sake of which a thing is” (Aristotle 1925 a: 2293), lying *outside* the domain the thing is constituted within. (This *external* situation of the aim or *telos* of things was *demonstrated* more than 2200 years after by Gödel: as the last “truth” of a system is outside the system).

This early warning of philosophy – inherently transposed into ethics – was rather forgotten over time. But this obliteration is all the more baneful in the mechanism of modern society: the “late modernity” and especially the last decades marked by neo-liberalism have but emphasised the tendency of separation between the material, formal and efficient causes and, on the other hand, the final purpose of human actions.

In Aristotle's view, the *telos* of human actions does not concern the fragmented aims of different actions and domains, but the “good life” (Aristotle 1925 b) “for the sake of” which people “desire to know” (Aristotle 1925 a: 2205) and act with “art”. Art is the deployment of the rationality of man and this means that it is subordinated to the rational purposes of the human life. In fact, the fragmented aims “are for the sake of the end, though they differ from one another in that some are instruments and

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<sup>1</sup> In fact, Aristotle has already showed that “natural science, like other sciences, is in fact about one class of being” (Aristotle 1925 a: 2332).

others are actions” (Aristotle 1925 a: 2293), i.e. are for “the good” of a thing or another (e.g. the knowledge in a specific area or the construction of a specific technology).

But, in the name of the specific “goods” one cannot ignore the final *telos*: not only for the human life as such, but also “the supreme good in the whole of nature” (Aristotle 1925 a: 2209). In Aristotle, the intertwining of causes leads to the unity of the world: “Nature never makes anything without a purpose and never leaves out what is necessary” (Aristotle 1925 c: 1247). If so, man must integrate in this unity: first of all, through his understanding of “the supreme good in the whole of nature” and secondly, through his concrete craftsmanship or art (*technē*) that should never divert from both being “necessary to life” and “useful for the community of the family or state” (Aristotle 1925 d: 2802). In this representation of things, the concrete aims of arts should be subordinated to the disinterested research of the reasons of natural coherence and order. More: this type of research fixes “limits” to the arts which, possibly inherently, tend to follow their unlimited quest for efficiency in their own area. Men seek for “a better notion...and of the art of...and they are right” (Aristotle 1925 d: 2805). In a current language, we can speak about both the cooperation of sciences, technology and philosophy, and the necessary trans-disciplinary view: just for the efficiency of the human arts<sup>1</sup>.

The imperative of the consciously following of the double *telos* – that of specific arts and contexts, and that of the good life as a whole (of together nature and man) – is countering the fact that men “are intent upon living only, and not upon living well” (Aristotle 1925 d: 2806).

This imperative is stringent either when we consider the specific aim related to a certain *technē* as a “matter of science, i.e. knowledge of the universals” or of the ‘why’ and the cause, or as a matter of experience, “that the thing is so, but do not know why” (Aristotle 1925 a: 2206). For example, even though we consider technology as constituted on the basis of knowing “the causes of the things that are done” (and not as *action* and *production* “concerned with the individual”) (*ibidem*), it knows the ‘why’ of those things (technologies and all which are related to them) only – because it aims only “at utility”, it is “productive” (Aristotle 1925 a: 2207) –, but *not the ‘why’ of the environment encompassing those things*. This ‘why’ requires an *external* perspective to the precise things which technology is focusing on: a perspective generated “from the sake of” the following of the “universal” (Aristotle 1925 a: 2209). Only in this framework can we approach “the ultimate ‘why’”, “the good”, “the end of all generation and change” (Aristotle 1925 a: 2212).

Therefore, as “nature makes nothing incomplete, and nothing in vain” (Aristotle 1925 d: 2802), as things have *consequences*, since there are causes of them. Technology concerns only with the causes related to the know-how within its specific area, but this means that in present scientists and technologists ought to be more

<sup>1</sup> Aristotle 1925 d: 2807: „from one point of view the master of the house and the ruler of the state have to consider about health, from another point of view not they but the physician; so in one way the art of household management, in another way the subordinate art, has to consider about wealth”.

careful when discussing the consequences of some technologies. They can no longer ignore the results of both the present trans-disciplinary studies and the holistic approach of reality emphasized by sciences and philosophy.

Aristotle's holistic approach of mining (*Meteorology*) and his observation about the "industries that make their profit from the earth" (Aristotle 1925 d: 2808) allow us once more to judge the unilateral partisanship of some scientists who endorse the harming civil technologies.

## **2. Direct support of harmful civil technologies as feature of the present time of transition**

I call here "time of transition" the last four decades imbued by neo-liberal politics. It is the time of excessive autonomy / *autonomisation of economy towards society*. It is the time which emphasise the structural contradictions of the modern system and which is in no way the proof of the success of profit-based economy.

The restrictive quest for profit means – in the technological research and implementation – that: 1) the novel technology is implemented according to the fragmented interests of corporations, and that 2) if a certain technology is profitable in short term for a firm, it is implemented *irrespective of the consequences*; simply, these ones are *externalised* by the firm which does not assume their responsibility.

The *fragmented* structure of the modern economy means also that 3) there is a lack of connection between domains. Thus, this structure led to the agglomeration of the above-mentioned consequences.

As long as the humans had neither the conditions nor the conscience of the maleficent character of their historical fragmented activities, their consequences were inevitable (Lankester 1913: 365–372). But when scientists have understood the unitary system of man-nature, the strong interdependence of the elements of this system, they should have followed only the quest for truth – i.e. the understanding of *causes* (Lankester 1890: 197) by *falsifying* the theories which explain these causes, and constructing such demonstrations within these theories that are reproducible, thus repeated by other scientists.

Obviously, science develops within the frame of a certain cosmological worldview representing the ideological pattern: namely, the "normal" science (Kuhn) does not pursue the goal to deny the existent cosmological worldview; only the observations of the "anomalies" and contradictions between this worldview and the new and incessant scientific experiments lead scientists to the questioning of the worldview itself, and thus to the construction of a new one. But leaving this aside, science aims at the correct understanding, irrespective of any other considerations; more: just by behaving in such a manner, science arrives to question even the cosmological/ideological view.

Consequently, a long while the modern scientists behaved in this way, though the big creators were marginalised by the conformist thinking and policies (Avramesco 2014). But generally the modern scientists have separated their scientific commitments from their social and political attitudes: with positive scientific results, but often with grey political conformism, if not even negative. However, the post-war

and neo-liberal era have attacked even the above-mentioned separation and emphasised that the political alignment of scientists should inflect the scientific obligations.

With technologists, it was the same trajectory. For both science and technology are based on the empirical (“grounded on what is measurable and observable” Olojede (2013)). And we cannot say that, because technologists are more linked to the problems of utility and commercial use, they would be more pliant to the influences of the extra-professional territory. There were and are conformist and non-conformist engineers, independent thinkers or claiming a conformist “neutrality” of technology. The causes of this situation are not determined because “technology has benefits, science not (necessarily)” (Stalinga and Khmelinskii 2013: 387) (since science has nevertheless an “ultimate utility” (Lankester 1890: 197)), but because of social (economic and political) and personal psychological reasons.

How does the conformism of technologists manifest in the neo-liberal era? It does as a specific *subjection* of technologists even within their domain: they are determined to behave as professionals by infringing the *raison d'être* of their profession, that to respect the empirical character of data and technological elements, ultimately the truth possible in a certain moment. Who does determine such behaviour? At first appearance, there are the private companies which fund technology:

*Large corporations like pharmaceutical corporations hire scientists to prove that their products are safe to use or superior to their counterparts and competitors, which may not necessarily be so. In this kind of situation, we can hardly expect an unbiased report of their findings” (Olojede 2013: 4).*

More profoundly, because of the private and fragmented interest governing economy and society, the jobs and well-being of researchers and technologists depend on private funds. This condition, supported by the neo-liberal fundamentalism, was the ground of the perverting of the psychology of some researchers and technologists.

One way to deal within this perverted psychology was the *spirit of doubt and confusion* kept after an opposite consensus of scientists and engineers was reached and related to civil products and technologies which are harmful in both a direct and indirect manner<sup>1</sup>.

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<sup>1</sup> See the well-known Oreskes & Conway 2010: 268: “Research produces evidence, which in time may settle the question...After that point, there are no ‘sides’. There is simply accepted scientific question. There may still be questions that remain unanswered – to which scientists then turn their attention – but for the question that has been answered, there is simply the consensus of expert opinion on that particular matter. That is what scientific knowledge *is*. Most people don’t understand this. If we read an article in the newspaper presenting two opposing viewpoints, we assume both have validity. But often one side is represented by a single ‘expert’ – or as we see in our story – one or two... (They are) juxtaposed against the collective wisdom...the modern science is a collective enterprise”. P. 274: “C.P. Snow once argued that foolish faith in authority is the enemy of truth. But so is a foolish cynicism”.

Other way is to *aggressively* support the harmful civil technologies promoted by some corporations and states, although there are scientific evidence against these technologies<sup>1</sup>: and though the postponement of the practical application of these technologies would provide time for further research and improvement (C'est officiel! 2014; Les chercheurs 2014). This behaviour may belong even to academic journals, i.e. to the peer reviewed method used by a collective of experts (Watson 2012; Georgetown professors 2014; Fugh-Berman and Sherman 2014; Meunier 2014). In any case, both companies and researchers hide the *conflict of interests* that characterises the position of these researchers (strongly/materially connected with the corporations which promote harmful civil technologies).

Actually, I became more interested in the subject matter discussed here when I read Professor geologist Nicolae Anastasiu's, correspondent member of the Romanian Academy, public eulogy of the shale gas extraction in Romania<sup>2</sup>. Letting aside his conspicuous conflict of interest<sup>3</sup>, the "logic" of the argumentation consisted of: shale gas would be only a big opportunity allowing the increasing consumption of fossil fuels<sup>4</sup>; it would be less harming than the conventional fossil fuels, and does not challenge the land or the water<sup>5</sup>, or earthquakes<sup>1</sup>.

<sup>1</sup> See the standpoint of a rich owner of a financial corporation, *Jeremy Grantham* 15 April 2013: <http://www.theguardian.com/environment/blog/2013/apr/15/jeremy-grantham-population-china-climate>: "There's a professor at MIT who defended tobacco who now defends carbon dioxide saying it seems to have lost its greenhouse effect, or whatever. And then there are the vested interests".

<sup>2</sup> See (in Romanian), 18 October 2013, <http://www.gandul.info/stiri/gazele-de-sist-pe-intelesul-tutoror-care-sunt-adevaratele-riscuri-si-beneficii-ale-exploatarii-lor-in-romania-11532830>: "extraction chemicals is the secret of each company"; 6 December 2013, <http://www.ziare.com/economie/gaz/absolut-toate-marile-raspunsuri-despre-pericolele-gazelor-de-sist-interviu-1271368>: "chemicals are like those used in cosmetics and it's impossible to contaminate the water used by local communities, and if nevertheless do, it is in a very little proportion, under the threshold of impact to people's health; the hydro fracking was used from decades and without any danger; nobody will use people's water, companies will transport their necessary water from the rivers (Prut, Siret) with cisterns" (AB, leaving aside the huge quantity of water necessary to fracturing, would be economic the transport of water tens of km?)

<sup>3</sup> *Professor Nicolae Anastasiu joins Shale Gas Europe's Expert Advisory Panel*, 23 September 2013, <http://www.shalegas-europe.eu/en/index.php/news-room/press-releases/135-professor-nicolae-anastasiu-joins-shale-gas-europe-s-expert-advisory-panel>. "Shale Gas Europe's Expert Advisory Panel contributes to the shale gas debate in a balanced, informative and engaging way... Its mission is to advise companies participating in Shale Gas Europe..." (AB: SGEEAP is thus a structure supporting the private companies and parts of the political elites in order to bend the public will to their interests to extract shale gas).

<sup>4</sup> But the higher „opportunity" of fossil fuels leads only to the reduction of financing the non-conventional fuels and to the increase of pollution.

<sup>5</sup> As it is, the shale gas extraction uses *more* energy, *more* water and contaminates *more* land and water than the conventional extraction of fossil fuels. And to the argument that this conventional extraction reached its peak, both economists and engineers opposed the solution of non-conventional energy.

More: if, hypothetically, the above-mentioned condition of energy would diminish and the price of the entire non-conventional extraction of shale gas would decrease, not only the problem of water

### 3. Epistemology of the support of harmful civil technologies

But why some scientists advocating untenable technological, in reality economic, goals do not respect the main presupposition of science – that the *evidence* is the ultimate proof of acceptability of a theory/a technological goal –? This is because science itself develops on some basic *assumptions* – about the nature of the universe, the natural sciences (Maxwell 1998; But see also Lankester 1890: 380: “So far as philosophy affected the study of Zoology in the beginning of the modern period, its influence was felt in the general acceptance of what has been called the Miltonic cosmogony”; Bazac 2009); or about the nature of society, the social and human sciences – which orient and frame it. And because the basic assumptions in economics are *ideological* – namely, reflecting the social positions of people who construct these assumptions/ the power relations –, as well as because technology evolves in a social framework, thus in certain power relations, the basic ideological assumptions might influence in a visible manner the viewpoints of some scientists.

Technology is more intertwined with society – and its power structure – than science. Its reason and ultimate aim is *to solve problems* (more than science does) related to *feasibility* and *usefulness*. But this last value, usefulness, is not neutral, but ideological and depends on the powerful who choose and impose the aims of society in a certain moment, more clearly said – who pay for some goals, but not for others, i.e. who *allocate the resources of society* in this selective manner.

Consequently, engineers or technologists are focusing on the feasibility of the concrete goals they choose only from a technical standpoint. Feasibility itself is approached in a technical manner, by separating the technical problems from the upstream and downstream conditions of the technical solving of these problems. The calculus and demonstrations through modelling aims at assuring the technical solving: *within the framework of the “social” command*, namely of the command of those who give their content to the value of usefulness. From this standpoint, the logic of engineers and technologists is that of “aim-oriented empiricism” (Maxwell 1998: 2), i.e. analysis of evidences and search for proofs within the framework of a specific “social” – i.e. politically translated – demand.

If so, their scientific method to seek confirmation of a certain technology is framed by and within this logic. Briefly, the non-technological, i.e. social/political framework of technology is which imposes to it what kind of evidences should be taken into consideration in order to disprove the technological models. This act of disproving is which discern the scientific manner of thinking – obviously shared by

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and land remains huge and insolvable, but also *the world climate would worsen beyond the admissible threshold: be this worsening a warming or cooling*. Therefore, these problems counterbalance the temporary lessening of the price of gas.

See: Mann 2013; *PR man* 2013; *Turn down the heat* 2013; Klare 2013; Main 2013; Media Availability 2013; Montana Environmental Information Center; UNCTAD 2013; Hansen 21 October 2013; Hansen et al. |21 December 2013; Easterbrook 2008/2014; Khmelinskii and Stallinga; Meneses 2014, etc.

<sup>1</sup> However, in a 2011 study published in the journal *Geology*, a high connection between the shale gas extraction and earthquakes was reported, *Wastewater Injection...* 2013.

technology – from the un-scientific manner. Or, on the one hand, the political demand imposes that technologists consider *only* those pieces of evidence which show that there would not be harming consequences of the demanded technology and, on the other hand, usually engineers are used to not take into account the upstream and downstream conditions of the technological act: they simply *externalize* these conditions (as the mainstream economics does with the human and social conditions and consequences of the economical process).

This is the context of some engineers' and scientists' supportive claims of shale gas extraction. Because the political pressure is huge, and with the entire evidence of the decisive harms caused to communities and nature, especially the destruction of water and land (Gleeson et al. 2012; Rozen and Reaven 2012; Warner et al. 2013; Haluszczak et al. 2013; etc. see for example <http://collectif-scientifique-gaz-de-schiste.com/>) New York State...2014), there are scientists who infringe au fond the *criterion of science/ of the scientific exploits as technology*: that to *demonstrate* by some evidences that there would not be undesirable consequences of a given technology – here, that of shale gas extraction. This demonstration is impossible and even if, hypothetically, could be realised, is not a scientific proof, because the shale gas extraction theory can be *falsified* even with a single counter-proof. Therefore, to demonstrate by evidences that these negative consequences exist is quite scientific, because this demonstration *falsifies* (Popper) the theory of shale gas extraction.

Finally, what these scientists do is to put their authority, gained in a certain discipline, as warranty of the truth in a *different* realm: this is the realm of *consequences* of a certain technology. Therefore, the problem is not related to the *technical aspects of the possibility of that technology*, but to the *exterior environment of that technology*. But the above-mentioned scientists do not care about this environment.

Like a private corporation which externalises the negative sides of the inputs and outputs of its activity, those scientists externalise the negative consequences of a certain technology, discussing only the technological feasibility. In fact, this entire attitude is only a shocking manifestation of the common mainstream ideology given to scientists and engineers: that of their “neutrality” as experts and thus, of their *separation from society*.

But this logic is developed in a quite dangerous direction: that to technically realise every demand coming from the structures which fund technology. Obviously, technologists have a scientific curiosity: they want to see what is forcing their limits of knowledge and know-how. But to design and to experiment technical solutions is not tantamount with the practical implementation. Or, the implicit belief of scientists and engineers in their laboratories and the intimacy of the spring of their mind – *if something can be made, it will be* – becomes in this context a practical assumption and go-by: as a result, this belief may lead them to some unintended consequences, i.e. may lead to support harmful civil technologies.

Therefore, *not everything that can be made deserves to be made*. But to choose the technological development is not the responsibility of engineers: “they are only

technicians”, as they like to say with a mixture of pride of their expertise and recognition of their subordinate social position in front of the decision-makers.

#### 4. Alternatives – from epistemological standpoint

It would be wonderful if more engineers and scientists expressing their commitments against harmful civil technologies would exist than those who support them; for, unfortunately – and because of a strong inertia of both social constraints and ideological alignment to the mainstream – the majority is still “neutral”.

What does it mean to be active against harmful civil technologies? It is not to adopt the viewpoint of a possible consensus, but rather, it is to behave in a consistent scientific manner: *falsifying* the dominant theories, even if they are assumed by some ones, and treating them in a *critical* manner, in order to learn, even from “non-conclusive arguments”, and to clarify or even change our previous ideas. Thus: to continue the traditional modern European model of theoretical and practical development as a result of a “cultural conflict”. In this conflict, it is normal to compare theories – e.g. that of the positive results of the increase of the fossil fuels consumption, even through the shale gas and, generally, non-conventional fossil fuel extraction, versus that of the planned and drastic limitation of this consumption, thus the prohibition of shale gas extraction, because of decisive dangers towards nature and society – which, accordingly, should not be “incommensurable” (Popper 1997).

Then, it is to relate the value of technical feasibility to that of usefulness: by measuring the degree of this usefulness, that is, at least for both long and short term, and according to the *common* interest, and not only to the private one (Bazac 2013).

By reversing the above-mentioned characteristics of the supportive attitude of harmful technologies, it is important, still from epistemological standpoint, to ensure the concrete political conditions for the fulfilment of a *consistent scientific position* of engineers. It is not here about a social revolution, but only about a public pressure of scientists and engineers in order to counteract the ruthless offensive of private corporations and mainstream policies which advance the argument of the “crippled epistemology” of those concerned with the consequences of the profit-driven ignorance of the systemic character of the fragmented human actions (Sunstein 2014). Though media does not communicate this public pressure (but this silence challenges the free circulation of science and technology), it is worth to know and repeat it.

See Kevin Anderson’s ecological activism (Jordan et al 2013; Anderson & Broderick 2013; Anderson 2013), or the public disclosure of “frackademia”/ funding of American universities by hydraulic fracturing companies and alignment of some researchers to the interest of these companies by eluding academic scientific standards (Horn 2012), or the public disclosure of the manners used by this behaviour (refusing to correct its invented claims, fabrication of data, falsification, distortion, or invention of any information or citation in academic work, inventing a source, deliberately misquoting, or falsifying numbers or other data) (Bhatt 2013), or the public disclosure of the psychological means in order to weaken and even annul

public worry and opposition to shale gas extraction (DeMelle 2011). (Thus, there are not few neo-Aristotelians, but they are not yet coordinated).

But, unfortunately, this type of Enlightenment action – to write and to publicly disclose – is not sufficient. If engineers and scientists want to attain their scientifically demonstrated landmarks, they need to resist in a more practical way: join common people (Peschard, 2007) in a movement of *resistance* which “adopt a certain set of dynamics that does not fit within the capitalist culture”. So, “if we’re thinking about the future of the earth, and the future of our coupling to the environment, we have to include resistance as part of that dynamics” (Brad Werner quoted in Naomi Klein, 2013). Simply put, this means not “saying that his research drove him to take action to stop a particular policy; he is saying that his research shows that our entire economic paradigm is a threat to ecological stability. And indeed that challenging this economic paradigm – through mass-movement counter-pressure – is humanity’s best shot at avoiding catastrophe” (Klein, 2013).

The public attitude of professionals, like engineers and scientists, in front of the present global problems as the climate change and the resource management is part not only of the present history, but also of the present history of technology and science. This appurtenance obliges (Stengers), if they want not to participate in the making of an “obscure disaster”, to use Mallarmé’s formula. From the point of view of the individual, the negation of the obedience of scientists and engineers to the funding corporations is a step toward the surpassing of their deep social alienation: and, don’t forget, this social alienation is at the same time alienation towards nature and manifests also as alienation towards technology, therefore towards just the sign of humans’ victory in front of the natural determinism.

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