

MATERIAŁY NADESŁANE, POLEMIKI I DYSKUSJE

*Andrzej P. Wierzbicki*¹

On the Possibility of Prediction

Summary. In the last 20 years, a fashionable approach to the question of possibility of prediction was to deny it, using neoliberal or postmodernist arguments; recently, however, this fashion ends. This is because this question was considered in the classical, binary logics (possible or not possible, there is no third way) which is not adequate to consider such a complex question; the use of three-valued logics for speaking about future events is well substantiated scientifically, starting with the works of Jan Łukasiewicz (1911). This paper shows that prediction – approximate, often erroneous in details, which corresponds to the third logical value – is nevertheless an indispensable element of civilisation development, and the quality of prediction depends on an intuitive recognition of diverse elements of the predicted process. Historical examples show that such intuition depends from an experience including also the details of predicted process, even if the prediction concerns only general aspects of the process. Moreover, there are many historical examples of so called *Kassandra effect*: correct predictions in which nobody believes. Therefore, we should doubt the beliefs of part of philosophy of technology that the development of technology is unpredictable. Such beliefs are based on a wrong assumption (originating from Heidegger, 1954, and Ellul, 1964) that in analysing technology it is possible to abstract from technical details and concentrate on a holistic, social aspects of the development.

Another question is the issue of the dangers of contemporary technical development. These dangers do not result from technology proper (creators of technology are members of society and in overwhelming majority construct new tools in the hope that these tools will serve positively in society); these dangers result from the mechanisms of socio-economic utilization of technology. Most dangerous is the accelerating rate of development resulting from the positive feedback between science and technology on one side and the competitive market economy on the other side. This increasing rate of development is related to increasing socio-economic stratification and leads to a destruction of the existing

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social structure; people adapt with increasing difficulty to the increasing rate of change. There are many examples of the change of social structure, starting with the destruction of the classical proletariat and the formation of a new class of precariat. There exists indications that too large rate of change might lead to a self-destruction of human civilization, hence the fundamental question is not what are *limits to growth*, but *how to limit growth*?

Keywords: prediction, quality of prediction, predictability and dangers of technology development

1. Introduction: prediction and three-valued logics

During last 20 years, it has become fashionable to doubt in the possibility of prediction, see, e.g., (Taleb 2007). There are two types of justification for this fashion, sometimes mixed: neoliberal and postmodern. The neoliberal justification is: planning is discredited, the state should not intervene on the market, we might support these statements by discrediting all predictions. The postmodern justification is that the contemporary development is faster and chaotic, thus prediction is impossible. The postmodern justification is more valid, but both are based on the logic that prediction is either possible or impossible; they do not perceive the actual paradox of prediction and do not see the way of resolving this paradox.

Prediction is a paradox, because for a long time, at least from (Heisenberg 1927) or even from (Łukasiewicz 1911)², it is clear scientifically that a precise prediction is impossible. Yet some prediction – inaccurate, erroneous in details, but approximate enough for a given application – is necessary, is indispensable for civilization development. We actually predict when we construct a house, a bridge, a system of airline connections, a defence system; all these human artefacts would not function without approximate prediction, see next section. This is a paradox, a *basic paradox of prediction* in the classical logic; but ostensible paradoxes of classical logic are often resolved in three-valued logic, as, for example, the paradox of a liar³.

An application of a logic of certain type to any sort of a problem relies on an (usually intuitive) assumption that exactly this type of logic is adequate for this problem. Accustomed to using only classical, binary logic (*true – false*, excluding the middle), people tend to commit errors by assuming that this logic is universal – while in a given application this logic might be erroneous, leading to

² If a precise measurement is impossible, as shown by Heisenberg, then also a precise prediction is impossible. Łukasiewicz has shown that we must use a third logical value – uncertainty – when speaking about future events.

³ If a liar says (in two-valued logic *true - false*) „I always lie”, then is this statement true or false? If a liar says (in three-valued logic, with a third value of *uncertainty*) “I usually lie”, then such statement is no paradox. See also next paper in this issue.

false conclusions because of being inadequate for this application. A classic example is the statement “there is no third way” by Leszek Balcerowicz in 1991. In the same year, Zdzisław Pawlak summarized his long research on the theory of rough sets by an international publication, a book (Pawlak 1991) that is today one of most frequently cited publications of Polish scientists. Zdzisław Pawlak has proved that in large data sets there are three possibilities for any logical rule: a part of the elements of the set can confirm that rule, another part can contradict that rule, but there is a large part of elements that neither confirm nor contradict the rule, creating a rough boundary between two former sets, a third way. The logic of rough sets is a kind of three valued logics; the contribution of Pawlak consists not in postulating this type of logic (this was done by Łukasiewicz 70 years earlier), but in proving that such a logic is indispensable when considering more complex questions, for example, described by large data sets. Because socio-economic questions are equally or even more complex than information data sets, the statement “there is no third way” was a logical error in the moment of its pronouncement. However, economists perceived this first after 2008, when the great financial crisis has shown the inadequacy of neoliberal doctrine and it turned out that there are many kinds of capitalism.

A similar logical error, also related to the neoliberal doctrine (as indicated above), is made very often in the question of possibility of prediction. The thesis of impossibility of prediction is, on one hand, obvious when we speak about precise prediction, on the other hand has a long tradition both in the philosophy of technology and in philosophy of science, see e.g. (Popper 1962). In the period of the domination of the neoliberal doctrine (1990-2008) many publications propagated this thesis, such as (Postman 1995), (Taleb 2007). If somebody wants to maximally limit the role of the state in economy, better to stress the impossibility of predicting economy development by the state (ignoring the fact that each bigger corporation relies on its own studies of future technology assessment). However, the thesis of impossibility of prediction relies on the use of binary logic; in applications we need not a fully precise prediction, only a prediction good enough for a given purpose, and this constitutes a third logical value. Therefore, there are recent signs that the fashion to speak about impossibility of prediction is already past; for example, a recent American book (Silver 2012) has a telling title: *The Signal and the Noise: Why So Many Predictions Fail – But Some Don't*.

2. Prediction as indispensable element of civilization development

Approximate prediction, but nevertheless a prediction, is necessary in civilisation development⁴. If we build a house, we predict future: on one hand a protec-

⁴ I understand here the concept of *civilisation* in a broad sense, see (Braudel 1979), as a way of perceiving and shaping the world by a certain sufficiently large society or com-

tion against winters and hurricanes, on the other hand an increase of the family, etc. This prediction is only approximate, a tsunami might destroy the house, or a large increase of the family might make the house too small. A bridge should hold even in extreme conditions, but an earthquake might destroy it. A contemporary network of airborne and maritime transportation would not work without predicting times of starts and arrivals, terms and conditions of scheduled tours. Obviously, it is more difficult to predict complex socio-political processes, but even in that case there are examples of correct predictions. Admittedly, we observe a *Kassándra effect*: if somebody predicts correctly an improbable (in the popular opinion) event, nobody else wants to believe in that prediction; later some commentators (such as Taleb 2007) would count such events to the effect of *black swan*, an improbable and (sic!) unpredicted event, suddenly emerging out of chaos.

It is true that an order can emerge out of chaos and this is a simple conclusion from the basic probability laws (see Wierzbicki 2011). But the most spectacular examples of the *black swan* effect given in (Taleb 2007) are off the mark. For example, it is not true that nobody predicted the fall of the communist (or “real socialist”) system. The fall was predicted, even if in a cautious formulation, by the married couple Tofflers in their book *The Third Wave* (Toffler and Toffler 1980): they maintained that the automation and robotization of industrial production will lead to the decline of the socio-economic role of proletariat, while the information society – the third wave – will be formed in a democratic society and market economy. This means, however, a conclusion, if we formulate it more bluntly, that the development of high technology will result in the fall of the communist system. Initially, nobody believed Tofflers; but Ronald Reagan knew about this opinion and started to exploit high defence technology to put a greater pressure on and to weaken the communist system. Moreover, this opinion was known also to the leaders on the opposite side, also in Poland⁵, who understood that they were in a sense on a lost position, which, I hope, contributed to an almost peaceful transition towards a democratic system in Poland. On the other hand Solidarity, as a labour union, was not interested in the decline of the socio-economic role of proletariat – and first now it realizes that its initial political triumph converts into a defeat.

On this background a methodological question arises: what are the conditions of a reasonably correct prediction of complex social processes? We can list at least two conditions, partly reinforcing each other. Firstly, it should be a process of long duration or long dynamics; secondly, since a prediction of a com-

munity in a given historical epoch; this includes but is more broad than defining civilisation by a certain value system, see (Kieniewicz 2003).

⁵ The book of Tofflers was translated into Polish just before 1984. I was personally engaged at that time in the popularization of the ideas of information society in Poland and I know that both Wojciech Jaruzelski and Mieczysław Rakowski read *The Third Wave*.

plex social process has an interdisciplinary character, an interdisciplinary intuition is needed, formed on the basis not only of a holistic inspection, but also including good knowledge of details of the analysed process.

3. Historical examples of predictions

Such conditions are illustrated by an example of change in the demographic prediction of the number of people in the world. This is a process of long duration and long dynamics indeed, hence the first condition is fulfilled. But the book *Limits to Growth* (Meadows at al. 1972) assumed a growth of the population of the world towards much more than a dozen milliards. One of the co-authors of this book, Jurgen Randers, in a new report of the Club of Rome (Randers 2012) corrected – using the predictions of UNO – the maximal population of the world to the number of 8.5-9 milliards, to be achieved around 2050.

What caused such a correction of prediction? It resulted from a better interdisciplinary intuition in modelling demographic processes, a change of such modelling originating in IIASA⁶ around 1990 and based on a good knowledge of details. The change consisted of making the index of average number of children of a woman dependent on her education, with a prediction of changes in average education of women. This led to an astonishing but hopeful conclusion that the maximal population of the globe will occur earlier and will be much lower than predicted before. Such a change in demographic modelling was not immediately accepted by demographers, first its acceptance by UNO resulted in its popularisation. This change is very important: it shows that the theories about “population bomb” were erroneous, gives us a new hope, but on the other hand it shows that a sufficiently good prediction is a difficult art, requiring interdisciplinary expertise and specific intuition.

Another example is already mentioned book *The Limits to Growth*, the first report of the Club of Rome (Meadows at al. 1972). The accuracy of this prediction was criticised many times, including my own criticism, early after its publication. Moreover, as results from the foregoing paragraph, the assumptions of this prediction were not quite correct. However, in this case the accuracy was not so important. The prediction of Meadows et al. played an extremely important *warning role*, caused that almost all children on the globe are educated today in the respect for natural environment and that almost all corporations try to prove such respect in their advertisements. And because of that we can suspect that Jurgen Randers (2012) – who still sees fundamental problems in environmental dangers – is not fully right: we learned to some extent⁷ to respect nat-

⁶ International Institute for Applied Systems Analysis in Laxenburg near Vienna; the change of demographic modeling resulted from the research of Warren Sanderson on the impact of education on demographic processes.

⁷ For example, we did not succeed in stopping global warming, but some climatologists believe that this is good, because global warming will help to stop coming glaciation.

ural environment, and the fundamental problem today might be the speed of change in the world and the phenomenon of *eerie silence* discussed below.

A third example is the history of nuclear energy production. The technology tried to make nuclear power plants absolutely safe and the prediction was that they are safe. However, it turned out that fundamental problems originate not from technology but from two other areas: psychology and politics. Psychology of human behaviour is strange: the catastrophe in Czernobyl resulted from (stimulated by alcohol consumption) switching off technical control equipment in order to experiment with reactors. The political concerns distort the economy of using nuclear power plants: each country introducing nuclear energy hides actual costs of utilization or removal of nuclear waste (which might be used, for example, in the construction of nuclear weapons); if the actual costs of a safe waste disposal were counted, then nuclear energy would be too costly. In Fukushima, nuclear waste was stored negligently, thus a tsunami resulted in the contamination of a large area. Therefore, fundamental dangers result not from technology and its creators, but from the way how people use technology.

4. The dynamics of the processes of social penetration of new technologies

The conditions of relatively good prediction can be satisfied also when forecasting social penetration of the products or services of new technologies. Contrary to popular convictions, these are processes of long dynamics, see (Wierzbicki 2011), characterized – for ground-breaking inventions – by large delay times (from 20 to 50 years) from the invention to the beginning of its socio-economic penetration, followed by large inertia (the actual process of socio-economic penetration might last also many decades). This is illustrated best by the historical data on the penetration of colour television in the USA (red curve on Fig. 1).

As we can perceive, the development of diverse services and products can be irregular – perturbed by wars or crises, such as the great crisis 1928-32 influenced the penetration of telephones. However, the socio-economic penetration of colour television had a regular character. The inventions of an electronic camera and a TV receiver occurred between 1922 and 1928, thus we observe around 30 years of delay, necessary for working on technical improvements and making such products less expensive. The socio-economic penetration of colour TV occurred in the USA in the years 1960-1990, with a maximal speed of such process 8-10% yearly. Such a general character of the processes of social penetration of high technology products or services is repeated for other products, such as video recorders, personal computers, mobile cellular telephony, Internet access, etc., as well as for other countries, perhaps with a bigger delays and more slow dynamics. Nevertheless, such processes are predictable – we must only use an interdisciplinary intuition and knowledge about the details of such processes.

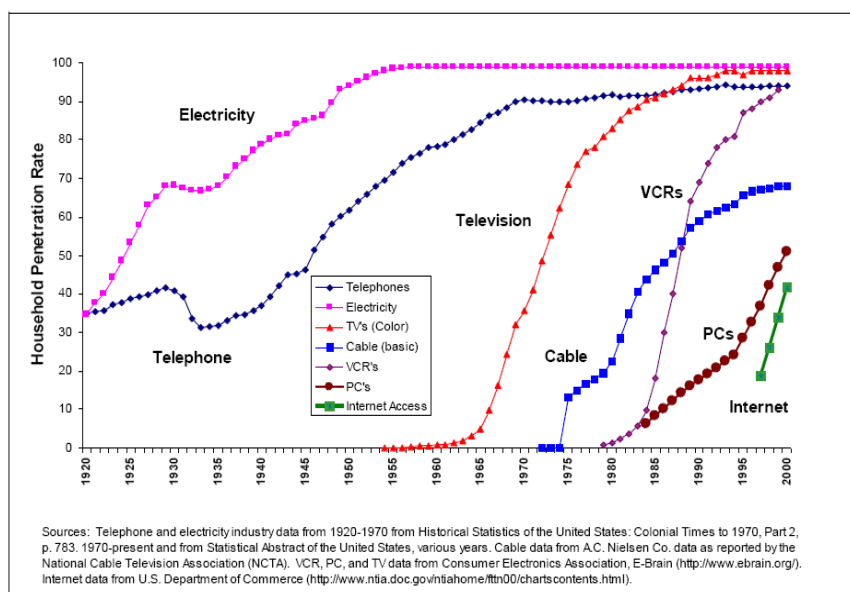


Fig. 1 The development (measured by social penetration) of selected services and products of high technology in the USA during 1920 – 2000⁸.

Because of such long delays, an argument “until 2050 there will be many new scientific discoveries that are not predictable, thus it is impossible to predict the socio-economic use of technology” is incorrect. Until 2050 we shall develop socio-economic penetration of discoveries already known but having as yet no broad utilization. We can speak about a more broad use of electric and automatically controlled cars, more broad use of robots as companions of people, of using technologies of meat growth in water solutions of nutrients, etc. Evidently, each of these processes, independently from actual benefits, brings also threats – even more dangerous if they are hidden or secondary. However, for a correct analysis of such threats we need again interdisciplinary intuition based on a knowledge of details of such processes.

5. Conclusions for philosophy of technology

Therefore, it is necessary to revise the classical paradigm of philosophy of technology, descendent from (Heidegger 1954), (Ellul 1964), assuming that it is sufficient to perceive the consequences of the development of technology from a general humanistic or sociological perspective and to derive conclusions. For example, the development of television contributed decisively to the develop-

⁸ According to <http://www.ntia.doc.gov/ntiahome/ftn00/chartscontents.html>.

ment of the *spectacle society* (see other papers in this issue); the latter was correctly diagnosed by Guy Debord in (Debord 1967), but this diagnosis came too late to influence in return the practice of the use of television, business models of television were already well developed and the diagnosis of Debord remained a part of theory of culture without influencing its practice. Because of the delays and long dynamics in the processes of socio-economic penetration of high technology services and products, philosophy of technology should assess the chances and threats related to these products on the stage of delay, before or just together with the start of socio-economic penetration – and in order to do this, the holistic general sociological and humanistic approach does not suffice, it is necessary to penetrate details of analysed processes. I believe personally that social sciences and humanities, including philosophy, will not understand contemporary technology, until they include into curricula of all directions of studies at least three technical obligatory objects of studies: computer science together with foundations of software construction, robotics with laboratories illustrating feedback principles, biomedical engineering.

Other, much more threatening aspects, often not sufficiently appreciated by philosophy of technology, arise from the ways of using technology either by market economy or by politicians, or also by crime and terrorism. A part of philosophy of technology, condemning all technical activities (as, e.g., Postman 1995), abuses an imprecise definition of technology to criticise actually the conglomerate of technology with market economy. The latter relation can generate important threats indeed (see below), but of a quite different type than suggested by Postman, requiring systems analysis. Enraptures of politicians by the possibilities of technology and resulting irresponsible applications of technology are well known, and the possibility of using technology by organized crime is best illustrated by the question: how to prevent mafia using drones, war-robots?

In the light of such questions, a more general question is justified: what might be the most dangerous aspects of world development?

6. Vision: what might be future threats?

Consider first what are the most obvious and what are most hidden – and dangerous – consequences of informational revolution?

Obvious consequences are a universalization of the access to information and – in some degree – to knowledge, an increase of the role of knowledge as a fundamental productive resource or a gradual change towards knowledge based economy, the destruction of the classical social class of proletariat predicted already by Tofflers, the globalization of life in many dimensions: informational, commercial, travelling, as well as a general acceleration of the socio-economic development. Each of the positive processes has a second, negative side, often hidden under diverse slogans.

The generalization of the access to knowledge creates a contradiction with the slogan of intellectual property, promoted not by individual creators of knowledge or culture, but by large corporations supported by lawyers, see (Lesig 2004). Lawyers argue that they represent the interests of individual creators, but the latter are not interested in a sharpening of intellectual property laws, e.g., a singer is interested in popularity, because it will result in future contracts, while the income from payments for intellectual property goes mostly to big corporations and lawyers representing them; similar interests to singers have authors of scientific publications. Neoliberal economists argue that *knowledge becomes a commodity* in knowledge based economy, hence it should be privatized; they do not notice that the foundation of all individual knowledge is an *intellectual heritage of humanity*, see, e.g., (Wierzbicki and Nakamori 2006, 2007), and that individual knowledge consists also of tacit knowledge decisive of human personality, hence treating knowledge as a commodity is equivalent to a new slavery, as a commodity might serve only selected knowledge products. We observe, therefore, a *three sided conflict about property of knowledge*: individual creators on one side, big corporations and lawyers on the other side, and the intellectual heritage of humanity on the third side – because treating knowledge and culture as a common public property was always an engine of civilisation development, and its excessive privatization is harmful for this development. A particular arena of this three-sided conflict is Internet, with the dispute about ACTA etc. Another arena is health care, where a *pollution of intellectual environment* by distributing only such information that supports the interests of big corporations is already visible.

I use the concept of big corporations not in an ideological sense (see, e.g., Klein 2008), but in a factual sense: the markets of high technology do not tolerate small enterprises that, according to the classical market theory, should offer free market prices equal to marginal production costs. However, marginal production costs in knowledge based economy become trifling, hence enterprises that would offer free market prices quickly go bankrupt – or, if they offer interesting innovations, are bought up or otherwise subjugated by big corporations. The market is dominated by big corporations in oligopoly conditions, in which prices can be higher than free market prices even in a competitive situation – and using arguments about the cost of research or intellectual property, big corporations offer prices actually much higher than competitive in the hope that nobody can check it⁹. *Therefore, knowledge based economy does not function as a clas-*

⁹ Checking whether the prices are competitive for oligopoly or whether they are results of a tacit collusion is actually possible, see (Wierzbicki 2011): from the theory of market games it is possible to derive a simple equation determining the competitive price on oligopoly market in relation to marginal costs, a coefficient of elasticity of demand versus price and the market share of a firm in oligopoly. If the actual price is much higher,

sic market economy, but as a new oligopoly economy. Afraid of justified state intervention in these new and highly profitable markets, big corporations do everything to make such intervention improbable, starting with spreading the slogans on the impossibility of prediction, the decline of the state, and finishing with demands of big pharmaceutical firms towards the USA government to punish Poland for a supposed discrimination of these firms on Polish market.

Destruction of proletariat is positive in the sense of freeing people from hard work, negative in the sense of resulting unemployment. Popular slogans again serve hiding actual conflicts: the labour demand in services is supposedly high enough, the free time can be used for cultural activities, etc. Actually, the high demand for labour in services is not sufficient, because high unemployment rates became today a permanent phenomenon. Worse, *work in services has become highly impermanent*: employers use labour laws that are favourable for them and the reserve of unemployed workers to remove employees that are inconvenient for them, particularly the organizers of labour unions. A new class emerges of workers employed highly impermanent¹⁰; this class might be called *precariat*.

Globalization of life has many positive aspects, but also some negative: e.g., it brings between others increasing migrations and related cultural conflicts, in which degree the immigrants should accept local cultural traditions, and in which degree they might cultivate their own (e.g. in the issue of a traditional female garb of Muslim women, contrary to European cultural tradition).

The general acceleration of socio-economic development has its positive aspects: together with the stabilizing population of the world it might lead to the erasure of hunger and extreme inequity in the world, but in itself is dangerous, from several reasons. First, together with other reasons of disintegration of existing social structure it causes fright and alienation against a fast changing world; there are limits to achievable speed of adaptation. Second, the Earth – until we start a colonisation of other planets – is a closed system, an excessive speed of development might, together with any larger conflict, lead to a global catastrophe. The “Poland 2050 Report” formulated it as follows: „metaphorically speaking, we are already driving at a speed of 240 km per hour with limited visibility and on slippery surface; what will we do if a sharp corner appears or a wild boar crosses the road?” 50 years ago, the book *Limits to Growth* (Meadows et al. 1972) warned that growth might be stopped by resource and environmental crises. One of co-authors of this book corrected these predictions in (Randers 2012) for today conditions and observed, even if not stressing this sufficiently strongly, that the actual problem today might be the question *how to stop growth*. It ap-

then a collusion is indicated (the collusion is usually tacit – big corporation observe prices of other big corporations and set own prices without trying to compete).

¹⁰ Fully permanent employment is not possible after informational revolution, but a relative permanence of work might be expected as a condition of a stable social structure.

pears that an answer might be – as occurs, e.g., in Japan or Sweden – *to concentrate not on the increase of GDP, but on the growth of quality of life.*

7. Vision: fundamental human rights

Perceiving these and other conflicts together with resulting threats, it is possible to construct diverse warning scenarios representing possible effects of sharpening such conflicts. More difficult is to formulate a positive, constructive scenario that would define the goals that could be achieved by the development of information society as well as ways of achieving these goals including strategies of counteracting the threats. For constructing such scenario it is necessary to have a positive vision – even if might be utopian – of a future that can be achieved due to informational revolution. Such a vision will not realize by itself: we must decide, having an access to new tools and a perception of new dangers, how to use them to help in realization of this vision. Moreover, this vision is based on an assumption that we shall solve global problems of hunger and of energy resources¹¹, hence it might be realized first after 2050. However, we should start to discuss and prepare such a vision already today: *we have collected enough knowledge in the intellectual heritage of humanity to utilize it together with the development of informational society tools for a deserving formation of living conditions of all people on Earth.*

The vision starts with defining general social goals and human rights. We would like to use informational revolution for constructing a democratic society in which each citizen has equal rights and personal security together with health service, freedom of beliefs and religion, broad access to education, information and knowledge, and reasonably permanent work. The economic organization of such society should be based on market forces, but without treating them as an absolute: market is only a tool of economic action, similarly as each tool it can be distorted or degenerated, and then we need institutions to regulate or correct it – and such a role should be played by the state. However, *human rights listed above should be paramount – both with regard to the state and to the market.*

This vision needs some commentaries. The informational revolution changes the conditions of the functioning of democratic society, some authors – see, e.g., (Bard and Söderquist 2006) – assert that it undermines democracy. Nevertheless, if we treat equal human rights as a paramount value, then we should counteract the tendencies to autocratic use of the Internet etc., and use the tools of informational society to strengthen, not to weaken democracy. Similar is the issue of personal security: network intelligence of the environment of human life (called also *ambient intelligence* or *Internet of things*) can be used for a to-

¹¹ The most permanent energy resources are solar and geothermal energy; we need only to develop appropriate technologies (even if some big corporations might be not interested in them) in order to make their usage inexpensive and reliable.

talitarian supervision, invigilation of even innermost aspects of our lives, but the problem consists precisely on a positive use of such intelligence, e.g., for increasing personal security in the case of an illness.

Health care should use *between others* also market solutions as far as they improve this care, but certainly not use them exclusively and absolutely – since the pharmaceutical market provides sufficiently many warning examples what will occur if health care would be fully privatized: interests of the firms providing pharmaceuticals and medical service would dominate then human rights. In the defence of human rights, the state has therefore a duty to organize health care in such a way that it provides sufficient basic care – with this goal, we should use the new possibilities brought by informational revolution and only supplement them with market solutions.

The freedom of beliefs and religion cannot mean a lack of respect towards cultural tradition of a region or a country, each newcomer has a duty to learn – e.g., using new tools provided by informational revolution – about this tradition and treat it with respect. On the other hand, it does not mean that a majority of people in a country, devoted to the cultural tradition, has the right to impose its way of behaviour – and particularly, religion – to a minority or to newcomers. This means that, e.g., a Muslim woman has the right to use any head ware she chooses and should not be criticized for this – neither by public nor by her family. However, this means also that all concepts of a *church of struggle* – either Christian or Muslim – are contrary to the vision of human rights as the fundamental paramount value.

Similarly as health care, access to education, information and knowledge can only *between others* use market solutions. This results from the fact that intellectual talents of children are independent from the wealth, race or religion of the parents¹², and each community can gain by best developing these talents. Hence a duty of the state is such an organisation of public education and information infrastructure, including public libraries (traditional and digital¹³, that the access to them is treated as a fundamental human right that cannot be dominated by market interests. On the other hand, private schools and universities, and also private repositories of knowledge, can very effectively enhance such educational and informational infrastructure.

8. Predicted changes of social structure

Reasonably permanent work is also a fundamental human right. People combine today aspects of *homo ludens* and *homo faber*, and a relatively (although not

¹² E.g., most intelligent dogs are cross-breeds.

¹³ In forty years, the basic resource providing the access to knowledge will be digital repositories and libraries, together with new tools of reviewing and moving between them, but traditional paper books will be also valued (even if only as antiques).

absolutely) *permanent work is a condition of personal dignity*, self-realisation of people.

Unfortunately, informational revolution coupled with market domination destroy the permanence of work and result in a destruction of traditional social structure. As already mentioned, the thesis that automation and robotization will result in the destruction of classical proletariat can be found in *The Third Wave*. Actually, the process was more complex: the developed countries started to transfer manufacturing to less developed countries with lower labour costs, e.g. from the USA to China. But even in China the destruction of proletariat will occur. On the other hand, in Great Britain a nostalgia for profits from manufacturing reappears: *The Economist* (issue 21-27 April, 2012) devoted a 16 page editorial to the slogan of *the third industrial revolution*, consisting of building fully automated and computerized factories with minimal labour costs. This way, the manufacturing with related profits could return to the developed countries. It is true that during last fifty years enough knowledge was created to build such factories (the idea of CAD-CAM, Computer Aided Design – Computer Aided Manufacturing, emerged in the Servomechanisms Laboratory of MIT around 1958) and they will be no doubt realized, but *The Economist* does not notice at all the depth of socio-economic consequences of such a development.

Part of such consequences was already mentioned. A positive side of the third industrial revolution will be freeing people from hard work, giving them more time for recreation and entertainment. But man was never exclusively *homo ludens*¹⁴, and after the first industrial revolution strengthened his habits of *homo faber*. The possession of a relatively permanent work became a condition of self-realization and personal dignity. Without it, people become lost and aggressive: e.g., most of family crimes in Poland are recently committed by men who lost their jobs. Admittedly, one of the megatrends of informational revolution is *the megatrend of dematerialization of work and changing professions* (see, e.g., Wierzbicki 2011), thus people cannot expect absolutely permanent work, have to care about continuing education and adaptation to changing conditions. However, there exist highly developed countries with value systems including permanence of work as a part of quality of life, such as Japan or Sweden.

Third industrial revolution would mean an ultimate destruction of proletariat, together with resulting deep and fast changes of social structure, with growth of new social tensions resulting from unemployment or impermanent employment in services. Such tensions already appear in developed countries, as exemplified by protests of young people in New York, London, Madrid, etc. Unemployment in these countries is sufficiently high that the employers in service sector can impose their conditions to the young people employed by them; this

¹⁴ Currently shaped *spectacle society* more often appropriates our unconscious for advertisements than allows for actual entertainment. See the discussion of the impact of vision on unconsciousness in (Wierzbicki and Nakamori 2006, 2007).

leads to impermanent employment. Young people employed in services can be characterized as a new *precariat class*; they do not have clear future perspectives, delay forming families and having children (this deepens a demographic megatrend of ageing societies), have difficulties in back payment of credits and mortgages (and banks coax them to take credits without collateral because of another megatrend of *virtualization* of economy, a disconnection of finance from real economy).

Moreover, precariat becomes better educated – because of yet another megatrend of increasingly mass character of university education; we cannot count (because of, between others, approximately five years delay in educating specialists in a given field) that there ever will be a market equilibrium between demand and supply of educated people. If we take into account new possibilities of global organization by Internet, third industrial revolution and resulting global rebellion of precariat could lead to a new great socio-political revolution which would use quite different means and weapons than that of 1917. This does not mean that such a development is inevitable, but we should ask: *who owns the knowledge about methods of automation and robotization of production?* The creation of such knowledge was paid for by public money in all developed countries, hence the knowledge should be a public property; for example, we could appropriately tax the construction of depopulated factories and use tax payments to create new working places, fight unemployment and impermanence of work.

9. The greatest threat: excessive speed of growth and social change, eerie silence

The above discussion suggests that the greatest threat for humanity might be the change of social structure resulting from an excessive acceleration of development.

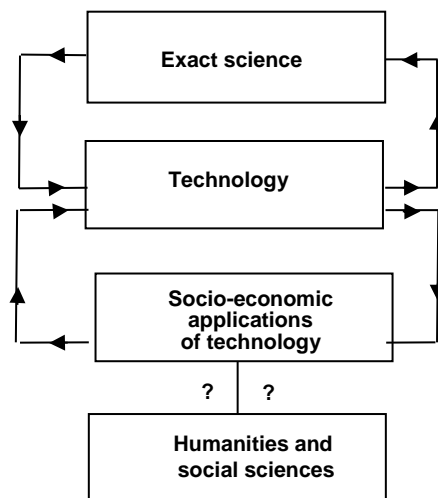


Fig. 2. Two loops of positive feedbacks between science, technology, and their socio-economic applications

This acceleration results from a positive feedback not only between science and technology, but between both of them and competitive market economy, see Fig. 2 (quoted after Wierzbicki 2011). Such positive feedbacks lead to an avalanche-like, exponential development, additionally stimulated by demographic aspects. We have small chances of limiting resulting actual acceleration of development before 2050, when a stabilization of the world population is expected; however, until that time we should limit socio-economic stratification of the world, because otherwise it would be difficult to limit the speed of growth. An exponential rate of growth cannot last indefinitely: this is illustrated by Fig. 3, quoted after *Poland 2050 Report* of the Committee of Future Studies “Poland 2000 Plus” of Polish Academy of Sciences and showing the growth of global GDP during recent 250 years. On one hand, such a growth is a natural systemic consequence of the positive feedbacks from Fig. 2; on the other hand, such a growth is not supportable on Earth as a closed system (at least, until we start a colonisation of other planets).

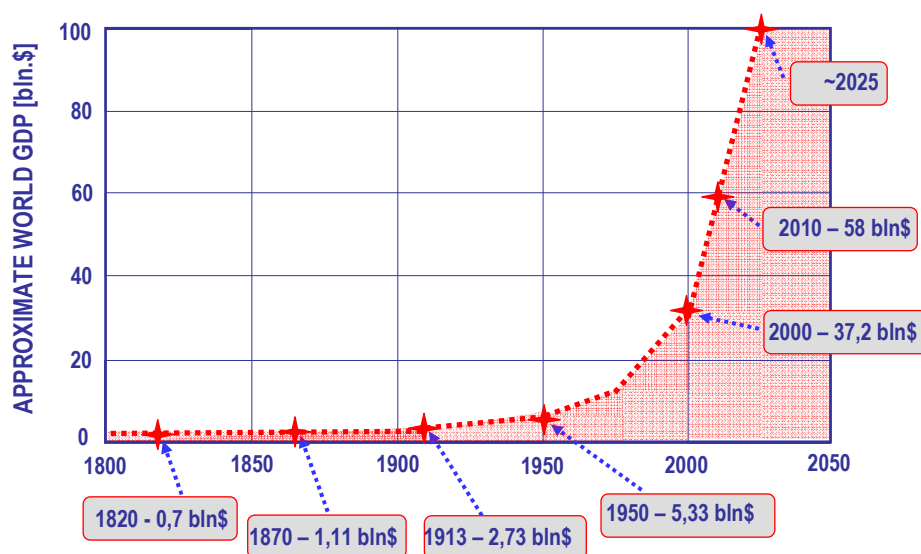


Fig. 3 Approximation of GDP growth on global scale during recent 250 years (in US dollars, data from Maddison 2004).

Even a small perturbation (e.g., resulting from the conflicts of precariat, or any others) during such fast growth can lead to a catastrophe. Therefore, especially menacing appears one of possible interpretations of the phenomenon of *eerie silence* (Davies 2010): the fact that during 50 years of signalling by radio into cosmos the presence of intelligence on Earth and listening for a response,

we do not get any response – in other words, the *response until now is silence*. There are many interpretations possible – for example, the level of civilization based on radio communication might be considered too primitive and polluting environment by truly developed intelligence (even we know today that truly broadband access to information cannot be secured by radio only, we must use optical fibre). However, the most menacing is an interpretation that a fast development of technical civilization in a positive feedback with market economy, dominating today on Earth, might be internally unstable, leading to avalanche-like growth and a catastrophe, hence civilizations such as ours might be rare and temporary ephemerids in cosmos. The fact that such an interpretation is possible should urge us to a deeper, more serious reflection about future threats.

10. Conclusions: should we look idly?

A decision about human intervention into development mechanism shaped historically must be, on one hand, bold (political correctness might result in tragic long term consequences), on the other hand it must be very prudent (we know from history many examples of dangers of social engineering). Therefore, it seems that remedial actions should concentrate on two aspects:

1) Shifting social attention towards *quality of life as a long term goal*, replacing the current attention on economic growth;

2) Including into the concept of quality of life diverse aspects of *fundamental human rights in a democratic society after informational revolution*, in which each citizen should have equal rights and personal security together with health care, freedom of beliefs and religion, broad access to education, information and knowledge, as well as relatively permanent work. Such new *human right should be paramount – both over the state and over the market*.

Philosophy, including philosophy of technology, would have then a very important role – to stimulate social discussion of these problems, starting with a deeper analysis of the concept of quality of life, more detailed discussion of fundamental human rights, the possibility of their warranty in new conditions after informational revolution, etc.

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Streszczenie. W ciągu ostatnich dwudziestu lat modnym stało się zaprzeczenie możliwości prognozowania, w oparciu o argumenty neoliberalne lub postmodernistyczne. Kwestia możliwości przewidywania jest jednak interpretowana zazwyczaj w logice dwuwartościowej (można lub nie można, nie ma trzeciej drogi), która w zastosowaniu dla tak złożonego zagadnienia jest logiką błędną; stosowanie logiki trójwartościowej dla dyskusji przyszłych zdarzeń jest dobrze uzasadnione naukowo, zaczynając od pracy Jana Łukasiewicza (1911). Artykuł dowodzi, że przewidywanie – przybliżone, często błędne w szczegółach, co stanowi właśnie trzecią wartość logiczną – jest jednak niezbędnym elementem

rozwoju cywilizacyjnego, a jakość przewidywania zależy od intuicyjnego ogarnięcia różnych elementów procesu, którego dotyczy przewidywanie. Przykłady historyczne wskazują, że intuicja taka zależy z kolei od doświadczenia obejmującego m.in. szczegóły tego procesu, nawet jeśli przewidywanie ogranicza się tylko do aspektów ogólnych tego procesu. Doświadczenie to powinno obejmować także dane historyczne dotyczące dynamiki dawnych procesów o podobnym charakterze. Znanych jest też szereg historycznych przykładów t.zw. efektu Kasandry, czyli prawidłowych przewidywań, którym niemal nikt nie wierzy. Dlatego też mylne są poglądy części filozofii techniki, że rozwój techniki jest całkowicie nieprzewidywalny. Poglądy takie wynikają m.in. z błędnego założenia (pochodzącego od Heideggera i Ellula), że w przewidywaniu rozwoju techniki wystarczy abstrahować od szczegółów technicznych i skoncentrować się na ogólnospołecznych, holistycznych aspektach tego rozwoju.

Odmiennej kwestią jest pytanie o najbardziej niebezpieczne aspekty współczesnego rozwoju techniki. Nie tkwią one w samej technice (twórcy techniki są członkami społeczeństwa i w ogromnej większości konstruują nowe narzędzia z myślą, że będą one wykorzystane z pożytkiem dla społeczeństwa), ale w mechanizmach jej społeczno-politycznego wykorzystania. Najbardziej niebezpieczne jest narastające przyspieszenie tempa rozwoju wynikłe z dodatniego sprzężenia zwrotnego pomiędzy nauką a techniką z jednej strony a konkurencyjną gospodarką rynkową z drugiej strony. To narastające tempo rozwoju prowadzi do niszczących zmian struktury społecznej; ludzie coraz trudniej przystosowują się do wielkiego tempa zmian. Są na to liczne przykłady, zaczynając od destrukcji proletariatu oraz formowania się nowej klasy prekariatu. Istnieją przesłanki, by sądzić, że zbyt wielkie tempo wzrostu może prowadzić do samozagłady cywilizacji na Ziemi; zatem głównym pytaniem jest nie *jakie są granice wzrostu*, ale *jak ograniczyć tempo wzrostu*?

Słowa kluczowe: przewidywanie, jakość przewidywania, przewidywalność i niebezpieczeństwa rozwoju techniki

Prof. dr hab. inż. Andrzej P. Wierzbicki,
Committee of Future Studies "Poland 2000
Plus" at the Presidium of P.Ac.Sc. and Na-
tional Institute of Telecommunication, War-
saw, Poland