

Selected problems resulting from the use of internet for teaching purposes

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Abstract. Information Technologies (IT) are most and most important factor in economical and social development of particular countries and of the whole world, therefore we often think and told about so called Information Society (IS) as a new form of socio-economical organization of the society. Most properties of IT are profitable for the people and most features of IS are positive. Nevertheless we can find also some problems arising because of too fast development of IT and some dangers connected with increasing dependability of present society on IT devices and services. In the paper selected problems connected with distance teaching and distance learning (so called e-learning) are pointed out and considered. As a most important problem so called "information smog" is pointed. It is very troublesome at present and may be source of big problem in the future.

Key words: internet, information society, e-learning, automated teaching, cyberspace, information smog.

1. Introduction

Technological inventions and revelations associated with fast development of tele-informatics, are fascinating, useful, captivating and . . . dangerous. New IT devices and services, newly created and fast developed, are undoubtedly a technical premise to constitute one of the deepest and most significant changes which has ever taken place in the history of humankind, the so called tele-informatics revolution [1].

The future will show if and to what extent this change will deserve to be called a revolution [2]; it will also be only in the future that we shall be able to estimate if it was advantageous for people. Or was it the opposite: if it created new dangers and new frustrations [3]. One thing is certain: the beginning of the 21st century is marked by the dominance of information techniques (especially computer sciences and telecommunication) over techniques serving the production of material goods. The said has and will continue to have significant consequences. The most striking fact is that now practically nobody can influence the direction and pace of changes which the world undergoes under the influence of common access to new tele-information means. Attempts made by some governments (for example the Chinese one) to channel (within one's domestic borders) the transformation of tele-informatics in a desired direction (in accordance with what they imagine is the desired direction) are embarrassingly inefficient in view of the global scale of certain processes. What is interesting is that just as inefficient are attempts made by the American administration to take over the role of an 'engine' referring to the past (fundamental discoveries in tele-informatics were made in the USA) and economic conditions (the development of the Internet was possible due to financial aid of American governmental agencies). Even an amateur and selective observation of the out-

come of these attempts shows immediately that only these activities (loudly discredited by media!) which are in harmony with the bottom-up inspired trend of the development of computer sciences and the Internet are successful; all attempts to steer the development in a different direction than the logic of the ongoing changes indicate eventually bite the dust.

2. Information society – nobody can stay against avalanche

Currently no world power – neither political nor economic – is capable of efficient steering 'against' the avalanche of technological transformations, economic and social changes, which name is Information Society. Development of the elements of this kind of new society induced by an unprecedented development of tele-informatics. Now, when development of Information Society is official goal for many political structures, including European Unity, nobody can stop it or try to stay away.

Microsoft, full of pride and original contempt of the Internet services market (it seemed that as a monopolist on the market of operating systems for PCs it can afford it) learnt it the hard way, by losing an important segment of the market. It had to follow Netscape desperately and consequently had a series of difficult court cases pertinent to the Explorer. Therefore if the development of tele-informatics cannot be changed by any government, if – faced with it – even the strongest capital is defenseless, we have to admit that this development is driven by its internal logic stemming from the inevitability of new discoveries, their technical and later social consequences. It is worth noticing that individual decisions of individual people, even the brightest ones, have really no effect on the process as such.

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In the modern world of extreme competition and in a civilization practically stripped of borders – none discoverer can for example refrain from inventing, even if she or he wanted to, since soon the same invention (always a logical consequence of the present state of technology and constantly accumulated knowledge) will simply be made by someone else, in a different part of the world.

Thus, the development of tele-informatics will inevitably go on. Moreover, we all are – regardless of whether we want it or not – entangled in this tele-informatic revolution and the only thing we can (and should!) do is to prepare ourselves, society and (in particular!) the currently educated young people to take maximum advantage of the good sides of the ongoing changes and to protect ourselves, as much as possible, against their negative consequences. Yet in order to protect ourselves against something we first have to get to know it. We can learn it empirically; but then usually some part of evil will have happened and its consequences will harm us painfully. That is why waiting for empirical understanding of all dangers associated with the tele-informatic avalanche the proverb ‘wise after the damage’ may be of use. It is better to foresee bad consequences and diagnose them earlier, based on seemingly harmless (yet!) symptoms using scientific methods of predicting and anticipation of certain process and phenomena, based on the observation of their present state and the dynamics of their changes. Using models and analogy we can discover dangers before their scale makes it impossible to counteract efficiently. This is the objective of this paper.

3. Models of tele-informatic revolution

Let us repeat it again: the turn of the second and third millennium will undoubtedly go down in the annals of the history as a milestone. It is here and now that many events and processes take place; processes which will shape future years and will be recalled as historic events. Today, with no historical perspective, it is difficult to estimate accurately and with certainty what is the crib of a great and far-reaching change and what is only an evanescent event of little real meaning. We can, nevertheless, formulate a very probable thesis that the most significant transformation to be observed right now is the creation – literally at this moment and on our eyes – of the so called information society, also referred to as the post-industrial society.

In the conclusion of the previous paragraph we have stated that a useful tool to prognosticate the assessment of risks associated with this process can be a model of this process. Let us then have a look at what models of processes of avalanche-like growth of tele-informatics applications (and equally avalanche-like growth of the number of people using particular techniques) are available in the world bibliography.

Even a rather inquisitive reading of literature does not make it possible to find a model of the desired level of usefulness. It does not mean, however, that there are no such models – they are just built for different use and they supply different information. It is easy to say that the most numerous observers and commentators of the discussed process concen-

trate on its economic consequences and call this phenomenon the ‘third wave’ (idea of A. Toffler [4]). Other researchers focus on social consequences and claim that we are dealing with moving to a new formation, the so called information society (theory of M. Castells [5]) or post-industrial (to mention only classic works by D. Bell dating back to 1973 [6]), while others concentrate on individual outcome of the ongoing changes (especially on the psychological effects). Among the latter the dominant group are those who believe that owing to informatization, a full liberation of the creativity of human mind is approaching; liberation of the mind so far fettered with the necessity to perform intellectually uninspiring production work, constrained by the dominant linear forms of registration and transmission of thought (speech, writing, printing). This (seemingly) fettered human mind is now said to be going to regain its greatness and liberate its potential having at its disposal pictorial and multimedia means of registration and transmission of thought which fit better the structural and dynamic characteristics of mental processes (the so called McLuhan’s thesis [7]), although there are also opposing views pointing at a possibility of dominating human mind – to the point of stupidity – and human creativity by the prevalingly present media (form over content).

Without going deep into discussing and assessing these papers, thesis formulated and research conducted, we can say something absolutely obvious, yet in the context of this article rather important: there is no model which could be used as a conceptual and meaning basis for the analysis of risks which arise from the fact that also in the field of teaching (beginning with the 90’s) we were and shall be under the omnipotent influence of information techniques which in schools and higher education establishments have become present truly everywhere.

4. Teaching and learning on-line as a source of chances and source of dangers

The common use of information techniques in various fields caused – among others – that these techniques became also a tool for teaching (we can observe the growing use of computers and tele-informatics in teaching) and the topic of teaching (a need to teach the so called computer literacy and training in media reception is stressed more and more often). If new tele-media become more and more present in teaching, they should also become the object of an in-depth analysis aimed at finding and defining all strong but also weak spots of this new technique. The author of this paper has presented many articles to show that computer techniques are a new chance to enhance the attractiveness and efficiency of didactic activities [8]. It is a very important factor also from the point of view of the quality of learning [9], as well as from the point of view of the open teaching and learning resources [10].

The use of IT in teaching and learning processes is based not on simple replacement of the human teachers by computers and other IT tools. Most effective and most useful is so called blended learning, in which students can split streams of information coming from two sources: computer programs

powered special distance learning resources and traditional contacts with the human teachers. This idea is clear and convincing as a general framework, but the devil sleep in details. Therefore problem, how to divide tasks and goals between human teacher and used for learning computer system is still open and should be treated as an area of consecutive scientific research [11]. The problems can be minimized by means of proper cooperation between students and teachers both during preparing of teaching materials and during using this materials for learning [12]. Nevertheless, the problem still remains and must be solved.

Yet now, when no one has to be convinced or persuaded that computers and the Internet can and should play an important role in the didactic process, the time has come to start warning about possible dangers of the said. This article is meant to present some ideas associated with problems which we can encounter already now and the ones which appear to threaten us soon; the latter require more attention and more serious preventive actions than it is commonly believed.

5. Problems connected with the application of tele-informatics in teaching

Negative consequences of the tele-informatic revolution in the field of education are unexpectedly numerous. In this paper we concentrate on one of them, a catastrophic growth of information litter present in the so called "cyberspace"¹. This means that the here discussed problem concerns mainly information stocks of the global computer network. It may seem to be an insignificant problem – limited only to the users of this global network. Yet having in mind its constantly growing importance in the functioning of a still bigger number of companies and institutions (it was estimated that towards the end of 2007, over 95% of Polish companies had their servers and pages on the Internet) and due to the avalanche-like growth of number of people using this network every day (in 2007 in Poland there were over 14 million persons using computer networks daily) – the problem must be considered a very serious one. Continuing on the topic of potentially dangerous consequences of tele-informatics in the field of teaching, the discussed problem must also be treated as very serious since abuse of the 'advantages' offered by computer techniques and networks in teaching may lead to significant harm done to the some types of school students unprepared and little immune to some stresses – which makes us follow especially closely and anticipate all potentially possible dangers.

There is still no catalogue of all possible (real and potential) forms and shapes of dangers associated with the use of tele-informatics in teaching. So called e-learning become most and most popular and the problems connected with the use of distance teaching tolls and methods increase accordingly. We can estimate, that in near future more than 70% of all learning and teaching activities will be performed using

Internet, multimedia and another IT devices and services. It will be comfortable for pupils and students, who may learn everywhere every time, and it can be profitable for many teachers and many school owners. Nevertheless it can be dangerous and we must talk also about this dangers.

This paper does not claim to show all dangers in an exhaustive way, either. While writing this paper I have, on purpose, reduced many different forms and types of dangers into only one model. This model which I proposed to call² "information smog" seems to be worthy of attention because in it we can find all characteristic elements making up most of the problems the source of which is the formation and shaping the information society. A more exhaustive and comprehensive discussion of all risks generated by the avalanche-like development of tele-informatics for the field of teaching and learning will be the topic of separate works. In this paper only one detail is being looked at with the use of the model called the 'information smog', in order to show with it, as if with the focus of a lens, the other, bad and dangerous face of the brave new world whose new idol will be the term 'information'.

6. 'Information smog' metaphor

It may be a good idea to explain first why the term 'information smog' to denote the main issue discussed in this article. This term was proposed for lack of any other, better name allowing to characterize synthetically the whole complex set of problems and phenomena associated with an excessive number of sources of information connected to a highly problematic value of information offered by the majority of these sources.

The very phenomenon of such an excess and deterioration of quality of sources of information has been noticed already earlier by many authors and, what is more, it was considered a phenomenon characteristic for the present stage of tele-informatics. Nevertheless in the whole bibliography available to the author there was no attempt made to analyze critically the nature of this phenomenon, nor (all the more) were there any preventive means suggested allowing to neutralize its destructive outcome.

Assuming that a condition for an efficient therapy is a good diagnosis, and the way to find a good diagnosis is a holistic but not overcharged with details understanding of the problem, it has been decided that an analogy could be drawn to 'information smog' as suggested by the name and treated as a signpost for a holistic analysis of the problem.

Let us see how much (and in what sense) certain phenomena currently taking place in the field of information find an analogy with a 19th century meteorological phenomenon of combination of blinding fog and stifling smoke, named smog or, to give it the full name, the industrial smog.

It seems that naming the aforementioned phenomenon of information litter the 'information smog' is justified in the first

¹By the way the common (and very useful!) term 'cyberspace' will have to be more formally defined; this will both facilitate its use in scientific contexts, and not only in journalism; this topic will not be further developed in this paper.

²This term was first proposed in a paper entitled "*Smog informacyjny*" *Information Smog*, delivered during a session of Committee of Civilisation Dangers of the Polish Academy of Arts and Sciences in the Small Aula on 14.12.1998.

place by its appearance just now: in the beginning of a new stage of technological revolution.

7. What is smog?

As we all know the classic smog was a by-product of combustion processes. To be more exact – of a primitive and disorderly process of burning anything, anywhere and anyhow – supplying energy necessary for various production processes developed in a very chaotic and stormy way at the beginning of the previous industrial revolution. By analogy, a stifling excess of information which is currently paralyzing the development and use of information techniques is a by-product of popularization and spread of the processes of production, storing, processing and transmitting information. These processes, rapidly developed and enhanced at the end of the 20th century are the basis for the formulation of a post-industrial society; yet the primitive and disorderly production of information accompanying it has resulted in an information smog.

Another analogy which is worth consideration and explanation is associated with the structure of the smog. As we know in the 19th century this term was given to a phenomenon of a very thick fog mixed with smoke, highly harmful to people and objects. Fog is made of drops of water – substance indispensable for life and in ordinary conditions ‘people-friendly’. The source of evil in the fog is therefore not its composition or ingredients, but the unheard of dispersion of drops of water and their being everywhere. The same amount of water put together in one place, ordered would constitute no problem at all. Sprinkled in the form of fog it hurts and stifles.

8. Transformation from the ‘spring of knowledge’ toward ‘information fog’

Above we told about the origin of physical smog. Exactly the same happens to information in modern tele-informatics systems. The Internet is an environment in which a huge amount of dispersed, spread and disorderly information is available – and this fact is the source of trouble. Information as such is not bad, quite the contrary, it is as indispensable as a glass of water on a desert. But if information is – as it happens to be now – spread over thousands of servers, dispersed on billions of www pages, mixed in a way which makes it practically impossible to sift good information from such which is inaccurate, imprecise or even entirely false – then the usefulness of information changes into its own contradiction. The present situation of www sometimes referred to as the ‘source of all knowledge’ reminds of a situation familiar from a saying ‘you can’t see the wood for the trees’. In a gigantic web covering the whole world there are various pieces of information on practically all topics. There are thousands of them and they could be useful were it not for the fact that they are scattered, dispersed and constitute ‘information fog’ which blinds, stifles and obscures orientation, eliminates all chances of safe arrival at a calm harbor of sound knowledge and - in the case of people with little experience and no criticism - can very easily lead to finding pseudo-truths and pseudo-science.

Everyone who has recently tried to find some useful information in the www knows only too well what we are talking about. After each request directed to systems of information research we receive, apart from some reasonable and useful answers, a few dozen or a few hundred addresses of inadequate, nonsensical or (in the worst case) intentionally misleading and false sites. Unfortunately there is no Cinderella to separate the poppy seed from the sand and each user must check for himself or herself which pieces of information can be useful and which ones are not. What is worse, if the user has too little knowledge and resulting from it commonsensical criticism, he or she can easily take an apparent truth for the truth as such, which in the understanding of information theory equals ‘obtaining’ negative information (the system’s destination entropy increases).

9. What is information smoke?

Excessively numerous and dispersed sources of information in the Internet instead of serving people often disturb them, especially due to the fact that part of this dispersed informational fog is poisoned – as if with black smoke – with contents deliberately introduced to the WWW to harm. Among the thousands of internet servers there are also such ones which promote pornography, among hundreds of discussion lists there are such ones which advocate racism, intolerance, contempt for humanistic values and an apotheosis of various extreme political or religious views. Many computer games enslave young minds driving them towards cruelty and aggression; many contents transmitted by electronic means concern activities or substance unacceptable from the point of view of all codes- both formal and moral.

This is the dark side of the Internet, suffocating smoke which as an ingredient of the information smog changes its inconvenience into a real danger. Let us notice that just like in the meteorological smog, these two phenomena of information smog reinforce and intensify each other. In an ordinary smog the fog reinforces the harmfulness and inconvenience of the smoke and the smoke is the cause of the fog and its catalyst. As a result both smoke and fog acting simultaneously are much more harmful than when acting separately. Similarly, in the information smog the risk of ‘poisoning’ – especially young minds – with pornography or pseudo-science is much greater for the reason that they can find servers which offer harmful contents by pure accident and unintentionally – simply by searching the web looking for information they need for example to do their homework. The dispersion and atomization of information (‘fog’) is a factor facilitating contact with harmful information and at the same time it is a factor rendering all prevention attempts vain: in a world in which there are thousands of information servers it is impossible to define good selection criteria which would efficiently allow to eliminate access to didactically harmful contents – without blocking access to a number of useful information at the same time. We can also show the influence of the ‘dark’ information onto the proliferation of web dispersion that is producing information ‘fog’ through information ‘smoke’.

10. Commercial roots of the ‘information smog’

The mechanism which in this case drives the disadvantageous development of events is primarily the commercialization invading the Internet. As long as the main reason to create and make available information servers in the Internet was a feeling of mission (universities, research centres, schools and museums), professional duty (offices and institutions), willingness to popularize certain events (internet transmissions of some events) or political ambitions (parties and community groups) or individual wish to exist in public (individuals) – the number of servers coming into existence (‘molecules of the fog’) has been growing at a pace proportional to the overall increase of coverage of the net – that is to say at a moderate rate. But soon it has been noticed that supplying information in the Net can be a good business. Although access to most information and services available on the web is free of charge, sites which are visited frequently can be used as ‘windows’ in which one can place advertisements. This has caused a real explosion of number information servers offered in the web and contributed to a significant decline of the level of information supplied, in other words it thickened the ‘fog’. Currently a number of authors have their internet pages only to draw attention of a certain audience so as to use this success later to attract persons wanting to advertise on their pages. Therefore these ‘dark’ advertising information undoubtedly drive the disadvantageous process of multiplication of the overall number of information on the Net.

It may be worthwhile to explain why the author of this article classifies advertising (among other on the Internet) into the category of ‘dark’ information. Of course, it is an arguable issue; many people tend to take the freedom to advertise as the gift of freedom as such or at least as equal to the freedom of economic activities, whose importance is not questioned by anyone today.

Classifying advertising into the ‘smoke’ component of information smog results from the fact that advertising is never meant to pass complete, objective, impartial, true and exhaustive information, but it is a message aimed to achieve a certain objective. Advertising is meant to encourage people to undertake certain activities and that requires supplying them with information (for example about properties of a certain product) in a biased, often dishonest way – which has very little in common with the essence of an information transfer. It is not by accident that during the production of advertising materials, more often than any other information, the borders of what is permissible and what is wrong are crossed. Advertisements for example willingly take advantage of pornography, exploit aggression, appeal to low feelings (greed) – that is they use the whole range of attributes of the dark side of human nature. This is why for the need of this paper we shall include advertisements into the ‘fog’ ingredient of the information smog and its unquestionable influence onto the growth of the number of information servers shall be treated by analogy to inducing fog by smoke.

11. Danger of common access

We have defined what and why we call information smog. We have also defined the harmfulness of this phenomenon. Now we shall try to answer why the above described situation worries us just now? After all computers as tools for processing and transmitting information have been known for 50 years and computer networks have their history of over 20 years, too! Why then strike the alarm now?

The reason why we are taking about the dangers of information techniques is connected to this aspect of development of this technique which in the last couple of years led to common access of these devices. A tool originally created for the needs of the army and sophisticated research laboratories has found its way to almost all companies (in developed countries practically to 100% of them) and to most houses. In these conditions a rather natural consequence of common use is a growing possibility to abuse.

Another, equally important reason, is the effect of synergy between the sphere of transformation and transmission. Even if there were many more computers than there are now but used locally, each of them by one of a few users, even if somebody abused this technique (for example fed into database unverified or even false information) the harm done would be insignificant and it would be easy to localize it. Unfortunately, when we are beginning to use computers connected into networks, a totally new situation emerges. These can be local networks for a single institution (the so called LAN), metropolitan networks serving certain groups of local community (MAN) and vast networks covering potentially the whole world (WAN). A piece of information posted in a net can move, its range may be huge and millions of people can have access to it – and this is precisely what is dangerous.

Information litter is a complex consequence of many processes out of which the most prominent one seems to be such a fast development of tele-informatic technologies that human abilities to adapt do not match it; people are totally unadjusted to these new perception situations in which they have to operate. Our mind can select and analyze incoming information if information come at a rate at which we receive sensory feelings during a walk. We can also receive and use information given at a rate of a lecture delivered by another human being or at a rate at which we study books. And yet modern media do not operate at this slow, thoughtful rate. Quite the contrary: the Internet (and also television, video, film and so on) perform a massive attack onto senses of a person receiving information who as a result of this attack loses ability to perceive consciously and critically, instead assimilates information without any thinking and often with no chance to compose pieces of information into a structure of inter-linking elements of knowledge system. The result is that in the mind (but also – what is more dangerous – the subconscious) of the information recipient there is an enormous amount of unconnected, unanalyzed and ‘raw’ information – causing a confusion in the field of knowledge and a total disintegration in the sphere of values.

The effect is similar to the one when a slowly-reacting person is forced to drive a racing car: an accident is unavoidable, it is just a matter of time when it will take place. This is why modern technique which has caused this problem must create mechanisms allowing to defend against an overflow of information. Our own mind and our own senses will not manage on their own because time after time they turn out to be miserably useless and inefficient when confronted with new challenges the tele-informatics civilization puts before them.

Blame can be also put on creating, on the basis of tele-informatics technology, a number of tools to produce information – easy to use and powerful in emitting information. This revolution in the field of production and dissemination of various computer communications, justly compared to the milestone which was Gutenberg's invention, today is an area full of countless abuse. Individuals are defenceless in the face of this abuse regardless of the above mentioned adaptation shock, societies are also defenceless due to the helplessness of outdated law. The problem grows bigger and bigger almost every day and should become the object of concern of pedagogues, debates of politicians, efforts of lawmakers, and first of all – of scientific research, in order to find a correct definition of the scale and nature of dangers.

The problem is that in the computer network covering the whole world every voice can reach the furthest corners of the globe in no time; this means that the voice of an 'ordinary man' is the same as the voice of a great politician. No doubt this is a great value and chance for humanity because everyone can – if he or she is willing and able to – give their own opinion on public matters and the recipient of the information can focus on one's own assessment of which of the presented views is just, thus avoiding indoctrination by public relations specialists employed by politicians and freeing oneself from the hypnotizing influence of mercenary media. The same mechanism in science causes that the voice of a fool can be heard equally well as the one of a wise man, whose authority is based on sound knowledge. But because pure statistics show that there are more fools, their voices will be certainly better audible - and there are few information recipients with enough criticism and knowledge to differentiate information 'wheat' from 'weed'.

Finally a factor deepening the discussed dangers are the vast capabilities of modern (commonly available) editorial software. Owing to this software absolutely everyone can prepare his or her own message in such a way that this message, prepared by an individual amateur, may look just as professional as information prepared by a most competent publishing house. Practice shows even that from the point of saturation of the market with multimedia gadgets, amateur transmissions are often by far better than the ones produced by professional publishing houses. Enthusiasts of this technique claim that this is the greatest success of printing since the times Gutenberg. However, if we measure with the scale of results by phenomena described in this paper, we can come to the conclusion that indeed, massive access to self-service technique of editing information materials is the largest dis-

aster of systems of storing and disseminating human thought since the fire in the Alexandrian Library.

The cause of such a crucial difference in opinions is simple: producers and enthusiastic users of the above mentioned technical devices concentrate their attention on their functional perfection emphasizing (quite justly) how many technical barriers have been surmounted. They say also that their success has positive social consequences ('global village'), which is also true. Nevertheless enthusiasts of progress in tele-informatics forget that factors they point to are by no means as important as the whole phenomenon whose significant ingredient, interesting us in this paper, is the facility to produce information materials which do not look worse than professional materials, but which in reality are an amateur product. It is worthwhile to comment and explain why it is wrong. Classic method of production of professional messages (for example of books) practiced for ages assumed a multi-layer process of control of their contents coming before (and conditioning) making the information available to the recipient. Before being printed, the material which constituted the content of a book was evaluated by reviewers, worked on by editors, refined, verified and improved. By the time it reached the user it could be treated as a reliable source. Currently, owing to the development of generally available means of computer word processing, just one person can be the author, editor and publisher which definitely does not contribute to the high level of such self-service publishing institutions. There would be nothing wrong with it were it not for the fact that with high quality of printing and editing and very efficient network of distribution, such 'self-service' amateur publishing institutions (often poorly educated and sometimes additionally suffering psychological deviants) cannot be distinguished in any way from the good ones and from credible messages, verified a number of times and offering knowledge most valuable and deserving attention.

The proliferation of trustworthy-looking nonsense, truth indistinguishable from falsehood, half-truths seemingly fully reliable is the very process and problem which is in the centre of attention of this paper.

12. Summary and conclusions

We have discussed only one of many problems which is associated with the formation of an information society, created by the development of science and stimulated by the development of technology, yet driven by its own laws and dynamics, determined by the laws of psychology and sociology. Undoubtedly one can say that technicians have caused (anyway not for the first time) a social process which changes the world with the impetus of a hurricane; capable of changing and transforming the whole social structure as deep as the roots, reaching to the sphere of values. This process, however, is no longer under technical control; once begun it cannot be stopped or slowed down in any easy way. It must therefore be steered reasonably so as to avoid its negative effects, taking maximum advantage of its potential of progress and development.

In this paper we have presented very few, only some elements of a vast and multi-layer problem which is the progressive submission of societies to the dominance of information over other goods. One phenomenon of social character is very interesting and surprising. Unlike numerous currently occurring economic, political, social or even other processes associated with the development of science and technology, which the very moment of their appearance become the focus of attention and give rise to many comments – information revolution remains as if unnoticed or it is accepted as something obvious and natural. It has its good and bad sides because on the one hand it reduces the shock associated with the new scale of introduced novelties, but on the other hand it incapacitates the sensitivity and vigilance necessary to avoid some negative consequences of the ongoing changes.

The role of science has always been to play the role of ‘early warning system’ detecting and signaling problems at a time when they are still little noticeable but at the same time easier to control. Usually inconveniences discovered at this state seem insignificant and of little importance – for example the 19th century smog was made light of (‘well – fog just like any other fog’). And yet it was – disregarding the inconvenience it caused – a symptom of future ecological problems, ozone hole and greenhouse effect. If attention had been concentrated on the origins of this phenomenon (smog) and corrective steps had been taken (search for environment-friendly technology) – we would have been in a totally different situation with pollution problem today. Unfortunately, pioneers of industrialization did not notice the appearing problems, quite the contrary – they treated their symptoms as a synonym of development and progress. This is why we had so many (not only in Stalinist social realism!) works which were an apotheosis of such processes and phenomena – at that time amazing and today perceived negatively (poems praising ‘smoking stacks of Silesia’, reports enthusiastically describing the construction of huge steelworks on sub-urban villages near Cracow, pictures and graphics presenting industrial districts in an idealized and affirmative way and so on). This is precisely what science should say ‘no’ to – but in these times it did not; we are still paying the price for that.

Currently the same situation repeats itself in the frames of a new technical revolution. Observing the above described phenomenon of ‘information smog’ we have to be aware that it is a phenomenon which we have to act against as it is a harmful and wearisome one. We have to realize as well that the discomfort we can feel now is not the only cause of our

concern; we have reasons to expect that there will be other problems following the information smog, by-products of another transformation currently taking place. We should not allow science to overlook symptoms of an imminent catastrophe and remain silent allowing that the only audible signal prophesying new order is the enthusiastic voice of its creators and beneficiaries. Science must send warning before it is too late – and this is the objective of this paper.

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