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Information Revolution: Achievements and Controversies in Science

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***Abstract*—The article provides a socio-philosophical analysis of the information revolution and the development of the information society. The article considers a relevant problem of the influence that the information revolution of the 21st century has on the development of science. An analysis of the ambivalent nature of such impact is given. On the one hand, the new information environment provides new opportunities for the scientific community. On the other hand, the authors analyze a set of possible negative consequences of the modern information dictatorship for the development of science.**

Keywords—information revolution; information technology; information society; information dictatorship; information environment; information crisis; knowledge society

I. INTRODUCTION

Humanity in its development passed through several social revolutions, global in their content and consequences for it. These are the Neolithic, industrial, several scientific, scientific and technological revolutions; each of them marking a new milestone in the development of the human community. The last revolution — the information revolution — in its global influence can be compared, perhaps, only with the most ancient and significant Neolithic revolution.

Today, the information environment along with the social and ecological environment is becoming a new human habitat. The introduction of digital and media technology causes large-scale transformations in modern society — in all the spheres of activity (management, industry, services, education, etc.). At the same time, fundamental changes affect both an everyday life of people and the scientific sphere. The latter in modern society is defined as the engine of progress, the most important factor in the development of humankind. As a result, the problem of the influence that the information revolution has on science as a major social institution and spiritual phenomenon is particularly interesting to study.

II. SIGNIFICANCE OF INFORMATION REVOLUTIONS

Several information revolutions — transformations of social relations due to fundamental changes in the field of information processing took place throughout the history of civilization development.

Each of the historical information leaps connected with the emergence of new channels and means of information exchange opened a way for a new stage in the development of humankind and scientific thought. Thus, the appearance of writing contributed to the preservation of the body of knowledge and increase in their level of reliability. The middle of the XVI century was marked by the invention of printing, which radically changed society, culture, organization of scientific activity. Book-printing led to an information boom and widespread dissemination of scientific knowledge. The third information revolution in the end of the XIX century was caused by the invention of electricity, thanks to which the telegraph, telephone, radio appeared, allowing to quickly transmit and accumulate information in any volume. The emergence of the media — radio, telephone, and television — shaped the global information space, including the scientific one. This allowed science to become one of the most important forms of social consciousness. The fourth information revolution (since the 70s of the 20th century) is connected with the invention of microprocessor technology and the appearance of a personal computer. Microprocessors and integrated circuits are used to create computers, computer networks, data transmission systems, and information communications. This period is characterized by three fundamental innovations — the transition from mechanical and electrical means of converting information to electronic ones; miniaturization of all nodes, devices, instruments, machines; creation of software — controlled devices and processes. The concept of "information technology" is becoming popular — it is a process that uses a combination of means and methods of collecting, processing and transmitting primary information data to obtain new quality information about the state of an object, process or phenomenon.

The increasing complexity of industrial production, social, economic and political life, changes in the dynamics of processes in all spheres of human activity led, on the one hand, to an increase in the need for knowledge and scientific research, and on the other, to the creation of new means and ways to meet these needs. The information leap in the end of the 20th - beginning of the 21st century was connected with

the use in social practice of innovations in the field of means and methods of using digital computing technology to produce new knowledge — all types of information and computer technology, telecommunications and the appearance of the Internet.

The latest information revolution put in the forefront a new industry — the information industry. It also led to the development of a new type of human community — the information society, in which new capabilities of high-performance computers significantly increased the human ability to store, search for, process and transmit information, and the rapid growth of new media technology led to a radical change in psychology and practice in science that received new opportunities and tools for intellectual activity.

III. Development of New Scientific Information Resource in Society

Modern social reality is characterized not only by the onset of a new informatization era, but also by such phenomena as post-industrial society, the atmosphere of postmodernity, the fourth scientific revolution and the "knowledge society". These phenomena do not always constitute links in one chain and often enter into rather contradictory relations, leading to ambiguous, not fully studied social consequences. This is clearly observed in the scientific field, which, with the appearance of the information society received both additional opportunities and new problems.

On the one hand, society and science received highly efficient means to enhance their intellectual activities, which increased the efficiency of operations with the data base and the quality of processing scientific materials. This radically changed the nature of a scientist's work.

A single global scientific information space was created, that was accessible to every member of academic world. Science as a social institution rose to a qualitatively new stage of development. It has become possible to create operational remote communication channels between scientists from different countries, conduct webinars and online conferences, and create virtual scientific communities.

Science uses a whole range of services and various components of the information industry:

- Technical means (computer equipment, telephones, video and movie cameras, etc.);
- Information carriers (drives, floppy disks, optical disks, video, audio, etc.);
- Telecommunication equipment and networks (satellites, telecommunication networks, etc.);
- Information in the form of text, graphic, sound, audiovisual, tactile, multimedia documents and organized data bases (databases and data banks, library and archival funds, information retrieval systems, etc.);
- Software that allows users to manipulate data, access and work with large amounts of facts and information;
- Standards, inter-network protocols and agreements that ensure the unification of information production, the interaction between information systems and networks, the protection of information from unauthorized access, distortion or destruction.

Information technology as a set of methods, production processes and software and hardware tools combined into a technological complex that ensures the collection, creation, storage, accumulation, processing, search, output, copying, transmission and dissemination of information, today tend to convergence — convergence and integration of markets, industries, infrastructures and information products content. Thus, IT became a catalyst for the development of a knowledge-based society and gained tremendous opportunities to "fulfill conceptual, managerial and administrative tasks" [1]. Another independent type of public resource has developed — the information one, which allows saving most of the other social resources. The social information resource can be defined as knowledge accumulated in a society, prepared for appropriate social use. This affected not only the economic sphere of the social development, but also to a great extent the science connected with it, representing in modern society the most important social institution with its extensive infrastructure, and a new factor of production, and multifaceted social and creative activity.

IV. Problems of Science in Information Society

However, the information revolution, like the two-faced Janus, has two parts of influence on science and its community — not only a positive, but also a negative one.

The information crisis that began in the last decades of the twentieth century was manifested by decreasing efficiency of information exchange. The volume of published data and the speed of information flow increased sharply. In this regard, there are contradictions between the limited human abilities in perception and processing of information and the existing huge amounts of stored information. Thus, for example, the total amount of knowledge changed very slowly at first, but since 1900 it doubled every 50 years, by 1950 the doubling occurred every 10 years, by 1970 — every 5 years, from 1990 — every year. There is a large amount of redundant information that makes it difficult to perceive useful and important information for the consumer. Sometimes it became more difficult to communicate between groups of different specialists and scientists, since the amount of unpublished and undeveloped information, scientific plagiarism increased, and the problem of different terminology systems emerged. There is a paradox of social and scientific communication amid the information crisis, which manifests itself in a kind of informational thrombosis, when the information boom and the avalanche-like growth of information volumes are accompanied by information hunger, physiological limitations of a human in perception and information processing, as well as difficulties in information navigation,

focusing on the necessary information out of the general stream. Thus, the problem of formation, processing and effective use of common information resources is the most urgent and acute one for scientists around the world. Further progress of the human community and science is today largely connected with the improvement of the information infrastructure.

The following circumstance also needs to be kept in mind. A post-industrial society focused on a utilitarian-pragmatic approach to the phenomena of the life around it, recognized that comprehensive commercialization of science, education, and the information itself (knowledge) is reasonable. The transformation of knowledge into a commodity has become a significant obstacle to the free access and free use of scientific information as a resource for the development of the human community. Digital capitalism, which fundamentally resolved the question “To have or to be?”, [2] raised by E. Fromm in favor of the first, led to the loss of moral principles in relation to scientific activity and scientific truth. The latest XXIII World Congress of Philosophy in Athens (August 2013) repeatedly raised the issue of grants from multinational corporations, various foundations with not quite clear statutory goals and objectives, the pursuit of which does not contribute to the impartiality of research and the relevance of their results to truth [3].

Amid functioning of huge information flows in the scientific field, the one who coordinates these flows is the winner. And the need for such coordination is both subjective and objective. Indeed, with the new information technologies era, an abrupt increase in the volume and availability of network scientific information is observed, which has not only positive consequences, but also inevitably leads to the emergence of information "garbage" and information overload. In such a “network chaos”, it becomes difficult for ordinary Internet users to navigate in the information and scientific space while having the need to manage this area [4], [5].

Comprehensive commercialization of science, the relativistic atmosphere of postmodernity (epistemological and moral relativism) led to the fact that accessibility and acceptance of a certain scientific information (concept, theory) often does not depend on its proximity to objective truth, its evidence base, passing through verification mechanisms and falsifiability, but rather on the one who is responsible for coordinating the flow of scientific information, which can be directed at your discretion, making the “necessary” information available-unavailable to mass reader, exposing it to marketing and PR processing [6]. Various ratings with relevant criteria are also included in this process of control and redistribution of information in the right direction.

Scientometrics with its seemingly limitless computer capabilities of data processing did not lead in practice to objectivity of indicators and a true increase in the efficiency of scientific work, since the creative nature of scientific activity is not exposed to such straightforward methods of managing “scientific units”, and their questionable objectivity does not create appropriate motivation for genuine scientists. Aformof "service" scientists performing research of a task, rather than a problem type, is becoming more common, indicating a decline in the quality of intellectual activity in general and the subordination of their “free creativity” to corporate, political, economic and other goals, sometimes far from the goals of science.

D. Davidovich, physicist, professor at the University of Belgrade (Serbia), employee of the Vinca Institute of Nuclear Sciences during a conference at the Faculty of Philosophy of Moscow State University entitled “The problem of scientometrics and social status of a scientist” commented on this situation: “In a small country, like ours, where scientometry sovereignty is seriously undermined, if it is not stopped on time, it will lead to the destruction of the last pillars of sovereignty, its own science and every form of critical thinking will be destroyed. This scientometric technology leads to a complete negative selection for science. Very often, these European projects, which are all evaluated according to scientometric criteria, are received by our people "who have dubious scientific reputation ..." The worst thing is that they then create their own network and very tough filters that only let "their own people" pass through… The technology of scientometrics ... destroys freedom of thought and many aspects of unity in the scientific community [7]. The scientific communities of many countries find themselves on the sidelines of world scientific thought as the result of such information-digital domination technology.

Social and humanitarian disciplines, which are the guides and spokesmen of certain axiological and ethical positions that can influence public opinion, are particularly concerned by the information asymmetry. A certain “conspiracy of silence” in cyberspace against the social and humanitarian thought of a number of countries (the lack of relevant journals in international scientometric systems, the non-inviting of prominent representatives of science from various countries to world forums, ignoring of their achievements, etc.) indicate the presence in it of value-based and worldview monopoly.

The existence of the information dictatorship makes it possible to position private interests of individual groups and even countries as objective, socially necessary and prioritized, as well as to influence the world scientific public consciousness. The conclusions about the impact of hyperreality on the society as a whole can be attributed to the current situation in world science: “Views, opinions and assessments are no longer formed by society through analysis and selection. They are created in one center and are imposed on society by massive propaganda.” Thus, one of the consequences of the information revolution is the transition from the scientific conquest of nature to the scientific conquest of a human.

V. CONCLUSION

Thus, humanity needs to develop an information strategy that should lead to the creation of a unified information environment and unified principles for its use. Such an

approach implies the creation of a system and hierarchy in the space of social information, key management parameters and their normative thresholds, and enhancement of social information culture. At the same time, the requirement of the dialectic unity of informatics tools and a system of social and scientific information should be fulfilled, where these factors should harmoniously complement each other, and not create obstacles to the development of genuine science.

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