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.Evolution of technology, rules and patterns Anton L. Grinin

The Universal history is based on a number of universal principles and evolutionary laws (Grinin 2013b; 2014). At different times and in different environments they show up in different ways and with different intensity. At the same time, in spite of the fact that ‘the class of systems is terribly wide’ (Ashby 1969), there are certain basic similarities within formation and behavior of systems at all evolutionary levels, in other words there exist certain patterns (Grinin, Korotayev 2014). Evolution is considered one of the most important phenomena of matter. We can distinguish evolution of life, chemical evolution, evolution of society, evolution of planets, stars and even the evolution of Universe. In this report, we speak about another type of evolution – evolution of technology. In the paper, we describe the role of the evolution of technology within Big History, especially in interconnections with mega-evolution and evolutionary transitions to new levels of complexity. We consider evolution of technology also close interconnected with the study of self-regulation, which is an integrative methodological approach uniting various areas of knowledge, such as Cybernetics, Synergetics and Evolutionary studies. Self-regulation is inherent not only to chemical, biological, and social systems. In the present paper, we show that in the coming decades the self-regulating systems will emerge and spread in a new form, i.e. in the form of human-created self-regulating technologies. It will result from the new production revolution which we call the Cybernetic one. Its first phase has already begun, and the most mature phase will start between the 2020s and 2030s. This revolution will lead to critical transformations in economy and society and will significantly change the world as well as human *modus vivendi*. In our opinion, between the 2020s and 2030s, there will take place a major breakthrough in medical technologies which will incorporate a number of other leading directions. All they will make a complex of MANBRIC-technologies: medico-additive-nano-bio-robotics-info-cognitive technologies. The leading role of medicine in the Cybernetic Revolution is first of all connected with global aging, increasing lifetime, the need of socialization and employment of elderly people and disabled people under the conditions of labor reducing. A wide variety of technologies will be directed to health support. Already today in the medical sphere some major innovations ripen which will reach their maturity in two or three decades (some of them even earlier) (Grinin L. E., Grinin A. L. 2015). Modern medicine is closely related to biotechnologies, pharmaceuticals, gene technologies, industrial chemistry, and some other branches, etc. At the same time health care costs are constantly increasing. Bionics, transplantation, neurointerfaces and similar directions are especially important in connection with rapid aging of population. Robots will become another leading self-controllable technology capable of solving the problem of labor shortage. In the next decades in the developed countries robots will perform either mostly or completely some professional duties (Frey et al. 2013). In general during the final phase of the Cybernetic Revolution there will appear a lot of self-controllable systems connected with biology and bionics, physiology and medicine, agriculture and environment, nano- and biotechnologies. The number and complexity of such systems, as well as the autonomy of their operation will dramatically increase. Besides, they will allow a considerable energy and resource saving. Human life will become more and more organized by such self-regulating systems. However, one should emphasize that during the Cybernetic Revolution, according to our forecasts, the increasing opportunity to change and modify the biology of the human body will become especially important. In other words, we are at the

threshold of a post-human revolution. Perhaps, it will be not so radical as transhumanists think, but anyway it implies an essential prolongation of life, a replacement of an increasing number of organs and elements of biological organism by abiological materials, most various implanted self-controllable systems into organism for rehabilitation or improvement of human's functionality.