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FUNDAMENTAL SCIENTIFIC IDEAS ARE CHANGING THE PRACTICAL FACE OF SOCIETY

(Reflection-essay on the publication of a book by V.L. Makarov, V.V. Okrepilov, A.R. Bakhtizin *Scientific Solutions of Complex Economic and Social Problems Using Supercomputers*)

There are books that 'fly by' like birds – they can even be alive, impressive for a moment – but they disappear behind the horizon of the mind almost immediately after the last page is closed. An aftertaste remains: sometimes pleasant, sometimes difficult, sometimes lasting and sometimes not. And then there are books that are groundbreaking, that reveal deeper levels of thinking and give direction to the development of ideas. And they often stay with us as readers for a long time – or even forever – after you have put the book on the shelf with the other books you have read.

The recent publication of a joint monograph by the members of RAS, Academician Valery Leonidovich Makarov, Academician Vladimir Valentinovich Okrepilov and Corresponding Member Albert Raufovich Bakhtizin, is certainly an enrichment for the latter and therefore important not only for the promotion of the subject presented in it, but also for Russian economics as a whole.

And I think that is no exaggeration. Why do I think so?

I will start a little from a distance.

I will mention four moments from my biography – moments that have defined 'the paths we choose'; moments when books, articles and ideas from eminent experts have been highly decisive.

First. The author of this essay, by virtue of his, if I may say so, 'scientific background', is not so much an economist as a mathematician. And I started my scientific and educational career as a fifth-year student, as a mathematician; I was studying in the Faculty of Mathematics, dealing with quite deep mathematical problems and was actually dedicating my life to them. But then, as one of the promising students, so to speak, I was sent to the university's Faculty of Economics, where I was to teach and take the exams of the second and third year students in the subject that was exotically called at the time: "Organisation of machine processing of economic information".

Here I was confronted for the first time with the kind of problems that were close to the practise of economics and that could and should not be solved simply with mathematical methods, which we were taught well, but with methods that were instructed very hastily (according to today's understanding), namely with electronic computing devices.

What seemed to me, a purely theoretical mathematician and programmer, to be something speculative suddenly turned into practical problems, because my first students and I were both assigned to solve problems of practical use in the field. So, I became 'familiar' with these tasks.

What 'saved' me? The good books! My elders gave them to me to read for a few days and nights. I cannot remember the names of these comrades or the authors of the books, but I remain forever grateful to them – they not only helped me with this task, they helped me fall in love with it! And this thing has become 'mine'.

I suppose I was not the only one who got help. A lot of time has passed since then.

In the 80-90s I worked in a systems programming research laboratory that solved much more complicated and quite different problems in the field of mathematical modelling, complex systems and so on. The ideologists in the formulation of the problems solved in our laboratory were the first students and followers of the very people who for many years determined the path of development of Soviet science in the field of electronic computer technology and its application to national economic tasks – great specialists, academics Lebedev, Glushkov, Burtsev. Their names were mentioned 'in one breath' in our environment. Their works, their books – priceless books! – were read until they threatened to fall into disrepair. And, it should be noted, one of the clients of our work was the Central Economic Mathematical Institute (CEMI) of the Russian Academy of Sciences, which to a large extent provided the scientific basis for the development of these ideas. The materials provided to us by our colleagues at CEMI were a great help in developing technical solutions.

The second thing that influenced my views was my 'acquaintance' with CEMI. The contact with the work of the colleagues – economists and mathematicians 'in one' – convinced me that basic knowledge is not an entertainment for 'the particularly gifted', but a basis for practise, for the solutions needed in the daily routine of industry, management, education...

Life has not stood still. Since the late 1990s, I had the opportunity to head the Aerospace Equipment Corporation, then the largest integrated enterprise in the Russian aerospace instrumentation and rocket-and-space industry, which was on the list of Russia's top 10 strategic enterprises, including 35 plants and design offices and dozens of companies with the appropriate profile. And, of course, one of the most important tasks was to ensure the development of computer systems for aerospace, whose performance and physical characteristics could be important for use in aircraft and other transport systems. Together with a large group of involved specialists from various institutions, institutes, including the Academy of Sciences, the corporation had to deal with problems that made it possible to find ways to put many currently known solutions into practise. Fruitful cooperation with specialists under the leadership of (now) Academician V.B. Betelin played a major role, if not the main role, in this work, which was absolutely applicable, but based on fundamental scientific knowledge. Use of their ideas. Their work.

This was, if I may say so, the third moment of my preoccupation with this subject, which is so important for our national economy. The moment when I became aware of the profound importance of such tasks for our country. And – books! articles, reports! – Those in which these problems were identified, studied and solved. We know that many results of this work help our country today in various fields.

And the fourth point is our interaction today with the authors of the monograph in the framework of joint activities in the International Union of Economists and the Free Economic Society of Russia (VEO of Russia); by the way, we happen to be colleagues in the Dissertation Council at the Moscow State University, which also allows me to see their attentive attitude to scientific thinking – both their own and that of their young colleagues.

There are many different aspects here.

For example, the Free Economic Society of Russia pays a lot of attention to the study of processes in the economy aimed at improving the quality of life of the population. Academician Vladimir Valentinovich Okrepilov has worked intensively on these issues – both practically and theoretically. Together with him we work in the Free Economic Society and the Industrial Council at the Governor of St. Petersburg. Not only do we have close ideas about how to develop the city,

but, most importantly, we also work together practically. I am very familiar with Academician Okrepilov's ideas. For example, when I had the opportunity to work out programmes for the development of the city as Chairman of the Committee for Economic Development of the Government of St. Petersburg, we relied on his developments to improve the quality of life of the population.

As for Valery Leonidovich Makarov, I know him very well as a great specialist on the most important issues of the development of the innovative economy, digitalisation and the development of intelligent production systems – anyone who is even remotely involved in these issues. His fundamental work in mathematical modelling, knowledge economics and many other areas influences the research of his colleagues today.

And, of course, a special place in promoting ideas on the application of methods of mathematical modelling based on supercomputer technology in the scientific community belongs to Albert Raufovich Bakhtizin, who is not only an eminent scientist but also an organiser of science, who heads the Central Institute of Economics and Mathematics as its director and works closely with his scientific supervisor Valeriy Leonidovich Makarov. Their creative unity is fruitful. Their joint work is always an event. I would like to mention that last year their joint book was awarded as "Book of the Year" by the Free Economic Society of Russia.

This event from my biography is not an isolated case, but I think it is exemplary. Thus, continues the chain of events that enables us, the interested readers, to become acquainted with the books, works, reports, articles and, above all, the ideas produced by the authors of great works, which include the authors of the new monograph. These ideas, which, when put into practise, develop society, help everyone.

In this context, I would like to note the following.

Anyone who has the opportunity to read the book *Scientific Solutions to Complex Economic and Social Problems Using Supercomputers* will gain invaluable knowledge in this field. Help. Support. An impetus to develop their own ideas.

The book is very multifaceted and at the same time very, as they call it, 'tightly knit'.

On the one hand, it gives an insight into the technological possibilities of solving the most important problems in the field of Big Data with the help of modern technical ultra-high-speed systems and technological solutions.

On the other hand, the book is a strong foundational work and at the same time offers practical knowledge in two, one could say, forms.

The first deals with the analysis of solutions based on various technical systems, methods and models. At the same time, the authors present in detail and comprehensively – something rarely found in monographs of this kind – the theoretical foundations and methodological development of agent-based models and describe in detail the software platforms for implementing these models. It is also noteworthy that the authors do not disregard the historical context of the topic when presenting complex mathematical and software constructions. This allows the reader not only to get a handbook on agent-based modelling (which is important in itself), but also to delve into the history of the development of ideas and methods and gain a systemic understanding of the subject. Make the ideas your own.

In another sense, we can talk about the practical application of the proposed approaches to address an extremely important task today: building a socially oriented economy, which is where the President has directed us, and indeed where our Constitution has directed us in its new guise.

What is a socially oriented economy? I would put it simply: it is an economy that is geared towards the continuous improvement of the quality of life of the people, of society.

S.Y Witte Institute for New Industrial Development (INID), where the author of this essay has been working for many years to develop the theory of Noonomy, pays substantial attention to this aspect of civilisational development. The socialisation of the economy is one of the fundamental components of the quadriga of Noonomy. In the process of forming a new industrial society of the next generation, the transition to a new technological mode, the core of which is, among other things, communication and digital technologies, together with scientifically based rational mechanisms of their application in the economy and social construction, should ensure, above all, the solution of the problems of social development and the achievement of economic parameters that will make it possible to realise the potential of noodevelopment. And precisely this task is one of the important practical applications of the basic methods proposed in the first part of the analysed book.

This is a truly fundamental academic approach: basic knowledge – idea – methodology – technological solutions – practical application to solve a major problem.

This is how books are written. This is how books should be written. And this is what you need to learn – even from such an example.

That is why I said at the beginning of my essay that the publication of this book is a big event in our science community.

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