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Translation

SOVIET SCIENCE AND TECHNOLOGY POLICY

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SOVIET SCIENCE AND TECHNOLOGY POLICY

This non-serial report contains selected translations of Russian articles on the planning and administration of Soviet research and development and the introduction of scientific achievements into industry.

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FEDOSEYEV ON DOMESTIC, INTERNATIONAL GOALS OF SOVIET SCIENCE

Moscow VOPROSY FILOSOFII in Russian No 4, Apr 81 pp 22-38

[Excerpts from an article written on the basis of a report to the general assembly of the USSR Academy of Sciences, 18 March 1981, by P. N. Fedoseyev: "The 26th CPSU Congress on the Tasks of Science in the New Five-Year Plan"]

[Excerpts] The 26th CPSU Congress allotted an exceptionally large amount of attention to the tasks of further developing science and, on this basis, accelerating scientific-technical progress. "The party of communists," said Comrade L. I. Brezhnev, "proceeds from the assumption that the construction of a new society is simply inconceivable without science."* The congress pointed to the necessity of moving all sectors of the economy forward to the leading edges of science and technology. We see that this aim of the congress is the concretization of the historic task of organically uniting the achievements of the scientific-technical revolution with the advantages of socialism.

The scientific-technical revolution is unfolding under the aggravated conditions of the struggle of two world systems when, on the one hand, the power and influence of the forces of socialism and of national liberation and social progress are growing and, on the other hand, the crisis in capitalism is becoming more acute, its contradictions are deepening and, at the same time, the aggressiveness of imperialism is becoming stronger.

Under present conditions, the imperialist strategists have a big stake in using scientific-technical achievements in an arms race. The successes of the scientific-technical revolution themselves are being more and more directed by these strategists toward the creation of monstrous means of mass annihilation of people and the incitement of war hysteria. Under these conditions, the question of increasing the effectiveness of our civil production on the basis of comprehensive use of the achievements of the scientific-technical revolution is the pivotal problem not only for the development of a socialist society but also for all human civilization.

The imperialists, by relying on the presence of a developed production base and a high scientific-technical potential and qualified personnel, by intensifying the plundering of economically poorly developed countries and the exploitation of the workers in their own countries, and by building up their military might, think that they can occupy a dominating position on the fronts of the scientific-technical

* "Materialy XXVI s"yezda KPSS" [Materials of the 26th CPSU Congress], p. 42

revolution and achieve economic and military supremacy over the whole world. American imperialism intends to use its scientific-technical base and military strength with a view toward leadership in the capitalist world and as a pressure lever on young national states, to interfere with their advancement on the road to social progress, applying all means, including armed intervention, against liberation movements. But the main design of American imperialism is to build up arms and scientific-technical potential, especially in the military field, to surpass the defense potential and economic growth of the Soviet Union and of countries of the socialist fraternity and to cancel out the great historical achievements of real socialism, and to turn back the tide of historical progress.

Allotting increasing financial means, technical equipment, and qualified personnel to the development of scientific-technical potential, American imperialists are trying at the same time to slow down the development of Soviet science in the most important areas. Under various pretexts, such as under the banner of protesting "human rights," the pretext of the "Soviet military threat," and "U.S. national security," American rulers limit and divert scientific-technical relations with the Soviet Union on problem areas in which they think the scientific achievements of their country are higher than Soviet science. As is well known, American officials have imposed a ban on the sale to the Soviet Union of a large number of types of scientific-technical equipment and various materials. Along the same lines, they are putting pressure on other capitalist countries, trying to isolate Soviet science from the general flow of world scientific-technical progress and to impose a sort of scientific-technical blockade on the relations of our country and countries of the socialist fraternity.

Soviet scientists, recognizing their patriotic duty, are devoting maximum effort to achieve self-reliance and independence in the development of Soviet science and technology in the decisive areas, to help in every way possible the strengthening of the defense capability of our country to counterbalance American claims of achieving military supremacy over the Soviet Union and the socialist fraternity.

On the basis of scientific achievements, further development or new developments have been achieved in such fields as atomic machine building, space technology, electronics and microelectronics, microbiological industry, laser technology, the production of artificial diamonds and other synthetic materials; the utilization of natural resources and distribution of productive forces have been bettered; and social relations have been improved.

The successful development of the economy and the solution of social problems is impossible, under the more complicated conditions of the 1980's, without the very active and direct participation of science and without the acceleration of scientific-technical progress. Therefore, the acceleration of scientific-technical progress is really the crucial problem in the economic development of our country under present conditions. "The country has an extreme need," said Comrade L. I. Brezhnev in the Summary Report of the CPSU Central Committee, "to have the efforts of 'big science,' along with the development of theoretical problems, concentrated in larger measure on the solution of key economic problems and on discoveries that are able to bring genuine revolutionary changes in production."* This is a clear program for the development and practical utilization of scientific achievements, including fundamental sciences, which are the chief source of technical progress.

* "Materialy XXVI s"yezda KPSS," pp 42-43.

Scientific and technical achievements can and must compensate for the growing additional expenditures of labor and resources in the economy caused by having more and more to use fuel and energy sources and raw materials in places that are remote and hard to reach. The solution of this economic task is becoming a matter of first-priority importance, for on this depends the effective exploitation of the new eastern regions of the country. Scientific-technical progress is called upon to overcome yet another difficulty -- to provide high rates of growth in production during an expected decrease in labor resources caused by unfavorable demographic trends in future years.

In short, we have a rich, meaningful scientific build-up and good prospects for future progress in science.

Socialist society has a vital interest in expanding the scientific-technical revolution; it can and must create more favorable conditions to help this revolution. However, as was noted at the congress, in practice we often do not utilize the advantages of socialism for the development of science, for increasing its effectiveness, and for accelerating scientific-technical progress.

The statement that science is a direct productive force has become literally true. But this statement must be tied to the understanding that science is becoming a direct productive force only when it is embodied in the means of production and in technological developments and then in the production of material wealth. ". . . Close integration of science and production," stressed L. I. Brezhnev, "is the persistent requirement of the present epoch."*

Unfortunately, great difficulties arise at the stage where scientific achievements and the introduction of technical innovations into mass production take place. The Soviet Union has enriched the world with many discoveries which have foreordained profound improvement in the engineering and technology of production, but we ourselves in a number of instances are behind in the time-lengths and scales of application of these progressive technologies. The congress ordered analysis of the reasons for the intolerable slowness in the assimilation of prospective developments.

In analyzing the reasons for such a situation, it is necessary to consider a number of conditions, including technical-economic ones. It often happens that the development of new technology does not provide effective technical-economic advantages over the engineering and technology that is in use. This is caused largely by the imperfection of the cost-accounting system, which makes it unprofitable for enterprises to make products more cheaply because this leads to the lowering of the production indicators used in evaluating their activity. This circumstance was brought out with definity in the CPSU Central Committee Summary Report to the 26th CPSU Congress. In a number of cases, new technology causes an increase in the cost of manufactured items because expenditures for the production of new machinery and equipment substantially rises, while productivity increases less than the price. As a result, this leads to unjustified growth in the cost of end products in all branches of the economy that employ such technology. Inadmissible lack of coordination exists in the methods and criteria for evaluating the effectiveness of capital investment and new technology.

* Materialy XXVI s"yezda KPSS, p 4.

A large group of economic scientists have been engaged for a long time in the analysis of the reasons for such a problem. However, a verified answer still has not been given to the basic economic questions of scientific-technical progress.

Under present conditions of the development of our economy, enterprises should be vitally interested in utilizing scientific and technical achievements. Central planning and administrative bodies and the Committee for Science and Technology, as L. I. Brezhnev pointed out at the congress, must formulate practical tasks that require maximum attention from scientists. "At the same time," L. I. Brezhnev continued, "science itself must be the constant 'disrupter of tranquility,' pointing out what sectors have become stagnant and backward and where the present level of knowledge provides the opportunity to move forward rapidly and successfully. We must think about how to turn this work into an inseparable part of the management mechanism.*

The assignment by the congress to the Academy of Sciences, the State Committee for Science and Technology, and the ministries to conduct work on the evaluation of the scientific and design bases of various economic branches and to make proposals for certain regrouping of scientific efforts must be considered exceptionally important.

As is known, the USSR Academy of Sciences and the republic academies give a large amount of attention to the search for new ways and forms for introducing scientific research results into the economy. In the course of the work, new forms of cooperation are arising between academy scientific institutions, on the one hand, and ministerial institutes and industrial enterprises and organizations, on the other hand. Significant successes in uniting science and production have been achieved by the Siberian Department of the USSR Academy of Sciences. Valuable experience has been accumulated at the Ukrainian Academy of Sciences, the scientific institutions of which are concentrating their efforts on the purposeful development of those fundamental and applied research projects that can be the basis for creating conceptually new technology leading to fundamental transformations of productive processes. The experience of the Siberian Department of the USSR Academy of Sciences and the Ukrainian Academy has been approved by the CPSU Central Committee.

Improvement in the forms of relations between science and production must be given constant attention by the Academy of Sciences and its departments and institutions. Experience shows that difficulties in implementing scientific achievements can be overcome by improving organization and management of scientific research and of the system and mechanics of interrelations between science, technology, and production.

During the past two decades, much has been done for the solution of these problems, and effective forms have been found for the integration of science and production. First, the transition to continuous special-purpose program planning has been brought about, with the aim of unifying science and production. The development of special purpose complex programs, as was stressed at the congress, provides the opportunity to unite the efforts of scientists with the producers and workers of the ministries for the solution of the most important scientific-technical problems and to reduce the time-lengths required for creating and assimilating new technology.

During the last five-year plan, the Academy of Sciences actively participated in work on 111 scientific-technical programs of 200 such programs approved by the State Committee for Science and Technology for 1976 to 1980. For such important programs

* "Materialy XXVI s"yezda KPSS," p 43.

as "World Oceans," Molecular Biology," "Scientific and Technical Information," and "Seismology and Earthquake-Proof Construction," the USSR Academy of Sciences was the head agency responsible for program fulfillment as a whole. A large amount of work is being conducted by the USSR Academy of Sciences on the power program. The 11th Five-Year Plan, now beginning, plans for the implementation of 160 scientific-technical programs.

Scientific institutions of the USSR Academy of Sciences is now conducting work on joint programs and plans with a large number of ministries and agencies. The president of our academy gave a good account of this at the congress.

Research on special-purpose programs must be given constant attention by our scientific institutions, departments, presidiums of scientific centers, and affiliates of the Academy of Sciences.

One effective form for integrating science and production consists of scientific-production associations. Experience by the best of those operating in the large industrial centers of the country shows that they permit more rapid introduction of scientific achievements and engineering developments and more successful solution of problems within and among economic sectors. This was discussed at the congress by representatives of Leningrad, Sverdlovsk, Belorussia, and by a number of others. However, the situation is not always the same in other places. Evidently, there is still some need for adjustment in the economic aspects and in questions concerning interaction between the scientific, planning-design, and production units that enter into scientific-production associations. There are often cases where ministries obligate enterprises entering into associations to fulfill their usual production program that is unrelated to tasks of introducing scientific achievements into production. The congress called for an end to such policies. According to Comrade N. A. Tikhonov, chairman of the USSR Council of Ministers, in his speech at the congress, each scientific-production association must become a great center for creating and manufacturing new, high-quality products and for the improvement of technology and the organization of production.

The USSR Academy of Sciences and the USSR State Committee for Science and Technology together with the economic ministries must examine and decide questions on the organization of the work of scientific-production associations and to define the mechanism for utilizing the results of fundamental research. And our institutes of the Department of Economics and the Institute of the State and Law must give effective scientific-methodological aid to the State Committee for Science and Technology, the Ministry of Finance, and the economic ministries relating to improvement in the legal and economic mechanisms for the functioning of a scientific-production association.

Improvement in the organization of scientific research largely depends on its rational and effective coordination.

As is known, the 25th CPSU Congress gave a responsible assignment to the Academy of Sciences -- the coordination of all scientific work in the country. Such an assignment to the USSR Academy of Sciences as the center of theoretical and fundamental research was tied, first of all, with the increased significance of fundamental sciences as the basis for scientific-technical progress and, secondly, with the increased role of special-purpose program planning. After the 25th CPSU Congress,

the coordination of scientific research was strengthened and relations were improved with the ministerial academies, higher schools, and ministerial scientific-research institutions.

Much work has been done in coordinating the scientific research of higher educational institutions. In a joint decision by the presidium of the Academy of Sciences and the board of the USSR Ministry of Higher and Secondary Specialized Education "On Strengthening Relations Between Higher Schools and the Scientific Institutions of the USSR Academy of Sciences," measures were taken for the further development of scientific research in higher educational institutions and for broadening the practice of joint scientific research by academy institutes and higher educational institutions. The 26th CPSU Congress proposed more effective use of the scientific potential of higher schools and a reduction of the gap in material support to academy and higher-school science. At the same time, it is necessary to improve the training, qualifications, and certification of scientific and scientific-educational personnel, providing all assistance possible to the development of mass scientific-technical creativity.

The transition to an intensive mode of development is related not only to production but also to science. The intensification of research activity has become a vital necessity. Calculations and verifications conducted with the drafting of the Complex Program for Scientific-Technical Progress to the Years 1990 and 2000 show that there will be an unavoidable slowing of the growth in numbers of scientific workers and generally of all people engaged in the science sphere. Material and financial resources for science are also limited. Therefore, two mutually related problems stand out -- the intensification of scientific research and giving priority to the development of the decisive areas of science.

The intensification of scientific research offers improvement in the technical support of science and a wider use of computers. Decisions by the congress provide for strengthening the experimental and experimental-production base of scientific-research and planning-design organizations. Significant increases are planned for the production of instruments, equipment, means for automation, reagents, and preparations for the conduct of scientific research.

Putting the priority principle into practice acquires decisive significance. This means that we must concentrate scientific efforts and resources on the main areas on which depends progress in science and in the solution of the key problems of social-economic development. In the future we must strive to specialize the activties of republic academies and scientific centers on the areas that have the best prospects for scientific development. The concentration of scientific resources is also necessary for achieving world levels, especially in those areas where our backwardness is especially intolerable. In other words, the whole system of scientific research must be, as L. I. Brezhnev pointed out at the 26th CPSU Congress, "significantly more flexible and mobile, intolerant of unproductive laboratories and institutes."*

The CPSU Central Committee, as stated in its Report to the congress, favors further expansion in the role and responsibilities of the USSR Academy of Sciences and improvement in the organization of the whole system for scientific research. Improvement is required in the network and structure of scientific institutions to correspond to the needs of scientific-technical progress and in the timely determination and change of direction in research and development.

* "Materialy XXVI s"yezda KPSS, p 42.

In view of the decisions of the 26th CPSU Congress, it is necessary to make research programs and plan tasks for scientific developments more specific and to implement the priority principle in practice. In this connection, the Academy of Sciences must keep the whole front of science within its purview, not permitting backwardness in any area and not neglecting opportunities for creative breakthrough in any sector which, at a given time, may not seem hopeful but could have good results at some time in the future.

As experience shows, the drafting of the Complex Program for Scientific-Technical Progress and the verification of prospects for the large economic problems are possible only if their social-economic and scientific-technical aspects are in agreement. On the one hand, the existing build-up in scientific-technical development largely predetermines the possibilities for solving social and economic problems and, on the other hand, the progress of science and technology themselves, especially in the long run, must be subordinated to the needs of the social and economic development of the country and must aid in the solution of great economic problems.

Documents of the congress, with due completeness and specificity, defined the chief areas of fundamental sciences and also tasks for the solution of the urgent problems of scientific-technical and social progress on which scientific workers' efforts should be concentrated. This means, above all, supporting the development and implementation of special-purpose complex programs for the solution of the most important scientific-technical problems, substantially reducing the time-lengths for creating and assmilating new technology, and strengthening mutual relations between science and production.

Among the basic scientific areas are envisaged the development of mathematics and the increase of effectiveness in its use for applied purposes. One of the central problems of present scientific-technical progress is the development and improvement of computer technology, which is related to a whole complex of problems in automation and control. The understanding of the microstructure of matter has been and remains one of the chief fundamental problems of science. A deeper understanding of the structure and nature of interaction among elementary particles, undoubtedly has been a very great step in conquering the forces of nature, like the one achieved with the discovery of atomic structure. Broad experimental and theoretical research on the physics of the atomic nucleus and nuclear reaction have also been provided for. A large amount of attention will be allotted to the development of accelerator technology, research facilities, and the automation of experimentation in nuclear physics. To increase the effectiveness in the utilization of large experimental facilities such as research reactors and accelerators, it is necessary first of all to provide the maximum possible reduction of time-lengths necessary for equipping them. Delays in construction often sharply lower the scientific value of the experimental data obtained at such facilities.

Decisions of the congress plan for further development of the fuel and energy complex. They provide for improvement in the structure of the fuel-energy balance and the rapid development of nuclear energy, including the creation of fast-neutron-reactor atomic power stations that permit a more effective utilization of nuclear fuel. As Comrade L. I. Brezhnev said in the Summary Report to the CPSU Congress,*

* Materialy XXVI s"yezda KPSS, p 38.

"Reality demands continuation of the search for conceptually new sources of energy, including the creation of the bases for thermonuclear energy." Therefore, in the five-year plan that is now beginning, there must be intensive development of research on high-temperature plasma and the problem of controlled thermonuclear synthesis. Work will also be continued on laser and electron thermonuclear synthesis and also on the solution of the most important engineering problems in thermonuclear power.

Science, including fundamental science, is called upon to play an important role in improving methods for transforming energy and also in improving existing methods and developing new methods for energy transmission.

Introducing a proposal for the development of research in the field of solid-state physics, quantum electronics, optics, and radio physics, the Academy of Sciences must increase its attention to these problems and successfully implement its own proposal. Research in the physics of semiconductors must provide for the development of physical and technological foundations for microelectronics for the improvement in existing semiconductor instruments, and the creation of new ones. A large amount of attention will have to be given to research on the complex of problems in solid state physics, which is opening up even newer prospects for many sciences and production.

In the report by Comrade L. I. Brezhnev at the congress, it was stressed that machine building, most of all, opens the door for what is new and advanced and creates scientific and engineering thought and embodying it in highly effective reliable machines, instruments, and technological lines. In the first place, machine building is the basis for implementing scientific and technical achievements. At the same time, machine building is the field in which in large measure in one way or another the technical base and productive apparatus of the future will be created. Therefore, in the five-year and ten-year periods being planned for, a large complex of problems will be developed that are related to improving quality, reliability, and productivity of machines and to reducing their metal content and energy consumption. Great hopes in this regard have been placed on scientific institutions of the Academy of Sciences. In the general theory of machines, there will be developments in the creation of automatic manipulators, including industrial robots. There must also be a wider development of work on the theory of systems for automatically operated machines. Research will receive intensive development in the field of control problems. Significant attention must be given to the development of the scientific bases for the automation of scientific research and experimentation.

In the five-year plan that is beginning, chemical science must accomplish important tasks. A large amount of attention will be given to the development of the theory of chemical structures, reactive capabilities, and chemical kinetics. First priority will remain on the problem of producing new polymers, physiologically active compounds, composite materials, and other products with predetermined complexes of properties. Special significance is being acquired by the development of the technological processes that provide for complex and maximum full use of raw materials and that eliminate environmental polution, by the creation of effective preparations for increasing yield from petroleum deposits, and by the development of methods for producing liquid fuel from hard fuels. Increasingly important significance is being acquired also by increasing the length of service of various materials and manufactured items and the protection of metals from corrosion and polymers from aging.

Successes in fundamental research in biological science, especially its physical-chemical areas, have been provided by intensive development of traditional applied areas such as technical biochemistry, technical microbiology, and the synthesis of biologically active compounds, and conceptually new possibilities have been opened up for the accomplishment of a large number of important practical tasks. Genetic engineering has come about and is already producing its first results. An important area of long-range significance has been formulated -- bioengineering -- which is oriented toward the use of biological agents and processes for practical purposes. The "Basic Directions . . ." provide for the concentration of efforts on the development of bioengineering processes for producing the products used in medicine, agriculture, and industry.

In the five-year plan now beginning, work will be developed on introducing highly productive varieties of plants and strains of livestock and useful microorganism cultures and on creating new physiologically active substances for agriculture and medicine.

Development is foreseen in research on the rational use and conservation of the land and water resources of the country and on the chemicalization, mechanization, electrification, and automation of agriculture. Long-range programs have been put together for research on these important areas. New academy scientific institutions have been created: so, in Saratov, the Institute for Social-Economic Problems in the Development of the Agrarian-Industrial Complex of the USSR and the Institute for the Biochemistry and Physiology of Plants and Microorganisms are beginning their operation.

Scientists of the USSR Academy of Sciences are participating in the development of the food program of the USSR for 1981 to 1985 and for the period to 1990, which is being implemented according to the decision of the October (1980) Plenum of the CPSU Central Committee and the 26th CPSU Congress. The accomplishment of the research relating to the implementation of this program is the most important task of academy scientific institutions.

Research is to be developed in the field of geology, geophysics, geochemistry, and mining sciences. This research is directed toward explaining the geological structure and history of the development of the Earth and Earth's crust, and also toward evaluating the conditions of the origin, the pattern of distribution, and rational means of utilization in the economy of the most important groups of useful minerals.

In the new five-year plan, there will be a continuation of the study and mastery of outer space in the interests of the development of science, technology, and the economy. With the aid of space systems, research will be conducted on a broader scale with respect to natural resources and the processes of the Earth's atmosphere and surface.

A characteristic feature of mature socialism, as Comrade L. I. Brezhnev has pointed out, consists of increasingly closer interrelations between the development of the economy and the social-political progress of society. And this requires further intensive development in the social sciences and significant strengthening of effectiveness in research in the humanities.

Guided by the decisions of the 25th CPSU Congress, Soviet social scientists in the past five-year plan concentrated their efforts on pursuing urgent problems of

Marxist-Leninist theory, research on the patterns and trends in the development of our society, the construction of the supply and equipment base for communism, problems in the improvement of production relations, changes in the social structure of society, and strengthening of the socialist form of life. A large amount of attention was given to the pursuit of urgent problems in the further development of Soviet democracy, improvement in national relations, and brotherly cooperation of peoples under the conditions of mature socialism. Social scientists of the USSR Academy of Sciences took an active part in analyzing theoretical problems relating to the new constitution and in working on the development of legislation based on the new constitution.

With their research, social scientists made a definite contribution to the development of the concept of developed socialism. During the past five-year plan, they created serious scientific works that were devoted to the history and theory of socialist society that threw light on the experience of world socialism, and that revealed the pattern of the worldwide revolutionary process. As L. I. Brezhnev notes in his report, there is good research on the history of the international workers' movement, the present stage in the crisis of capitalism, and the development of state-monopoly capitalism, and serious steps have been made in the study of present international relations. In a word, as L. I. Brezhnev said, much has been done and it deserves recognition. However, not everything is satisfactory in the field of social sciences. Unfortunately, the tendency of certain scientists toward scholastic theorization, noted by the 25th CPSU Congress, has not been overcome with complete success. Philosophical works often repeat and prove well-known truths instead of analyzing new phenomena of life. Often, research by social scientists is replaced by artificial theoretical "innovations" and by the construction of different variants of category systems that differ only in the sequence in which they follow one another. Much time and effort are wasted on fruitless discussions of various concepts and definitions in the fields of philosophy, sociology, and political economy, and in some other fields as well.

At the same time, new phenomena and trends in economics and in the political life of society are being analyzed insufficiently; the task bequeathed by Lenin to develop a theory of materialist dialectics as a whole world view and methodological system is being accomplished too slowly; and public opinion studies are poor. A large amount of attention is required by problems of the social consequences of the scientific-technical revolution, to communist education tied closely to the social-economic policies of the state, and many others.

On the basis of generalizing on the experience in developing the social-class structure of our society during the last decades, the Summary Report by the CPSU Central Committee to the 26th CPSU Congress points to real possibilities that "the establishment of a classless social structure will come about essentially within the historical framework of mature socialism."* Thereby, a substantial contribution is being made to Marxist-Leninist teachings on the relationship between the two phases of communism formation from the point of view of the development of their social structures. Considering these prospects, largely new analysis must be done on such problems as the convergence of the two forms of property, the elimination of differences between urban and rural life, and between intellectual and physical labor, prospects for the development of a political system for socialism, and so forth.

* "Materialy XXVI s"yezda KPSS," p. 53.

In our multinational state, science must carefully consider questions of nationality relationships and the strengthening of friendship among peoples. The dialectics of nationality relations during the stage of developed socialism consists of movement toward the full unity of nations and nationalities -- not through ignoring or eliminating their national-cultural distinctions, but by gradual convergence and by the development of each of them on the basis of fraternal cooperation and mutual understanding.

The congress stressed with new force the international nature of socialism and gave attention to the necessity for countries of the socialist fraternity to "learn from one another." Characterizing the dynamics and basic trends in the world socialist fraternity and having pointed out that both in the internal development of each socialist country and in their development of cooperation with one another, new tasks and problems constantly appear. L. I. Brezhnev noted that it would be incorrect to paint a picture of the contemporary socialist world in bright holiday colors. There are also complications in the development of our countries. The reasons for these complications and the ways to overcome them constitute the profound and scientifically based answer to this question given by the 26th CPSU Congress.

In the report by L. I. Brezhnev and in the materials of the 26th CPSU Congress, a scientific analysis was given of new phenomena in the world of capitalism, the distinctive features of the present stage in the overall crisis in capitalism, the political role of developing states that has developed in the world arena, and urgent problems of the international communist and workers movement.

At the center of theoretical activity, there must be the development of dialectical and historical materialism, scientific communism, and political economy. It is necessary to speed up the long-drawn-out work on fundamental studies of these problems. The work of institutes in the humanities must be raised to a new level, especially in philosophy, sociological research, and a number of others as well. The needed scientific level must be represented in April of this year by the third All-Union Conference on Philosophical Questions in Present-Day Science, which must generalize and further the development of basic world-view and methodological problems in present-day science. We ascribe great meaning to the work of philosophical and methodological seminars, which involve hundreds of thousands of scientists and fulfill important research and education functions.

One of the urgent areas of scientific investigation in the coming years will remain the development of ways to raise further the management level of the economy, the introduction of advanced methods of socialist administration, a fuller consideration of centralized control with administrative independence and enterprise initiative, and a more effective mutual interaction between planning and control by economic sector and planning and control by region. It is necessary to speed up work on creating an organizationally well-coordinated mechanism for complex special-purpose planning that eliminates agency barriers and guarantees the needed level of responsibility for fulfillment of outlined measures by the appropriate ministries and agencies and timely provision of programs for effective management and resources of supplies and equipment.

Among the basic areas, research is being pushed forward on the patterns of the world socialist system and problems of socialist economic integration and external

relations. In accord with statements by the congress, it is necessary to activate seriously the study of the experience and important tendencies of the internal political life of the brother countries of socialism, prospects for strengthening socialist integration, and the development of international socialist division of labor.

The complication of the world economic situation, growing interrelations and mutual influences of economic and political processes in world development, persistent attempts by aggressive imperialist circles to poison the international atmosphere and to heighten confrontation and military threats in international relations give paramount importance in social scientists' research to deep and specific study of various aspects of world economic development, the economics of capitalist and developing countries, further development of the methodology and methods of forecasting social-economic and political tendencies. Analysis must be done on changes in class structure and internal political contradictions in the citadels of imperialism and specific explanations of the reasons for its growing aggressiveness. A significant growth in the role of developing countries in international life requires the unification of efforts of specialists in various areas of international affairs for the complex treatment of problems relating to the social-economic development of the "third world" countries, questions relating to the democratization of the international economic order, and to the countering of neocolonial practices by multinational corporations.

In L. I. Brezhnev's report, attention is given to the noticeable aggravation of the ideological struggle in the present world. "For the West," says the Summary Report of the CPSU Central Committee to the CPSU Congress, "it is not just a matter of the conflict of ideas. They are setting in motion a whole system of means calculated to undermine the socialist world and break it up.

"The imperialists and their accomplices are conducting a systematic hostile campaign against the socialist countries. They are blackening and distorting everything that happens in these countries. For them, the most important thing is to turn people against socialism."*

Scientific analysis and publicizing of the advantages of socialism, the socialist form of life, and socialist culture, the inculcation of Soviet patriotism and dedication to communism, the development of the bases for world outlook and methods for ideological work and struggle -- these are a first-priority obligation for scientists, especially for our institutes of the humanities. We cannot permit and must persistently overcome underestimation of this work and passivity in carrying it out.

Scientific cooperation with foreign scientific institutions and, first of all, with scientists of socialist countries, can be a substantial reserve for fulfilling the tasks placed before Soviet science. The decisions of the 26th CPSU Congress provide for all-out development of scientific-technical relations with socialist countries. Utilization of the advantages of international division of labor and of the combined scientific-technical potential of the countries of the socialist fraternity, the organization of joint research on urgent problems has important meaning both for our country and for other socialist countries. In this connection, valuable experience has been accumulated. It is necessary, henceforth, to develop and

* "Materialy XXVI s"yezda KPSS, p. 9.

improve forms for cooperation, to draft and implement joint programs in natural and social sciences, and to increase research effectiveness.

Proceeding from the principles of peaceful coexistence among states with differing social systems, the decisions of the congress provide for establishing scientific-technical relations with capitalist countries. We will continue to implement existing agreements for scientific cooperation and to develop cooperation in working out global scientific problems such as environmental protection, research in the peaceful conquest of space, the study of world oceans, and others.

All groups of Soviet scientists unanimously assure the CPSU Central Committee and the General Secretary of the CPSU Central Committee, L. I. Brezhnev, personally, that they will put maximum effort into the fulfillment of the historic decisions of the 26th CPSU Congress and will always wholeheartedly serve our socialist Motherland, the consolidation of her power and authority, and the strengthening of peace throughout the world.

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PROBLEMS IN INTRODUCING COMPUTER TECHNOLOGY INTO NATIONAL ECONOMY

Kiev VITCHYZNA in Ukrainian No 3, Mar 81 pp 160-166

[Article by V. M. Glushkov, academician, hero of socialist labor]

[Text] Time has suggested the theme of this issue. The time of the 26th CPSU Congress, the events and scales of which have already entered history in an authoritative manner. The time of the Eleventh Five-Year Plan, which we, the scientists, and also all the Soviet people, connect with a great many cherished events and plans, to the successful accomplishment of which we generously give our forces, faculties and abilities.

For the first time our cybernetic demands for a full voice resounded at the end of the 1970's in the draft of directives of the 26th Party Congress. This resulted from the growing difficulties in managing the national economy, on the one hand, and certain experience in overcoming them by means of automation, on the other.

What does this experience consist of? There already was a computer center in the USSR Academy of Sciences before the mid-1950's. In 1955 it was decided to create similar centers in a number of republic academies so that a wide circle of institutions could utilize their services. In 2 years a computer center was formed in Kiev on the basis of the computer technology laboratory of the Institute of Mathematics of the UkSSR Academy of Sciences. A year later the computer center began serious work on the organization of technological processes on the basis of electronic computers. From the time of issuance in 1961 in Kiev of our country's first control machine, the "Dnepr-1," digital automated systems for control of technological processes date their family tree.

And the idea of creating shared multicomputer centers for the solution of tasks in economic planning, advanced in 1962 by Academician V. S. Nemchynov and a group of his pupils, served, in my opinion, as the first real impetus to use electronic computers in the control of economic facilities and in economic simulation.

In the same year I was asked to prepare a national program of the Soviet Union in the area of use of computers for the automation of management in the economy. A special commission then reviewed the proposed rough draft. Proposals were then prepared regarding the creation of automated systems for the management of large enterprises and the organization of multiple-user computing and data processing centers for small facilities. The concept also arose of state networks of communication channels to connect computer centers. These ideas and proposals were later

included in real plans and projects. In 1963-1964 computer centers began to be formed in the USSR Gosplan and union republic gosplans and in a number of ministries.

In 1967 we started the first unit of an integrated enterprise management system (in which all the documentation of the facility where the ASU has been installed passes through the computer). It was developed at the L'vov Television Plant, rapidly received recognition and was "mass-produced" in the group of the machinery-building brance. The same systems were organized at the Moscow "Frezer" Plant and the Leningrad Optico-Mechanics Association, and preparatory work was started at the Minsk Tractor Plant, etc.

These were separate and small islets in an ocean of manual ("paper") technology for the formation of information connections, centers of automation of organizational and economic control in our country. That is, they gave initiative to successful practice in the use of computer hardware in the matter of planning and management on the enterprise level. Also of use was experience in the methods of planning and management in construction and some other sectors. All this also suggested the certainty that in the correct development of this direction and in the presence of a perfected structure of the economic mechanism as a whole the ASU becomes that very basic link, thanks to which the entire chain of effective management of the economy is successfully obtained.

And the technology itself impels searches for management systems corresponding to its possibilities. This was felt even before the 24th Party Congress, and the historic statement appeared in its directives: "Create a general state system of information gathering and processing for the computation, planning and management of the national economy on the basis of a state network of computer centers and a unified automated communications network of the country. In that case assure from the very start implementation of the principles of organizational, methodological and technical unity of this system."

In the development of decisions of the congress new and rather considerable contributions were made. Thus the task of developing and introducing ASU into production has grown considerably. Serious disruptions have also occurred in the training of personnel. A number of faculties and specialties in applied computational mathematics and cybernetics have been opened in vuz's of the country. Such faculties have already been functioning at Kiev and Novosibirsk universities. An offensive began to be developed over the entire front. Such an offensive has grown considerably, although the inertia of the old period still makes itself felt. On the one hand, a great hunger for personnel was experienced, but the essence of the matter and its importance were not understood by many traditional economists, the practical ones in particular, and on the other, a rather curious phenomenon developed. Since the ASU problem was raised to a fairly high level, for many managers it became fashionable to have computer hardware at their enterprises or institutes. Often instead of thinking deeply and creating a really effective system they hurried to purchase computers and other devices and put them into production. And when it turned out that even the computer did not solve difficult production problems, complaints were heard and some even began to refuse them.

Strange, but a fact. Although we anticipated complexity in the organization and operation of new technology. To change a computer into an ASU it is necessary to

create and build in a data bank or an informational model of the enterprise, sector or other object it is desired to control or manage. This model (data system) has to be reconstructed and renewed constantly and in time. When, for example, some units, parts or tools have been found at a plant warehouse or, on the contrary, they are no longer there, the computer ought to investigate that at once and not when a deficiency for some reason starts to harm the shops. It will not be able to save time in the calculation of wages, when appropriate information has not been obtained promptly regarding the closing of each unit. Without a data bank, without a memory, an electronic computer is just a gold adding-machine, no more. To provide such a memory for the "L'vov" system of the L'vov "Elektron" Association we were forced to re-write the entire system of that clock enterprise and put it in the computer. Even during abridged coding this established over a billion positions. Many more than control of a space vehicle requires.

And this is far from all. It is necessary to breathe life into information gathering or with our language organize automated form flow. This means that various publishing houses, units, etc, should be replaced so that the machine receives them without translator-programmers because, as a rule, they lead to considerable expenditures of time and additional errors. Our Institute of Cybernetics has studied the use of form flow for computers for over 4 years with all its forces.

It must be noted that this process is complicated by the fact that some documents have been approved by the USSR Ministry of Finances and it not a simple matter to change them completely. Some of them we also have not successfully modified.

In the year the "L'vov" ASU was started the increase of production in the association was 12 percent, whereas earlier it had not exceeded 4-5 percent. The additional 7 percent of increase, the L'vov workers themselves think, was obtained through internal resources, and primarily through the elimination of working time. This occurred because data were continuously fed into the computer from five warehouses, 40 conveyors and other sensors from each working place.

Quality control was arranged so that in the absence of an automatic sensor the worker has before him a television screen and a special metal writing-pad with 16 apertures and a special card. Setting up the card, he looks at the television set and strikes one of the openings with a punch. Nothing has to be recorded, the signal has already been put in the computer. Theworker has a small panel and tumblers. He knows that during interruptions in the supply of electric power it is necessary to switch the eighth tumbler, and when the instrument fails, another. And he does not run, he does not seek it, does not dispute it. Thanks to synchronization of the activity of various services and the efficiency of individual workers, downtime also was reduced.

Unfortunately, the main part of expenditures of working time, on account of interruptions in supplies, remained the same. We encountered a paradox: the information conveyor in the ASU is designed for precision in minutes, but deliveries of materials and equipment, as earlier, are planned with a precision of 3-4 months. Though the many plusses which electronics gives the enterprise, mobilizing its reserves, are lost through inferior external couplings.

I would like to emphasize still another complication in ASU introduction. We succeeded rather well in automating the control activity of the Kiev transport offices. Electronics took upon itself the solution of planning tasks, the idle running of machines was sharply curtailed and other indicators were improved. But we did not succeed in achieving the effect, for the introduction of unified form flow proved to be beyond our capabilities. Strictly speaking, it was developed, but informational problems stood in the way of introduction.

The fact is that the Kiev transport workers deliver freight of enterprises of all the ministries of four republics--Russia, the Ukraine, Belorussia and Moldavia. For the successful work of the ASU of the transport office it is necessary to have a single computation form with all the freight receipts and dispatches, but to reduce it to computer series on the scales of a single transport enterprise is impossible. A local problem grows at once into a nationwide problem, and therefore has to be solved on a corresponding level.

There also were complicating factors in the ASU distribution. Firstly, because of a shortage of personnel. During the course of the Five-Year Plan, with very great efforts (we calculated this together with the USSR Ministry of Higher and Secondary Specialized Education) the number of qualified ASU workers only doubled. Why not more? We could have expanded this institute and faculty, but there have not been enough qualified instructors. And it would take years to train them.

The party organizations helped us, especially the CPSU Central Committee. Retraining of personnel was widely organized and the Institute of Management of the National Economy, at which managers have begun to be retrained, was founded. And that is how it is at all other institutions. However, the shortage of qualified instructors has greatly stimulated the training of personnel in ASU operation.

Another complicating factor was that decisions were not made in time regarding the transition to third-generation hardware and the introduction of new technology was delayed. For example, we obtained YeS computers only after the end of the Ninth Five-Year Plan, whereas they were to be obtained earlier according to the plan.

A third complicating factor is the organizational. The fact is that the expanded program of ASU introduction can be successfully controlled by means of a transition to a new technical policy, namely a policy of standard planning solutions. Thus, for example, these have been introduced into construction. For the first time, standard designs of buildings are made, then are rapidly linked with a specific locality and constructed.

In the group of sectors in which we work the transition to standard ASU was already accomplished in 1967-1968, and this gave an exceptional effect. In particular, in the USSR Ministry of Machine Building the labor productivity of planners was 3.5-4 times as large. This was a result of standardization of ASU plans.

Unfortunately, such an effect was successfully achieved only in individual sectors. In most cases, instead of ASU, pseudo-ASU were created which, except perhaps the name, provided nothing automating the national economy. And then in the course of the Ninth Five-Year Plan certain improvements in the organization of control in a new way were successfully achieved, and initial experience accumulated, which is the main thing. Far from all of it was positive, but in science negative experience is also experience, for it warns which path should not be pursued.

That's how it was, and the first assault position was taken. With more efforts than were contemplated and with considerable expenditures, but the products were perceptible and promising.

The ASU's had to take a second assault position in the Tenth Five-Year Plan. It was already on a qualitative, and not a quantitative level (although the number of control systems had to more than double). "Assure the further development and increase of effectiveness of automatic control systems and computer centers..," it was emphasized in "Main Directions," And there were all the grounds for that. Then, as in the previous Five-Year Plan, institutes and computer centers were only being created, the just assembled cadres had no real experience and at the start of the Tenth there already were the necessary skills and fairly fruitful systems appeared which began to save the state many hundreds of millions of rubles. In particular, these are the ASU's of the Ministry of Instrument-Making and Means of Automation and a number of machine-building ministries.

In general this made it possible to cope with the task in the Tenth Five-Year Plan as regards repayment of the costs invested in automation, but we could not be completely satisfied with that result. The main fault here lies in the fact that the ASU's are developed to a considerable degree in a different variety of improvement of the economic mechanism, and that this has to be accomplished in a close interaction and according to a single plan. And it is important for them to come to understand the order of precedence. Each installs its own ASU and hardware. All as it were, is well, I go in the first line of the NTR [expansion unknown]. And they do too.

Suppose I am a minister or director and you are in an analogous rank, I am your supplier and you are my consumer. You want me for some reason to write to you, but I do not at all want to complicate life for myself and I limit myself to a formal answer or expressively shrug my shoulders, as if to say, one would be glad, but unfortunately... And when I would like, without the possibility of making independent decisions, to have my computer center compute all the pros and cons regarding your proposals and present those data to me. And you have the same exhaustive data before you. Wouldn't that help us to more quickly come to understand and arrive at a solution mutually advantageous for our sectors or enterprises (and for the state itself)?

That someone could become the Minister of Information. He could not only provide the solution of numerous interdepartmental problems, but also contribute considerably to the further growth of the technology and economic potential of the country.

Therefore today the main task consists in, together with the further development of ASU's in breadth, the improvement of means of information, the automation of productive processes and the nonproductive sphere, the planning of science and other important aspects assigned unprecedented importance in "Main directions of economic and social development of the USSR in 1981-1985 and in the period up to 1990," without losing the basic reference point--the creation in the future of a statewide automated system for collection and processing of information for the computation, planning and control of the national economy.

In the Eleventh Five-Year Plan we must take perhaps the most complicated third assault position. In the first place, this means that we should work with full

force on the further improvement of computer hardware, its elementary base and the software, methods and systems. This is accomplished in two directions. The first is the development of traditional lines which had their beginning in the Ninth and Tenth five-year plans. The second is the appearance of completely new tasks.

As regards traditional lines, this is mainly the development of YeS computers. Such machines of the first series were introduced in the Ninth Five-Year Plan, of the second series in the last and of the third in the present period. This is evolutionary development with continual improvement of the quality indicators, improvement of the technical and economic characteristics, etc, the final goal of which is optimum solution of tasks of ASU's and automation in the broadest sense of the word.

The second direction is the small computer system [SM], or minicomputer system. Work is now being done on the second generation of those machines.

In addition, very large computers, new in principle, are being designed, machines necessary for automation of the planning and solution of especially complicated tasks in the management of the economy on the macrolevel, the levels of the USSR Gosplan and the union republic gosplans. They are in part also a contribution of the Tenth Five-Year Plan. This includes our development of the "Yel'brus-1" and "Yel'brus-2." The latter computer performs up to 120 million operations per second. It is produced by the Moscow Institute of Precision Mechanics and Computer Technology imeni Lebedev. We are making for that system a so-called collective intelligent terminal which will serve as a unique translator from languages used by programmers of various classes into the languages of that very high-speed computer.

In the last year of the Tenth Five-Year Plan we also are developing our own line. By the end of 1982 the first macroconveyer computer, with a capacity of over 100 million operations per second is to consolidate its position. It will open up the possibilities of emerging at the end of the Eleventh Five-Year Plan in experimental sectors beyond a billion operations per second.

Another new direction is microelectronics, microcomputers. A child of the last Five-Year Plan, it also will find wide application in the Eleventh Five-Year Plan. What does it consist of? In "Main directions" there are references to the need to improve the elementary base. This means that the technology of large integrated circuit production created during the last two five-year plans, which made it possible to change to the construction of fourth-generation computers and microcomputers, requires improvement and above all automation. Jointly with the Ministry of the Electronics Industry we are also automating that old, traditional technology, bringing it to the contemporary level. Thanks to this the rejection percentage is reduced and the quality indicators of the systems are increased. Along with that a technology new in principle is being prepared, electronic lithography. Our institute is developing the automation for this. This novelty will serve to put microelectronics on a level new in principle in the Eleventh Five-Year Plan. Thus, shall we say, if the microcomputer is formed at once of several (up to 10 circuits) according to the new technology, it will be possible to contain the entire computer in a single circuit with a volume of 1 cm^2. This is achieved because the circuit is not produced photographically but applied on a plate by electron exchange.

Thanks to this new direction energy consumption will be reduced in the future and computer costs will be reduced, which is very important. The mass production cost

of microcomputers made with the new technology is not more than several hundred rubles, which makes the automation of relatively small processes advantageous. If the cost of a minicomputer reaches 100,000 rubles and an average computer 500,000 to a million rubles, then it is understandable that they can be used only for the automation of especially valuable objects--rolling mills, slab mills, etc. And if their price drops to the expected several hundred rubles, it becomes possible to automate even motor-vehicle engines and many other things.

Provisions are also made for the wide use of microcomputers built into automated systems for the control of technological processes. They will also appear in television sets, telephones, washing machines and other household equipment.

In "Main directions" the task is set of "expanding the automation of planning and designing and scientific research work with the use of electronic computer technology." For the first time in our country planning and design tasks were solved by means of automation on the first Soviet computer, the "Kiev," in 1951. Today no important aircraft, ship or engine building design office can dispense with the computer. And now questions are being raised not only regarding the expansion of automation but also regarding putting it on a new qualitative basis. Today people make sketches for a purpose. But in an automated design system only suggestions remain for it; this arrangement is not suitable, that is transferred here, that there, rooms are laid out better here... But the computer makes all the computations and drawings and prints all the necessary documents. After such complex automation the labor productivity, depending on the type of design work, increases by several times, and in one case I know of it achieved a 25-fold growth. In that case the quality of plans improved considerably and the possibility of errors was completely eliminated. That acceleration of planning is simultaneously acceleration of scientific and technological progress, it seems, is self-evident.

Thus the task of increasing the labor productivity of scientists is the most serious task facing us. But it did not come upon us suddenly. In December of last year an act was signed relating to the acceptance of a new automated laboratory in the Institute of Power Problems of the UkSSR Academy of Sciences. Machines make all the measurements in it. Depending on the experiment the labor productivity of a scientific worker increases by from 2 to 3 times in simple cases to several thousand times in complicated cases. During the time of a few investigations it grew by 5000-6000 times.

This is the first but not the last aspect in the matter of the automation of research.

Automated control systems using microprocessors and microcomputers envisaged by "Main directions" are obtaining further use in medicine. If, shall we say, a blood luminescence analyzer can make from two to four measurements per day (and this is a very important diagnostic means in the early stages of oncological diseases), then in a pair with the microcomputer it gives an analysis in one or two minutes. This device alone costs from 10,000 to 15,000 rubles. How many would be needed to provide for all the polyclinics? And with the new method in a single tandem with a computer and a spectrometer, diagnostic measurements can be made for an entire city.

Already today by means of a computer combined with an ultrasonic locator it is possible to observe on a display screen palpitation of the heart much better than on an X-ray photograph, and even determine its volume, rhythm, etc. If one has X-ray apparatus with a mobile head and separates the effects of X-raying on a computer, one can obtain contrast images of internal organs, which is very important for the diagnosis of diseases.

The development of manipulators and the creation of automated shops and plants also represent special tasks of the present Five-Year Plan. In this direction, firstly, the production and use of first-generation robots will be expanded--robots having no sensory organs but only working organs of the type of a simplified human hand. They can replace parts and accomplish transport loading, elementary warehousing and other operations. Secondly, the volume of their use is increasing sharply.

The latter, like the development of all computer technology in general, depends to a great degree on the programming. It has become a critical aspect of this development, it can be said. Thus, whereas earlier in first-generation computers the hardware cost 95 percent and the programs 5 percent, now the cost of programs exceeds 50, and at times reaches 70 percent of the cost of the system. In order to transfer programming for a broad class of tasks from the rails of the art and set it on industrial rails, new subscribers to this technology are needed. We are developing the so-called R-technology of programming, which makes it possible to increase programmer labor productivity by 10-15 times. It is already starting to be introduced. Consequently, it is again a matter of maximum use of machines and generally industrial organization of work, of its distribution among individual programmers, the creation of production lines for the manufacture of program product, where on the input are the tasks and on the output is the finished documentation, debugged programs, etc.

Those are unusually important for robots. More precisely, for their operation. If it is possible to rapidly and easily reprogram them, then it is effectively rearranged for the output of new production.

Also especially important is the development of peripherals. In particular, various sensors for ASU's for technological processes, special cash registers for trade, the automation of savings banks, etc. Almost no scientific problems remain in this sector; they were completely solved in the last Five-Year Plan. It remains to turn attention to this matter.

Some may say that the dash register is also a problem for them. And there is such a problem, not a small one, one of statewide importance. Our cash registers now used in commerce record only the sum of money paid for goods and do not record what was purchased. Therefore there actually is no material record of sales. Certain data on supply and demand become known only after inventories are taken at the end of the year. In practice, March of the following year is more likely. At that time the annual tasks have already been turned in and it is too late to introduce corrections. That is, in the system of observation of supply there is a two-year delay built into the technological information cycle itself.

Modern automated cash registers can "read" the register number of a sold commodity by means of a photoelement, and its cost is also recorded in the machine. Thus the financial computation system is not basic for them, but auxiliary. The main

thing is the registration of what and how many are sold. This makes it possible to take inventory with lightning speed at any hour, without awaiting the end of the year. And, self-evidently, to watch the competition and the demand, to react in time to the fluctuations of the arrow of a market barometer. Enterprises also acquire the possibility of being reconstructed with the output of goods sooner than old goods began to be created. Well, perhaps it is not worth while to especially record what is an important distinct bilateral connection of trade with production. I will only say that both the state and each one of us will end up a winner in this.

In the Eleventh Five-Year Plan further development of shared multicomputer center networks and further increase of the effectiveness of the ASU for the organizational plan are also provided for. What resources do we have there? First for all ASU's is automation of the form flow, that is, the transition to peperless forms of control. Organizational control is now accomplished as follows: a computer center with some auxiliary personnel is separated from production. Data on slips of paper arrive from production (norms, information about receipts, computations, etc), and have to be translated by people into the machine language. This increases the cost of operations, the possibility of errors and the delay or reaction time of the system. Therefore methods have been developed which make it possible to monitor the activity of the technologist, the warehouseman, etc, with lightning speed, note bottlenecks at the place of production and, using the entire power of the machine, "undo" them. In this way the effectiveness of production control and of the ASU increase sharply, and expenditures are reduced.

A no less important task is integration of automated control systems. Whereas earlier ASU's for technological processes were developed separately, and organizational control separately, and it was the same with systems of measurement and planning, then the process of their combination, integration and horizontal and vertical integration is constructed at once. Vertical integration, where bilateral connections are undertaken with associations, the sector and the Gosplan for automatic data transmission and interactions in computer networks. Horizontal integration is connection along the line of movement of material flows. This means that the director of an enterprise or a manager of something of a different rank can effectively through his computer center make contact with the computer center of his supplier or the user and acquaint them with all the nuances of their interrelations without sending "reminders," telegrams, etc.

To what extent is this important? Only for computations putting the delivery schedules in order in sectors of the national economy is it possible to double the ultimate labor productivity. Only the elimination of expenditures on the boundaries between the administrative and technological links is capable of assuring a tenfold increase of the output of end product (expressed in costs) from a cubic meter of wood, and also without a final boundary.

There is no doubt that "intelligent machines" which have caused a revolution in science have led to radical changes in the economy and production and in total capacity to exert oneself also on implementation of immense plans of the Eleventh Five-Year Plan and will help the Soviet people to take a new assault position on the way to construction of a communist society in our country.

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CURRENT PROBLEMS IN COORDINATING RESEARCH IN THE BELORUSSIAN REPUBLIC

Minsk VESTSI AKADEMII NAVUK BELARUSKAY SSR: SERYYA HRAMADSKIKH NAVUK in Belorussian No 1, Jan-Feb 81 pp 60-70

[Article by V. P. Hrybkoyski: "Current Problems of Coordination of Research in the Republic"]

[Text] Thanks to the constant concern of the Communist Party and Soviet state, a powerful scientific and technological complex has been established in Belorussia. Achievements by Belorussian scientists in development of the social, natural, technical, agricultural, medical, pedagogic and psychological sciences have been widely publicized and acknowledged, have been honored with Lenin prizes, USSR and BSSR state prizes, Lenin Komsomol prizes, medals and certificates awarded by international exhibits, the Exhibit of Achievements of the National Economy of the USSR and the BSSR, are recorded in many thousands of certificates of invention and in documents attesting to the economic effectiveness of incorporation of the results of scientific projects in the economy. Discoveries of new natural phenomena made by Belorussian scientists serve as convincing evidence of the flourishing of science in this republic and the high scientific level of investigation.

A profound and comprehensive analysis of the state of science and scientific-technological advances in this republic was presented in a report by P. M. Masherov, First Secretary of the Central Committee of the Communist Party of Belorussia, and in the decree of the 19th Plenum of the Central Committee of the Communist Party of Belorussia, which was held in September 1979.

Noting achievements in the development of basic and applied research and in solving scientific-technical and socioeconomic problems connected with strengthening the bond between science and production, P. M. Masherov emphasized at the same time that "only the first steps have been taken in a job of great scope and complexity, a job connected with increasing this republic's contribution toward accomplishing a party-designated task of historic importance -- linking the achievements of the scientific and technological revolution with the advantages of socialism. We still have many bottlenecks in planning and organization of research, and especially in the practical adoption of scientific research results in the economy."*

* ZVYAZDA, 13 September 1979

The necessity of speeding up scientific and technological advance is placing on the agenda increasingly large and complex tasks, accomplishment of which is possible only through the joint efforts of scientists and specialists of various ministerial subordination. This predetermines the increasing significance of improving the forms and methods of organization of scientific research work.

In this article we shall examine some of the most pressing problems of improving planning and coordination of research in this republic.

The system of planning and coordinating research was formed in this republic over the course of five decades, together with the development of science itself. Less than 3 years after establishment of the BSSR Academy of Sciences, on 13 May 1931, the Council of People's Commissars issued a decree stating that the Belorussian Academy of Sciences was to become the supervising center of all scientific research activities in this republic.

A Council for Coordination of Scientific Activities was established under the Presidium of the BSSR Academy of Sciences in February 1953, at the initiative of Academician AS BSSR V. F. Kuprevich, president of the Belorussian SSR Academy of Sciences. Timetables were designated for drawing up scientific research project plans, as well as the procedure of their examination and ratification, and council administrative machinery was set up, with full-time staff personnel. Special commissions were established to coordinate research being conducted outside the BSSR Academy of Sciences. Coordination Council sessions are held at least once a year, with the participation of representatives of interested ministries and agencies, scientific establishments and higher educational institutions of this republic. A broad range of questions is discussed at these sessions, questions connected with the development of science in this republic.

Establishment by the Presidium of the BSSR Academy of Sciences of 38 scientific councils on the most important scientific areas within the natural and social sciences was a further step along the road toward improving coordination of research. The scientific councils, the membership of which includes prominent experts from various agencies, became the central element of coordination service of the BSSR Academy of Sciences. It was determined in 1961 that coordination of scientific research activities in this republic would be handled in the social and natural sciences by the BSSR Academy of Sciences, in the agricultural sciences by the BSSR Ministry of Agriculture, in the medical sciences by the Ministry of Health, in the Pedagogic Sciences by the BSSR Ministry of Education, and research on history of the CPSU and CPB by the CPB Central Committee Institute of History of the Party.

In September 1968 the CPSU Central Committee and USSR Council of Ministers issued a decree entitled "Measures to Improve the Effectiveness of Scientific Organizations and Accelerate Adoption of Scientific and Technological Advances in the Economy." This decree noted the high level of development of Soviet science and industry achieved in a short historical period, and at the same time revealed deficiencies in the work of scientific research organizations and scientific subdivisions of higher educational institutions. Their activities were not concentrated in full measure on solving major scientific and technical problems and on resolving problems connected with accelerating the rate of labor productivity growth in the various sectors of the economy. Considerable time was required for practical adoption of scientific advances. Scientific facilities at enterprises and the technical

equipping of the latter as well as higher educational institutions were growing to an insufficient degree.

Considerable attention was devoted to the development of science and acceleration of scientific and technological advance in this country at the 24th CPSU Congress, after which a new stage in the development of science and technology began, a period of intensive search for new forms of organization of basic and applied research, increasing the effectiveness of science and strengthening its link with the economy. The basic points expressed at the congress were further developed and strengthened in the resolutions of the 25th CPSU Congress, the 27th and 28th congresses of the Communist Party of Belorussia.

Enhancement of the role of the USSR Council of Ministers State Committee for Science and Technology became a major factor in the development of science in this country. In the Ninth Five-Year Plan it directed elaboration of coordination plans for solving combined scientific and technical problems. At the same time the 27th Congress of the CPB instructed BSSR Gosplan and the BSSR Academy of Sciences, this republic's ministries and agencies to draw up effective measures to improve coordination and planning of scientific research, for concentration of manpower and resources on solving major scientific-technical and socioeconomic problems. In 1971 monitoring of execution of coordination plans pertaining to solving major republic scientific and technical problems was assigned to BSSR Gosplan, which became the center for coordination of applied research in this republic.

Coordination activity of the BSSR Academy of Sciences was improved in parallel. The Presidium of the BSSR Academy of Sciences drafted and implemented an extensive program of development and reorganization of the Belorussian SSR Academy of Sciences, aimed at increasing effectiveness of research and adopting scientific research results into production. The network and composition of scientific problem councils were broadened, and the powers and duties of the Council for Coordination of Scientific Activities were refined. It has been headed since 1969 by Academician AS BSSR M. A. Borisevich, President of the BSSR Academy of Sciences. Council membership presently includes the ministers of health, higher and secondary specialized education, education, agriculture, land reclamation and water resources, members of the presidium of the BSSR Academy of Sciences, the chairmen of scientific problem councils, as well as prominent scientists and experts of this republic.

In the 10th Five-Year Plan, pursuant to the resolutions of the 25th CPSU Congress, radical reorganization of planning, financing and coordination of basic and applied research began throughout the country. There began a changeover to extensive employment of specific-program methods of planning. Drafting and elaboration of programs pertaining to all-union scientific and technical problems was headed by the USSR Council of Ministers State Committee for Science and Technology (subsequently redesignated the USSR State Committee for Science and Technology), while BSSR Gosplan handles republic scientific and technical problems.

On 3 December 1976 the Central Committee of the CPB and the BSSR Council of Ministers issued a decree entitled "Measures to Achieve Further Improvement in Planning of Scientific Research and Acceleration of Practical Adoption of Research Results into Production." It introduced new and important elements into the system of direction of applied science in this republic. In particular, it specified that

BSSR Gosplan, together with project execution targets, would specify amounts of requisite expenditures to the executing agencies. This financing cannot be used by scientific establishments at their own discretion for any other purposes. Gosplan is also empowered to make decisions to halt scientific research projects which are no longer important or are being carried out on an insufficiently high level.

The BSSR Academy of Sciences displayed initiative in dissemination of the specific-program method of planning research projects on major combined problems in the field of the natural, technical and social sciences. Commissions established by the Council for Coordination of Scientific Activities, the members of which were prominent academy and higher educational institution scientists, studied the state of research at higher educational institutions, and the Presidium of the BSSR Academy of Sciences, acting on their recommendations, specified for the first time the most important areas of research at higher educational institutions. Methods instructions were drawn up for setting up research programs, and a statute on lead organizations was drafted. A list of the most important problems was ratified, on the basis of which combined research programs were specified for the 10th Five-Year Plan. Lead organizations and program coordinators were named. A total of 36 combined basic research programs are scheduled in the 11th Five-Year Plan. This republic's scientific establishments are also participating in putting together new research programs pertaining to union and republic combined scientific-technical problems. There is occurring the process of rapid dissemination of program methods of planning scientific research, experimental design, and engineering projects. Adoption programs are being drafted. At the same time there is the danger of adoption of the new method where conditions do not exist for its effective utilization, and therefore one of the important problems in the area of organization of science is connected with the necessity of improving and deepening the new method of research planning.

The specific-program method of planning was first used in our country. Lenin's GOELRO plan was essentially the first combined program. It is a well known fact that the enormous successes achieved over a short period of time in nuclear energy utilization and space exploration were due to a substantial degree to combined programs worked out in detail.

At the present time this republic's scientific establishments and higher educational institutions are taking part in elaboration of: a) all-union scientific-technical programs; b) republic scientific-technical and socioeconomic programs; c) programs for solving the major republic combined problems in the area of the natural and social sciences; d) programs put together by branch academies, ministries and agencies.

The fundamental differences between a combined program and conventional scientific research and experimental design coordination plan boil down to the following:

1. The list of major problems for which combined programs are to be drawn up shall be approved by higher agencies in relation to the executing entities. All-union scientific-technical programs are ratified by a joint resolution of the USSR State Committee for Science and Technology and USSR Academy of Sciences, republic scientific-technical programs -- by the BSSR Council of Ministers, and republic programs in the area of the natural, technical and social sciences -- by the

Presidium of the BSSR Academy of Sciences. Thus grass-roots initiative by scientists and specialists is supplemented by scientific strategy from above.

2. If the participants in the projects specified by a coordination plan are more or less equal in authority, in combined programs a lead organization is designated, which has more extensive rights and obligations than the other participating entities. The Belorussian Academy, in addition, based on the experience of the Siberian Department of the USSR Academy of Sciences, designates one of the republic's leading scientists as program coordinator.

3. Coordination plans are usually drawn up according to an ascending line, from the individual executing entity through a number of echelons, up to the republic or union level. It has frequently happened that executing entities which would seem to be jointly working on one and the same topic would go for years without getting together and would have little knowledge about how things were proceeding as a whole. At the same time the entire draft combined program should be elaborated by the lead organization. It should also submit reports on work performed and results obtained. Numerous contacts between experts are ensured in the process of drafting programs, experts working in organizations of various ministerial subordination, research topics are consolidated, their content detailed and refined, and possibilities are determined for joint execution of various parts of the program.

4. A combined program specifies not only the conduct of scientific research, experimental design and engineering activities. It should encompass the entire range of questions which must be resolved in order to achieve the stated goal. In particular, combined programs set up under the BSSR Academy of Sciences on fundamental problems, in addition to scientific subject matter, include substantiated programs and plans for preparing candidates and doctors of sciences, a probationary training plan, requests for ordering major needed Soviet and imported scientific instruments, measures pertaining to the manufacture and joint utilization of equipment, a plan for holding conferences and seminars, and plans for publication of monographs and other studies.

The specific-program method of planning gives lead organizations and scientific councils enormous opportunities for uniting the efforts of the academy, higher educational institutions and republic branch scientific research institutes for solving major scientific, scientific-technical and socioeconomic problems. Initial success has already been achieved in this area.

However, as was stated at the 19th Plenum of the CPB Central Committee, the advantages of specific-program planning of research are not yet being fully utilized. Frequently combined programs differ little from previously existing coordination plans. To this one can also add that the mechanism of coordination and cooperative efforts by scientific establishments of different ministries and agencies as well as the procedure of specific-purpose allocation of funds for the program part of projects have not been elaborated in sufficient detail, while the advantages of joint acquisition, manufacture and employment of expensive scientific equipment are being poorly utilized. Lead institutes of some ministries are participating little in the elaboration of specific-purpose programs. There is not always effective coordination between the lead organization, BSSR Academy of Sciences scientific councils, and co-participants.

Today, at the beginning of the 11th Five-Year Plan, it is essential to secure not only extensive utilization of the advanced specific-program method of planning but also its improvement and deepening, taking account of the specific features of each concretely stated task.

It became obvious early in the industrial revolution that if the production process is broken down into simple operations, specializing the labor of individual workers and cooperating their efforts, this alone is sufficient in order substantially to increase labor productivity. The subsequent course of development of industry convinces one that boosting labor productivity is connected in one way or another with specialization and co-production. There are two poles in the area of labor productivity. At the one pole is assembly-line production, where specialization and cooperation of labor are manifested in the highest form; the highest productivity occurs here. At the other pole is primitive, cottage-industry production and correspondingly the lowest labor productivity.

One must bear this in mind because, although science as a sphere of human activity proceeds ahead of production, organization of labor in science as a whole lags behind organization of labor in the sphere of material production. There are still many scientific teams and individuals working on the principle of "an economy in kind": they do everything themselves -- from fabricating standard parts for equipment to publishing reports.

One way to increase the effectiveness of science involves detailed specialization of scientific establishments, with labor specialization and cooperation. Specialization in a narrow field of science is even more important than in production. While a good product possesses use value and can serve people regardless of the process or technology used to produce it and regardless of how long the process of its manufacture was, in science value is possessed only by those results which were obtained for the first time. Hence the necessity of unswervingly moving forward, while this is possible only under the condition of concentration of substantial resources in a comparatively narrow scientific field.

It is significant that the CPSU Central Committee and USSR Council of Ministers decree issued in September 1968 and dealing with measures pertaining to increasing the effectiveness of the work of scientific organizations specifies detailed delineation of obligations between academic scientific establishments and higher educational institutions on the one hand and branch scientific research institutes on the other. The former should bear responsibility for the area and level of development of "the field of science assigned to them, for the scientific-technical level of research conducted by them, and the effectiveness of utilization of research results in the economy," while scientific research, design, and engineering organizations of branch specialization "should bear responsibility for accelerating technological advance in corresponding branches of production in this country, for the level and effectiveness of scientific research, design and engineering projects conducted by them, and for their utilization in the economy."

That same decree states the necessity of evaluating, at least once every three years, the performance of all the above-enumerated organizations, and "to specify, in order to eliminate unnecessary proliferation of research topics, that projects performed by institutes and organizations in areas not assigned to them can be taken into consideration in evaluating their performance only if the results of these projects constitute especially effective achievements."

These fundamentally important points specified by the CPSU Central Committee and USSR Council of Ministers received further development in the "General Statute on Scientific Research, Design and Engineering Organizations," ratified by a decree of the USSR Council of Ministers State Committee for Science and Technology dated 13 November 1970.

Such a delineation of roles between branch and non-branch scientific establishments is profoundly substantiated; it proceeds from the necessity of harmonious development of basic and applied research and from the very nature of the different scientific establishments and the place they occupy in relation to material production.

Any branch or sector of the economy is to a significant degree a closed system, which enjoys full autonomy. A ministry which is responsible for the development of a branch not only creates the material and technological foundation for production but also organizes training of worker cadres, technicians and specialists with higher education, as well as scientific personnel. It establishes a system of its own scientific research, design and engineering organizations. If one does not consider suppliers of raw materials and component product items, a branch has or should have everything it needs to grow and develop and to perform its tasks. All establishments -- both scientific and production -- have long-range and current operation plans.

Of all the interministerial barriers which impede acceleration of scientific and technological advance, the branch barrier is without question the principal one. If a branch institute does not maintain close working ties with an academic institute, for example, a fundamentally new project proposed by the Academy of Sciences is perceived by a branch scientific research institute as unexpected, alien and unplanned. Such an institute lacks a scientific backlog and has neither the moral nor material incentive to take up a project and carry it through to practical adoption. Without a branch institute of appropriate specialization, practical adoption in a branch of the economy is impossible, and not only because the institute has the power to veto any new innovation, but also for purely technical reasons.

Experimental production, regardless of scale and degree of development, and branch production of one and the same product item differ from one another in technology, equipment, and component product items and materials. Therefore a branch scientific research institute, in order to adopt an innovation in its branch, must restudy and rework it, "tying it in" to specific production conditions. A substantial part of the labor expended on experimental design work outside the branch goes for naught thereby. The weaker the ties between branch and non-branch scientific establishments, the larger this portion is. This conclusion proceeds from the working experience of the Belorussian Academy. Its validity can also be demonstrated with the experience of cooperation between this republic's higher educational institutions and enterprises. The 5 April 1980 issue of the newspaper SOVETSKAYA BELORUSSIYA contains an article by V. Uryvskiy entitled "Return on Creative Search." At first the author writes about the high technological level of the products built at the Minsk Tractor Plant, about the international prestige of the Soviet tractor industry, and about the fact that some of the credit for the successes of the tractor builders must go to the wheeled tractor branch laboratory at the Belorussian Polytechnic Institute. He then confesses the following. "Higher educational institution projects carried out without such a tie-in," writes

the author of the article, meaning tie-in to specific conditions of production, "are frequently subsequently 'reworked' by branch and enterprise design and engineering establishments. Unfortunately in such a case those who conduct research, including the authors of inventions, lose the right to material and moral incentive reward. In such cases the certificate of adoption states in an indefinite manner that the results of a scientific research project were only 'taken into account' or 'utilized' in developing the new equipment. The economic effect from such a project, like it or not, is not of an actual but rather of a conditional nature. In addition, 'completion' of research, if essentially little remains from a previous research project, would appear to be an obvious waste of resources."

It sometimes happens that when an establishment which is outside a certain branch undertakes a project which falls within the sphere of activity of that branch, it achieves nothing for its efforts. And this project should not be taken into consideration when evaluating the performance of an institute or organization, in conformity with a CPSU Central Committee and USSR Council of Ministers decree (September 1968). Not only the institute is wasting its efforts, but also experimental production when it is verifying the effectiveness of projects which cannot be adopted.

From this proceeds one of the most important if not the most important problem in the area of research planning and coordination. It is essential more closely to coordinate the research project plans of branch and general scientific establishments which determine scientific and technological advance.

Branch scientific research institutes should in fact become a central link in the chain which ties together basic research and production. But in order to achieve this, they should be sufficiently strong organizations, staffed with highly qualified personnel, possessing scientific equipment and experimental-industrial facilities, and their scientific specialization should correspond to that of those branches of industry and agriculture which have received the greatest development in this republic.

In Belorussia there are good examples of the alliance between science and production. In his report at the 19th Plenum of the CPB Central Committee, P. M. Masherov named "The BelavtoMAZ Association, the Minsk Tractor Plant imeni V. I. Lenin, Integral, Azot, and Gidroavtomatika, where academy, higher educational institution, branch and plant science are working shoulder to shoulder, having taken firm root in the shops, laboratories, and design offices."*

The positive operating experience of the above-named associations merits study and broad dissemination. The BSSR Academy of Sciences, in conformity with measures by the BSSR Council of Ministers pertaining to implementing the decisions of the 19th Plenum of the Central Committee of the CPB, was instructed to draft proposals for the Commission on Problems of Scientific and Technological Advance of the Presidium of the BSSR Council of Ministers on further improving the structure of the scientific-technological potential of this republic and ways to achieve fullest utilization of its potential in accomplishing the tasks of economic and social development of the Belorussian SSR. In executing the above measures, approximately

* ZVYAZDA, 13 Sept 1979.

80 commissions were formed, containing scientists and experts from scientific councils of the BSSR Academy of Sciences to study the state of scientific research work at branch scientific research institutes. The Academy of Sciences seeks to strengthen and broaden productive ties with branch scientific establishments, determines the possibilities of joint utilization of the facilities of all this republic's scientific establishments, offers its assistance in training scientific cadres, etc. The majority of branch scientific research institutes are sympathetic to the work being done by the councils and fully cooperate with them. At the same time responses have been received from some institutes which cannot be interpreted other than as a disinclination to strengthen ties with the Academy of Sciences. As regards direct ties between non-branch scientific establishments and enterprises, in general they are mutually advantageous. Scientific establishments receive considerable funds on the basis of commercial contracts. Enterprises are assisted in solving pressing problems. Non-branch scientific research institutes, just as branch institutes, are inevitably forced to engage, to use the apt expression by P. M. Masherov at the 14th Plenum of the Central Committee of the CPB in December 1978, "in patching holes and achieving partial efficiency in individual elements of production."* However, the general direction of scientific and technological advance does not lie in solving current, even important problems for production. Only with well-coordinated activities of establishments of general scientific and branch specializations and considerable incentive for enterprises to put new innovations into production can there occur a significant acceleration of scientific and technological advance.

The 12 July 1979 decree of the CPSU Central Committee and USSR Council of Ministers entitled "Improving Planning and Strengthening the Effect of the Economic Mechanism on Improving Production Efficiency and Job Quality" created favorable conditions for successful activities in this direction.

In science, as in no other sphere of human activity, success depends on the level of skills, abilities, professional and moral-political qualities of personnel. We know from the experience of development of science in this republic that prominent scientists can establish an entire area of science in a new location in a span of two or three five-year periods, their own school, organizing the operations of a large scientific subdivision or an entire institute. While research work forces without prominent scientists work through the course of many years fruitlessly.

Although we usually use the term "coordination of research," the subject in question is always essentially coordination of the activities of scientists and specialists. Therefore the effectiveness of all measures aimed at improving coordination of research depends entirely on whom we endeavor to coordinate and with whom. One can list the qualities of a scientist which create favorable conditions for improving coordination activity: a high level of scientific and professional qualifications, common scientific interests on the part of those whose work is to be coordinated, an understanding of the necessity of accelerating scientific and technological advance in this country, and the ability to link one's personal interests with the interests of the common cause. Directors of scientific establishments and their major subdivisions should possess first and foremost precisely such qualities.

* SOVETSKAYA BELORUSSIYA, 6 December 1978.

The presence or absence of common scientific and professional interests in a certain group of individuals must be considered an objective factor in respect to each specific worker. These factors can be controlled by means of correct training and placement of personnel, and in particular by means of their interministerial movement.

Today a scientific worker is as a rule a narrow specialist. It takes years for a person to attain knowledge at the state of the art in a given field of science, after which he can produce scientific results. Therefore, when a scientific worker leaves his research team, in his new position he frequently will endeavor to link his work in the new and previous area of investigation. He maintains contact with his former colleagues. From this standpoint it would be extremely beneficial to make every effort to promote mixing of personnel among the Academy of Sciences, higher educational institutions, and republic branch scientific research institutes. Personnel of branch scientific research institutes could serve a probationary period with the Academy of Sciences in considerably greater numbers than is occurring at the present time, and greater numbers could enroll in specific graduate study programs. On the other hand, it would be expedient to hand over to branches not only individual academy personnel but also entire scientific teams or even laboratories, if they could accomplish on the spot extensive adoption of their scientific research results. This practice, followed by the Siberian Department of the USSR Academy of Sciences, has fully proven itself.

The science of Soviet Belorussia arose and is successfully developing as an inseparable component part of our nation's science. The establishment of many of this republic's scientific facilities and the successes they have achieved are in part due to the assistance they have received from other scientific centers. It is natural that Belorussian scientists maintain close, productive ties with the people at the USSR Academy of Sciences, the academies of the union republics, branch scientific research institutes and many creative organizations. The enlistment of Belorussian scientists to work on major all-union problems or problems being worked on jointly with the nations of the socialist community is an honor. But recently the Coordination Council has more and more frequently been encountering a complex situation whereby some scientific problem is advanced which is of exceptional importance either for the nation's economy or for environmental protection, and yet there is nobody to whom it can be assigned. A powerful scientific-technological complex has been established in this republic, and everybody understands that the problem must be solved, but nobody has been trained for performing this work.

One of the reasons for this situation lies in the fact that our industry, agriculture, construction industry, transportation, and the natural environment require more and more attention on the part of scientists. The demands which are being placed on science are increasing with each passing day. There is also another reason apparent, however. Is it possible that some of this republic's scientific establishments are excessively involved in performing the tasks of non-republic establishments? And are external tasks always more important than our regional problems? Is it possible that the problem lies in ties which were established on a traditional basis, or in more generous financing? In any case it is essential that the volume of research performed by republic scientific establishments for the republic increase year by year. There are sufficient major and interesting problems in our economy for scientists and specialists of the most diversified specializations to be able to find useful application of their knowledge.

Concentration of scientific manpower on solving regional problems significantly facilitates labor specialization and cooperation and increases the effectiveness of science as a whole. At the same time the participation of Belorussian scientists and specialists in working on numerous separate problems arising in various parts of the country makes coordination of research difficult on a republic scale.

In coming years one must expect of the BSSR Academy of Sciences an increase in the percentage share of scientific research projects conducted for the republic within the overall volume of research. The Presidium of the USSR Academy of Sciences has decided to establish within the BSSR Academy of Sciences system an Institute of Social and Economic Problems of Urban Development and Architecture. The activities of the new institute will evidently involve primarily republic problems. The Presidium of the BSSR Academy of Sciences is discussing the possibility of establishing during the coming five-year plan several establishments which will work on development of the earth sciences, with priority focus on the Belorussian region. Those scientific work forces which have long since been established are also beginning to deal with republic research topics to a steadily increasing degree.

In order to achieve more rapid development of combined research in individual oblasts in Belorussia, it is expedient to establish interministerial scientific research stations, such as at Soligorsk, in the Polesie, in the Belovezhskaya and Nalibotskaya forests, on Naroch' Lake, and elsewhere. First steps in this direction have already been taken. Glavpoles'yevodstroy of the USSR Ministry of Land Reclamation and Water Resources has established an experimental facility in Gantsevichskiy Rayon of Brestskaya Oblast to work out the scientific principles of commercial growing of Vaccinium macrocarpum, the large cranberry. A laboratory and greenhouse have been built at that site. The requisite conditions have been established for organization of an interagency research station of the BSSR Academy of Sciences and BSSR Ministry of Forest Industry, which will work on growing this valuable plant as a commercial crop. A research facility of the Institute of Land Reclamation nad Water Resources and the BSSR Academy of Sciences is to be established in Sennenskiy Rayon, Vitebskaya Oblast, to study problems connected with putting into agricultural use sandy soils in an area reclaimed by draining.

One fourth of all the world's scientists are working in our country, with inventing activity quite prolific; every year thousands of new machines, mechanisms and processes are adopted in the nation's economy. In 1979 workers of the BSSR Academy of Sciences alone, who comprise less than 0.5 percent of the total number of scientific-teaching personnel in this country, received 974 certificates of invention and affirmative decisions on submitted proposals. Unfortunately, the number of licenses sold correspond in no measure to the level of development of science and technology in this country. This means that we have not yet mastered in full measure the skills of international commercial relations, have not yet succeeded in establishing the requisite patent-licensing service in this country, and have not yet subordinated to the necessary degree planning of basic and applied research and other aspects of activity to the necessity of selling scientific innovations.

There has long been a discussion of the fact that it is essential to take immediate steps in the area of trade in scientific innovations. It would be beneficial to set up a curriculum to train patent specialists at higher educational

institutions, to engage in scientific research in the area of patent and licensing activities and international trade, to beef up the patent departments at scientific establishments and enterprises with the addition of highly-skilled specialists, and to bring order to the business of publication. At the present time there is not a single higher educational institution in the country which is training patent specialists. The specialty of "patent expert" is not to be found in the current list of occupational specializations for persons with higher education. Patent specialist training is offered only at the Central Institute for Advanced Training in Patent Work (TsIPK). It enrolls persons with a higher education, and only on ministry assignment. Where do its graduates, these double-qualified specialists, work? Responding to this question, G. Pankovich, TsIPK department head, stated in the 3 March 1980 issue of the newspaper PRAVDA: "Only a certain percentage of those who graduate from the institute are employed as organizers of inventing and patent-licensing activities, and they are under the constant threat of personnel cutbacks. The remainder, who have increased their knowledge in the area of patent work and who have been awarded a diploma, return to their previous jobs, which in most cases have nothing to do with their new area of specialization."

Selling licenses is an opportunity to earn foreign exchange and acquire imported equipment, as well as savings in raw material resources and short-supply goods which our country must export; it also involves the prestige of our science and technology and our sociopolitical system. There is everything here -- science, economics, and politics. The importance of this matter is obvious. In all areas of scientific activity, including in research planning and coordination, it is essential to take account of the interests of international trade in licenses.

The difficulties and problems discussed in this article apply for the most part to growing pains. They must be examined taking into account the great successes achieved by our science and technology. If one compares this republic's scientific and technological potential in 1980 with that same potential 10 years ago, one cannot help but note considerable changes. A large number of highly qualified scientific personnel have been trained, new scientific subdivisions have been established in areas of current importance at the Academy of Sciences, at higher educational institutions and branch scientific research institutes, research projects conducted on a commercial-contract basis have become quite widespread, invention activity has been stepped up, scientific-production associations and dual-subordination laboratories have been established, and scientific research results are being adopted in the economy to an increasing degree.

Questions pertaining to speeding up scientific and technological advance occupy the attention focus of the Communist Party and the Soviet Government. For this reason there is no doubt that the new and considerably more complex problems of scientific and technological advance will be successfully resolved and that in coming years we shall witness even greater successes on the part of our Soviet science and technology.

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UKRAINIAN INTERDEPARTMENTAL SCIENTIFIC-PRODUCTION COMPLEXES DESCRIBED

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[Summary of reports to the presidium of the USSR Academy of Sciences by Academician B. Ye. Paton, president of the UkSSR Academy of Sciences, and by V. V. Panasyuk, an academician of the UkSSR Academy of Sciences and deputy chairman of the Western Scientific Center of the UkSSR Academy of Sciences, followed by summaries of questions and answers and resulting actions taken by the presidium of the USSR Academy of Sciences: "On the Practice of Organizing Interagency Scientific-Production Complexes"]

[Text] Guided by the decisions of the 25th CPSU Congress, the UkSSR Academy of Sciences is concentrating the efforts of scientific collectives on the main lines of scientific-technical progress. Significant attention in this is allotted to the search for and utilization of new means and methods for raising the effectiveness of scientific research and for hastening the introduction of its results into practice in the national economy. The experience in the work of this academy received approval from the CPSU Central Committee and from the general secretary of the CPSU Central Committee, Comrade L. I. Brezhnev, in his speeches at the October (1976) Central Committee Plenum and at a meeting of presidents of academies of sciences of the socialist countries in 1977.

The UkSSR Academy of Sciences is constantly broadening and deepening fundamental research, which can be the basis for creating conceptually new technology leading to radical transformation of production. Technological processes developed by its scientists have a substantial influence on the development of metallurgy, machine building, power, chemical industry, and agriculture. The activities of the academy in these fields was approved by the CPSU Central Committee in 1979.

Applying this experience under regional conditions, the Western Scientific Center of the UkSSR Academy of Sciences is doing much to concentrate scientific efforts on the solution of important research and economic problems. On the initiative of and with direct participation by the L'vovskaya Oblast Committee of the Ukrainian Communist Party in the Western Scientific Center of the UkSSR Academy of Sciences, a system for regional control over scientific-technical progress was created on the basis of interagency scientific-production associations and complexes, the activities of which are built on special-purpose programs.

Since the significance of the work done goes far beyond that of the republic academy, the presidium of the USSR Academy of Sciences at its meeting discussed the practice of organizing interagency scientific-production complexes after hearing a report by the president of the UkSSR Academy of Sciences, B. Ye. Paton, on some of the chief principles of organization of academy science in the Ukraine and its role in the scientific-technical progress of the country, and a report by the deputy chairman of the Western Scientific Center of the UkSSR Academy of Sciences and academician of the UkSSR Academy of Sciences, V. V. Panasyuk.

B. Ye. Paton said that the transformation of science into a direct productive force is made possible by ever increasing close ties between science and production. A qualitatively new stage has begun in the development of science and technology, which is characterized by a sharp rise in the speed of realizing various innovations and in the shortening of time from the birth of an idea to its practical embodiment. A most important factor in hastening scientific-technical and social progress is fundamental research; B. Ye. Paton stressed that its results lead to sharp qualitative changes in technology and production and that, without this research, it is not possible to count on the appearance of new scientific discoveries and applications of them on really significant scales.

The development of fundamental research is the chief task of the UkSSR Academy of Sciences, as of all the other academies. In this, fundamental research closely relates to applied developments which, as a rule, are found to be based on theoretical achievements. Soviet science is unified and, therefore, the UkSSR Academy of Sciences does not try to develop all trends without exception, but concentrates attention on those problems, the solution of which can make the most contribution and be of the most use to the country. Following this path, an intensive search is being conducted for new forms and methods for organizing scientific research, experimental and design developments, and the introduction of their results into production. The realization of the program principle in planning scientific work opens up new opportunities to increase its effectiveness and for the combination of the efforts of Academy of Science workers, associates of higher educational institutions, and producers; it helps overcome the administrative barriers related to the ministerial principle of managing industry and it makes serious scientific achievements the property of practice. B. Ye. Paton, in this connection, congratulated the decision by the USSR State Planning Committee, the USSR State Committee for Science and Technology, and the USSR Academy of Sciences concerning the formation of a number of the most important scientific-technical programs and their inclusion in the five-year plan for the economic and social development of the country.

On the initiative of the UkSSR Academy of Sciences and the association of the automobile builders of the ZIL plant in 1976, such a form of organization for applied research and introduction arose in complex scientific-technical and social-economic programs of academy institutions, ministerial scientific-research institutes, and production collectives. At present, in the interests of the large scientific-production associations and enterprises of the country, work is being conducted on 20 such programs with participation by over 50 institutes of the UkSSR Academy of Sciences. One cannot say that this path is strewn with roses, according to B. Ye. Paton; all points in the programs are not always completely fulfilled and, in a number of instances, enterprises transfer their own duties on to scientific institutions but, nevertheless, this arrangement is undoubtedly useful.

One of the new forms of relationship between science and production on the basis of the program principle has been the joint work by the UkSSR Academy of Sciences and various ministries, according to complex plans for scientific research and introduction into practice. Such plans permit not only improving the quality of scientific developments in their final stages but also to prepare production for the introduction of technical innovations. The academy is now working on 16 such complex plans.

An important instrument for strengthening ties between science and practice is the presence within the composition of scientific institutions of the UkSSR Academy of Sciences of experimental-design, technological, and production organizations. They play an important and constantly increasing role in the development, first of all, of fundamental research, because conduct of the latter requires the development and manufacture of unique facilities, stands, and instruments. Such a base permits a considerable shortening of the time needed to accomplish extremely serious and complicated tasks. It helps increase the effectiveness of the institutes, providing a high rate of completion of applied developments. About 160 million rubles' worth is the volume of work done by 66 such organizations in 1979. Almost half the workers of the academy work in them.

B. Ye. Paton reported that, in a number of leading academy institutes of the Ukraine, a number of complexes have been formed and are successfully functioning that combine an institute with a design bureau and experimental shop or plant. Some institutes even work with two experimental plants. Such links permit the completion of a cycle of work from idea to practical introduction in minimum time.

Scientific-research problem laboratories oriented toward economic sectors are being created by the academy in its institutes and at enterprises of various ministries, where the academy provides ideas or developers that are lacking in the ministry, even though the ministries may have sufficiently capable institutes of their own. Such laboratories are especially effective in the case of the need for massive introduction of scientific developments.

Agreements for creative cooperation between academy institutes and ministerial enterprises have also received wide application.

Speaking about the substance and forms of relations between science and practice, B. Ye. Paton went into the question of creating and widely using conceptually new technology that causes revolutionary transformation of whole sectors of industry and that serve as chief factors in hastening scientific-technical progress. Strengthening and deepening fundamental research, the UkSSR Academy of Sciences allots first-priority attention to the creation of progressive technology. He is talking not about petty technological processes and methods but about great technological solutions which would raise labor productivity, lower the materials content, and so forth.

The next aspect of Ukrainian scientific development was characterized by B. Ye. Paton as "geographical." Five scientific centers have been formed within the republic with the task of developing scientific problems that have important significance for the development of individual economic regions and of organizing

complex research through the efforts of academy institutes, higher educational institutions, and ministerial scientific research institutions. The significance of these centers as regional bodies for the coordination and unification of the efforts of scientists and producers in the accomplishment of the tasks of scientific-technical progress is steadily increasing.

A large amount of interesting experience in relations between science and production has been accumulated in various cities and oblasts of the Ukraine. An agreement was signed in Donetsk for scientific-technical cooperation between the academy and enterprises of Donetskaya and Voroshilovgradskaya Oblasts; the leadership in this work, which is very important, included participation by first secretaries of oblast committees of the party, who had organized the familiarization of local workers with the results of the research of the Academy of Sciences. Development of the agreement included concrete programs of work by scientists with enterprises, and construction projects, and organizations of the Donbass which are now being fulfilled.

In Kiev, under the management of the city committee of the party, works the Council for the Promotion of Scientific-Technical Progress; this council rests on a system of scientific-technical commissions for economic sectors. Directing the efforts of scientists and producers into a single channel, the commissions help hasten the introduction of scientific achievements into practice. As a result, it is at Kiev enterprises that one of the highest rates of growth in labor productivity has been achieved.

And finally, in the western oblasts of the republic, on the initiative of the L'vovskaya Oblast committee of the Ukrainian Communist Party and its first secretary, V. F. Dobrik, scientific-production associations have been created with interagency goals. Oblast party organizations allot a very large amount of attention to this work, from putting together plans of work for the complexes to its implementation and introduction; their mobilizing role helps overcome the sluggishness of individual managers of enterprises, provides equipment and supply support to undertakings by workers in science, and helps overcome administrative barriers that until now have seemed insurmountable.

The experience in cooperation between institutions of the Western Scientific Center and enterprises has received high praise by the public. The president of the USSR Academy of Sciences, A. P. Aleksandrov, visited L'vov and became familiar with the experience of the work by the associations and complexes that exist there and he approved it. B. Ye. Paton finished his speech with the consideration that there are many forms of relations between science and production and that he had examined only a few of them.

V. V. Panasyuk devoted his report to the results of the activities of the Western Scientific Center of the UkSSR Academy of Sciences in the formation of lasting ties between science and production and to problems of regional management of scientific-technical progress. At the beginning of the report, the scientific and technical potential of the western oblasts of the Ukraine was characterized. During the four decades since all of the Ukrainian lands became a part of the Soviet state, the western oblasts of the Ukrainian SSR, owing to the continuous concern of the CPSU Central Committee and the Soviet government and with unselfish assistance from all

the peoples of our country, have been turned into an important economic region with highly developed industry and agriculture. Such branches of industry as petroleum and gas, mining chemistry, coal, machine building, instrument making, and light industry have become decisive in its economy. Only in the last ten years, more than 250 industrial enterprises have been built or reconstructed. A significant scientific potential has been created also in the region, including that of large institutes of the UkSSR Academy of Sciences: physico-mechanics, applied problems of mechanics and mathematics, the geology and geochemistry of combustible minerals, social sciences, divisions of institutes of theoretical physics, nuclear research, biochemistry, botany, economics, and so forth. In all, 18 institutes of the UkSSR Academy of Sciences, more than 30 scientific research institutes of ministries and agencies, and 25 higher educational institutions function in the western oblasts of the republic; in them, work more than 12 thousand scientific and scientific-educational workers, including more than 500 doctors of science and 4.5 thousand candidates of sciences. Many developments by the center's scientists have served as the basis for the solution of serious scientific and technical problems. This pertains to research in the fields of mechanics, physics, measurement technology, medicine, chemistry, biology, and other areas of contemporary science.

Interesting and fruitful forms of relations between science and production are being applied in various regions of our country -- in the Russian Federation (particularly Moscow, Leningrad, and Novosibirsk), in Belorussia, and in Moldavia. Creatively apprehending and developing this experience and also the experience of the UkSSR Academy of Sciences in creating scientific-technical programs and in organizing scientific-technical associations and in establishing long-term relations between academy institutions and ministries for increasing the effectiveness of scientific research, the Western Scientific Center, with participation by the L'vovskaya Oblast Committee of the Ukrainian Communist Party, created, as has been said, a regional system of managing scientific-technical progress on the basis of interagency scientific-technical associations and complexes.

What are the basic components of this system?

First, 'complex plans' for the development of scientific research and assistance to scientific-technical progress in the oblasts of the region for the five-year plan. These plans are being developed jointly with scientific research institutions, higher educational institutions, Soviet and nongovernmental organizations in connection with the coordination role of the Western Scientific Center and zone councils of rectors of higher educational institutions. General management of plan preparation is accomplished by oblast committees of the Ukrainian Communist Party.

Second, "problems of a fundamental character," provided for by the complex plan as, for example, the physical and chemical mechanics of brittle fracture, the physics of phase transition and creation of materials with predetermined properties, problems of petroleum reserves in the Volynsko-Podolskaya plate, the scientific bases for reviving and increasing the protective functions of the Carpathian ecosystem and surrounding areas, and other problems the development of which will be done under the observation and control of methodological coordination councils and sections of the Western Scientific Center.

Third, "special purpose programs" for the fulfillment of the scientific-technical and applied tasks provided for by the plans.

Fourth, "special purpose interagency scientific-production associations," being created contractually for the implementation of these programs through the efforts of workers in science and production independent of their administrative subordination. The contract determines the aims of the association and the head organizations for scientific research, experimental-design developments, and introduction into production.

The contract, policy, and special purpose program of the association are approved by the ministries or agencies of the head organizations. The association is managed by a scientific-technical council, which decides questions of scientific-technical and financial support to program work and of continuous planning of the whole process from scientific research to the introduction into production, which creates interagency laboratories for accomplishing central tasks, and which organizes scientific-technical seminars and meetings, and so forth.

In the 10th Five-Year Plan in L'vovskaya Oblast, 15 special-purpose programs were prepared, in the fulfillment of which are involved over 60 scientific-research, higher educational, design-development, and production organizations. For example, for fulfillment of the program "The Quality of Electron Beam Instruments," the interagency special-purpose scientific-production association "Ekran" was created; it is headed by the bureau chairman of the Western Scientific Center, Ya. S. Postrigach, an academician of the UkSSR Academy of Sciences. Within the association, projec ts in the program are supported by the conclusion of economic agreements and the organization of joint laboratories at the expense of special-purpose financing and allocations according to the policy of the UkSSR Academy of Sciences and the State Committee for Science and Technology. Socialist obligations, accepted jointly by association participants, are an important mobilizing factor in its activity.

Thus, the interagency special purpose scientific-production association made its aim the integration of efforts of various agencies in solving urgent and complex scientific-technical problems in the interests of one or several enterprises under the jurisdiction, as a rule, of a single ministry.

In our economic region, there are enterprises of various ministries that have similar scientific-technical problems. Proceeding from the general tasks of scientific-technical progress, according to the types of economic activities of the region and on the basis of related problems of the association, "interagency scientific-production complexes" are being created. Each one is managed by a board, the composition of which is approved by the bureau of the party oblast committee upon presentation by the bureau of the Western Scientific Center. The board of a complex contains representatives of scientific institutions, higher educational institutions, managers and chief specialists of enterprises, and representatives of party bodies and civil organizations. Each board is headed by a leading scientist, a member of the bureau of the scientific center, but one of his deputies is the chief of a corresponding department of the oblast committee of the Ukrainian Communist Party.

The board of a complex develops strategy for hastening scientific-technical progress in a given economic sector, determines special-purpose programs for individual groups of enterprises, creates interagency associations for fulfilling these programs, coordinates the work of associations, controls the course of implementation

for these programs, and so forth. The board is subordinate to the bureau of the scientific center. The center also accomplishes general coordination of the activities of interagency scientific-production complexes and associations. This is the fifth component of the system.

Further in his report, V. V. Panasyuk talked about several of the achievements of the system he described.

Among the most important developments completed and introduced according to the program for the interagency machine building complex within the framework of the association "Nedra" (The Physico-Mechanical Institute of the UkSSR Academy of Sciences, other academy and ministerial instutes and, in a direct relationship, the Drogobych Bit Plant) is the manufacture of a highly effective rock-breaking drilling tool. Another example is the creation of new technology for strengthening pipe for the USSR Ministry of the Gas Industry. The introduction of such technology has already provided an economic effect of over 30 million rubles. A development at the Physico-Mechanical Institute of new cooling and lubricating liquids for metal cutting has received broad introduction at enterprises across the country, thanks to the machine-building complex .

In interagency associations of the instrument-making complex, technological processes for producing electron-beam instruments have been designed and optimized. Bases for automation in systems for designing and quality control of instruments have been created. The economic effect at the L'vov production association "Kineskop" alone is 20 million rubles.

Recommendations for conducting exploration and geological survey work for petroleum and gas have been developed and are being implemented in the region; they were the work of institutes of the UkSSR Ministry of Geology and the Coal Industry, the Institute of Geology and Geochemistry of Combustible Minerals of the UkSSR Academy of Sciences, and geological expeditions of the "L'vovneftegazrazvedka" trust. The creation of a shop-flow system for milk production and improvement in technology for livestock feed production are characteristic examples of cooperation between scientific-research institutes and agricultural enterprises.

Just within the framework of activities of the machine-building, instrument-making, and geological-geophysical complexes in 1979, a total economic effect of over 41 million rubles was achieved. As a whole, over three years of activity by all the associations and complexes, 120 scientific developments were introduced into production with an economic effect of over 80 million rubles.

The growth in effectiveness of scientific research accomplished by interagency associations and complexes and the hastening of the introduction of the results into production are being aided by the following factors.

The boards of complexes have the opportunity to bring pressing scientific-technical problems to industrial enterprises and to mobilize efforts for their solution.

Since the principle of continuous planning acquires a real basis under the operational conditions of complexes and associations, the time is reduced between the appearance of an idea and its utilization in practice. This is aided also by the

work of interagency laboratories, operational solution of financial questions, the organization of stage-by-stage testing of research results in production, and the enlargement of the science sector in industry.

An important virtue of complexes and associations is the stability and durability of relations between science and production.

What are the tasks that need to be accomplished in this field in the future? We must improve the mechanism for managing fundamental and applied research. We must develop a unified method for establishing sc ientific-technical programs and also methods for controlling and analyzing their fulfillment. We must broaden the functions of complexes and associations and, in particular, involve them in the formulation of long-range plans for the development of the corresponding economic sectors of the region. We must improve the furnishing of supplies and equipment, financing, and personnel for work on complex scientific-technical special programs. We must broaden socialist competition among associations and complexes for the best final results.

V. V. Panasyuk stressed that the effectiveness of the new form of cooperation between science and production as a form of civic leadership by scientists and engineering-technical workers is determined to a significant degree by the measure of support and attention to them on the part of party organizations -- from primary organizations to oblast organizations.

The speaker was given questions. The first two of them were from Academicians V. A. Kotel'nikov and A. P. Aleksandrov and pertained to problems of assimilating new types of products and technologies needed by the state but from one or another economic point of view are undesirable for enterprises. V. V. Panasyuk answered that this is a national problem. However, with aid from party organizations and within the framework of interagency complexes in accord with the plan, everything necessary is being done to ease the introduction of a new scientific-technical development at a given enterprise and to create the conditions necessary to keep the economic indicators of the enterprise from falling.

Academician G. I. Marchuk asked if the interesting experience being discussed was accompanied by interagency cooperation at a level of agreement among agencies or whether cooperation is strengthened by the state plan. The speaker said that at the present time there is agreement at this level.

In the course of the discussion, the first secretary of the L'vovskaya Oblast Committee of the Ukrainian Communist Party, V. F. Dobrik, characterized L'vovskaya Oblast as highly developed economically and the source of products worth billions of rubles. He reported that 70 percent of the products here are manufactured by production associations and scientific-production associations and that the creation of such associations in L'vov has been going on for some time and, in fact, the first Soviet association, called a "firm" at that time, appeared in that city. At first they were simply ministerial associations but, later, their framework expanded so that, in the first place, the introduction of science and technology into economic practice would be strengthened. In the L'vov area there is a large scientific-technical potential. Within the oblast are six academy institutes

and four divisions of institutes of the UkSSR Academy of Sciences in Kiev, 12 higher educational institutions, 37 scientific-research institutions associated with different economic sectors, and 19 design bureaus. Because of the need to eliminate parallelism in the work of scientific institutions and to arrange longlasting ties between science and production, interagency complexes have also arisen. Thus, the idea to organize them was prompted by life itself.

In summing up the three years of work on the creation of the complexes, stable science-production collectives have been put together that are able to accomplish serious, long-range tasks. Duplication of research has been eliminated. A systematic exchange of information is taking place among agencies. There has been significant improvement also in the utilization of the supply and equipment base of scientific-research organizations. A large detachment of scientists from higher educational institutions who did not have access to this base have now received it. The resources put into science are now better utilized. The possibility for rapid implementation of ideas and developments has now opened up before scientific-research institutes and design bureaus. This pertains also to academy institutes; it is not accidental that academy scientists are heads of complexes; it is they who provide the basic lines of development for the work. But industrial enterprises receive advantages from hastening the assimilation of conceptually new technology and from improving, on this basis, the quality and reliability of products being manufactured.

The chief result of the work of one complex -- that for instrument making -- has been the ability every three or four years to make changes in instruments which have become old or obsolescent. In the "Sistema" association, a broad array of electrical measuring instruments have been created, the parameters of which are very much better than of those being purchased abroad. Now, we must arrange their serial manufacture at enterprises of the ministry.

A result of activity by the agricultural complex has been the shop-flow system of milk production and the reproduction of large-horned cattle, providing a substantial addition to animal products.

A television completely based on domestic elements has been developed and is beginning to be produced; it is able to compete with the best foreign apparatus.

By applying the latest methods of automatic welding developed in the UkSSR Academy of Sciences, the problem of sharply increasing the production of buses with the L'vov trademark has been solved (without an increase in production area or large construction expenses).

The western areas always receive a large amount of aid from the UkSSR Academy of Sciences, according to V. F. Dobrik. The Central Committee of the Ukrainian Communist Party systematically involves itself in questions of the organization and functioning of interagency scientific-production complexes. A number of ministries and agencies work closely with the oblast committee in this matter: about ten national ministries, in response to our appeal, have boldly released funds for the creation of interagency laboratories.

Now, two new complexes are being formed around L'vov: a chemical technology complex and a socio-economic complex. They must aid in the solution of still another series

of problems in the region. New scientific-production associations are also being created. V. F. Dobrik stressed the significance of including projects being done by complexes in the five-year plan because it is easier to accomplish the assimilation of new technology within the framework of the plan.

In conclusion, he expressed the hope that the new system of ties between science and production that have been developed and put into practice by the Western Scientific Center of the UkSSR Academy of Sciences will become one of the elements of a system which will permit improvement in the economy of the country as a whole and to raise it to a new, higher level to correspond to the decisions of the 25th CPSU Congress and subsequent plenums of the CPSU Central Committee.

Belorussia is well informed about the experience of the UkSSR Academy of Sciences and is using roughly the same routes to hasten the introduction of scientific developments into production, according to N. A. Borisevich, president of the Belorussian Academy of Sciences and academician of the Belorussian Academy of Sciences.

The Belorussian Academy of Sciences has also developed complex programs which provide for participation in their fulfillment by a number of ministries and agencies, and there are laboratories with dual subordination and scientific-production associations formed outside the governmental structure. Nevertheless, the L'vov experience is also valuable for Belorussian scientists. The UkSSR Academy of Sciences is very right in creating, in its Western Scientific Center, large specialized institutes that are able to head whole scientific-production associations. A large role is played also by the attention given to relations between science and practice by the oblast committee of the party. As a result, really serious steps forward are noted in the introduction of scientific-technical developments.

Further, N. A. Borisevich told about the work of scientific-production associations, organized outside the governmental structure, composed of Belorussian Academy of Sciences institutes and industrial enterprises. Five such associations have operated for four years: with organizations of the USSR Ministry of Light Industry, "Len," with the production association "Minsk Tractor Plant imeni V. I. Lenin," with industrial enterprises of Gomel', with the production association "Belavtomaz," and also with "Biryuza." When academy institutes and any large production enterprise participate together in a scientific-production association, the operation is successful. But, for example, when the "Biryuza" association was formed consisting of academy institutes and the scientific-research institute for construction materials, a mistake was made: not a single enterprise was included in it, and all scientific developments sink as before in the ministerial research institute and the way to practice is not hastened. Now, the question is being examined whether to include industrial enterprises in the association or to abolish it. This year, in the republic, a scientific-production association for powder metallurgy has been organized on the basis of the Scientific-Research Institute of Powder Metallurgy of the Belorussian Polytechnical Institute, an experimental facility, and a production plant. Recently, a Republic Scientific-Technical Center for Hardening Technology was created, which includes four institutes of the Belorussian Academy of Sciences, the Republic Scientific-Production Association for Powder Metallurgy, the Minsk Design, Development, and Technological Institute of the USSR Ministry of Tractor and Agricultural Machine Building, the production associations "Belavtomaz" and "Minsk

Tractor Plant imeni V. I. Lenin," and the Design-Technological Institute and Plant, "Remdetal'," of the State Committee for Supply of Production Equipment for Agriculture. After the development of an appropriate program, the managers of the center intend to ask the Central Committee of the Belorussian Communist Party and the republic Council of Ministers to approve this program so that it will acquire the force of law for all organizations included in the center.

In Belorussia in September 1979, N. A. Borisevich reported, a plenum of the Central Committee of the Belorussian Communist Party took place that was especially devoted to questions of science and the hastening of scientific-technical progress. A decree adopted by the plenum should aid the strengthening of ties between science and production and the hastened introduction of scientific achievements into practice.

Activities of the Commission of the Presidium of the Belorussian Supreme Soviet on Questions of Scientific-Technical Progress, which was formed in 1979, are directed toward the solution of these problems.

The creation of scientific-production associations and complexes outside the governmental structure should receive wide application on a national scale, according to N. A. Borisevich. For many academy institutes, especially those that do not have their own experimental plants, such associations offer an experimental and production base. Therefore, the discussion of this topic by the presidium of the USSR Academy of Sciences is timely and correct.

The director of the L'vov bus plant, A. F. Sled', said that for many years it has cooperated with 27 scientific-research, design-development, and technological institutes and also with scientific-production associations of the country. This cooperation, in many instances, has been regenerated in stable contractual relations. The new forms of ties between science and production in the Western Ukrainian Region must be examined as more contemporary, progressive, and necessary for producers.

At the present time, the plant collective together with scientists is solving problems of scientific-technical programs that are important for the enterprise, including those of long-range significance; it is conducting scientific-technical seminars and meetings of scientific-technical councils with scientists on site at the enterprise. Producers are trying to learn what is new in the laboratories of science and are trying to assimilate this in their own enterprises. A complex program for the technical re-equipping production at the plant has been developed in which special attention has been given to improving the quality of buses; in the fulfillment of this program, there is participation by the physics-mathematics and electric welding institutes of the UkSSR Academy of Sciences, by the L'vov and Kiev Polytechnical Institutes, and by ministerial scientific-research institutes.

Praising highly the work of scientific-production associations and complexes, A. F. Sled' believes that it is necessary to provide a definite legal statute for them.

G. I. Gorbunov, the chairman of the presidium of the Kola Affiliate of the USSR Academy of Sciences and a corresponding-member of the USSR Academy of Sciences, noted in his speech that on the Kola Peninsula, to which nature has given great and

varied mineral and raw material resources, administrative and inter-sector barriers are holding back the development of the economy. As an example, he introduced the irrational use of the Khibinskiye apatite ores, where many valuable components of the ore that accompanies the apatite are not being extracted. The same applies to the complex titaniam-magnetite ores of Kovdor, where thousands of tons of raw material badly needed for the production of phosphate fertilizers are dumped.

Scientists of the Kola Affiliate of the USSR Academy of Sciences are actively engaged with problems relating to the complex utilization of raw materials but, in introducing their developments, they come up against the narrow agency interests of business managers. In this connection, G. I. Gorbunov suggested the examination of the question of creating on the Kola Peninsula an interagency mining-industry complex, the chief aim of which would be the introduction of scientific developments for the complex utilization of raw materials.

N. N. Vashchenyuk, chief engineer of the "Kineskop" production association, told about how important tasks in improving the quality of electron-beam instruments had become accomplishable under the conditions of interagency scientific-production associations and complexes. Much has been done in developing automated systems for product quality control. Because of this, all L'vov kinescopes have been recommended for the state Mark of Quality, their technical characteristics have been approved, the brightness has improved by 25 percent, and their durability has improved by 25 percent. Among the basic trends in further work are the creation of color kinescopes with a 110° angle of beam deflection, a slotted mask, and a shaded screen. Contemplated is the creation of flat, solid-bodied analogs of present black-and-white and color kinescopes. All this is work that determines progress in domestic instrument making.

In his concluding remarks, Academician A. P. Aleksandrov characterized the work of the UkSSR Academy of Sciences and its Western Scientific Center in creating interagency scientific-production complexes as a very valuable example that ought to be followed. The president said that the direct participation of oblast party organizations is the moving force behind these complexes. He supported the speech of G. I. Gorbunov, which put forth the idea of forming an interagency mining-industry complex on the Kola Peninsula Peninsula, and he expressed the hope that in preparing the appropriate proposals, there would be participation by the Department of Economics and the Permanent Commission for the Study of Natural Productive Forces of the USSR Academy of Sciences and also by the Institute of Metallurgy of the USSR Academy of Sciences.

The presidium of the USSR Academy of Sciences decided to approve the experience of the Western Scientific Center of the UkSSR Academy of Sciences in the regional management of scientific-technical progress as the basis of interagency scientific-production associations and complexes. It was recommended that the scientific centers and affiliates of the USSR Academy of Science and the academies of sciences of the union republics study the experience of the Western Scientific Center in regional management of scientific-technical progress, with the goal of further deepening the regional relationships between science and production and raising the effectiveness of scientific research.

It was noted that the UkSSR Academy of Sciences had done a large amount of work in the development of new highly effective technology on the basis of fundamental research. It was decided to recommend to union republic academies that they study the experience of the UkSSR Academy of Sciences in developing highly effective technology and to use it in creating and introducing new technology into the national economy and also in putting together the next five-year plans.

It was recognized as useful to ask the UkSSR Academy of Sciences and the L'vovskaya Oblast Committee of the Ukrainian Communist Party in the fourth quarter of 1980 to hold, at the Western Scientific Center in L'vov, a national seminar on "The Integration of Science and Production Under Conditions of Developed Socialism (Forms, Methods, and Paths of Development)." It was recommended that the Western Scientific Center of the UkSSR Academy of Sciences prepare, and that the publishing house "Nauka" provide in the plan for 1982 for the publication of a monograph, "Problems in Regional Management of Scientific-Technical Progress (Theory, Methodology, and Practice)," 20 printed pages in volume.

The USSR Academy of Sciences Institute of Economics, the Central Economics and Mathematics Institute, and the Institute of State and Law were given an assignment jointly with the UkSSR Academy of Sciences of providing in 1980 and 1981 a development of methodological materials and a revision of existing normative documents on the organization of the activities of interagency special-purpose scientific-production associations and complexes by the UkSSR Academy of Sciences and of publishing these materials.

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DISSEMINATION OF SCIENTIFIC AND TECHNICAL INFORMATION TO INSTITUTIONS OF THE USSR ACADEMY OF SCIENCES

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[Report by Academician B. B. Kadomtsev, head of commission that examined the dissemination of information to Academy scientists, delivered at a meeting of the Presidium of the USSR Academy of Sciences]

[Text] The commission, which included scientists representing institutes of information and libraries, examined the situation pertaining to supply of scientific and technical information to institutions of the USSR Academy of Sciences.

The general trend of the commission's work was to take a look at the status of supply of information from the standpoint of scientists, i.e., the producers and consumers of information. On this basis, we should begin by describing the information situation in which the modern scientist works.

The end product of a scientific investigation, an experiment, discovery, is a report put down in writing, in which the results of the investigation are submitted, its place in science is defined and the means of obtaining these results are described. Since the 17th century, when the modern form of communication between scientists was established, the main element of such communication became a primary publication in one of the scientific periodicals. To this day, primary publications are the main source of new information for scientists. As a rule, primary publications are fragmentary, i.e., they describe only a specific phase of the studies. Moreover, they are often related to other analogous studies and, consequently, serve as a means of communication in the collective creativity of scientists.

In the last 3 centuries, the number of scientific periodicals has been growing exponentially, the number of journals doubling every 10-15 years. At the present time there are more than 100,000 such journals. The enormous flow of primary publications makes it necessary to develop a mechanism for condensing the information they contain.

Publication of survey articles and books is the traditional means of condensation [compression], which has been and continues at the present time to be quite effective. Surveys are usually written on the basis of primary publications covering several years (a period comparable to the time that primary information becomes obsolete, constituting 5-10 years). A survey the size of several original articles contains material from 100-200 primary publications in systematized

and evaluated form (i.e., the compression factor constitutes several tens). Two to four years after survey articles, monographs are written which sum up information in different branches of the natural sciences in even more condensed and critically evaluated form. (The situation is somewhat different in the social sciences: by virtue of traditions and need for comprehensive argumentation, books dealing with social disciplines continue to play the role of primary publications.)

Surveys and books, which perform the role of secondary information, do not satisfy all the needs for information, particularly that concerning findings in an area of concern to a given scientist or in related areas. This is why, already in the 19th century, abstract journals began to be published, the number of which is growing proportionately to the number of main journals, so that there is one abstract journal for about every thousand main ones.

But even with abstract journals, the modern scientist cannot obtain all of the information referable to the subject of his endeavors. For example, about 100,000 articles per year are published in the area of physics alone, and it is impossible to read all of them. Nevertheless, lack of concern typifies the modern scientist more than does concern about the existing situation. To what can we attribute this?

The fact of the matter is that information is distributed in the journals very unevenly. S. K. Bradford demonstrated that if all journals were ranked in order of decrease in number of articles published on a specific subject, we would obtain a distribution of the $n_x \sim n_0/x$ type, where x is the journal number, n is the number of articles in it on the topic in question. We see that the overall number of such articles increases on a logarithmic scale with increase in x. In other words, if we take as the unit the number of specialized journals in which one-third of the articles deal with the relevant topic, the number of semispecialized journals would equal a, and the number of peripheral journals would be $\sim a^2$ (for physics, for example, $a \approx 5$, so that 20% of the journals yields over 70% of the information). Thus, one can be rather well-informed by keeping up to date on articles contained only in the "core" of the journals. An even more drastic correlation is obtained if the articles are ranked in order of being cited.

Quotability, i.e., the value of an article (or journal), declines even faster with each issue, at the rate of $1/x^{\alpha}$, where $\alpha = 2.5\text{-}3$. Consequently in order to keep up with the most valuable information one does not have to read all of the articles and journals, merely some relatively small number thereof. It must also be borne in mind that the editorial boards of scientific journals evaluate articles, and intereditorial "football" [soccer] leads to additional ranking thereof in different journals.

Much heterogeneity is also observed in productivity of scientists. According to A. Lotki, the number of scientists N (x) who have written x number of articles decreases from x as $N = N_1/x^2$, i.e., the number of productively working scientists is very small, and more than half the scientists have time to write only 2-3 articles in their lifetime. In view of all this, we can see why the modern scientist, who reads only a small number of articles in the most reputable and specialized journals is rather well-informed about virtually all news in science. Nevertheless, both the abstract journals and bibliographic listings, as well as exchange of preprints and participation in conferences, alleviate substantially the work of a scientist and increase his productivity.

Let us now consider the current status of dissemination of information among scientists of the USSR Academy of Sciences.

The library network of the USSR AS [Academy of Sciences] and academies of sciences of Union republics currently numbers 617 libraries servicing about half a million readers; 250 libraries of the USSR AS are combined in three centralized systems headed by the Library of the Academy of Sciences (Leningrad area), Library of Natural Sciences (Moscow area and branches of the Academy of Sciences) and State Public Scientific and Technical Library of the Siberian Branch of the USSR AS (with its own network). The Institute of Scientific Information on Social Sciences (INION). Each republic's academy of sciences has its own central library. The total stock of library books constitutes 89.3 million units, 42.5% of which are foreign publications. The academy libraries add 3.7 million books and journals to their stock each year.

Quite valuable and informative publications are acquired by currency [?] subscription implemented by the Information Organizing Office for Foreign Scientific Literature of the USSR AS. They constitute 50% of all acquisitions (the other half is acquired on the basis of international exchange of books). Currency allocations for foreign literature of the Academy of Sciences constitute 33%.

In recent years, there has been a constant reduction in volume of acquired scientific literature. Because of the rise in book prices on the international market (10-12% per year), there has been a 36% reduction in subscriptions to foreign publications in the last 6 years (22% reduction for journals and 50% for books). Such a drastic reduction in influx of scientific literature of first and foremost importance is causing alarm among scientists and cannot fail to affect the pace of scientific research.

When the USSR joined the Geneva Convention in 1973, reproduction of 800 titles of scientific journals was stopped. In 1975, the USSR AS allocated additional funds for the purchase of reproducing equipment to compensate for the loss of information received. This improved substantially the servicing of readers. For example, in the Natural Sciences Library (BEN), a service was organized for making copies of articles ordered by representatives of scientific research institutes.

The information institutes of the USSR AS--All-Union Institute of Scientific and Technical Information (VINITI) and INION--perform much work to develop the system of scientific information at the USSR AS.

INION is involved in three types of work: scientific information, publication [editorial] and library work, which permits optimum use of publications received at the institute. The information publications of INION include bibliographic lists of current literature and retrospective bibliographic guides, abstract journals and collections, collections of surveys, analytical surveys and specialized information in three series. In 1979, about 1000 publications were put out totally 5000 printed sheets.

The scientific stock of the INION library constitutes 11 million units, and there are more than 40,000 readers. INION sends copies of articles from foreign journals to our country's scientists.

An automated information system for social sciences has been set up at the INION, and the International Information System of Academieis of Sciences of Socialist Nations (MISON) was organized and is being refined.

VINITI is the chief institute in the area of scientific and technical information. There, scientific research is conducted and plans worked out, which affect the work of the entire State system of scientific and technical information.

VINITI prepares and publishes scientific and technical information in the form of abstract journals, bibliographic guides and collections entitled "Itogi nauki" [Advances in Science]. In 1979, 1.2 million articles (0.7 million of which in the form of tapes) from 38,000 journals were abstracted.

VINITI has funds for acquisition of foreign publications constituting about 10% of all currency allocations of the Academy of Sciences for foreign literature. Preparation and publication of abstracts require about 4 months. After processing for information publications, the books are forwarded to a branch agency (PIK [publication production combine] of VINITI). They are stored for 3-4 years, during which copies are made, then transmitted to BEN and other libraries.

The PIK (VINITI) is a cost accounting organization that publishes about 70,000 author's sheets [equivalent of 40,000 ems of printed material] (of which 10,000 by phototypesetting) per year. In addition to journals and books, the PIK VINITI prepares xerox copies and microfiches of documents filed at the PIK at the request of different organizations. About 20% of its production is received by institutions of the Academy of Sciences.

Prototypes of domestic copying equipment--xerox machines (ER-210 K2), machines for making copies of microfilm (ER-11-M2) and microfiches (ChKP-12-2) have been developed at the SKB [Central Design Office] of VINITI. The SKB VINITI produces 12 xerox copiers per year (50 have already been produced). The microfilm copiers (ER-11-M2) are produced at the rate of 10-15 per year, while the more sophisticated electrographic microfiche copiers (ChKP-12-2) are still very expensive and only eight have been produced thus far. If a small series (10-15 items per year) is produced, the cost could be reduced significantly. To meet the needs of libraries of the USSR AS and academies of sciences of Union republics, 12-15 xerox machines and the same number of electrographic machines to make copies from microfilm and microfiches are needed per year. Thus, by organizing the production of a small series of xerox copiers and electrographic machines, the needs of the central libraries of the academies of sciences would be met.

In the last few years, the VINITI has been changing to an automated information system whereby documents are taped, and this must definitely be evaluated as a progressive step. However, the institute must avoid transferring the flaws existing in its work to the automated system. In the printed editions of abstract journals, all articles are abstracted in succession, i.e., the journals are filled with unevaluated information. The VINITI has recently stopped publishing flagged ["signal"] information, i.e., the practice of rapidly reporting on new articles in specialized journals with detailed itemization in sections, which had the purpose of rapidly informing scientists about the most timely problems. VINITI has not undertaken publication of cumulative indexes for retrospective retrieval of information in physics and other branches of the natural sciences. On the whole, the information of VINITI requires optimization from the standpoint of convenience of use thereof by the scientific research institutes of the USSR AS.

Departments, laboratories or groups of scientific and technical information have been organized at many of the institutes of the Academy of Sciences. They are manned at the academies of sciences by almost twice the staff of libraries. However, while the results of their work are definitely beneficial, they are still modest. This is related primarily to the fact that the departments are scattered, they have very little copying, reproducing and computer equipment, and scientists do not have free access to them. Neither the ONTI [departments of scientific and technical information] nor libraries of scientific research institutes have adequate facilities to make xerox copies of microfiches and microfilm. In addition to bibliographic information, statistical [digital] and reference information, which is beyond the field of work of the ONTI, is begining to play an increasing role for scientific research institutes.

Suggestions for Improving the System of Scientific and Technical Information

The situation pertaining to supplying information to scientists of the USSR AS cannot be deemed satisfactory. Of greatest alarm is the reduction in volume of foreign scientific publications reaching Academy libraries. It is imperative to augment the currence allocations for 1981 by 50%, with subsequent 10% increment per year, for new purchases to fill the existing gaps and restore the 1975 level. A substantial rift has occurred between scientific research institutes and information institutes: at the present time, the rank and file scientific worker cannot use modern and progressive information equipment.

One should combine the efforts of libraries, institutes of scientific information and ONTI of scientific research institutes, as well as the Internal Center for Scientific and Technical Information (contact with CEMA nations) to develop an optimum system of disseminating information, for the purpose of creating a broad enough infrastructure in the information system, within which the scientific research institutes could make use of the publications, existing not only on paper, but on tape, so that they can participate more actively in evaluating information, forming information banks (both bibliographic and digital). Of course, when creating the information system in the Academy of Sciences, it bases itself on collaboration with CEMA member nations.

It is considered expedient to organize a unified information and library council under the Presidium of the USSR AS, consisting of library councils for social and natural sciences, in order to coordinate the work of libraries, VINITI, INION, departments of scientific and technical information at scientific research institutes, as well as to implement methodological guidance for the creation of the information system.

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CSO: 1814/36

PROBLEMS WITH ACADEMY LIBRARY-INFORMATION SERVICES

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 5, May 81 pp 35-36

[Article by Academician V. V. Menner]

[Text] A complex situation is developing with regard to information and library servicing of scientific institutions that are severed from central libraries and information agencies. The local libraries of scientific institutions are unable to replenish their shelves with the needed stock at the present time. The scientific libraries, in which scientists obtain most information, are experiencing major difficulties. In particular, under conditions where the prices for foreign publications are rising, international book exchange is acquiring much importance. But making such book exchanges has become substantially more difficult because of the more complicated procedures for writing up and keeping records of orders. This has been particularly troublesome for libraries. Since they are manned by considerably fewer personnel than the staffs of information services, they cannot assign several employees to work solely on international book exchanges. As a result, several libraries of republic academies have already been compelled to discontinue internal book exchanges, a situation that is by no means admissible when there is a shortage of foreign literature.

As for problems of scientific information services, of course it is very important to discuss the prospects of development of automated data banks and other elements of automated systems of scientific and technical information. But this is the future of information and one should not overlook today's problems by worrying about it. In the 1950's, we started well with the abstract journal. But today its value has diminished significantly. It is not only a matter of constant reduction in volume of abstracts with increase in number of publications, and that their contents are emasculated. This is not so terrible. The worst is referable to the flaws in the reference retrieval system of journals, and mainly in classifying articles, which was already mentioned in the report of B. B. Kadomtsev. We are constantly asked why libraries insist on acquiring CHEMICAL ABSTRACTS and certain other foreign abstract journals. Perhaps, these journals are not better per se than ours, but they have an excellent reference system, which is what compels the consumer to refer to them constantly. In-depth indexing [classification] is also needed when inputting information in a computer; without it the system may be deficient and all the expenses on equipment will be useless.

Diamicrocards may indeed be quite beneficial, particularly for outlying institutes that are cut off from central libraries and experience the most difficulties in replen-

ishing their stacks. But the use of such cards is quite limited as yet. The consumer is still unwilling to use them, not only in our country, but abroad, where they were introduced much earlier. Today, it is impossible to systematically replace journals with diamicrocards.

V. V. Menner then mentioned some of the specific difficulties in the work of academy libraries. One of these difficulties is the absence of a central depositary to which obsolete publications could be sent. Another is the long time spent on repairs. Many libraries are closed for repairs [or redecorating] for several years.

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CSO: 1814/36

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ACADEMY OF SCIENCES RESOLUTION ON LIBRARY-INFORMATION SERVICES

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 5, May 81 pp 41-43

[Resolution of the Presidium of the USSR Academy of Sciences]

[Text] In the resolution adopted by the Presidium of the USSR AS [Academy of Sciences], it is noted that information and library services to scientists of the USSR AS are lagging behind the current requirements of Soviet science. A particularly poor situation has developed in recent years in the area of supplying libraries and institutes with foreign periodicals and books. There has been a substantial reduction in recent years in subscriptions to foreign scientific publications because of the rise in prices thereof.

The existing system of scientific and technical information at the USSR AS, and its material and technical support also require improvement. It is imperative to define a clearcut distribution of duties and procedure for interaction between chief institutes of information, departments of scientific information at academy institutes and libraries of the USSR AS.

The Presidum of the USSR Academy of Sciences hereby resolves:

To instruct the All-Union Institute of Scientific and Technical Information [VINITI], State Committee for Science and Technology [GKNT] and USSR AS to prepare and, in coordination with the GKNT, to submit suggestions on organizing the system of scientific information at the USSR AS in order to meet more fully the information requirements of scientists at institutions of the USSR AS; to implement development of an automated reference and information system to service institutions of the USSR AS, with provisions for preparation and broad use of data bases [banks?] on tape and copies of primary sources on microfiches; it is deemed a first and foremost task to publish sources of secondary information, abstract journals and cumulative indexes for retrospective retrieval. Publication of bulletins with notable [signal] information should be resumed in 1981; the scientific workers at institutes must be called upon extensively for proper evaluation of scientific information and competent indexing; the time required to process and publish scientific information mainly abstract journals and index for them, must be reduced substantially; suggestions should be submitted for expanding production by the Central Design Office of VINITI of xerographic equipment and machines for copying on paper from microforms.

The Institute of Scientific Information on Social Sciences of the USSR AS was instructed to implement further development of the social sciences information system with due consideration of new directions dealing with timely problems of economic

and sociopolitical development of real socialism, current international relations, worldwide economic development and the ideological struggle; steps must be taken to expedite development of an automated reference and information system to service scientific and state institutions, and the higher school of bibliographic and factographic information; development of the automated information system within the framework of the Internal Information System for Social Sciences must be deemed to be one of the first and foremost tasks, with special attention being given to use of promising forms of reciprocal access to data bases via telecommunication channels.

The Presidium of the USSR AS also resolved that development and introduction of automated information systems and work on upgrading information technology are deemed to be the most important directions of improving information support of scientific research conducted at institutions under the USSR AS.

The VINITI was instructed to develop libraries of the USSR AS and all concerned organizations under the USSR AS suggestions on fulfilling the task of creating the automated system of scientific and technical information of the USSR AS in 1981-1985 together with INION [Institute of Scientific Information for Social Science], with organization and appropriate technology for the information network and distribution of centers ["bases"] for bibliographic and factographic (digital) data.

It was suggested to the Coordination Committee for Computer Technology [hardware] that it provide computers, data processing equipment, storage discs with 100 or more megabyte capacity and telecommunication equipment in 1981-1985 for the purpose of disseminating scientific and technological information to information and scientific research institutes of the USSR AS.

To expedite organization of the network of computer centers for information, the Council for Automation of Scientific Research was instructed to consider the question of special-purpose financing of work to develop equipment for coding, displaying and providing graphic and alphanumeric information, starting in 1981.

The directors of VINITI and INION were asked to implement priority input into the automated data banks of information referable to the most important natural and social sciences (physics, biology, astronomy, mathematics, mechanics, control processes, economics, philosophy, scientific communism and others), while the directors of scientific research institutes under the USSR AS were asked to pay attention to organizing departments of scientific information and to offer comprehensive assistance in the use of computer and copying equipment available at the institutes for purposes of dissemination of information.

The Presidium requested that the International Center for Scientific and Technical Information take steps with regard to adding special-topic subsystems dealing with the most important natural sciences to the International System of Scientific and Technical Information in order to furnish information to libraries and scientific research institutes of the USSR AS.

The deputy president of the USSR AS for major construction was instructed to take steps to implement construction of the building for the Natural Sciences Library (BEN) and depository on the basis of the funds of BEN and VINITI in Troitsk, as well as to expedite construction of buildings for VINITI in Moscow and for the SKB [Special Design Office] of VINITI in Lyubertsy and implement construction of the second section of INION.

It was resolved to organize the Unified Information and Library Council of the USSR AS under the Presidium of the USSR AS, having included in this unified council a library council for natural sciences and library council for social sciences with the standing of independent councils.

Methodological guidance and coordination of the work of VINITI, INION, central scientific libraries of the USSR AS and Union republic academies of sciences, preparation of recommendations for optimum development of the system of scientific information of the USSR AS were listed as the main tasks for the Unified Information and Library Council of the USSR AS.

Academician Yu. A. Ovchinnikov, vice-president of the USSR AS, was appointed chairman of the Unified Information and Library Council of the USSR AS.

This council was instructed to prepare a status concerning the system of scientific and technical information of the USSR AS, to examine the plans and reports dealing with scientific research and experimental design projects of institutes of information of the USSR AS, determine the needs of scientific institutions under the USSR AS with regard to information and copier equipment and distribution thereof among scientific institutions and departments of the Presidium of the USSR AS, as well as to develop measures to upgrade the reference system of information publications, organize unification of information documentation, particularly that pertaining to computerized manipulation of structural formulas of chemical compounds, to approve prototypes of designs and software for bibliographic [documents] and factographic systems, deploy measures to improve working conditions and assign personnel in libraries of the USSR AS, develop recommendations on forms of contact with foreign and international centers of scientific and technical information for the purpose of reciprocal exchange of information.

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INDUSTRY, GOVERNMENT NEGLECT S&T INFORMATION SERVICES

Minsk SOVETSKAYA BELORUSSIYA in Russian 22 Jul 81 p 2

[Article by M. Libintov, chief of Department of Scientific-Technical Information of republic's Belorgvodstroy Planning-Technological Trust: "How Does Information Work?]

[Text] The 26th CPSU Congress set the task of completing the transition of the national economy to a primarily intensive course of development. In this big endeavor, an important role is assigned to scientific-technical information. Analysis shows that these services still lag behind the demands of the times; their workers frequently play the role of a "boy running errands."

Let us take, for example, two of the capital's enterprises, standing, as it were, face to face: the Minsk plants for gears and electrical equipment imeni Kralov. At the former seven persons make up a subdivision that has for its purpose the generalization and dissemination of the achievements of science and technology. The number of engineers and technical personnel here exceeds 800. Moreover, the USSR State Committee for Science and Technology recommended that not less than one-two percent of the total number of engineering and technical personnel be information workers. It is understandable that with such a disparity the scientific-technical information service is not in a position to encompass the unencompassible: ensuring of quality dissemination of advanced experience.

A similar department, possessing for some reason or other an entirely different name, has been created at the electrical equipment plant. Sixty-four coworkers work there. It would seem that the situation here would be radically different. Actually, everything is different. Some of them are engaged in information work. In the words of V.V. Chernukhi, the chief of the department, no more than six-seven people. But it turns out that they are working by no means in accordance with the requirements of the contemporary level. This, of course, could not help but affect the results of management. Over the course of a number of years, the plant has failed to meet state targets.

The list of such enterprises could be continued. The fact that plant information workers find themselves in a position that is rather undeterminate is shown by the department names. Thus, at the electrical equipment plant it is called the department of scientific-technical and economic information and documentation, at the gear plant--the bureau of rationalization, invention and technical information, at

the plant for automatic lines--the department of scientific-technical information and rationalization. The mixing of functions of subdivisions of essentially different functions, of course, cannot result in anything worthwhile. The fact is that information is a very complex affair; here one has to be purposeful and not allow oneself to scatter oneself in the solution of other problems.

The inadequate attention paid by heads of enterprises, ministries and departments to scientific-technical information services is also expressed in the fact that they frequently do not participate in socialist competition and that measures have not been worked out everywhere for the moral and material reward of the best engineers. Staff personnel of information services frequently receive a bonus from sources of material incentives, regardless of the results of their work. How does one evaluate the quality of labor of information workers when there has not been worked out so far a unified method for determining the result of use of scientific-technical information sources. For this reason enterprises, sometimes belonging to the same ministry, are obliged to look for and develops methods of evaluating effectiveness. Not all these searches result in success. The reason for this is that not all our heads are distinguished by initiative and a practical approach to the matter. Here there can be only one recommendation: interested organs have to make controls stricter and to ensure more rigid planning of realization of innovations.

It should be said that certain experience already exists in this work. At the plant for automatic lines, for example, there has been in operation for a number of years a regulation on time periods of examination and introduction of innovations borrowed from scientific-technical information sources. For their violation, shops and sections, where innovations were to be introduced according to plan, pay a forfeit from their funds in the amount of 12-20 percent of the economic gains that the innovation was to have produced. The making of such a cost-accounting claim impels a collective to make rational use of each such proposal.

Scientific-technical information departments are working with good results at the following plants: Minsk Motor-Vehicle Plant, Vitebsk Radio Parts Plant, also at the Gomsel'mash Production Association. Here measures are being taken to stimulate an improvement in information activity and the introduction of technical innovations. The size of the bonus fund depends, for example, on the number and quality of completed developments. In a word, experience does exist. It is important for it to receive all-round development so that the effectiveness of information comes to be considered as a basic factor that accelerates scientific-technical progress.

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PROBLEMS IN INTRODUCING NEW AGRICULTURAL TECHNOLOGY

Khar'kov RUKOVODSTVO KOMPARTII UKRAINY RAZVITIYEM PROIZVODITEL'NYKH SIL SEL'SKOGO KHOZYAYSTVA RESPUBLIKI in Russian 1980 (signed to press 17 Sep 80) pp 84-101

[Excerpts from Chapter 4 of book by Ye. A. Bondarev "Ukrainian Communist Party Management of the Development of the Agricultural Productive Forces of Republic," Izdatel'skoye ob"yedineniye "Vyshcha shkola," 1000 copies]

[Excerpts] CHAPTER IV. THE MANAGEMENT ROLE OF PARTY ORGANIZATIONS IN ACCELERATING SCIENTIFIC DEVELOPMENTS AND INTRODUCING THEM INTO AGRICULTURAL PRODUCTION.

The 25th CPSU Congress pointed to the necessity for a sharp rise in the effectiveness and an improvement in qualitative indicators of agricultural production that are directly dependent on the level of agricultural science. In this connection, the party has increased its attention to the activities of scientific-research institutions and higher educational institutions that specialize in agriculture.

The party has always attached great meaning to increasing the effectiveness of scientific developments and their introduction into agricultural production. This was manifested with special force after the 23d CPSU Congress. Fulfilling the decisions of the congress, the CPSU Central Committee and the USSR Council of Ministers on 2 October 1968 adopted the decree, "On Measures for the Further Improvement of Scientific-Research Work in the Field of Agriculture (152, 1968, 11 Oct). On 20 December 1968, an analogous decree was adopted by the Ukrainian Communist Party Central Committee and the UkSSR Council of Ministers (127, No. 12, 1986, art. 165). The decrees provided for measures for improving the work of agricultural scientific-research institutions and higher educational institutions.

In accordance with these decrees, the UkSSR Ministry of Agriculture issued a series of orders, particularly one on 9 January 1969, "On Measures for Further Improvement of Scientific-Research Work in the Agricultural Sector," and one on 21 April 1969, "On Measures for Increasing the Effectiveness of Work of Scientific-Research Institutions." (161, list 262, storage unit 127, sheet 20). They designated 18 head institutes, on which was put responsibility for planning and methodological management of research on basic agricultural problems and the development of programs for the activities of experimental stations. Expansion of the network of research farms was provided for by transferring a number of kolkhozes and sovkhozes to scientific-research institutions. Work plans of the problem laboratories of agricultural VUZes

were examined and approved (161, list 262, storage unit 127, sheets 21-25).* As a result, the scientific-research institutions of the republic as early as October to December 1969 submitted materials to the UkSSR Ministry of Agriculture on the status and courses for further development of all branches of Ukrainian agriculture and developed programs of activity for 1971-1980 for each scientific area and also five-year plans for the technical re-equipping and construction of scientific-research institutions and experimental bases. To improve the coordination of scientific research and methodological management of such research in the republic, the Southern Department of the All-Union Academy of Agricultural Sciences imeni V. I. Lenin was created. Scientific-technical information sections were strengthened in oblast and rayon agricultural administrations. The Ukrainian Scientific-Research Institute for Agriculture publishes the bulletin "Sil's'kogospodars'ka informatsiya" (161, list 262, storage unit 85, sheets 50-53). Measures were adopted for raising the effectiveness of agricultural projects. At the All-Union Selection and Genetics Institute (Odessa) in 1968, construction was begun on the first artificial-climate station** in the USSR, and in 1971, the phytotron at the Mironovka Scientific-Research Institute (161, list 262, storage unit 324, sheets 59-62). Conditions are being created that reduce the selection process almost by half (152, 1976, 4 Apr).

Increase in the effectiveness of research is helped by the concentration and specialization of scientific institutions. The CPSU Central Committee and the USSR Council of Ministers, in the May 1972 decree, "On Measures for the Further Improvement of Scientific-Research Work in the Field of Agriculture," recognized the usefulness of creating 27 large selection centers with all the necessary laboratories in the basic agricultural zones of the country (149, 1972, 14 May),*** with the aim of accelerating the development and introduction of highly productive varieties and hybrids of grain, leguminous, semolina, and feed crops, and also the scientific-methodological management of seed selective cultivation work in the zones. This has aided in the achievement of substantial progress in the fields of selection and seed cultivation. A high mark was given to this work in the COSU Central Committee and USSR Council of Ministers decree, "On Measures for the Further Improvement in the Selection and Seed Cultivation of Grain and Oil-Bearing Crops and Grasses" (November 1976) (149, 1976, 21 November).

The "Basic Directions for the Development of the USSR Economy for 1976 to 1980," adopted by the 25th CPSU Congress, indicated the necessity for "providing for the further development of the theory and methods of genetics for the creation of valuable new varieties of plants, breeds of livestock, and cultures of microorganisms,

* Under the UkSSR Ministry of Agriculture at the beginning of 1968 were 79 scientific-research institutions (17 institutes, 6 republic research stations, 20 oblast state agricultural research stations) and 36 experimental fields of scientific-research institutes. In them there were 3100 scientific associates, including 65 doctors of sciences and 1140 candidates of sciences (161, list 257, storage unit 96, sheet 1).

** In January 1978, construction was completed here of the largest phytotron in the world, with eight hothouses with 240 m^2 in area (149, 1978, 29 Jan).

*** The country now has 42 selection centers for plant cultivation, including 32 for grain and feed crops (142, 1977, No. 10, p. 26).

and also means for producing physiologically active substances . . . for agriculture . . . (7, p. 215) Successful implementation of the decreed tasks requires improvement in party management of the activities of scientific-research institutions, the strengthening of control of these important work sectors on the part of party organizations, and the increase of responsibility of the administrative and social organizations for creating, in each scientific collective, a normal psychological atmosphere and the creative businesslike conditions that make highly effective work possible.

At the same time that it implements measures for accelerating scientific research, the party gives increasing attention to the work of introducing research results into agricultural production. The Summary Report of the CPSU Central Committee to the 25th CPSU Congress stressed that the practical introduction of scientific ideas is no less important than their development (7, p. 48). According to assessments by specialists around the world, the average expenditure of time for applied research is about two years, and the time between the completion of this research and industrial introduction is about six years (92, p. 115). Thus, there is substantial potential for increasing the effectiveness of scientific developments.

The introduction of scientific achievements into agricultural production depends on many factors, particularly on the interrelations between scientific institutions and farms, on the preparedness of the latter for practical use of the developments and recommendations of scientists, on the organizational system for introducing research and the level of party management of this process, and others.

An attempt to hasten the introduction of scientific developments into production during the period being examined was the reorganization of the management of scientific-research institutions. A CPSU Central Committee and USSR Council of Ministers decree of 20 February 1961, "On the Reorganization of the USSR Ministry of Agriculture," pointed to the necessity of changing the ministerial apparatus "from an apparatus for the administrative management of agriculture, as it was for many years, to an organizational center for the introduction of scientific achievements and advanced experience into production (126, 1961, No. 3, art. 17).

Experimental-demonstration farms (one or two) have been created in each region and highly qualified specialists have been sent to work on them. In the Ukraine, 604 farms have been organized (154, 1961, 16 May).

However, the reorganization did not yield the hoped-for results, insofar as it was not reinforced by economic measures. In 1963, the means allotted for laboratory equipment were 60 percent less than in 1962. At this time, for one scientific worker in agricultural research there was an allocation of 1100 rubles, while in other sectors it was 1800 rubles (161, list 218, storage unit 138, sheets 46, 49).

On 28 August 1961, the CPSU Central Committee and USSR Council of Ministers adopted the decree "On the Transfer of Agricultural Higher Educational Institutions and Scientific-Research Institutions from Cities to Sovkhozes and to Educational-Research and Experimental Farms." (127, No. 7, 1965, art. 85). The locations and time-frames were determined for the transfer of scientific-research institutions and educational institutions to agricultural enterprises. Thus, the Scientific-Research Institute of Animal Husbandry in the Forest-Steppe and Forests of the UkSSR was moved to the "Ukrainka" experimental farm; the Khar'kov Agricultural Institute imeni

Dokuchayev was moved to the "Kommunist" educational-experimental farm; and the Ukrainian Scientific-Research Institute for Vegetable Raising and Potatoes was moved to the "Merefa" experimental farm (170, holding 2, list 108, storage unit 50, sheets 10-11). This measure, to a recognizable degree, helped strengthen the relations of scientific-research and higher-educational institutions with agricultural production and helped accelerate the introduction of scientific developments into practice.

Governed by general party decisions, the Ukrainian Party Central Committee and the UkSSR Council of Ministers adopted, during the period being examined, a number of decrees directed toward improving publicity and accelerating the introduction of scientific achievements into agricultural production, particularly one in November 1959 on the further development of the Exhibit of Advanced Experience in the Economy of the Ukrainian SSR (127, No. 11, 1959, art. 150), and one in December 1963 on the reorganization of the Exhibit of Advanced Experience in the Economy of the Ukrainian SSR (127, No. 12, 1963, art. 134). For their part, oblast and rayon party committees adopted decisions in which they indicated shortcomings and outlined measures for activating the transfer of agricultural production to a scientific basis. Thus, the Khar'kov party obkom bureau on 24 May 1961, examining the question "On Measures for Publicizing and Introducing Advanced Experience into Agriculture," noted that scientific-research and educational institutes in the field of agriculture still failed to generalize and distribute the experience of innovators sufficiently and that they made few scientific recommendations to kolkhozes and sovkhozes. The bureau obligated the oblast agricultural administration to put together by 5 June 1961 a concrete plan for publicizing and introducing scientific achievements and advanced experience into oblast agricultural production (170, holding 2, list 108, storage unit 33, sheet 38). On 21 March 1964, the Khar'kov party rural obkom bureau defined new tasks for agricultural production administrators in the introduction of scientific achievements and advanced experience into oblast agriculture. The party committees of production administrations were obligated to develop and approve, by 25 March 1964, concrete measures for each farm (170, holding 10923, list 4, storage unit 12, sheet 63). With the aim of strengthening control over the fulfillment of the adopted decisions, the party obkom conducted a hearing at the obkom bureau with reports from party committees, managers of economic-administrative organizations, production administrations, and even primary party organizations of individual farms. Thus, on 28 August 1964, the party rural obkom bureau heard the question "On the Work of the Party Organization and Management of the Kolkhoz imeni Gor'kiy of the Sakhnovshchinskiy Rayon on the Introduction into Production of Scientific Achievements and the Experience of Innovators." (170, holding 10923, list 4, storage unit 24, sheet 14). The adopted decree made an analysis of activities of the party organization and kolkhoz management at this level and gave an evaluation of the work done. On 18 February 1966, in examining the question "On Progress in Implementing the Decision of the March (1965) Plenum of the CPSU Central Committee on the Introduction of Scientific Achievements and Advanced Experience into Agricultural Production" the obkom bureau recognized the work of the oblast agricultural administration at this level to be unsatisfactory and demanded a profound improvement in it (170, holding 2, list 133, storage unit 21, sheet 15). Analogous measures were adopted by the L'vov (167, holding 3, list 3, storage unit 1514, sheets 40-44), Nikolayev (168, holding 5163, list 2, storage unit 11, sheet 66), Kherson (171, holding 46, list 1, storage unit 3437, sheet 28) and other party obkoms.

The system for introducing agricultural scientific achievements into production, however, remained insufficiently effective for a long time. The Summary by the CPSU

Central Committee to the 24th CPSU Congress stressed: "If one thoroughly analyzes all the links in the complex chain that unites science and production, it is not difficult to see that the weakest links are those relating to the practical implementation of scientific achievements and their introduction into mass production" (6, p. 56). Analysis of the introduction of completed subjects conducted at the Siberian Department of the USSR Academy of Sciences shows that, whereas at the beginning of the 1960's the proportion of developments not introduced for one reason or another was 25 to 30 percent, the proportion had risen by the end of the 1970's to 35 to 40 percent (92, p. 23).

The problem of the relationships between science and production has been discussed very actively in recent times. Increasingly often, questions are raised as to who should implement the proposals of scientists (152, 1975, 30 Dec). "It is our deep conviction," wrote F. Polupanov, director of the Ukrainian Scientific-Research Institute for the Mechanization and Electrification of Agriculture, "that research scientists should not engage in the ineffective activity of "hawking" their ideas, searching for enterprises that could fabricate models and so forth" (152, 1971, 8 Jan).

The process of implementing scientific achievements in agricultural production is inseparably tied to improvement of the whole technological process on the basis of developing and introducing scientifically based systems for conducting agriculture. Broad approval has been received by the activity of cost-accounting centers as intermediate ("third") links between research and practice. In 1967, an efficiency center was created at the All-Union Scientific-Research Institute of Agricultural Economics (146, 1970, 4 Aug), which began to conclude agreements with agricultural enterprises for the introduction of scientific developments that provided an economic effect. During a three-year period, it fulfilled work worth more than 3.5 million rubles. The director of one sovkhoz near Moscow recalled the following concerning relations between the farm and the efficiency center: "Cost-accounting relations with the institute bring us more, if you please, than the free scientific aid of a patron. We, of course, bear expenses, but then we also receive something in return. And we can question scientists fully . . . (146, 1970, 4 Aug).

A strong impetus to the dissemination of labor and production efficiency in UkSSR agriculture was the republic conference for the best plan for introducing efficiency into production for 1967-1968 (76, list 1, storage unit 162, sheet 3). By 1963, kolkhozes and sovkhozes had 243 efficiency councils that united 3729 persons. In a majority of regional agricultural production administrations, inter-kolkhoz cost-accounting efficiency groups were created. Efficiency councils and groups that same year took 1703 measures for labor and production efficiency, which had an economic effect of 1271.4 thousand rubles (176, list 1, storage unit 162, sheet 6). Organization work for introducing scientific developments into agricultural production was especially enlivened after the adoption in September 1968 of the CPSU Central Committee and USSR Council of Ministers decree "On Measures to Increase the Effectiveness of the Work of Scientific Organizations and Accelerating the Utilization of Scientific and Technical Achievements in the Economy" (128, issue 9, 1969, pp 257-283). The CPSU Central Committee and the USSR Council of Ministers obligated ministries and agencies to take immediate measures to provide significant reductions in time-lengths between the completion of theoretical research and the practical application of its results in production. In turn, on 29 November 1968, the Ukrainian Communist Party Central Committee and the UkSSR Council of Ministers adopted an analogous decree (127, No. 12, 1968, art. 164).

The party decisions became a guide to action for party, economic administrative organizations, and scientific-research institutions for the introduction of scientific developments in agricultural production. Thus, in August 1969, examining the question of the status and measures for increasing labor productivity in kolkhozes and sovkhozes, the UkSSR Council of Ministers authorized the UkSSR Ministry of Sovkhozes to create inter-sovkhoz production-technology laboratories in 20 various administrative zones and the UkSSR Ministry of Agriculture to create 6 zonal technical-production laboratories and technical-production centers (under cost-accounting). The task of these organizations was the implementation of measures for efficiency and management of production under the condition of agreements*(161, holding 1, list 262, storage unit 115, sheet 131). In February 1969, the UkSSR Ministry of Agriculture and the Scientific-Technical Society for Agriculture conducted a republic seminar on questions of labor and production efficiency, and on 18 to 20 November 1969 at Vinnitsa, a republic scientific-technical conference took place on the subject "Efficiency in the Field of Mechanizing Agricultural Production." As a result of the measures taken, transition of agricultural production to a scientific basis was noticeably accelerated. In 1970, organizations of the Scientific-Technical Society for Agriculture introduced about 8 thousand proposals and recommendations into practice, with an economic effect of over 20 million rubles (176, list 1, storage unit 187, sheet 2).

Thus, with the aims of hastening the introduction of scientific developments into agricultural production, during the period being examined, party organizations began wide utilization of councils and cost-accounting efficiency groups at scientific-research institutions and VUZes, at oblast administrations, and at rayon agricultural production administrations, and also of efficiency groups at farms. Zonal standards-research stations and standards centers were enlisted to participate in this operation. However, a harmonious system of organizations and institutions with a center that directed and controlled the activities of all the links in the introduction of scientific developments into agricultural production did not come about during the period being examined. Evidently, the proposal of certain researchers to create all-union and republic coordinating bodies with cost-accounting subunits for labor and production efficiency was the right proposal.

The development of the "third" link also inhibits the lack of attention to local scientific-production organizations. Useful recommendations by scientists often do not receive the support of agricultural organs. There are instances when specializations of enterprises or the dimensions of cultivated land are changed contrary to the proposals of scientific centers without sufficient basis. It seems necessary to establish an order in which plans for implementing scientific achievements and advanced experience would pertain to every farm and would be included in production and financial plans equally with production programs for plant growing and animal husbandry. It would also be useful to tie measures for material and psychological incentives more closely to the results of fulfillment not only of production plans but also of plans for introducing labor and production efficiency. There still remain a number of unsolved problems in the practice of implementing scientific developments in agriculture. In particular, labor and production efficiency centers consider that the introduction of recommendations should be engaged in, first of all, by farms themselves, and that specialists from cost-accounting units should be only consultants (43, p 164). Managers and specialists of kolkhozes and sovkhozes adhere to the opposite opinion. We think that, in the solution of such problems, from the position of national interests, it is necessary to have authoritative intervention by party organizations.

* It was proposed to provide these organizations with a staff of 400 workers.

The acceleration of the transition of agricultural production to a scientific basis is aided by the development and introduction of scientifically substantiated systems for farm management. In the UkSSR, work on their development began soon after the 20th CPSU Congress (47, p. 45). All the work was accomplished under the direction of and with direct participation by party organizations. Thus, being guided by instructions from the Ukrainian Communist Party Central Committee of 13 January 1959 on questions of introducing scientifically substantiated systems of management into kolkhoz and sovkhoz production, the Kherson party obkom adopted measures that provide for fulfilling this large and important task. Under the oblast planning commission of the oblispolkom, a commission was created that developed crop rotation plans corresponding to the soil and climate conditions of oblast zones and to farm specialization. By authorization of the party obkom, the Scientific-Technical Society for Agriculture, together with specialists from the oblast administration, prepared and published in the oblast newspaper NADDNIPRYANS'KA PRAVDA, models of scientifically substantiated systems of farm management for two kolkhozes in the Khersonskiy and Novo-Troitskiy Rayons. For practical aid in the development of scientifically substantiated systems, 24 scientific workers and 232 students from senior courses of agricultural institutes were sent to farms. As a result, at the end of 1959, scientifically substantiated systems were developed at each kolkhoz and sovkhoz and were approved by the rayispolkoms (171, holding 46, list 1, storage unit 3425, sheet 83).

A large amount of work was done at this level by the party organization of the Khar'kovskaya Oblast. On 23 February 1959, the party obkom bureau adopted the decree "On the Introduction of a Scientifically Substantiated System of Farm Management into Kolkhoz and Sovkhoz Production" (170, holding 2, list 99, storage unit 29, sheet 59), which obligated the oblast agricultural administration, the administration and party organizations of scientific-research and educational institutions to provide methodological and organizational aid to kolkhozes and sovkhozes of rayons under their jurisdiction, in the development and introduction of scientifically substantiated farm management systems (170, holding 2, list 99, storage unit 29, sheets 59-71). Scientific-Technical Societies for Agriculture were enlisted in this work. The Khar'kovskaya Oblast management of the society and its primary organizations created teams (in which there were about 200 scientific workers and agricultural specialists), who took active part in developing scientifically substantiated systems of farm management in all 660 kolkhozes of the oblast (176, list 1, storage unit 63, sheet 4). Scientifically based systems of farm management for a number of kolkhozes were developed by the Dnepropetrovskaya Oblast Scientific-Technical Society for Agriculture. On the basis of the the kolkhoz imeni Lenin of the Sinel'nikovskiy Rayon and the "Svitlo Zhovtnya" kolkhoz of the Pyatikhatskiy Rayon, the oblast administration of the Scientific-Technical Society for Agriculture prepared and published in mass circulation the appropriate recommendations which served as a basis for development and introduction of the systems in other oblast farms (176, list 1, storage unit 114, sheet 4).

Party, economic-administrative, and social organizations of other UkSSR oblasts have also operated actively. As a result, scientifically substantiated farm management was developed universally within the republic and in 1964 was published as a collection of recommendations for conducting agriculture and livestock breeding in the consolidated zones of the Forest Region and the western regions of the Forest-Steppe and Steppe (55, p. 20).

Despite the successes achieved, however, work on introducing scientifically based systems of farm management had substantial shortcomings. Many recommendations had a general character and were little suited for practical utilization; the question of

means and methods for organizing the introduction of scientific developments was not fully answered; and too few specialists and farm managers were enlisted in this work. The systems developed, in an overwhelming majority, were not well-founded economically (95, p 47). In addition, in this period, at times there was found to be interference in the technology of production by incompetent persons.

In accord with the decisions of the March (1965) Plenum of the CPSU Central Committee and the Directives of the 23d CPSU Congress, the USSR Ministry of Agriculture together with scientific-research institutions renewed the development and improvement, under new conditions, of scientifically substantiated farm management in 35 economic-vegetation zones of the country. This could be considered the second stage of work in introducing scientifically substantiated farm management to kolkhozes and sovkhozes. In it, several thousand scientific workers and agricultural specialists participated. Zonal commissions studied the possibilities for more rational distribution and specialization of agriculture within zonal boundaries, having marked out about 260 agricultural regions or subzones within which there were about 350 production types of specialized farms. In the materials of the zonal commissions, the opinion was fixed that in the Ukraine the development of livestock breeding should not restrain further increase in non-feed grain farming. The necessity was revealed for more accurate definition of regions for growing sugar beets, oil-bearing crops, potatoes, vegetables, and so forth (79, p. 123).

The complex program outlined at the 24th CPSU Congress for the development of the country's economy was the basis for expansion in a qualitatively new direction (the third stage) of development of scientifically substantiated systems for agriculture management. Work began according to complex plans of development adopted by farms and regions that provided for improvement of all features of production and improvement of the social-economic conditions of rural life. The journal PARTIYNAYA ZHIZN' acquainted its readers with the complex plan developed in Niklinovskiy Rayon of Rostovskaya Oblast (141, 1970, No. 21, pp 34-35). This publication, along with other materials, helped expand work on putting together complex plans for development in other farms of the country, including a number of rayons of the UkSSR. In Khar'kovskaya Oblast the beginning of this work was in Krasnokutskiy Rayon. On instructions from the party obkom, the first secretary of the Krasnokutskiy party raykom, P. A. Chaban', visited Niklinovskiy Rayon. On his return, he acquainted the rayon party leaders, secretaries of party organizations, and kolkhoz and sovkhoz managers with the practice of putting together complex plans for farm development. The party raykom and the rayispolkom developed measures for introducing complex scientific planning into farm practice. The model plan for the complex development of Krasnokutskiy Rayon, developed by Khar'kov scientists in accord with measures of the party raykom and rayispolkom, provided for the following: in the economic sphere -- the development of all possible specialization and concentration of production; in the social sphere -- personnel training and assignment and improvement in the cultural and technical level and social-political awareness and improvement in welfare and living conditions.(110, p. 10).

In December 1971, the Republic Council of Kolkhozes approved and recommended for introduction at all UkSSR farms, the experience in social-economic planning of three advanced kolkhozes of the republic: the "Radyans'ka Ukraina" in Chernobayevskiy Rayon of Cherkasskaya Oblast, the "Gruziya" of Genicheskiy Rayon of Khersonskaya Oblast, and the imeni Lenin of Krasnokutskiy Rayon of Khar'kovskaya Oblast.

Active support by party organizations in the practice of social-economic planning and broad publicity for advanced experience in the press (56; 69) contributed to its rapid and widespread dissemination. According to data of the USSR Ministry of Agriculture, as early as 1974, of 8.5 thousand kolkhozes, 6 thousand had developed complex plans for social-economic development (110, p. 12).

At the present time, all rayons, kolkhozes, and sovkhozes of the republic have complex plans for social-economic development (143, 1979, No. 12, p. 24), each of which, covering all aspects of rural work and life, is a scientifically substantiated guide for the work of party, Soviet, and administrative bodies.

The party organizations of Gusyatinskiy Rayon of Ternopol'skaya Oblast is skillfully solving problems of the economic and social development of farms. As the result of continuous and purposeful work to improve agriculture and the specialization and concentration of agricultural production, the gross revenue of the kolkhozes here grew significantly, equalling 26 to 27 million rubles a year. Successful production activity has permitted kolkhozes and sovkhozes to allot 15 to 16 million rubles a year to the construction of farm and social-cultural sites. It was one of the first rayons of the republic to acquire the title "Rayon of Highly-Developed Agriculture" (143, 1979, No. 12, p. 25).

The Volnovakhskiy Rayon of Donetskaya Oblast can serve as an example of positive work in the practical implementation of long-range complex plans for social-economic development. From 1965 to 1978, it built 37 administrative-cultural centers, 62 clubs and Houses of Culture, 51 nurseries, 136 stores, and so forth. All villages of the rayon were tied together with hard-surfaced roads, the total length of which was 836 km, that is, 40 km for each 100 square kilometers of territory. Much was done for the construction of road networks within farms. The experience of the Volnovakhskiy Rayon party organization in the complex solution of social-economic problems was approved by the Ukrainian Communist Party Central Committee and is widely used in the work of many party organizations of the republic. As a result of the All-Union Review and Competition in 1978 for the Best Construction and Best-ordered Kolkhoz and Sovkhoz Settlements, two rayons (Volnovakhskiy of Donetskaya Oblast and Striyskiy of L'vovskaya Oblast) and 39 population centers of the republic received awards at the Exhibit of the Achievements of the USSR Economy (143, 1979, No. 12, p. 25).

In the well-known document "Draft Plan for Scientific-Technical Projects," V. I. Lenin pointed out the necessity for close ties between scientific research and farm construction (2, vol. 36, pp. 278-281). Fulfilling Lenin's legacy, the party has developed and implemented organizational measures directed toward increasing the effectiveness of scientific research and accelerating the introduction of its results into agricultural production. A large amount of work has been conducted by the Ukrainian Communist Party: Measures have been taken to strengthen the supply and equipment bases for scientific and educational institutions, to strengthen their relations with agricultural enterprises, and to introduce a general system of seed cultivation (developed by the Mironovka Scientific-Research Institute and approved by the Ukrainian Communist Party Central Committee), and to increase the productivity of livestock breeding.

The planning of measures in the field of scientific research in accordance with directive instructions by the party began at meetings of party groups and primary

party organizations; then the plans were examined and revised by superior party bodies. A large amount of attention was given to the organization of control over implementation of these plans. Party organizations helped as much as possible to support a creative climate within collectives and arranged for the exchange of scientific-research experience by conducting seminars, theoretical and practical-scientific conferences with participation by representatives of scientific institutions, party, Soviet, and agricultural bodies, and agricultural enterprises; they solved problems relating to the preparation of agricultural enterprises for the output of new products and the organization of scientific planning for the development of production and rural life.

Collectives of scientific institutions and scientific institutions and scientific-technical societies were enlisted for direct assistance to managers and specialists in composing current and long-range plans for introducing scientific achievements into practice, for the creation of labor and production efficiency centers and groups at agricultural enterprises, for the preparation of scientific systems of farm management, and for the organization of complex social-economic planning for the development of kolkhozes, sovkhozes, and rayons. The October (1976) Plenum of the CPSU Central Committee gave a high mark to the work of the Ukrainian Communist Party Central Committee and of the party organizations of Kiyevskaya, L'vovskaya, Dnepropetrovskaya, and other oblasts for strengthening relations between science and production (146, 1976, 26 Oct). Owing to the tireless activity of party organizations in the development of agricultural science and in the organization of the introduction of its results into agriculture, substantial progress has been achieved. Today, science in agricultural production has become, in a genuine sense, a direct productive force -- a leading feature. "In industry and in agriculture," said L. I. Brezhnev in his speech on the 50th Anniversary of the USSR, "we cannot now take one step forward without help from the latest achievements of science . . ." (19, p. 96). The communist party, highly valuing the work of scientists, constantly makes new demands on them with the aim of further increasing the volume of agricultural production and satisfying the growing demands of the Soviet people.

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MARCHUK ON ROLE OF SCIENCE IN SOCIETY

Moscow MOLODYM O NAUKE in Russian 1980 pp 9-12, 302-303

[Table of contents, annotation and excerpts from chapter 1 of book "To the Young on the Subject of Science", by Guriy Ivanovich Marchuk, Izdatel'stvo "Molodaya gvardiya", 75,000 copies, 305 pages]

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Annotation

Academician G. I. Marchuk's book, addressed to youth, talks about the role of science in the life of society, about certain global problems confronting mankind, as well as about regional problems connected with the development of Siberia. A great deal of attention is paid to the principles of scientific and technical progress, the place of youth in science, and the inter-relationships between schoolteachers and pupils. For a number of years the author headed up the Siberian Section of the USSR Academy of Sciences. It was precisely during this period that he wrote the book. It is intended for a wide circle of young people--those in the senior grades in school, college students, graduate students, scientific staff members, teachers, and specialists in the national economy.

Chapter 1. A Matter of Importance to the State

/Excerpts/ Our Party's 25th Congress specified the role of the USSR Academy of Sciences as a center for theoretical research, a coordinator of all science on a nationwide scale. This position received new development after the issuance of a decree of the CPSU CC and the USSR Council of Ministers concerning the improvement of planning and perfecting the economic mechanism, one of the principal goals of which is speeding up the implementation of scientific and technical discoveries and developments, aimed at increasing the growth rates in the productivity of social labor and the quality of output. In order to take into account the achievements of science and technology in the plans for the country's economic and social development, the Academy of Sciences, in conjunction with the state organs (the State Committee on Science and Technology and USSR Gosstroy), must work out programs on solving the most important scientific and technical problems as well as problems of the comprehensive utilization of natural resources, taking into consideration the applications of the results of basic and applied research. Among the top-priorities for the immediate future, provisions have been made for developing programs with regard to effecting savings in fuel and metal, building the BAM and developing industry in regions where this mainline passes through, and reducing the application of manual labor, etc.

The Academy of Sciences ascribes great importance to working in conjunction with the State Committee on Science on Technology on a comprehensive program of scientific and technical progress and its socioeconomic consequences looking on ahead to the year 2000.

On the surface the theoretical quest at times seems remote from the demands of practical work. As a rule, the enormous importance of basic research to the national economy does not manifest itself immediately but only after the passage of quite a lengthy period of time. It forms a stockpile for solving problems in the more or less distant future. It is precisely on the basis of such research that

new scientific and technical trends emerge which revolutionize production. "We well know," said General Secretary of the CPSU CC L. I. Brezhnev at the 25th Party Congress,"that the full flood of scientific and technical progress would dry up if it were not constantly being fed by basic research."

Basic research has the goal of getting to know the underlying principles of nature and society, the foundations of its logical constructs and hypotheses. In this continuous process of cognition some trends of research are deepened and broadened, while others die away, leaving after themselves bits of experience which are important for forming new scientific trends. By discovering new facts, summarizing data on the world around us, utilizing the ideas and methods of contiguous fields of science, and sometimes those which are very remote from each other, scientists fix objective data in new concepts, as well as the principled connections between objects and phenomena.

Basic research is directed at getting to know the underlying principles of the material world and the development of scientific methods which open up the paths to study new principles. Some of it, in finding an ever-increasing methodological basis and improving the internal logic of development, leads,as a rule, to the creation of new concepts and theories, marking a definite stage in knowledge. And other research, coming up against internal contradictions in the theoretical constructs or entering into conflict with practical experience, does not give rise to new methods and theories. But even such research turns out to be important for science, inasmuch as it facilitates the determination of possible paths for the development of further research.

Applied research is based on the results of basic research; it utilizes the general theories and methods of the latter and is directed at carrying out specific plans and programs for developing production.

Of course, it is impossible to draw a precise boundary between basic and applied research. In its development and generalization applied research frequently makes the transition to basic research. At the same time, enriched by the new results of applied research, basic research naturally stimulates the posing and solution of major problems which are very important to the national economy, achieving their own culmination and final proof.

Of course, it is not at once and not all basic ideas achieve their own applied culmination. Sometimes years or even decades pass before the practical importance of this or that basic scientific trend manifests itself. That's the way it happened, for example, with the theory of numbers, the theory of probabilities, mathematical logic, and the abstract theory of automata, which only after a lengthy development in accordance with the laws of internal logic found a wide field for practical application, enriching science and practical work with methods which subsequently exert an influence on many scientific trends and applications.

It is impossible to over-estimate the importance of basic research, inasmuch as it exerts an increasingly active influence on radical changes in the economy, equipment, and technology. Thus, modern physics has led to the understanding of the atomic nucleus and, in the final analysis, to the creation of an entire industrial sector, connected with the building of high-capacity nuclear electric-power

stations, the importance of which in the total energy balance is constantly growing. The study of heredity served as an impetus to the development of genetics. Based on its achievements in our own times we have already created new varieties of grain crops by means of purposefully targeted changes in the genetic characteristics of plants. Ahead lies the solution of an even more important problem: breeding plants with the desirable properties based on directed mutational genetics.

As a rule, substantial results of basic research stimulate the development of comprehensive programs of an applied nature, aimed directly at carrying out major plans of the national economy, as well as at creating new models of equipment and technology which change the nature of production in certain sectors of the economy.

During the postwar period our scientists, designers, and workers, upon assignment from the Party and the government, developed several major projects. One of them which is very important for our country is space exploration, the pioneer in which is the Soviet Union. In order to solve the problems connected with this, we need to have an enormous complex of extremely complicated research in the field of aerodynamics, the theory of optimum control, radio-electronics, material science, chemistry, the physics of inner space, biophysics, and medicine. In short, the ideas of practically all the natural sciences will be focussed on this program. The outstanding Soviet scientist and engineer, Academician Sergey Pavlovich Korolev, has become the director of this program. The goal which has been set for large groups has stimulated the development of many new trends of basic research--ranging from problems of flight dynamics to the theory of meteors hitting against obstacles. In the achievement of this goal there have clearly been manifested the characteristic traits of the socialist social system, capable within a brief time of mobilizing to solve very important scientific and practical tasks large groups of persons and ensuring their successful execution--from the initial exploratory research to the implementation of the engineering plans. It is appropriate to emphasize that major national economic plans of such scope set forth problems not only for the scientists but also for the workers in a number of economic sectors. Within the process of carrying out such plans they must strengthen their own material base, raise the level of developments and production facilities, intensively seek out new scientific and technical possibilities, and master up-to-date equipment. Our science and industry have coped brilliantly with these tasks.

An analogous situation arose in our country with the creation of nuclear power engineering; its foundations were laid by theoretical research in the field of nuclear physics. At a certain stage in this research its exceptional practical importance for future power engineering became clear. During the early 1950's an important trend arose in equipment technology--nuclear reactor construction, which relied on the achievements of nuclear physics, thermal physics, material science, radio-chemistry, and many other scientific trends. In turn, reactor construction facilitated the appearance of new basic research, which enriched science itself and created the basis for technical developments. The construction in our country of the world's first nuclear electric-power station marked the onset of the age of nuclear power engineering. At the present time nuclear power engineering is becoming an extremely important sector in the national economy, and its influence on the country's energy balance is constantly growing.