INFORMATION SUPPORT OF MANAGEMENT OF SCIENTIFIC AND TECHNICAL PROGRESS

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In present-day world,scientific and technical progress is the main factor of the intensified economic development and exercises a tremendous stimulating influence on the social and cultural development of society.Scientific and technical progress is based on purposeful development of basic and applied scientific research.But before the results of research can have an impact on production processes in society, they must first serve as a basis for experimental design,project elaboration and experimental production of new and promising industrial products and processes,and also for the last preparatory stage to their large-scale industrial introduction. Scientific and technical progress thus permeates all interconnected links of the "research-production" cycle,which must be therefore considered as parts of an integrated system.The goal of the management of scientific and technical development is to attain maximum effectiveness of social production.

The objective function describing the process of scientific and technical development includes many arguments, and,in the final analysis,the task is to maximize the total effect in spite of certain restraints(largely,limited resources).The fulfilment of this complicated task is possible only is there is a well organised management of scientific and technological development.

In the USSR and in other socialist countries with a developed socialist economy, its scientific and technological development is controlled on a balanced basis with due regard for social as well as economic factors.

The management of scientific and technological progress on a nation-wide scale involves solving a set of problems stated in common system terms. These problems include, above all, the following:

--determination of long-term and short-term goals of scientific and technological progress proceeding from the general goals of economic and social development of society;

--identification of development trends of technology and production for these long-term and short-term periods;

--determination of the potential of scientific and technical progress and of the resources as well as of the existing economic, social and political nature limitations;

--allocation of resources allotted for scientific research and development as well as for modernization of production;

--drawing up and implementation of the specific plans of scientific and technological development at all levels of national economy.

It should be pointed out that for management goals to be achieved feedback is necessary, namely, control of how the tasks are fulfilled in terms of effectiveness indicators of social production and of economic development rates.

Obviously, planning scientific and technological development and implementing these plans are inseparable from the overall comprehensive process of management of the country's

social and economic development. Separate branches of economy and regions of the country are regarded as subsystems of the national economic system, and the management of their scientific and technological development--as a subsystem of the nation-wide management of scientific and technical progress. All these systems and subsystems must conform to general systems criteria.

For management of scientific and technological progress and, in particular, for the above tasks it is necessary to be provided in good time with varied and sufficient information about the state of the system and the effectiveness of management both viewed as varying with time.

The overall task of management of scientific and technical progress can be by way of convention divided into two main components:

1. Establishment and improvement of the creative basis for scientific and technological development.

2. Implementation of scientific and technological achievements in production.

The former aspect includes the shaping of the trends of research and development; development, transformation and organisation of new research and design institutions and groups; provision of research technology and pilot plants; training scientists and engineers as well as assistants and ancillary personnel according to specialities and qualifications required. In all these activities information should transfer data about the results of the accomplished research from one link to another, i.e. transfer data about the achieve-

ments of basic research--to research groups specializing in applied research, data about the results of applied research--to designers and planners, and data about new structures and designs--to specialists engaged in production. Lastly, on the basis of information exchange between organisations belonging to a similar subject profile, alternative decisions should be taken: whether to conduct a certain research project independently, or, instead, to "borrow" some results obtained by other institutions and creative teams.

The second aspect involves planned adoption of new technology and advanced technological processes, organisation of the production of new industrial facilities, the construction of new enterprises and workshops, preparation for the manufacture of and development work on the first series of new products, and so on. Here, information about new plant and production processes is used. At the same time scientific and technical and technico-economic information characterizing the processes of innovation and properties of new products acts as a feedback for all management units controlling scientific and technological development.

It should be pointed out that it is necessary to provide information support for all units embraced by a comprehensive plan of designing and adopting new technology,--from the origination of the new idea to the serial or mass production of the new product. Scientific and technical progress constantly gives birth to new kinds of technical systems and devices, to their new types. A new type, and especially a new kind, of technical system or device usually appears to become a rather

stable category and to exist for a comparatively long time, even though within each type there is a continuous process of replacing the existing models by improved ones. In each case information should reflect all the elements of the "life cycle" of each type and model of commodity from conception to death, i.e. to the time it is discarded.

Thus, information essential for management of scientific and technological progress is of a complex nature and includes scientific and technical, technico-economic and economic information. Only integration of all these types of information ensures an objective selection of management decisions. Hence, information is one of the resources used in the management of scientific and technological progress. It plays the role of an intermediary in the interaction of all the links of the complex hierarchical management system and in the assessment of the results of management.

The information sources for these purposes are forecasts of long-term development of science and technology; information about various plans, ranging from national five-year economic development plans and plans for solving major scientific and technological problems down to the research plans of individual scientific institutions; data on the resources of all the links of the "research-production" cycle; information about specific results of research and development projects, about discoveries and inventions; data on industrial innovations including reports of how the plans for the adoption of novelties have been fulfilled. Data characterizing the level of national science and technology in comparison with that attained abroad are also essential.

Naturally, the role played by individual types of information is hot the same at different hierarchical levels and at different stages of management of scientific and technological development. For instance, data taken from scientific and technological forecasts are of great importance for long-term planning, whereas in case of current management of an enterprise these sources are of lesser importance; scientific and technological information is made intensive use of when drawing up forecasts and plans on the nation-wide scale, or for a whole sector of economy when assessing projects, making up plans of research and development and evaluating the importance of the results obtained.

It should be pointed out that none of these information sources is homogeneous, i.e. none contains solely scientific and technical or, say, economic information. Confining ourselves here to documents received by centres of scientific and technical information, we should like to point out that such douuments, particularly R & D reports, usually tell not only about subjects of research and development and the results of the completed projects, but also contain economic information about the resources of scientific and technological development. By summing up the latter kind of data in such reports one can obtain valuable data characterizing the scientific and technological potential not only of separate organisations but of the sectors of the national economy and of the country as a whole. Consequently, this is a matter of how to extract as much information as possible from scientific and technical documents and to analyse and summarise it for management of scientific and technological progress. The potential of the system of scientific and technical information in this respect was

underestimated for some time but now the first steps have already been taken to fill the gap.

Automatic management systems (AMS) into which information systems are incorporated as their specialized subsystems are a good "catalyst" for promoting a more active use of the potential of institutes and centres of scientific and technical information for support of management processes. These subsystems develop into information "data banks" which provide scientific and technical information to broad sections of scientific workers and specialists engaged in production. They also supply other AMS subsystems, above all management subsystems of research and development projects, with data (including generalized ones) essential for management purposes. In turn, data from other AMS subsystems flow to the "data banks". Such "data banks" can be set up at different management levels with varying degrees of generalization (aggregation) of information provided for management.

Let us illustrate the use of an information "data bank" by some typical problems in the management of scinetific and technological development.

1. Decision making on the establishment of a new scientific institution. A proposal on this issue is usually submitted by an all-Union ministry or a government body of a Union republic. To make a decision at least the followng information should be available:

-- the list of scientific institutions now engaged in research on the range of subjects proposed for the new scinntific establishment (inclidung not only the institutions subordinated to the given management organ but also those located in the same region, on adjacent territories and in other regions of the country)

--what resources (manpower, material and technical basis, etc.) are available at these scientific institutions and to what extent these resources are used for projects within the subject range of the proposed new scientific institution;

Analysis of such information can lead, in particular, to one of the following decision alternatives:

--the establishment of a new institution (in the given field or region) is desirable and possible;

--there is no need to set up a new scientific institution, as there is another scientific institution (or there are others) concerned with the same research subjects and possessing the necessary resources for the development of work on the required scale;

--it is advisable to boost work on the given range of subjects in one of the existing scientific institutions either by granting it additional resources or by transferring to this scientific institution units from other institutes and, hence, by pooling the available resources.

A great deal of information essential for well-grounded decision making can be extracted from the sources available to institutes and centres of scientific and technical information (data on the range of subjects of research of scientific institutions, etc.) and much--from materials of statistical accounts (data characterizing the resources commanded by scientific institutions).

2. Organizing work in elaboration of a new scientific or technological problem. The emergence of a new vitally important

problem often necessitates establishing a whole system of new scientific and design teams. Scientific workers and other specialists included in these teams often have had no previous experience with the new tasks and, consequently, are not acquainted with the existing relevant scientific and technical information. Such situations occurred in many countries for instance, at the outset of the work in nuclear power engineering, at the first stage in the development of digital electronic computers, in shaping molecular biology as a new field of science, etc. In such situations before obtaining of the necessary information, one has to identify the list of research fields and specialties to be drawn upon in the formation of the new research teams. When this is done, the subsequent search of information about R & D and D & D institutions and about scientific workers and other specialists within the listed range of subjects is carried out as described in the preceding example.

3. Planning of R & D manpower training. In planning research manpower development through post-graduate course it is necessary to possess data both about the demand for scientific workers of each speciality and about the available resources for this purpose. Formal evaluation of the demand for scientific workers of a given speciality can be based on in the ratio of holders of scientific degrees to the total number of workers in the field. To evaluate the possibility of training the required number of scientists of the given speciality through post-graduate courses, one needs data on the composition of the specialists with higher education in a certain group of specialities with due account for the age factor, data on the potential

scientific tutors of post-graduates, and data on the work-load of potential scientific tutors, which is formally characterized by the number of post-graduates per tutor. Obviously, one cannot be guided by average indicators only; it is necessary to obtain detailed data about each research institute and higher school having a post-graduate course. Evidently, in this case the necessary information can be extracted mainly from analysis of statistical accounts, whereas the possibilities of the conventional sources of scientific and technical information are limited in this respect. More examples dealing with preparation of management decisions with the help of information "data banks" could be given by examining other numerous tasks of the management of scientific and technological development.

Future integration of information "data banks" into a joint automated network complete with high-speed communication channels holds a great promise for enhancing the effective use of the store of data. This gives particular urgency to unifying the form of storage of information and ensuring interaction and compatibility of the "data banks" in the network.

Great importance is also attached to the search of effective methods of extracting information from scientific and technical documents and to the formation of the data base. Lastly, the development of the new aspect of information activity will entail some reorientation of the "philosophy" of people engaged in scientific and technical information service, accustomed to concentrate their efforts on information services to scientific workers and specialists rather than on information support to management. The development of this trend may be expected to raise the level of activity and make more technical facilities available to scientific and technical information service.

ILLEGIB

THE ORGANIZATION OF THE SYSTEM OF SCIENTIFIC AND TECHNICAL INFORMATION IN INSTRUMENT MAKING

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The supply of information to scientists, practitioners and executives is based in the USSR, as in other scientifically and industrially advanced countries, on treating scientific information work as a separate field of endeavour and organizing the necessary services and systems of scientific and technical information along this line.

A national scientific and technical information system has been created in the USSR, comprising a broad network of all-Union, sectoral and inter-sectoral regional information units which provide to the managers, scientists, engineers, technicians and skilled workers all the scientific, technical and economic information they need about scientific discoveries, development trends in science and engineering, industrial processes, and up-to-date industrial knowhow. Exhaustive, reliable and timely scientific and technical information today is crucial for a swift pace of the scientific and technological progress and a more efficient social production.

Sectoral systems of scientific and technical information occupy an important place in the national information system.

They do most of information servicing of the leading staff of ministries and administrative departments, specialists at R&D organizations, engineers and technicians, industrial workers and employees.

Separate systems of scientific and technical information have been set up in all industries, in the fields of construction, communications, transport, agriculture and health service - in conformity with the management structure of the Soviet national economy. Sectoral information centres are leading in these activities.

The instrument making industry is a sector in which more than 500 research and design organizations and industrial enterprises are operative. They develop and manufacture a wide spectrum of products - from small office equipment to multi-computer information and computing complexes, used as hardware in automated management information systems of various kinds. The products of this industry are used in numerous and various sectors of economy and are very essential for scientific and technological progress.

In designing the sectoral system of instrument making information, the main thing was to choose for it such a rational structure as would ensure meeting the multi-profile information needs of this industry. (This problem is typical of other industries as well).

A broad network of information services is currently working in the field of instrument making - there are information units at all R&D and D&D institutions in this sector as well as at large and medium enterprises.

Some of the information units of the main enterprises and organizations were nominated "base organisations" to be responsible for information services in the individual subfields of the instrument making industry with its wide variety of products.

The organizational structure of this sectoral information system thus has three levels: lower- information units at organizations and enterprises, medium - base information services and higher - the central information organ of this sector of the economy.

This structure provides for a maximum use of the potentials of all information systems within the sector through their coordinated interaction in fulfilling the main tasks of information work: reference information services, technico-economic analyses of the surrent condition and trends of instrument making, creation and dissamination of information materials, publicizing the industry's latest achievements through mass media (press, radio and TV) and also by holding all kinds of meetings, conferences and exhibitions.

For reference information services to the ministry's staff, as well as to specialists at R&D institutes, D&D organizations and industrial enterprises, a sectoral reference information file is used, which is made up of the reference information collections of the central sectoral organ, the base organizations and many other organizations and enterprises in the field.

Five eyears ago an automated system of scientific and technical information, called "Referat", was created in the field of instrument making and it has been successfully run ever since, considerably enhancing the exhaustivity and speed of the reference

information services. The designers of this system geared it to the structure of the instrument making industry and embodied in it a natural combination of conventional forms and methods of information work and the modern ones involving the use of electronic computers, business machines and communication media.

The build-up of the sectoral system of reference information services is oriented primarily at discharging the following basic tasks:

- decentralized input of information into the system's file ; for this purpose base information services are assigned (by subject area) each responsible for the acquisition of material within its subject area;

- enhanced coordination of activities of all information services within the sector, securing their smooth interaction in supplying information to the users;

- a considerable rise in exhaustivity and speed of the service, and introduction of a wider spectrum of services; all to be achieved with the limited technical facilities available.

The "Referat" automated system presently provides four types of service:

- selective dissemination of information, monthly alerting the system's users to new accessions on the basis of their standing interest profiles;

- a question-answering service, based on retrospective searches covering the entire information holdings of the system;

- production of data bases for narrowly specialized information retrieval systems (in various subfields of instrument making); these data bases are furnished with information search-

ing tools; and

- issuing bulletins of abstracts (each issue carries and alphabetic keyworks index, allowing multi-aspect information searches to be conducted).

To carry on the above services one does not need to keep a compete centralized collection of primary documents in the field. A data base of secondary documents (texts), for example, bibliographic entries plus abstracts or annotations, is quite sufficient. A data base of this king has been maintained at the TSNIITEpriborostroeniya Institute since 1968. At the moment it includes more than 700,000 abstracts of journal articles, books, theses , R&D and D&D progress reports, catalogues, standards and norms as well as specifications to patents, author's certificates, inventions and innovator's proposals.

The overall economic effect from introducing automated STI systems is hard to estimate because we do not know how to quantify the effect of heightened service exhaustivity and speed. What can be computed so far is the gain from less time being spent by specialists in information searching, a cheaper service and prevented duplication of effort. For the "Referat" system, for example, this effect alone amounts to several millions roubles every year. It should be emphasized that the organizational and technological structure of the "Referat" seems to have been desighed very efficiently; the extent of automating and mechanizing information storage, retrieval and output, has been chosen happily, as witnessed by the fact that the design concepts of the "Referat" have been widely adopted since in building sectoral information systems in the various sectors of economy.

Introduction of service fees is a major factor in raising the efficiency of information systems.

Soviet information organs are now changing over to the principle of cost-effectiveness and cost-accounting. In this connection, the TSNIITEIpriborostroeniya Institute began in 1973 to provide reference and information services to its corporate users on a contract basis. In such contracts the sets of services to be rendered by the Institute are set down as well as the patron's subscription fees that reimburse the costs of the reference information service. The set of services includes selective dissemination of information, restrospective on-demand searches, supply of all kinds of reference data, copying of documents, etc.

The operational experience of the "Referat" system shows that its popularity with the users is growing. For instance, in 1974 the number of subscriptions almost doubled over the 1973 figure.

Over and above its on-demand document-based reference information services, the instrument making information organs respond to factographic requests sent in by the users. More than 6,000 factographic requests are answered every year by the central sectoral information organ alone. As the automated information system in instrument making improves and more experience with its practical operation is accumulated, a second, updated version of the "Referat" system is being developed, which will feature automatic search of the document file for specified factographic data as well as on-line user-system interaction.

A descriptor information language with grammar is used in the "Referat-2", which provides for a semantic processing of

information. This language has enough semantic power to handle both documentary and factographic information on the basis of a computer-based Unified Sectoral Theasurus.

The system's software provides for flexibly varying the search strategies. Bibliographic data, descriptors and numeric data are used as search characteristics. An essential extension of the system's functions, use of up-to-date technical facilities (third generation computers, high-speed microfilm equipment, computer-controlled photocomposition and high-speed information transmission) will provide favourable conditions for further advances in information services to scientists and engineers, and be a powerful leverage in more efficient management of scientific research and of the development of novel technology in the industry.

As far as the outlook for automated sectoral systems is concerned, special attention should be given to their working in conjunction with sectoral management systems as well as with those of the all-Union information organs. Interaction (exhange of machine-readable information) is sure to raise service speed and exhaustivity and save the input effort.

Computerization allows an effective division of functions among the individual services and systems embraced by the national information system. In this way optimal conditions for the entire system operation are created through elimination of duplicate engineering and intellectual effort. The existing system of scientific and technical information in the USSR proceeds precisely from the principle of dividing the subject areas and functions among the information organs.

Analytical reviews and surveys are also a very important means to step up the scientific and technological progress in the various sectors of the national economy.

Surveys and the like materials are necessary for science-based decision making in planning assignments for research and development on new instruments and automatic devices, in allocating material, labour and money resources to be spent on developing special research institutes and design bureaux, and in planning the industry's output and product-mix.

Regular analyses and summaries of scientific and technical information about the latest advances in the world's science, technology and industry are an absolutely necessary element for building up an effective system of economy management. This activity produces a foothold for solving the problem of information services for the managerial bodies at different hierarchical levels in the industry, which is a major problem in developing the sectoral information system.

Collecting, storing and publishing scientific and technical information about industrial equipment and manufactured products is a further important task of the sectoral information system. The speed and quality of this information largely determine the rates of introduction of new technologies and new scientific and technological standards of production, and hence, also the product quality, output and pace of the scientific and technological progress.

For several years now the TSNIITEpriborosteroeniya has been publishing a special catalogue of "Instruments, Automation Means and Management Systems", at present comprising more than 7,000 catalogue entries of products manufactured by the instrument making industry.

A catalogue of products of more than 2800 foreign companies and corporations has been compiled, totalling over 17,000 items. It provides for swiftly supplying to users in instrument making and in other economy sectors, information about foreign industrial equipment and products.

In order to enhance the supply of information about the products of the instrument making industry, enhance the quality and reduce publishing times, the Institute has unified its information and reference-cataloguing publications. Specifically, a standard for "Cataloguing Data on Instruments, Automation Means and Management Systems" has been drawn up, the first of its kind in the USSR.

For the second version of the automated "Referat" system a complete automation is envisaged of the processes of production and dissemination of bibliographic, abstracting and nomenclature information.

Basic Trends in Raising the Efficiency and Further Development of the State System of Scientific and Technical Information in the USSR

The State System of Scientific and Technical Information in the USSR is made up of interacting specialized, sectoral, regional (intersectoral) and national (in the Union and Autonomous republics of the USSR) systems of scientific and technical information; all these systems have common goals, uniform organizational principles and compatible linguistic tools, software and hardware.

The specialized organizations, both state (government) and public (non-government), comprising the State System of Scientific and Technical Information provide a rapid information support to all categories of users in compliance with their information requirements and in the form most convenient to the users, either in the Russian language or in any national language of the USSR.

A timely supply to enterprises, organizations, administrative agencies and individual scientists and other specialists, of the scientific and technical information they need, and an efficient use of this information, promote the development of up-to-date technological processes and new machineries; this is a decisive condition for accelerating the pace of scientific and technological progress. Scientific knowledge and scientific and technical information have now become a major national resource of the USSR.

The State System of Scientific and Technical Information at present comprises 10 all-Union, 86 central sectoral and 15 republican institutes, as well as 90 intersectoral regional information centres and more than 10,000 information departments and bureaux at industrial enterprises and organizations. In addition, about 60,000 special scientific and technical libraries work in concert with all these information bodies.

The total manpower in the State System of Scientific and Technical Information now exceeds 150,000 persons, and national reference information holdings of the system is comprised of almost 2,000 million documents. The organizational structure of the State System of Scientific and Technical Information and the functions of its individual units (STI agencies) have been described in detail by V.A. Krasnov, in his report "State System of Scientific and Technical Information in the USSR", so, with your permission, I shall not go into this matter here.

What are the lines along which we are planning to improve our information system in the coming years?

Organizationally, this system reflects the national system of economy management as it is now taking shape in the country. As the management system becomes more and more perfect, the STI system, in getting adapted to it, is bound to change. For example, as industrial, research-and-production and regional associations are being set up in the USSR, information agencies of a new kind are created under their aegis,

each intended to serve a group of enterprises and organizations incorporated in the association concerned. This development implies a big rise in information service standards and provides an opportunity for more pinpointed specialization of service.

The need is ripe now for introducing into the structure of the State STI system one more level of STI agencies, namely that of basic nondepartmental sectoral organs, intended to coordinate the activities of the individual groups of existing sectoral STI agencies.

This need springs from the fact that many of the existing central sectoral STI agencies are basically departmental rather than truly sectoral bodies.

For example, in the field of machine-building there are as many as twelve sectoral information agencies, in chemistry there are six such agencies, etc.

These new basic services keep common reference information files for the benefit of departmental sectoral services affiliated to them. This additional structural level is needed also in conjunction with the efforts towards automation of the STI system and creation of interconnected automated networks. These are two drastic and essential innovations that are bound to be gradually put into effect.

Work has been going on in setting up new intersectoral territorial STI centres, which have been very efficient in disseminating the latest developments in science and technology and up-to-date industrial know-how among all enterprises, irrespective of their departmental affiliations. By the end of

1980, the network of intersectoral territorial STI agencies is to be completed.

Especial attention will be paid to the setting up of STI departments (bureaux) at industrial enterprises, R&D and D&D organizations.

As the scientific and technical information needs of scientists, specialists, industrial operators and managers continue steadily to grow, the reference information activities of the information organs will have to be upgraded continually, too.

Dissemination of printed information materials as the chief vehicle of mass-scale information supply, if not supplemented by other, more up-to-date forms of reference information service, such as selective dissemination of information, even at the present time proves inadequate to these tasks.

Selective dissemination of information provides for accurate exhaustive and timely supply of pertinent information. It has been highly appreciated by users in science and industry and is to be further promoted.

New sources of information have appeared in recent years, such as R&D and D&D progress reports, scientific and technical translations and other documents. They have enriched the reference information files of information agencies due to larger stock of materials and their wider coverage, and this makes it possible to broaden the spectrum of information services rendered on the basis of these files.

Special importance is given today to analysis and generalization of information stored. On this basis, essentially new in-

formation is generated in support of a substantiated decisions made by the managers of various administrative units, heads of development projects, specialists working in design and development organizations and industrial enterprises, and scientists.

The main products of analysis and generalization of information are analytical and comparative surveys, which give concise and systematic information on, and scientific overviews of, the current state, trends and development forecasts for the various fields of science, technology or activity--describing in a nutshell all scientific or technological achievements over a certain period of time and quite often even recommending solutions of the problems concerned.

Demand for such survey materials is very strong, and this calls for boosting the development of the survey and analytical activities carried out by scientific and technical information agencies.

There are plans for further stepping of the efforts of scientific and technical information organs in preparing and supplying to planning agencies, ministries, administrative departments, managerial staff of industrial enterprises and organizations, information about major Soviet and foreign achievements in science, technology and production, to be taken into account in drawing up and discussing the plans for the development of the national economy and of its individual sectors, enterprises of organizations.

This information is presented by the scientific and technical information agencies in the form of annual reports in the periods when such plans are being drafted and discussed.

A timely supply of information on equipment and products intended for industrial consumption, as produced or planned for production by the USSR industries, is a major prerequisite for an adequate elaboration of projects of new enterprises or modernization of existing ones, and for upgrading industrial processes and raising labour productivity.

Machine-building ministries already embarked on annual issuance of catalogues of serially produced equipment and of equipment envisioned for output in the coming years; they also provide timely information on discontinuation of manufacturing outdated models. In the coming five-year period, this information will encompass the entire nomenclature of the national industrial output.

Steps will be also taken to promote notification about equipment planned for production and about modifications introduced into designs and parameters of the products being manufactured.

More efforts is being spent to improve patent information supply to the national economy and to perfect the use of information files which are being set up in various sectors of national economy and in Soviet republics.

Special measures will be taken to improve the efficiency of local information services, such as local information departments or information bureaux at enterprises, and at R&D and D&D institutes. After all, the efficiency of the nationwide scientific and technical information system depends on their successful operation. When such a department or bureau fails to supply timely and selective information, this means that a large portion

of information channelled in through all-Union, central sectoral or territorial information agencies will remain outside the specialists' field of view or get to them too late. All the vast and expensive endeavour in collecting, processing, storing and disseminating scientific and technical information is justified only if the information materials ultimately get across to the scientists, specialists, workers, industrial innovators and managers.

Due attention is paid to the system for transmission and use of scientific and technological results on the basis of intersectoral information. The economic effect of scientific and technological innovations adopted from information materials and introduced into practice has been estimated at an annual sum of several hundred million roubles counting only data actually covered by records.

By developing and improving only the conventional forms and the manual methods of information service it is in principle impossible to drastically raise the efficiency of the State System of Scientific and Technical Information. The scientific and technological progress contributes to a continually shortening of the time lag between a discovery and its industrial implementation, so that for some products the lag is now as short as six months. In such a situation, greatest successes are scored by a country which is capable of using the latest achievements in science and technology in a shortest possible time. What users today actually need is on-line information. And this problem

can be solved only through automation and mechanization of information processes involved in data gathering, processing storage and dissemination.

Beginning from 1976, automated STI systems are to be created in the USSR as multi=purpose systems featuring one=time information input and based on hardware complexes designed for the information agencies of various levels -- sets of computers, information receiving and transmiting units, and microfilm copying, storage, retrieval and output devices.

As a result of the completion of respective research and development projects in the current five=year period and introduction of their results into industry, more than 30 major automated STI systems, based on second and third generation computers, are being run experimentally and commercially as component subsystems of the automated management systems at various levels how under development in the Soviet Union.

Experience gained with the use of these systems for reference information services and the advances in theoretical and applied research in the STI files will constitute a solid base for designing automated information systems and promoting their basic component subsystems and units up to standard design modules and concepts, based on a large=scale application of third generation computers and of the up=to=date facilities for an allround mechanization of information processes.

In the coming few years, still more will be done to develop automated STI systems and to provide a large=scale exchange

of machine readable information between them.

The structure of the State System of Scientific and Technical Information and the available know=how in development of specialized, sectoral and republican automated systems of scientific and technical information have provided a necessary springboard for a transition from development and introduction of individual automated systems to building up a network of interconnected automated centres of scientific and technical information. This network is to be incorporated in the State-wide Network of Computing Centres equipped with most efficient computers of the Unified Computer System operating in a time=sharing mode, furnished with input=output devices connected to high=speed communication channels and a ramified network of terminals and conjoined with the automated management systems at respective levels.

Initially this network is to encompass the all=Union and several of the central sectoral and intersectoral regional scientific and technical information agencies; other information organs will get connected to the network gradually, as automated scientific and technical information systems will be created in them and the appropriate communication channels will be placed at their disposal.

Such a network will make it possible to improve the standard of information service offered users independent of their departmental affiliation and geographical location, raise exhaustivity and drastically reduce access time, eliminate

wasteful duplication in information storage and processing and enlarge the contingent of system users.

Soviet participation in international cooperative projects in the information field will be promoted, which will work as a further major factor in raising the efficiency of the State System of Scientific and Technical Information.

The Soviet Union takes an active part in the development of an international system of scientific and technical information of the CMEA countries and of an International Centre for Scientific and Technical Information as its component part. Along this line, a series of specialized and sectoral information systems are to be developed and implemented. More than 30 Soviet information bodies are taking part in this endeavour.

On the basis of bilateral agreements, partnerships in the field of scientific and technical information will be promoted, in particular with the USA, Britain and France. Multilateral cooperation in the framework of various governmental and non-governmental international organizations in scientific and technical information has been expanding, first and foremost, in connection with the project of a World System of Scientific and Technical Information (UNISIST).

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