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# Handling of Scientific Information in Romania*


FRANCOIS KERTESZ
Oak Ridge National Laboratory**
PO Box X, Oak Ridge, Tenn. 37830


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**The Scientific Documentation Center of the Romanian Academy acts as the focus of information activities. It ensures centralized procurement of difficultly assessible reports. It maintains contact with similar national and international organizations. Review and state-of-the-art articles receive special attention. An answering service is provided, giving references in response to specific subjects. Romanian scientific efforts are summarized in Russian and English-language bulletins and offered in free exchange for similar foreign publications. The organization of this activity and the individual tools are described, emphasizing the needs of chemistry and chemical engineering.**


Practitioners of scientific information handling usually believe that their field of activity has a universal character. This is reinforced by the fact that most of us entered this field through the back door, after having been trained in one of the physical or biological sciences. However, the very fact that a *Symposium on Chemical Information Services Abroad* has been organized by the Division of Chemical Literature, indicates that special situations prevail in various areas of the world and organization of scientific information services is greatly affected by certain factors.

The history of science is full of examples which indicate its all-pervading, supernational nature, preconditioning us to feel that as long as we ask the right question, science will always provide the correct answer. On the other hand, it should be emphasized that organization of a system to serve the information needs of scientists and engineers is not purely scientific, but is also a social problem. It is affected by special factors such as location, environment, etc. Examples abound to illustrate this state of facts. Even within this country, a more or less lonely chemist in a small remote college has different requirements with respect to an information system than his colleague employed in a research laboratory of a large chemical company in northern New Jersey, with access to a well stocked library and all the information resources of his employer and of the New York metropolitan area.

Local conditions prevailing in a given country affect even more various aspects of information handling. Therefore, instead of a detailed description of the organizational structure, I would like to examine primarily the factors which influence the development of the information system of Romania, using that country as a model to show how the needs of a scientist and engineer in that country differ from those of his colleagues in a large, technically fully developed country.

I hope that this personal analysis, based on earlier acquaintance with local conditions and recent impressions, will make up for the lack of detail concerning the various agencies. After all, organizations usually are in a constant state of flux; they are subject to change because they are affected by these forces. My subject is a study of the factors which differentiate the information needs of the Romanian technical man and are responsible for the specialized tools developed during the recent years.

The first factor to be considered is *geography.* Instead of reciting well-known encyclopedic facts about the country, it suffices to point out that it is an Eastern European country, between Hungary, Yugoslavia, Bulgaria, the Black Sea, and the Soviet Union. Up to recently, it has been somewhat out of the way of the general tourist traf-

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fic, but the situation is changing rapidly. Still, it differs from countries such as Switzerland or Denmark, which are close to the main population centers of Europe. After repeated political changes, the population within the present boundaries of the country is somewhat less than twenty million. Agriculture is still very important, but the country is becoming increasingly industrialized.

The next important factor to be considered is the *language*. The importance of the language as a cultural and political factor must be experienced personally in order to understand it. People cling to their mother tongue and do not give it up easily, even if economic rewards are offered. Even in the U. S., in spite of our much-vaunted melting pot, many immigrant groups, for example the Amish and the Puerto Ricans, retain their language as the expression of their national culture, although it would be to their advantage to merge with the English-speaking population. The history of Canada and Belgium also offers examples of political struggles centered around the language problem.

The emotional attachment to the language is reflected also in literary works. French school children were brought up on the tear-jerking sadness of Alphonse Daudet's *Dernière Leçon de Français,* describing the last French-language class after Germany took over Alsace-Lorraine. Like in that province, the political sovereignty of some Romanian provinces changed four times back and forth during the period including the two world wars. This can have a traumatic effect on people and institutions.

Scientific information experts have repeatedly suggested the elimination of scientific publications in the less accessible languages in order to improve the communication process. They advocate the use of one or at most two languages, including Russian as a concession to political realities. We are still ruing the day when the Royal Society relinquished its requirements to use Latin as the language of its publications! However, there is a counterforce tending to counteract this trend toward the efficient use of a single language for scientific communications. This is the national pride in the native tongue to which I referred above. Its effects are manifested both deliberately and unconsciously. This national awareness of the language as a carrier of its culture helped to preserve the language of the Romanian people who lived for many centuries under foreign domination. Hungarians and Austrians ruled in Transylvania and Bucovina; for a long period of history, the main portion of Romania was occupied by the Turks. The Eastern and Southern boundary of the country toward the Soviet Union and Bulgaria changed several times. However, the population retained its cultural heritage, although it belonged to a country with a different language.

Now that the geographic limits of the country more or less follow the boundaries of the language, the same national pride is responsible for the establishment of the many technical journals in the national language, Romanian.

Let us examine the language itself more closely. Its basic character has many favorable features, facilitating its function as an information transmission medium for science. It is a Romance tongue; scientists with knowledge of Latin or French are probably able to decipher some of the meaning of scientific papers without too much trouble, because in addition to the usual international cognates, many of the nontechnical words are recognizable. (This is not true of my own mother tongue, Hungarian, which is an arcane depository, divulging its secrets only to natives.)

In spite of the many non-Latin words of Germanic, Slavic, Hungarian, Turkish, etc., origin in the Romanian language, resulting from interaction with the neighbors, the Latinity of the language is clearly recognizable in technical texts.

Let us now consider another aspect of the language problem. Although a reader acquainted with Latin or a Romance language can grasp the basic meaning of a scientific paper in Romanian, the language itself is spoken only by few people and hardly at all outside of the country. This limitation is clearly understood by the local scientists who tend to be multilingual, like technical people belonging to similar small language groups. Romanian technical men are able to read papers with ease in at least two major languages.

The actual choice of the linguistic orientation is determined by another factor: *political alignment.* This, of course, keeps changing with history. Romania maintained for a long period of time strong political and especially cultural contacts with France. As a result of this, until the outbreak of World War II, French was widely spoken among the educated and outside of the primarily French-language areas, most French-language books and newspapers were sold in Bucharest. French was the first and by far the most widely taught foreign language in Romanian schools. The school system itself was modeled after the French pattern; as a matter of fact, the Romanian "baccalaureat" has been accepted at French universities as a complete equivalent of the French high school diploma. Promising Romanian students were sent mostly to French universities for undergraduate and especially for graduate school. France was also politically the dominant factor in the life of the so-called "Little Entente" countries of Southeastern Europe, to which Romania belonged, during most of the time between the two wars. Journals intended for international circulation were published in French, and the language remains a very important medium of scientific communication.

If French was the language of literature, diplomacy, and scientific communication, German became the language of commerce after World War I. In certain branches of science and technology, such as organic chemistry, the German influence was very strong. Laboratory equipment, glassware, instruments came from Germany, with German instructions. The influence of the language was facilitated by the fact that in the previously Austro-Hungarian portions of Romania, German has been widely used, playing the same role as French in the "old kingdom," the original two principalities, which were the basis of modern Romania. In addition, the Romanian province of Transylvania has a large German-speaking population.

After World War II, Romania became part of the Soviet Bloc of Socialist countries. As a result of this, Russian was widely taught in the school system, and the economic and cultural life of the country was reoriented toward Moscow.

This sharp political change erased some of the French influence and blew away traces of political collaboration with the Germans during the Hitler period; it created a close relationship of Romanian science and technology with the Soviet Union. Scientific instruments, college textbooks, and even large equipment, such as the research reactor of the Institute of Atomic Physics, were obtained from the Soviet Union. This required that people be trained in the handling, operation, maintenance, and repair of complex devices, making it necessary for a large number of technical specialists to learn Russian and to maintain contact with their Soviet counterparts.

In addition, many researchers who are currently in leading positions in various research institutions obtained their advance training during the postwar period in the Soviet Union. Romania is a member of the Joint Institute of Nuclear Research in Dubna and of similar international organization of the Socialist countries. All this contributes toward a certain technical orientation toward the Soviet

Union and the Russian-language technical information system.

Russian culture affected Romanian life also at another level. The predominant religious body in the country is the Eastern Orthodox Church, which is related to the Russian church. The church seems to be stronger in Romania than in most Eastern European countries. Its influence may be seen from the fact that until the middle of the last century the Cyrillic alphabet was used; it was changed in order to emphasize the Latinity of the Romanian language. Even today, the closely related language used in the neighboring Moldavian Republic of the Soviet Union is written with Cyrillic characters.

In spite of all this, the Russian language never exceeded the level of importance of French in the scientific literature. A cursory study of scientific papers revealed that the number of Russian references has decreased during the last decade or so, while the number of Western, and especially English-language references keeps increasing.

Political orientation is not a static phenomenon. Although a member of the Warsaw Pact countries, Romania is known to follow a relatively independent policy; as a result of this, relations with Western countries, and specifically with the United States, have become more warm. When I arrived in Bucharest in 1969, only a short time after President Nixon's visit, I was very much impressed by the warm hospitality extended to American visitors.

Of course, the influence of the English language and of American science and technology has been noticeable before this time. Just as the German technical literature dominated organic chemistry, American-controlled international companies have been the leaders of the oil technology. Extraction of oil and the rapidly growing petrochemical industry are important pillars of the Romanian technical effort; as a result, the influence of the English-language technical literature is widely felt. In one case, this influence is not necessarily for the best: it is curious to note that although today this country is taking some hesitant steps toward metrication and hopefully soon will abandon the archaic English system of weights and measures, Romanian articles in journals devoted to oil, natural gas, and related technical areas give pipe dimensions in inches; when citing American sources, the authors do not bother to convert gallons per minute and similar units to the corresponding metric unit. This implies that the readers are sufficiently familiar with the English units because they read our journals regularly.

Although I do not intend to discuss only linguistics, history, and politics in this paper on the technical information handling, I believe that the cultural, economic, and political factors should be emphasized. They helped to orient Romania successively, and to some extent even simultaneously, toward the French, German, Russian, and English-language technical literature. Today, English is definitely on the upswing. It is the most widely taught foreign language in the secondary school, and, in certain areas, such as nuclear science and engineering, nearly all practitioners have at least a reading, and often a speaking knowledge of English. This trend has been accelerated by the agreement concluded three years ago between the United States and Romania, because it facilitates the exchange of specialists and the training of many young Romanian scientists, in this country; this increases the pool of English-speaking technical men. When these American-trained engineers and scientists return to their own institutions, they will reinforce the impact of Western scientific literature in Romania, increasing the reliance on American and other English-language information services.

A study of languages and their use for general communication and for technical information would not be complete without mentioning the contacts of Romania with its neighbors, all of whom are its more or less close political allies. My impression is that there is definitely more goodwill and friendly understanding than during the period between the two world wars when the countries in that part of Europe were divided into feuding groups of successor states of the Austro-Hungarian empire. Today there are friendly political contacts and close economic cooperation, even with Yugoslavia, which is outside the Warsaw-Pact countries, as indicated by the joint construction of the Iron Gate dam and power plant complex on the Danube River. Although the Soviet-Bloc countries often organize technical meetings and symposia for their own scientists, there is little evidence that they master the smaller languages sufficiently well to read each other's literature in the original. The Romanian technical literature that I have perused contains very few citations to the Hungarian, Bulgarian, Polish, or Czech papers.

At this point, I would like to mention the more or less empirical basis of this study. I started to work for *Chemical Abstracts* as an abstractor of Romanian technical papers, among others, nearly 30 years ago; during the last dozen years, I have been covering the pertinent literature for *Nuclear Science Abstracts* and the Joint Publication Research Service,[1] a branch of the National Technical Information System in charge of foreign-language material. Probably because of the shortage of Romanian-speaking technical men in this country, the assignments that I have received from JPRS covered a great variety of fields, including chemistry, metallurgy, engineering, agriculture, biology, etc. JPRS required that we count the references and list them according to the country of origin of the cited journal. This helped to alert me as to the orientation of scientists in a given field. I have noted long runs of references to either Western or Soviet journals with one or the other predominating. The absence of certain countries was also noticeable. However, I must admit that I have not as yet tabulated these data and cannot present exact figures. However, even without an exact count, it was possible to note the preponderance of certain countries of origin in various fields: German papers predominated in chemistry, American and English in nuclear engineering, and Russian and American journals shared the field of oil technology.

I was able to supplement this "paper" study with personal observations when in 1969, I returned to Romania after an absence of 33 years, as a member of the AEC Exhibit held in Bucharest. The prevailing friendly spirit toward Americans resulted in invitations to visit laboratories and research institutes, and I took this opportunity to become acquainted with the information activities of the country.

I visited the Scientific Documentation Center of the Romanian Academy, where I had discussions with the director, Aurel Avramescu and his deputy, Pia Atanasiu. The center has been organized about eight years ago with the dual purpose of acquainting foreign scientists with the work of Romanian investigators and in turn to provide information to researchers in the Academy's institutes. At the same time, research and development work is carried out in the information field itself. The center also publishes current awareness bulletins in a variety of technical fields, which range from mathematics and astronomy, physics, chemistry, geology and geography, all the way to law, linguistics, and philology. Its publications include a monthly journal of book reviews and a quarterly devoted to information research. The abstracts of Romanian papers are published in Russian and English.

Until recently, a sister institution, the Central Institute for Documentation covered the field of engineering information. The role of these two centers in the information

field is similar to that of large American technical societies, assuming also some of the function of NTIS.

These two organizations are about to be coordinated by the National Information Institute. This relatively new group represents, to a certain extent, a management information system, attempting to coordinate information in interdisciplinary fields which require joint action from a variety of areas. The new institute emphasized environmental studies, automation, power plant systems, long-range economic planning, etc.; it also represents Romania in the information system of the COMECON (Council for Mutual Economic Assistance) countries in Moscow.

Many of the Romanian research institutes are supervised and managed by the Academy of the Socialist Republic of Romania (Romanian Academy). The Academy has an actual operating role, as in the Soviet Union, in contrast to the primarily advisory character of the National Academy of Sciences in this country. Membership in the Academy is a very high honor; until recently it brought also financial rewards, but these extra benefits have been abolished. The larger institutes maintain their own information system for the benefit of their researchers.

Research and Development in applied fields, such as petroleum, chemical technology, medicine, agriculture, etc., is supervised by the ministries which are responsible for the field. As a result of this, the ministries assume responsibility for technical information in specialized areas. This parallels the responsibility of an American department or agency, such as NASA or DOD for the research sponsored by it, and for the dissemination of the resulting information. However, the ministry has a broader activity. For illustration, let us consider the Ministry of Electric Energy, which maintains an Office of Documentation of Power Generation.[2] This office not only edits and distributes technical journals in the field, but it also issues standards, operating instructions, and provides translations of foreign-language articles into Romanian for staff members of the research institutes, and assumes responsibility for labor safety. The Ministry also operates a technical museum, covering the fields of mechanics, magnetism, electricity, heat generation, illumination, telecommunications, chemistry, hydraulics, and electrical and industrial machinery. Some of the ministries publish "Popular Mechanics" type reviews for the general public. In this country, these functions would be divided among several specialized technical societies, ASTM, a federal department, state agencies, trade associations, etc. Other branches of industry are similarly covered under the auspices of a specialized ministry; as mentioned before, the Academy assumes responsibility for most areas of pure science and for some special fields, such as atomic energy.

Several technical journals of the ministries carry selected abstracts of foreign papers within their scope. They also cover the foreign book literature by printing lengthy book reviews, enabling the prospective buyer to make an intelligent decision and to keep up with the foreign literature.

This brings up the ultimate question of the usefulness of an information system—how well does it fulfill its mission to keep the individual scientists informed. During my visit to the research institutes, I was very much impressed by the awareness of Romanian scientists of the activities of their colleagues abroad. They quoted names of people publishing in their field of interest and seemed to know the major universities and research laboratories. Their awareness was greatly assisted by their access to good libraries.

At this point, I must again emphasize that I am drawing conclusions from a rather subjective survey. My "sample" was not scientifically chosen, and I did not closely inspect all libraries at the institutes that I visited. With this caveat, I would like to cite the impressive library and information activities of the Institute of Atomic Physics of the Academy. The area assigned to the library seemed to exceed that of my own institution, the Oak Ridge National Laboratory. Their journal subscription list includes about 2500 titles, which compares favorably with libraries of similar institutes elsewhere. The staff members of the information group with whom I came in contact, appeared to have a good technical background. They take care of literature searches, translations, and similar information needs of the researchers. On the other hand, scientists working elsewhere in the Bucharest area did complain that they do have occasional problems in finding journals that they need in their work. The Institute of Atomic Physics with its excellent library is located about 15 miles outside of the capital, which is inconvenient for researchers within the city.

As a general rule, the information facilities of educational institutions appeared to be less well endowed than those of the special research institutes under the Academy or a ministry. This is, of course, a fairly general occurrence everywhere. However, this situation is occasionally mitigated by an overlap of supervision between university and Academy institutes. I saw an example of this when I visited the Institute of Physical Chemistry, directed by I. G. Murgulescu. Under his leadership, this institute became a well-known center for research on molten salts, employing about 25 scientists who publish regularly on various electrochemical and other aspects of molten-salt systems. A few days later, I was shown also the laboratories of the Chair of Physical Chemistry of the University of Bucharest and found out that Murgulescu holds that chair, dividing his time between the University and the Institute. (He is also an important political personality; at that time, he was Vice-president of the National Assembly of Romania.) Thus, even though the university laboratory appeared to be less well endowed, I believe that his associates there would have convenient access to the specialized information resources of the Academy institute.

I was interested to note that the field of information science is not neglected and has its own up-to-date practitioners in Romania. This is probably due to the traditional excellence of the Romanian school of mathematics. Avramescu is an internationally recognized expert in information science; he has published on information theory in this country.[3] During his 1970 visit to the United States, he had discussions with information handling groups in this country and presented a talk at the October 1970 COSATI meeting held at the National Science Foundation.

The Romanian literature contains many articles on various aspects of information handling. Indexing problems have been studied and a Romanian-language thesaurus for the coordinate indexing of the documentation literature has been developed. As computers are becoming increasingly available, their role in information storage and retrieval is closely examined. Romania has four IBM 360 computer systems, but there is considerable need for adequate software and specialized thesauri. The priorities of information research in a country with planned economy, such as Romania, are related to the requirements of the Five Year Plan. The need for information is clearly "problem-oriented." For this reason, the various indexing techniques, such as Uniterm,[4] are closely studied. Like the other Eastern European countries, nearly all articles published in Romanian journals carry a UDC index number; however, the universal decimal classification system is not considered a suitable searching tool.

Preoccupation with computerized information systems is reflected by the increasing number of current articles in

the Romanian literature. A recent issue of the English-language publication of *The Centre of Economic Computation and Economic Cybernetics* contains an article on the developing management information network.[5] The authors attempt to evaluate how information activity affects management decisions concerning technical development processes. The political viewpoint, as exemplified by party directives, is strongly represented in the analysis of the problem. The same issue also contains articles on computerized storage and retrieval[6] and EDP and information processing studies.[7]

Browsing through the Romanian literature of information science, one may note with interest that foreign information handling activities and organizations receive close attention.[8] The purpose of these articles on world-wide problems appears to be to help adoption of the best features in Romania. This is a common occurrence in the smaller nations. They review foreign activities in a variety of fields, and as a result are quite well informed. On the other hand, scientists in the large countries often neglect the scientific output of smaller nations; many of them believe that if a paper is not published in a "reputable" journal, in one of the four or five major languages, it is not worth bothering about. The technical man in a small country is aware of his own limitations and the shortcomings of the tools at his disposal; therefore, he surveys activities in his field as reported in the technical literature of the major countries. As a result, he is often better informed than his colleagues in the large industrialized nations. (One of the best reviews of the development of the American information-handling activities may be found in a Hungarian physics journal published about three years ago.[9] I believe that our excessive loyalty to refereed papers in prestigious journals leads us to overlook important items published in less known and less accessible periodicals.)

The leaders of the Romanian information organizations recognized that as a small country, Romania can greatly profit from formal participation in international efforts. The country collaborates with the budding international Nuclear Information System of the International Atomic Energy Agency and is especially active in the organization of UNISIST, in the expectation that sharing of resources through a world-wide information effort will help to eliminate costly duplication of intellectual work. As a representative of his country, Avramescu supports strongly standardization for compatibility, such as the proposed international list of scientific and technical journals. He also espouses the direct access of national information systems and centers to the world-wide information center network, emphasizing the need for regional centers.[10] He also recommended that the scientific and technical descriptor vocabularies of the four UN languages be intertranslated.

To evaluate the efficiency of the present system, let us consider a scientist who works in a Romanian laboratory. It is of interest to examine how well he is served by the information tools available to him. It is obvious that we cannot find a single prototype. If our man is a well-known scientist who has been abroad and has met in person his colleagues who work in the same field, he is in a very special position. In such a case, it does not matter that he is Romanian; his situation would be the same as if he were a well-known Brazilian or Indian scientist: he is not truly a part of his national scientific establishment, except to the extent that he obtains his livelihood from a university professorship or the directorship of an institute. He probably spends as much time in New York, Paris, or Moscow as in Bucharest. If he has been accepted as a full-fledged member of a Derek de Solla Price-type invisible college in his field, he has no need for a conventional information system to obtain the material that he desires; his personal friends and colleagues usually supply him with preprints, news of scientific breakthrough, and the latest technical gossip long before any of it breaks into print. Although this is a great advantage to him, this state of affairs contributes to his alienation from his local colleagues. Every small country has a few truly international scientific personalities who do not participate very much in local activities.

The second prototype is a contributing expert of a special school which has been developed in the country and received recognition abroad. He might be a member of Murgulescu's molten-salt research team, a young mathematician at the University of Bucharest known to be in close contact with French scientists in the field, or a reactor physicist with many publications just returning from the Joint Institute for Nuclear Research in Dubna, Soviet Union. If the Romanian group is indeed appreciated abroad, there is usually a true interchange of young scientists in both directions. At the Institute of Physical Chemistry of the Academy, I encountered guest scientists from Kiev, USSR, and Trondheim, Norway. In such a case, publications, correspondence, and preprints are freely exchanged in both directions. The Romanian scientists' work is appreciated and sought after abroad, and in return, the local men are able to keep abreast of happenings in foreign laboratories.

Problems arise in the third case, involving technical men working in areas in which the Romanians are behind but would like to catch up—e.g., certain applied engineering fields in which they want to make use of foreign developments without being able as yet to make serious contributions. Many of the engineering journals that I have abstracted contained relatively simple descriptive articles, usually found in this country in trade papers. The paper might evaluate the performance of equipment fabricated elsewhere, without making original contributions. In such cases, the heavy reliance on the foreign literature in the citations could indicate a lack of original work at home. On the other hand, these kinds of journals fulfill the mission of acquainting a new generation of young scientists and engineers with the pertinent literature and guide them toward more original studies. I expect that the level of some of the journals will rise, while other publications will simply cease to exist when the demand for them disappears.

In my opinion, the main purpose of the Romanian information-handling organization should be to render service to this somewhat neglected and less glamorous segment of the country's technical community.

Distribution of journals is well organized, rendering the acquisition of technical publications quite easy. The subscription costs are relatively low; most post offices accept the subscription fee and transmit the address of the new subscribers to the circulation office of the journals. The selected abstracts in the primary journals and the Scientific Information Bulletin help to bring foreign developments to the attention of Romanian technical men.

The monthly abstract journal of Romanian papers, published in Russian and English, is designed to help to acquaint foreign scientists with work performed in Romania. This is of definite bibliographic interest, but outside of a few librarians, such services are very little known and even less used by bench scientists. This is true of similar publications or reprint collections in this country, covering work performed in specific geographic areas or at individual companies. The volumes look nice on the shelf, impressing the onlooker with the bulk of work performed at a given company, but I doubt that they are widely used for search and retrieval of specific items.

Primary journals in one of the major foreign languages

are a better tool to acquaint the world-wide scientific community with work performed in Romania. As mentioned previously, English is definitely gaining in popularity in these multilingual journals.

There is another factor that helps to decrease the feeling of isolation and remoteness that might be felt by the average Romanian scientist. Bucharest and to some extent other Romanian cities, such as Iasi and Cluj, are gaining popularity as sites for international conferences. Several major international societies, such as IUPAC, IUPAP, IAEA, etc., organized major meetings and topical conferences during the recent years in Romania, attracting many foreign scientists to the country. Travel into Romania has become much easier lately. The visa formalities are relatively simple and in addition to the national airline, which connects Bucharest with many European capitals, 15 foreign airlines, including Pan American, serve the country. Hotel facilities are adequate and reasonably priced; Bucharest has joined the growing number of capitals with an Intercontinental Hotel. All this helps to increase the number of foreign scientists visiting Romania and to bring together the local researchers with their colleagues abroad. In turn, Romanians themselves acquired the mobility that seems to be the characteristic of the jet set and scientists during the last third of the twentieth century. They may be encountered in the conference rooms and laboratories in Copenhagen, Geneva, and at an increasing rate, in this country also, practicing the oldest and most direct method of scientific information transmission—person to person.

In the above, I attempted to analyze the problems which affected the techniques and organizations developed to handle technical information in Romania. That relatively small, and for Americans somewhat remote, country has its own well-established cultural and scientific tradition. It cannot simply adopt solutions found acceptable in the major industrialized countries, but it does not share the problems of the "emerging nations." I tried to point out the effect of special factors, such as geography, language, political alignment, and economic conditions on the current status of the information services. These services are not perfect and as elsewhere in the world, they are in full evolution, but I believe that they satisfy the needs of Romanian scientists.

This study is to a large extent based on subjective impressions and personal acquaintance with individuals and organizations. The history of the Romanian information system has been outlined in a Romanian publication, also available in English.[11] An excellent reference book has been published recently by MIT Press, covering all aspects of scientific and technical information activities in six Socialist Eastern European countries.[12] The influence of common political orientation on the system has been underlined, emphasizing also bi- and multilateral international cooperation between the countries.

The chapter devoted specifically to Romania (pp. 267–88) describes the technical documentation network and the academies. It also contains a directory of the Romanian documentation centers and a list of periodical and serial publications.

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