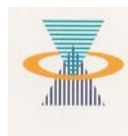
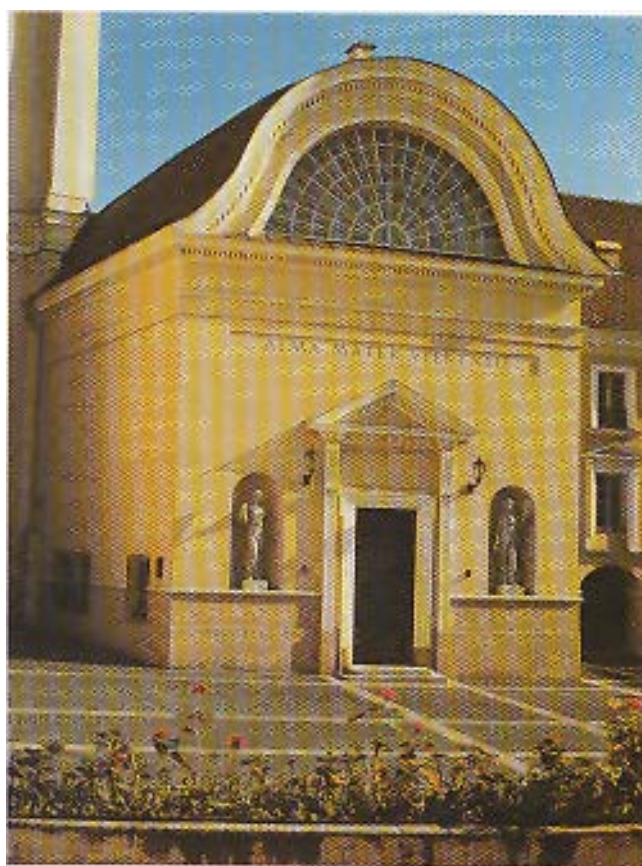


Evaluation of Research in Lithuania

Volume I: General Observations and
Recommendations prepared *by the Advisory
Board*, and Summaries of the *Panel Reports*



**The Research Council
of Norway**

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Preface

Following discussions at a conference hosted by *The Nordic Council of Ministers*, this evaluation was initiated by the former *Lithuanian Agency for Higher Education, Research and Development*. After discussions about method and scope an agreement was signed by the *Ministry of Education and Science of the Republic of Lithuania* and the *Royal Norwegian Ministry of Education, Research and Church Affairs*. In May 1995, Minister Vladislavas Domarkas and Minister Gudmund Hernes met in Oslo.

On the Norwegian side the responsibility for carrying out the evaluation was delegated to the *Research Council of Norway*. We appointed an advisory board for the project: Dr. Anders Omholt (chairman), Professor Terje Mathiassen, Professor Eivind Smith and Professor Bjarne Waaler. The Council also appointed eight evaluation panels. (The names of the panel members are listed in Appendix 4). Oystein Ramseng has been engaged as project manager. Adviser Kari Lindbekk at the Research Council has coordinated the work.

The Lithuanian partner, the *Ministry of Education and Science of the Republic of Lithuania*, provided information on the 97 research institutions which were evaluated. Head of Department of Science and Technology, Stanislovas Zurauskas, acted as our main contact.



Christian Hambro

Director General

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Note

Unfortunately, we have not been able to reproduce diacritics (accents etc.) in Lithuanian proper names.

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General Observations
and Recommendations,
prepared by the Advisory Board

1 Introduction

1.1 Background

In 1992 Latvian research was evaluated by the Danish research councils. The same year Estonian research was evaluated by the Swedish research councils. These evaluations were presented at the Nordic Conference on Education and Research in February 1994. At this conference representatives of *The Nordic Council of Ministers* suggested that the Lithuanian authorities might invite a team of Norwegian experts to participate in an evaluation of higher education and research in Lithuania.

Following this suggestion, *The Lithuanian Agency for Higher Education, Research and Development* addressed *The Research Council of Norway* and *The Norwegian Council of Universities*, asking for such support. (Appendix 1) After informal discussions the Norwegians agreed to support an evaluation of research, whereas the evaluation of higher education was not included, owing to lack of capacity.

In February 1995 representatives from *The Ministry of Education and Science of the Republic of Lithuania* and from *The Research council of Norway* met in Vilnius to discuss details of scope, organization and financing of the evaluation. The formal Agreement on Evaluation was signed in May 1995 by Vladislavas Domarkas, Minister at Education and Science of the Republic of Lithuania, and by Gudmund Hernes, Minister of Education, Science and Church Affairs. The Agreement was signed also by Algirdas Cizas, Director of the *Centre for Quality Assessment in Higher Education*, and by Christian Hambro, Director General of the *Research Council of Norway*. (Appendix 2)

The purpose of this evaluation is to help the Lithuanian Research Authorities in their efforts in planning the future development of Lithuanian research. Based on reports from Lithuanian research institutions, on international publications of Lithuanian research and on site visits, the evaluation panels were requested to make recommendations for the further development of the evaluated areas of research, particularly with regard to international cooperation, doctoral training and research cooperation in Lithuania.

Higher education is not included in this evaluation. However, all the panels have focused on the relation between higher education and research, and have regarded good research at the universities as a prerequisite for good teaching. This report therefore also includes some comments on the general problems concerning the quality and relevance of higher education.

1.2 Organization

The Agreement states that *The Research Council of Norway* has been delegated the responsibility on the Norwegian side, including the overall responsibility for the evaluation. A protocol to this agreement defines the areas of research and the institutions to be evaluated. (Appendix 3) Information has been provided by the Lithuanian partner, *The Ministry of Education and Science of the Republic of Lithuania*.

The Norwegian partner appointed an advisory board for the evaluation. The Lithuanian partner appointed a commission on evaluation of research and higher education. The advisory board and the commission were to overlook the necessary planning and coordination between the partners during the evaluation.

The Norwegian partner engaged a project manager for the evaluation. The Lithuanian partner appointed a main contact in Lithuania.

The Norwegian partner appointed 8 evaluation panels. (See Appendix 4 for presentation of board and panels.) For each panel the Lithuanian partner appointed a scientist as an associate (Appendix 5), with responsibility for providing professional information, and an assistant to take care of practical arrangements during the site visits.

This evaluation covered 97 research institutions, i.e. most of Lithuanian research. For budgeting reasons, a few research areas were left out, but all institutions within all the other areas were included.

Each of the eight evaluation panels carried out site visits lasting 5-7 days in May-September 1995. Together they visited all the research institutions included in the evaluation project. The draft reports from the panels were sent to the institutions for comments. Afterwards, the concluding report was finalized in January 1996.

1.3 Financing

On the Norwegian side the project has been financed jointly by the *Ministry of Education, Research and Church Affairs* and the *Ministry of Foreign Affairs*. Their grants cover all expenses incurred in Norway in connection with the evaluation, including honorarium to board and panels, travel expenses to and from Lithuania, wages of the project manager, and printing and shipping of the final report. With support from Open Society Fund - Lithuania, the Lithuanian partner has covered all expenses incurred in Lithuania, including board and lodging for the evaluation panels and travel expenses within Lithuania.

1.4 The Panel Reports

The evaluation is based on written information from Lithuania, and on discussions with representatives of the institutions of research and higher education during the site visits in Lithuania.

The main written information consisted of reports from the research institutions (faculties and institutes). These reports are based on a questionnaire which was originally prepared for a Lithuanian selfevaluation of research and higher education. (Headlines presented in Appendix 6) The selfevaluation has been postponed, but the reports, which had already been prepared, have been very useful as a basis for this evaluation.

The first set of reports, received by the Research Council of Norway in November 1994, and covering the period 1989-93, provided the panels with highly valuable information. Updated reports containing information from 1994 were prepared before the site visits. These reports were received in Norway by the end of March 1995.

At the request of the Research Council of Norway, and in cooperation with the evaluation panels, additional information from the institutions to be evaluated was provided by the beginning of May 1995. This information comprised written statements in English on research projects (which the institutions appraised as particularly important) and on doctoral theses in progress or recently concluded. Further, it included summaries of the most important publications/papers and copies of publications/reports, mostly in English, concluded during the last 2-3 years.

The first site visits started in May and the last site visits were completed in September 1995. The time spent at each institution to be evaluated was usually three hours. At each institution the panels normally had a joint meeting with the management of the institution, representatives of all research groups, and doctoral students. The meetings usually included oral presentations of selected research projects. Where relevant, the panels included visits to laboratory facilities and inspections of instrumentats, computers and libraries.

According to the agreement on the evaluation, guidelines for preparation of the panel reports were worked out jointly by the Norwegian and Lithuanian partners. (Appendix 7) Owing to variations in the information provided by the research institutions, and also to different scholarly and scientific traditions and scopes of the panels, the Guidelines have not been followed slavishly, but have served as a framework for the panels.

The main objectives of this evaluation was to make recommendations for the further development of the evaluated areas of research, and to contribute to the efforts of the Lithuanian research authorities in planning the future development of Lithuanian research. It is the hope of those who have taken part in this evaluation that the concluding recommendations will trigger a process of fruitful discussions and wise decisions.

2 Summary of Recommendations

The general observations and recommendations made in this section are based on more detailed observations and recommendations from the various panels. It goes without saying that conditions differ for different fields of research, and that the following general observations and recommendations do not necessarily pertain to all of them. Thus, for a full understanding of the results of the evaluation, the reader is also referred to the panel reports on the research areas of particular interest. Observations and recommendations pertaining to the particular area in question will be found there.

Obviously, there is a pressing and general need for better financing of Lithuanian research. If need be, it should be ensured that the best research in all important fields is adequately funded, if necessary at the cost of discontinuing less important research activities.

Despite the many difficulties in Lithuania today, the various panels have identified a number of good, even excellent research institutions and individual researchers, also by international standards.

However, the need for changes in Lithuanian research is obvious. As a basis for these changes, a plan with a five to ten years perspective should be prepared for the development of Lithuanian research. The plan should be worked out in close contact with the various communities of researchers.

The most important measures needed are:

- To establish a research council system which would distribute a sizeable fraction of national research funds on the basis of scientific merit, giving due consideration to national goals. The Ministry of Education and Research and the other ministries should remain responsible for providing basic funds and for stimulating research of specific importance to their own sector.
- To reorganise universities and research institutes, with the aim of
 - changing the research profile so that it will best serve the present and future needs of Lithuanian society;
 - merging university faculties and departments to form larger units;
 - reallocating personnel and other resources between universities and research institutes;
 - diminishing and reorganizing the institute sector, and keeping mainly as separate institutes those that are relevant for important social and economic sectors, and in the foreseeable future can expect to be economically supported financially through contracts in a market economy, or by public agencies or ministries.
- To give university teachers more time to do research.
- To stimulate research personnel to broaden their field of interest and /or change research subjects, when this is desirable to meet the future needs of Lithuanian research. A broad basis of knowledge is needed in order to follow and adapt to important advances in international research.

- To increase international contacts and cooperation substantially through
 - rapidly improving the knowledge of Western languages, above all English, in the scientific community and among students;
 - publishing in international, peer-reviewed journals (when appropriate);
 - providing scholarships for studies abroad and money for travel to international conferences etc.;
 - using international experts in national peer reviews.
- To improve the situation substantially with regard to
 - scientific equipment;
 - libraries;
 - computers and other IT facilities.
- To appoint ethical committees at national level to deal with ethical problems in research.
- To give the universities and the research institutes a high degree of freedom within their total budget limits and the framework in the national research plan.

These topics are discussed in more detail in the following pages.

3 Observations

3.1 Introductory Remarks

Lithuanian culture has a very long tradition, with important scholastic institutions with a long and honourable history. However, in most of the economically advanced countries a rapid expansion in scientific activities began before the midst of this century. During the past 50 years research has expanded immensely, especially in the industrialised world, with profound importance for the economy and for life in society. This was also the case in the Soviet Union, and Lithuania enjoyed inclusion in a sizeable research system, often of a high quality.

However, the fact that Lithuania was part of the Soviet empire, also meant that much of its research, particularly in natural sciences and technology, was structured and run according to the needs of this empire, with a strongly centralized power of direction, which did not give priority to the needs of Lithuania. Consequently, research and research organizations which were relevant in the Soviet context, often do not suit the needs of Lithuania as an independent state.

It also implied a similarly strong ideological influence on research, especially in the humanities and social sciences, including economics and law. In such disciplines the negative impact of the Marxist ideology, over a period of two generations, has been strong. Thus research related to market economy and democratic institutions, for example, was scarce.

Despite these difficulties and the present economic problems, there are a number of good research institutions and many skilled individual researchers. Many groups range as excellent ones by international standards. Even if the challenges are many, the potential for rapid recovery and a raising of quality to international standards is evident. However, for the reasons given above, parts of Lithuanian research are not very relevant to the present needs of the country.

It is generally recognised that a high standard in science, technology, social sciences and the humanities, including law and economy, is of utmost importance for the well-being of a country and its population. A high standard of competence in the population gives a solid basis for industry and other parts of economic and social life, as well as for democracy. Furthermore, the humanities contribute significantly to a country's national identity, cultural development and conception of selfunderstanding, and thereby to the existence of a democratic and stable political system. This is of particular importance, of course, in Lithuania's situation today, even if the country can build upon a long cultural tradition.

Modern science is associated with a number of important ethical problems. These ranges from care for animals used in medical and biological research, to rules for experiments involving human beings, and disposal of individual research data and to methodological and collegial problems in research. A system for the handling of such problems is apparently absent.

Lithuania is passing through a serious period of transition, characterised not only by severe financial constraints but also by demanding challenges in restructuring the whole society. These constraints and challenges also apply within research and higher education. In Lithuania's present situation, this necessitates and justifies a strong national research policy, with the well-being of the society as the overriding goal. An overall plan for the development of research is highly needed.

The negative consequences of the Soviet influence on Lithuanian research were strongly exacerbated by isolation from the West. To a large degree, lack of communication and cooperation with Western countries, and lack of the economic means to buy Western equipment when this would have been useful, did to a large degree prevent Lithuanian research from reaching high international Western standards. Our own experience from a small country, as Norway is, strongly underlines the importance of free access to international developments in all major fields of scholarship and scientific work. Lithuania would do well in extending its contacts with Western research as much as possible.

An important consequence of the isolation from the West was the poor position of Western languages, of which English is in this context by far the most important in this context, in the schools and in higher education. Quite apart from other difficulties of a political and practical nature, this prevented flow of information and exchange of thoughts between the Lithuanian and the Western academic communities. As has obviously been realised by the research community itself, it is of utmost importance to remedy this difficulty as soon as possible. This must be done both by strengthening foreign, Western languages in schools and by using foreign text-books in higher education.

During the past five years, Lithuanian authorities have made a marked effort to restructure the research system and the decision-making procedures at higher levels. Legislation has secured freedom for universities and research institutes and for the individual researcher. It is important to avoid a situation where the authorities and users of research results try to influence the methods of research and publication of results. This does not, however, excuse scholars and scientists from contributing to a rational use of institutional and national resources.

Our knowledge of the school system in Lithuania is incomplete, and we have not evaluated the university education as such. Still, it is our impression that the level of education in the Lithuanian community is good, and provides a sound basis for rapid improvement of economic and social conditions. We take it for granted that Lithuania will strive for a rapid economic growth during the few next years, and it has a good chance of succeeding. However, such improvements will, in turn, lead to an increased demand for education, at school level as well as at higher levels. Therefore, in the perspective of some years, growth in research and higher education is desirable and to be expected.

In the following we shall expand on the above-mentioned questions, to the extent that they are common to several of the research areas investigated by the eight panels, or are of general interest in other respects. As regards matters and standpoints of particular concern for the different areas, and for more detailed arguments, the reader is referred to the reports from the different panels.

It should be stressed that many of the shortcomings and difficulties discussed in this report are

not unknown in Norway and other Western countries. But the collective and massive, simultaneous impact of several of these shortcomings and difficulties makes the situation grave for Lithuanian research.

3.2 Size and Overall Structure of the Research System

The number of researchers and teachers in research and institutions of higher education in Lithuania is somewhat more than 15,000, of which nearly one third have a doctoral degree and about five per cent the degree Dr. Habil. About 10,000 of these persons work in higher education, with about the same fraction having a doctor's or Dr. Habil. degree. The number of students is a little more than 50,000. This gives a teacher-to-student ratio of about one to five, which is high compared by Western standards. In comparison, Norway had in 1993 a teaching and research staff of less than 10,000 at institutions of higher education (which we consider too low in relation to the number of students, which was about 170,000). If properly managed, these human resources form a reasonably good basis for the development of Lithuanian society and Lithuanian research. However, in view of the present lack of adequate funds for research, and the number of students, the number of researchers and teachers in higher education is far too high.

The structure of Lithuanian research institutions is not the best. This is an unanimous impression of the participants in this evaluation. One striking feature is the fragmented and rigid structure of the universities. This often leads to correspondingly fragmented research and teaching, with less than optimal use of talent and other resources. Larger units (both at faculty and department level) could give higher flexibility and better possibilities for taking on broad and multidisciplinary research projects, and would facilitate collaboration with the research institutes.

Another important feature is the division into two distinct spheres, the research institutes and the universities. Perhaps as an aftermath of the Soviet period, the teaching staff at the universities are very often overloaded with teaching, with too little time for research. On the other hand, the competence and capacity of the present research institutes are, in our opinion, utilized too little in teaching. Even if the institutes do have doctoral students, it must be a goal to improve cooperation between the universities and the institutes. It is of utmost importance for the quality of the teaching and for the recruitment to doctoral programs that also undergraduate students became exposed to recent research results and are inspired by good researchers.

We have the impression that parts of the system are overstaffed in relation to what is accomplished, partly due to inefficiencies in work and organization, and partly because many researchers do a considerable amount of work outside their institution to obtain the money necessary to support themselves.

It was also our impression that the management of institutes and universities were often more occupied in finding the means to continue their work within the established institutions, than with addressing the important question of how to reorganize the human and other resources

for optimal performance. This, of course, is often a necessity for survival, and is also not an uncommon situation in western research institutions, too.

Most of Lithuanian research is done in the Vilnius and Kaunas areas, with some institutions located in other places. Since Vilnius and Kaunas are fairly close, and all distances within Lithuania are reasonable, the different locations should not prevent close collaboration and division of responsibility and labour. A condition for this, however, is that all the institutions have equal opportunities to obtain resources for their research.

3.3 The Universities

The situation at the universities is of deep concern to all the panels. It is of the utmost importance to all countries to have good higher education, and the quality of this education is highly dependent on the qualifications of the teachers. This requires, in turn, that the teachers do active research in order to keep up to date on new advances in knowledge. Research at the universities is, of course, also important to the society in many other ways.

The universities are now precluded from doing their best in research, often as a result of circumstances outside the control of the individual teachers, and of the faculties and central steering bodies. In the following pages we shall merely list these difficulties, and postpone our recommendations to a later section. Most of the problems are recognised by the university community itself, and Western university teachers meet many of them at their own universities, but they appear to be much more dominant in Lithuania today. The financial situation of the institutions, and for Lithuania as a whole, is the cause of many of the problems, and may preclude an immediate solution to some of them

The most important observations of factors that are likely to have a negative influence on the development of research at the universities, observations made by almost all the panels, are as follows (some of them have been mentioned already in the preceding text):

- The load of teaching is too high, and teaching takes too much of each teacher's time. This stands in contrast to the low student/teacher ratio. The teaching seems to depend too much on lectures, and not enough on textbooks and other means of self-study. In many cases the teaching is too specialised and is focused on description, rather than on developing analytical and general skills. This tends to lead to insufficiently rational use of the teaching staff.
- As a consequence of the teaching load, time for research is scarce and often even non-existent. Sabbatical leave with pay is usually not available.
- The age distribution is a problem in many research groups, with a staff of researchers of high average age who, as a whole, are less likely to initiate new research and implement major changes than younger colleagues would be.
- Experimental equipment is often out of date, worn out or insufficient. Dependence on Russian technology makes maintenance and repair difficult.

There is a lack of computing capacity, both of individual PCs and larger machines. In many cases used equipment from abroad has eased the situation, but the problem is still serious.

Libraries are poorly equipped with modern, western literature and journals. The libraries cannot afford to subscribe to even the most common international journals. Librarian science seems to be inadequately developed.

The problems listed above, together with a very low rate of pay, make it difficult to retain good researchers at the universities. Nor can they devote their full time to university tasks. This may, in turn, lead to a vicious circle that only a deliberate effort can break.

Knowledge of foreign, Western languages, above all English, is too weak. This applies to staff and students alike. Textbooks in foreign, Western languages do not seem to be used. Since English is a main tool for international communication in most fields within research and higher education, poor knowledge of English is a serious obstacle to receiving impulses from the West.

Too few research results are published in languages that allow communication with international academic communities. This hampers an international peer review of Lithuanian research.

It takes too long time to obtain a doctoral degree in line with Western standards (5 years after receiving the equivalent of a masters degree, according to our information). In many, if not most cases the output of doctors seems to be too low, even taking into account the required five years education.

The necessity and purpose of having two doctoral degrees is seriously questioned. The degree Dr. Habil. seems to be an unnecessary prerequisite for obtaining promotion to full professor. Peer review and evaluation based on internationally acknowledged publications (when appropriate) would be more in line with general international practice and well suited for selection to professor and other academic positions.

Although there are promising cases of cooperation, for example in the agricultural fields, cooperation with the independent research institutes is often weak or non-existent. In many cases it could be strengthened considerably, to the mutual benefit of the various institutions, and Lithuanian science.

Cooperation within and between the universities is not sufficiently well developed. The same holds for division of labour.

Last, but not least, there are too many small university faculties and departments, and the structure seems to be rigid.

3.4 The Research Institutes

The research institutes were established during the Soviet era as comparatively large, specialised institutions, many of them serving an important role in the military and industrial strategy of the former Soviet Union. In general, these institutions seem to have been of fairly high quality and have done good research. Important observations, which are valid for a number of institutes, are as follows:

- Many institutes seem to be too large in relation to their objectives and Lithuania's current needs.
- Their present difficulties are largely due to financial problems. Low national funding and few or no customers who are willing and able to support research projects make it impossible to keep up the standard and the staff. The panels also, however, question the efficiency and productivity of the institutes.
- At many institutes the staff has been reduced considerably, which has eased the immediate economic problem, but the reductions have often been due to people leaving for other jobs, or being laid off because of pressing short term economic problems. This means that the reductions have not necessarily been compatible with the present or future needs of the institute, or of Lithuania.
- In general, equipment seems to be old-fashioned and often worn out, and urgently needs to be renewed. This applies to both experimental equipment and to computer equipment.
- Some of the institutes are engaged in teaching. They have some doctoral students and the staff participate in university teaching. This is a commendable effort, and utilises the competence and capacity of the staff. However, the competence and capacity of the staffs could well be utilised to a higher degree.
- The future of the institutes seems to be uncertain, and there is often no long-term goal or policy. The corresponding economic or social sector of society is often not able to support or take long-term responsibility for financing the institute.

3.5 Financial Support and Steering

The present financial support makes it difficult for many of the institutions to achieve a satisfactory level of competence and efficiency. The state budget for institutions of research and higher education constitutes about 1.2 percent of Lithuania's Gross National Product. We realise that this is a result of the present difficult situation in Lithuania, and that support for research and higher education has to compete with many other important fields. In view of this the figure is not too bad. However, only a long term, continued increase in research budgets will allow for the improvements that are necessary in order to achieve a reasonable standard at Lithuanian research institutions. With the present budget, it is not advisable to maintain the present size of the research system.

In most countries, government financing through the state budget implies low flexibility. Within the Lithuanian government the overall political responsibility for research policy and financing rests with the Ministry of Education and Science. Various other ministries take responsibility for financing research of particular importance and relevance to their own sector. The ministries are advised by the Lithuanian Science Council, which has no funds of its own. The decisions of a Ministry often are, and should be, influenced by political necessities and possibilities. The panels that participated in this evaluation noted that Lithuania lacked a system for providing adequate and flexible financing of research programmes and projects, based on scientific and scholarly arguments, and not on short term political considerations. This problem will be discussed further in Chapter 4.

4 Recommendations

4.1 General Remarks

It is not easy to give good advice. Any advice will depend on the advisors' basic standpoints and level of information. It also inevitably contains some wishful thinking. However, the members of this undertaking have reached a degree of consensus that makes us feel on fairly safe ground, and that the recommendations given may be sound and useful. Nor do the comments made by Lithuanian universities and institutes on the draft reports from the different panels contain arguments that lead us to believe that the recommendations made in this chapter are grossly wrong or irrelevant.

It is difficult to see to what extent it will be possible to implement the recommendations. Some of them will be hailed with enthusiasm by the research community, some will be received more reluctantly, and some may even meet with resistance. Implementation requires an understanding of the overall goals on the part of the research community, and a willingness to put these before personal interests. This in turn requires a combination of open discussions and firm decisions.

Research and higher education are indispensable tools for economic growth and improvement of social conditions in any country. Some results from research and development can be used directly in industry, agriculture, and other sectors of the country's economy. They influence the development of the social life and well-being of the people. Research results are also important for the culture and language of a country. But their greatest importance lies perhaps in the fact that a close link between research and higher education yields well educated people, and that persons with training in scientific methods and analytic thinking can make a significant contribution in any field, e.g. administration, industrial development, health care and the future of democracy.

We therefore recommend that Lithuania sets herself ambitious but realistic goals for the development of its universities and other research institutions. These goals must have a time perspective of five to ten years. Important goals are to raise the quality of research and rationalise the use of resources. These goals require the thoughtful selection of important fields of research, and a well planned system of recruitment. Research that is a relic of the past should be discontinued. What is to be preserved of the present system, and what organizational measures should be taken immediately, must be determined in the light of these goals and decisions. Good researchers must be saved for research, but may be required to change their particular field of research. This is not an insurmountable task for a good researcher. However, seen in a long-term, international perspective, research should not be limited to serving national needs.

Such planning and such decisions must include the overall organization and financing of

research and higher education. This must be based on overall economic and social goals and national interests, and on the current economic and social possibilities. It is well outside the scope of our recommendations to give any detailed prescription for such a planning process. What we want to underline, however, is the importance of clearly illuminating the national needs and of making the shortcomings visible. In addition, the country's research activities must be coordinated with a comprehensive, far-sighted policy.

We would like to point out that the present dimension of Lithuanian research is far too large as a starting point for a "new deal". One reason for this situation is that, with the foreseeable level of funding, it is impossible to support all the research going on at present in a proper way, and at the same time support important new developments. Another reason is that some of the present research needs to be terminated because it is neither relevant to the needs of Lithuania nor of high enough quality. Decisions to reduce or discontinue research are extremely difficult for many reasons, but are necessary.

Some improvements can certainly be made solely by re-allocating the present funds, but over the years the financial situation for Lithuanian research has to be improved in general. The present level of funding of research and higher education is understandable in view of the present economy of the country, but we recommend that research is given high priority as the Lithuanian economy recovers and grows.

A proper planning process requires contribution and participation from many levels:

- at Government level to set national goals and express what contribution is expected from research in order to attain these goals;
- at Research Council level, to set goals for research and select ways of developing research;
- at institutional level, to analyse the possible contribution various institutions can make;
- at individual level, to contribute to and comment on the processes at the higher levels.

It is important that signals and views from the ground level reach, and are considered by, the higher levels during the process.

In this survey we shall in general not point to specific priorities. In this connection the reader is referred to the reports from the various panels. However, owing to limited time, even they contain only brief indications.

Nevertheless, we should like to make some general comments on the problem:

In some important fields it seems necessary to strengthen basic research, because this is the basis for good applied research. For example, fundamental biology is essential for research in medicine, agriculture and forestry, and for environmental biology. High quality applied research depends on competence which can be developed and maintained only if there is enough room for basic theoretical and methodological studies.

Emphasis should be given to fields which suffered strongly from ideological pressure during the Soviet period, such as Economics, Law and other subjects important for the country's

culture and development of democracy. On the other hand, fields that are primarily an aftermath of the Soviet period and of little value to Lithuania today, should be discontinued.

It is important to identify fields that are lagging seriously behind, in terms of quality, quantity or relevance to the country. Examples of such fields are energy research, pharmacy and library science.

In addition, we should like to emphasize some general guidelines for selecting priority areas:

- Research of high quality and relevance should be protected and given priority, but care must be taken to ensure that such fields do not grow out of proportion. (Relevance means in this connection relevance to some specified, important goal or, for example, to some other research field.) Researchers who do research of high quality, but of little relevance, should be expected to change their research field (which most good researchers can, at least to some degree).
- Research of low quality is dangerous even when relevant, because it may create false authority. If the research is important, it should be ensured that young, promising students and researchers are sent abroad in order to catch up in the field. Research of low quality and little relevance should be discontinued, and the resources should be better spent on other research.
- It is important to exploit the ideas, initiatives and enthusiasm of the individual researchers and research groups. Such factors are important for a good result.

4.2 Research Conditions

If the human capital of good researchers is to be well exploited, and the research is to serve its purpose, the conditions for research at the universities and the institutes must be altered and improved. The recommendations in this section are focused to a large degree on conditions at the universities. However, to the extent they are not directly related to the relations between research and higher education, they are just as valid for the research institutes.

However, whatever the prevailing economic limits are, a number of measures should be taken to improve the conditions for research, and secure maximum output of the resources available. In the following pages we list a number of recommendations, most of which are the same from all the evaluating groups.

In general, universities should become more heavily involved in research, particularly in basic research, and what may be called fundamental applied research, that is to say applied research that involves understanding and using of basically new knowledge. Academic teaching needs to be based on research so as to keep updated about the frontiers of knowledge and to give the students some understanding of how new knowledge is generated. Research is therefore fundamental to university teaching: good science creates good universities. A good teaching staff also ensures that the curriculum is up-to-date and relevant. University education must meet the needs of society as well as the needs of the students, and it must be borne in mind

that good academic training often has a wide range of applications. University research has, of course, also a value in itself, because it generates new knowledge.

A condition for achieving the above is that university teachers have more time for research. Today, teachers with enough time for research are exceptions. The internationally accepted standard is an equal distribution of time between research and teaching, allowing a necessary, but not undue, amount of time for participating in the institution's internal life and administration. We recommend that this is followed also in Lithuania. Care must be taken, however, not to introduce such a change immediately, as the right thing for everyone, regardless of competence and potential to do good research. The point is that good researchers are indispensable for a good university education, and in order to maintain a high level of competence, opportunities to do good research must be secured. As mentioned above, good and inspiring researchers are also indispensable in motivating undergraduate students to proceed with post-graduate education, after obtaining their first degree.

To achieve this, the last thing to do is to increase the total number of researchers. The first thing is to consider decreasing the number of courses and lectures given to the students, and to rationalize the remaining ones. This can be done in several places. Although we have not evaluated the university education as such, there are signs that students could well be required to do more self-study, perhaps organised in study groups. This requires that suitable textbooks, also foreign, be available. A substantial improvement of university libraries is also important, to meet the needs of the students and make them less dependent on lectures.

Various incentives should be used to encourage researchers: resources, for example money for equipment, should depend on the quality and amount of published research, and time spent on advising graduate students should count as part of the stipulated teaching load, etc. It is necessary to examine what systems of incentives would be most conducive to scholarly and scientific improvements at the various institutions.

An important condition for having good research groups is a reasonable age distribution among the research staff. Younger and scientifically fully updated persons must play a part in the research teams, and not be overruled by tradition and power. When deemed necessary or useful, post doctorate stipends should be used to keep young and promising researchers at the universities until permanent positions become vacant. This could also be a valuable incentive to young researchers.

Plans should be worked out for upgrading and modernizing experimental equipment and laboratory facilities. The same applies for data equipment and computing facilities. The possibilities of taking over less modern, but still serviceable outfit from Western countries should be explored. We recommend that this be included in the agenda for Baltic-Nordic cooperation, as well as bilaterally between Lithuanian and other countries.

For any country, knowledge of foreign languages is essential for being able to draw upon the international pool of knowledge. This is particularly important for a small country. The key to solving this problem is for most subjects English: for students, so that they can read textbooks in English, and for researchers, to enable them to communicate with the international academic communities. It goes without saying that Russian and other languages must not be forgotten. As far as Lithuania is concerned, contact with Russia and other East European countries should be maintained at a satisfactory level. The same holds good for many other

Western countries whose mother tongue is not English.

We are aware that courses in English and German have already been started at some places. This should be general, and all researchers and students who have no command of a Western foreign language should be required to take courses to remedy this. Programmes to this end should be initiated. The courses need not be held by research personnel. Modern techniques in the form of electronic teaching programmes should be used extensively to provide sufficient capacity.

In university courses, textbooks in English should be used deliberately and extensively, not only because of their professional content, but to force students (and teachers) to master their subject in English. We are aware that such measures will be limited by cost, but believe that negotiations with leading publishing companies could bring the cost down considerably. We note that the price of the same book may vary considerably from one country to another, apparently depending on the national cost level and the ability or willingness to pay.

Libraries must be allocated more funds, to enable them to acquire important, relevant international journals and books. To enable libraries to fulfil their purpose in the best possible way, they should be strengthened professionally, also by developing library science in Lithuania. This may be a key factor in strengthening both research and education. It is important to establish exchange agreements with other countries in order to reduce costs. Similarly, the use of international networks (Internet) in research and education should be fully exploited.

In most disciplines publishing in international journals is essential in order to be a full member of the international academic and scientific community. This creates a continuous review by peers and helps to make Lithuanian scientists and their work better known to their foreign colleagues. In turn, this will open up for personal contacts and for international cooperation. In the long run, most doctoral theses should be written in English or another main language to facilitate international communication.

To achieve this end, economic support for participation in international conferences, seminars and workshops should also be given high priority. Sabbatical leave should be widely granted, to enable a scholar to concentrate on research, preferably at a good research institution in a foreign country.

One must not forget the importance of sending young researchers and graduate students abroad, to meet educational needs that are not easily covered in Lithuania, and to broaden their scope of knowledge. This is necessary, in particular, in fields that are important, but weakly covered in Lithuania, either quantitatively or qualitatively. In this context we should like to point to the great importance of establishing programmes for international exchange of researchers. It is necessary to work out criteria for making examinations and studies abroad valid also in Lithuania.

Many of the present and past publications in Lithuanian are of great value to users of research results and to policy makers. The emphasis on publishing in English must not overshadow the importance of publishing in Lithuanian too, if the results are of relevance and importance to the Lithuanian community at large, or to the work connected with Lithuanian culture and language. In such cases, however, an attempt should also be made to make results and viewpoints internationally available.

By extending their international contacts, the researchers will also be able to draw upon the financial resources of a larger scientific community, thus alleviating some of the consequences of Lithuania's difficult economy. In particular, every opportunity for increased contact and cooperation between the Baltic and the Nordic countries should be exploited fully. We are aware that various Baltic-Nordic programmes have already been realised or being planned. This will benefit both parties. Even marginal financial help can be very useful.

In the long run, good research requires good recruitment. This means that doctoral programmes must be professionally good and attractive to students, but not too time-consuming. It is the general impression that there is room for improvements. The time required to study for a doctor's degree should in most fields be sought reduced to three to four years, in line with Western standards. Proper financing of the doctoral candidates by means of fellowships would also help to attract good students. A national plan should be worked out for recruiting and financing doctoral candidates.

In Western societies equality between the sexes is an end in itself. In the case of research, as in many other sectors of society, it also increases the available talent. For this reason, women in particular should be encouraged to take education at doctorate level and head for an academic career.

Even if it is not abolished, the Dr. Habil. degree should not be maintained as a condition for promotion to top positions (full professor). Candidates for professorships should be judged on their scholarly and scientific merits, preferably based on publications in international journals and books, and on their ability and potential to continue research and build up fruitful research teams. Additional qualifications are an ability to inspire students and colleagues, to see their own research in a wider framework and to participate in the internal life of a university. When evaluating scholarly and scientific merits, special weight must be attached to recent achievements. Outdated competence as basis for power is dangerous.

The competence of the applicants should be evaluated by a group of reviewers (peer review), containing at least one distinguished person from another country. Such an evaluation should be based on a proper description of the position in question, as regards both scientific profile and expectations regarding the above-mentioned qualifications. Similar criteria and procedures should be practised for appointments to other research positions in the universities as well, and research positions at the research institutes.

In order to obtain full benefit from the research system, good interaction between the research institutions and the various sectors of the economy, and other activities in the society, is necessary. This interaction can be improved by encouraging mobility of professionals between universities and research institutes on the one hand, and government agencies and the private sector on the other. For example, industry will gradually need more professionals at doctorate level in order to be able to compete.

4.3 Organisational Measures

4.3.1 Top Level

Scholarly and scientific activities must enjoy freedom: freedom for researchers to undertake their research in the way they find rewarding and sound, and freedom to publish their results, without being influenced or suppressed by "sponsors" or public agencies. When the results can be exploited commercially, or are sensitive in other respects, for example in relation to national security, or in connection with the protection of privacy, exceptions may be made. Universities must be free to raise their voice against government authorities and to pursue research that may be disputable in other sectors of society. All this, however, does not relieve the researchers from their moral duty to participate in a collective process of consensus on research goals and measures, and to participate in a fruitful manner in cooperative research programmes. One of the strengths of modern democracies is their ability to combine personal freedom with collective organisation, and strive towards the common good of all people. This must also apply to research.

It is true that good science is always valuable, and an end in itself. However, when large resources are allocated to a particular field, or if too much of the country's resources are used in a manner which does not serve the country's goals, a forceful scientific policy is both needed and justified. Such a science policy must be initiated and carried through by the Parliament and the Government.

However, it also requires a competent and forceful leadership at the universities and research institutes, obviously under internal democratic control. This leadership must compromise between the goals of society and the long-term welfare of research. It also requires that the national political leadership which sets the national goals does not interfere with the concrete scientific approach used to attain these goals. This should be the task for a scholarly and scientifically competent body. In the Soviet Union this was entrusted partly to the Academies, whose efficiency was limited by lack of democratic control and the small degree of influence of young, bright scholars and scientists. In the Western countries a common solution is to establish research councils, composed of highly qualified people, usually appointed by the government in close contact with the scientific community. Usually each member remains in office for a limited number of years, to ensure a dynamic process and updated competence. A permanent, highly qualified administration is necessary. Care should be taken not to become involved in details, which can lead to much unnecessary work.

The power of such a body depends on its economic resources. Given sufficient funds, a research council can strongly influence the development of selected fields of research, and encourage researchers to re-orient their scientific activity in desired directions. It can also secure a proper balance between basic and applied research. For these reasons, we recommend the establishment of a Lithuanian funding agency (research council), which would be free to allocate one fourth to one third of the government funds provided for research at universities and research institutes. The members should be appointed by the government in an agreed process of consultation with the research community. Given a suitable committee structure, such an agency could be instrumental in increasing the quality and usefulness of Lithuanian research.

In such a system, the Universities should get sufficient direct allocations for basic needs and to some extent fund research of their own choice, while the money routed through a research council should fund high quality programmes and projects, selected for their scientific merits and their relevance to national goals. Given the limits on Lithuanian economy now and in the immediate future, an independent and courageous body will be needed to distribute the funds fairly, to secure continuation and to promote the growth of the best research teams and of important research fields. It should comprise representatives of researchers, users and government authorities, whereas the scientific quality and relevance of the various programmes and projects must be evaluated by "peers", i.e. highly qualified, active researchers. Foreign expertise should be called upon on an ad hoc basis to help in selecting good research programmes and projects which deserve funding. Such a system would increase competition between research groups, which usually proves fruitful.

A research council can also be instrumental in encouraging cooperation and coordination between institutes, by making the funding conditional on such cooperation and coordination, when this is relevant.

The political level should set the goals and allocate funds directly to the universities, the research institutes and to the research council. This should take place in close dialogue with the research council and the institutions. It is important that the Government, the research council and the institutions understand and trust each other.

It is important that research fields and groups be evaluated from time to time. This should take the form of an international peer review, perhaps at intervals of five years or so. Even the political level must undertake evaluations, to ensure that research contributes to the agreed goals in a reasonably efficient way.

Ethical problems are often important in modern research, notably in medicine and biology and in social and environmental research. We strongly recommend that ethical committees be established at national level to deal with such questions.

4.3.2 Institutional Level

There is an obvious need for some restructuring within and between the Lithuanian universities and research institutes. This restructuring must be done with care, so as not to lose the competence that has been built up. The process must ensure that the researchers are heard. On the other hand, it is important that the institutions and their staff do not linger on in the unknown for long.

There are three observations that call for major institutional changes. One is the fragmented structure of the universities, at both faculty and department level. The other is the size of the research institute sector. The third is the limited degree of coordination and cooperation between the universities and the research institutes. Within the limited time available, the panels were able to obtain little or no basis for suggesting concrete solutions, but agree on three general recommendations:

- a) A process of merging and reorganizing university departments and university faculties should be started, with the aim of creating stronger and more flexible units. This will not only strengthen the research, but also increase the researcher's influence on research

policy and on society's use of competence and research results.

- b) The research institute sector should be reduced and restructured. It is important for Lithuanian research, however, to get the best researchers and research groups to remain at the institutes. Therefore, with as short a delay as possible, it should be decided what research should be transferred to the universities, what should be retained at the institutes, and what should be discontinued.

Reorganisation of the remaining institutes should be considered, to give units of suitable size and strength, and a framework for cooperation with the university institutes should be agreed. The institutes currently working on applied research and development should, to a certain extent, be maintained. It also may be necessary, or become necessary, to expand existing institutes or create new ones. We lack sufficient information to make concrete suggestions, but stress that these institutes must be adjusted to the needs they are intended to meet.

It may also be fruitful to retain some of the best institutes, or parts of them, affiliated to a university faculty. A prerequisite for this entire process is an agreed framework for the future organisation and goals, which can guide researchers in their endeavours to adjust to a new system.

- c) Coordination and cooperation between the universities and the research institutes, as we envisage them in the new framework, should be maintained and strengthened. While the responsibility for the doctoral programmes should lie with the universities, the institutes should still participate, not only in these programmes, but also, when appropriate, in undergraduate teaching. The aim is to bring science into all university education and to relieve the university teachers of some of their burden, thus giving them more time for research. Cooperation on research projects should be encouraged. In practice, it could in many cases take the form of part-time teaching positions for researchers at the research institutes, for example, where the persons' responsibilities should be divided between the two institutions.

Applied research will often contain elements of basic research. Even so, much of the applied research cannot be carried out easily at universities and teaching institutions, where openness and proximity to teaching may act as obstacles. Such research is normally performed at independent research institutes or private enterprises. This research and development must be carried out in very close contact with the prospective users of the results. If this is not the case, its implementation is often met with less enthusiasm than it deserves, or even hostility. In this case, the research may become irrelevant to the users' need. After all, the main criterion for successful applied research is to arrive at economically successful products or solutions to, for example, environmental, industrial or social problems.

This division of labour must not preclude university staff from taking part in applied research and development projects. It is fruitful if their competence can be used for such purposes as well, and if they can serve as advisors on, and part-time participants in, research and development at the applied research institutes. This applies in particular to technology, but also to informatics, medicine and other fields. Here, a proper balance has to be found in each case.

It is also necessary to consider the geographical distribution of research and research condi-

tions. Some panels have noted a certain geographical imbalance between Vilnius and the other sites. It is important that all universities have approximately equal opportunities to obtain resources for their research. Geographical distance should not prevent good cooperation between institutions in different places on both teaching and research. An organized network between the universities, also including the research institutes when relevant, may be useful in helping to achieve the objective of more and better cooperation and coordination.

It is important that spin-offs from research in the form of commercial products or other benefits to society are encouraged. Science parks and similar adjunct institutions will be useful for this purpose, and we recommend the further development of such institutions. Risk capital must also be available, public or private, order to exploit inventions and new products commercially. Even with private enterprise as the rule, a government fund is in many cases required to promote commercialisation. Foreign capital is of course acceptable, provided the production and main other benefits remain in Lithuania.

In the long run, the institutes should be financed mainly by the users, through research and development contracts. Users in this context include private companies, public agencies and ministries. It is of great importance, however, for such institutes to have some money of their own, which can be used to implement their own long-term strategy and build up new competence. Through specific, strategic research programmes the competence and capacity of the institutes can be developed to meet the needs of the users. Sizeable financing through contracts, for example, with industry cannot be expected in the immediate future. This increases the need for government funds, which in this context should be considered as an instrument in a national policy for developing industry.

Summaries of the Panel Reports

5 Agricultural

Panel Members:

- Nils Ragnar Standal, Professor, -Agricultural University of Norway, *Chairman*
- Olav Arne Baevre, Professor, Norwegian Crop Research Institute
- Harry Eriksson, Professor, Swedish University of Agricultural Sciences
- Inger Nafstad, Professor, Norwegian College of Veterinary Medicine
- Lars Sjøflot, Professor, Agricultural University of Norway

Summary of Observations and Recommendations

5.1 Introductory Remarks

Since the re-establishment of independence in Lithuania, greater changes have probably been experienced in the agricultural sector than in most other sectors. The land reform, the disappearance of the markets in the East and the difficulty of finding markets in a surplus situation at home and in Europe constitute great challenges to the industry and the research institutions.

Research and higher education activity in the agricultural sector is naturally influenced by the development in the production sector. In the former Soviet system the research and academic institutions were highly specialized and were directed to work for the whole union. The "all-union-state-institutes" each had special tasks and duties with branches in Lithuania as well. The status of the work was quite high and the available resources relatively good. Most of the funding came directly from Moscow as a part of centralized plans or programmes for all the sciences. After independence, Lithuania is a small "market" for the former established specialized and large institutions. The national needs for research and education will in one way be much broader, while the available resources will naturally be much smaller. In this situation it is difficult to keep up with high level scientific skills in narrow areas at the same time as the need for developing and utilizing the applied side on a broad scale is urgent. The transition period calls for solutions to practical and immediate problems and thus also for special measures in research and teaching. For the institutions this may mean reorganizing the staff and thinking and acting in new ways.

However, lack of clear national objectives, a desirable or expected structure and size of the agricultural sector, and lack of strategies for development of agricultural production, the agri-food industry, environmental issues and rural development in general make prioritizing and long-term planning difficult for the institutions.

This evaluation has been organized in five different disciplines within the agricultural sector: Agriculture and Horticulture; Agricultural Engineering; Forestry; Animal Science and Veterinary Science.

The institutions evaluated are either academic institutions where education/teaching is the main task or research institution with research and development work as their main task. The Academies have the status of autonomous bodies but are supervised and receive their basic funding from the Ministry of Education and Science. Research has to be financed mainly through applications and contracts for specific projects and activities. The research institutions also receive some basic funds from the government. The rest of the funding is supposed to come from research and service projects and contracts.

Since the panel members are from the Scandinavian countries (Norway and Sweden) it is quite obvious that a comparison has been made with the situation in those countries. We do not think this weakens the evaluation, because geographical location, population size and magnitude of the sector do not differ too much.

5.2 Size, Overall Structures and Financing of the Agricultural Research System

The general impression is that the size of the scientific and technical staff for research and higher education is sufficient if the organizational aspect of the system is optimized. Reallocation of resources within the agricultural sector is necessary in order to fill the gaps that are pointed out in the various parts of the evaluation report. This may be easier to accomplish in a system consisting of larger institutions, departments and research groups. More difficult and complex problems specific to agriculture or related to the community and the environment have to be solved in correspondingly complex institutions or in cooperation with other institutions. The division into an academic sector (the Academies) and research institutions is hardly an efficient structure for optimal utilization of the total resources for research, education and extension work. It is a generally accepted fact that the best way to spread new knowledge based on research findings is through students. In the case of the pure research institutes this contact with students may be too limited. We hope that those responsible for agricultural science at large will be able to work out a strategy for efficient utilization of the present resources.

The system of funding is not very different from comparable countries. The general lack of adequate funds for basic maintenance, equipment and computer and library facilities is obvious. The high energy costs are striking and measures should be taken to reduce them.

It is to be expected that funds for applied research must come to a large extent from the Ministry of Agriculture, the industry and the farmers' organizations. It is vital, however, that funds be made available for basic research, especially at the Academies, and for research by graduate students (doctoral candidates).

Some of the research grants should be given on a competitive basis by an independent Research Council. These grants should also stimulate international cooperation.

It would be an advantage if the institutions could decide for themselves how the budget allocations are used for salaries and other expenses.

5.3 Research Conditions and Priorities

There is a general need for better accommodation and better equipment to support experimental research in fields, greenhouses and laboratories. The need for better chemical support and the lack of equipment etc. invite renewal in this sector. With a change in structure, it may be possible to reduce investment in order to increase efficiency. We strongly recommend centralization or building of one laboratory to support all soil and plant research. The laboratory could be an independent and self-financed institution.

The panel strongly recommends strengthening the basic disciplines in entomology (including nematodes). In our opinion, basic genetics and fundamental research for plant breeding should be located at the Academy of Agriculture.

It could be a matter of discussion how far the specialization should go at an agricultural or environmental institution where the applied part of the research is naturally the most important. There should be limits to how far research should go into the basics of mathematics, materials, mechanics or electronics.

Agricultural research should, however, consist of both basic science and applied research. It is neither desirable nor useful to locate basic research at one institution and applied research at another. There should be a more clear link from basic research to applied research leading to recommendations and advice. Basic research is fundamental for teaching at university level and we strongly recommend that the proportion of basic research at the Academies be increased.

As far as the technical/engineering disciplines are concerned, research is especially important if the aim is to manufacture machinery and equipment for primary production in Lithuania. Similarly the disciplines will be important for processing, handling and marketing of products and for water supply and environmentally sound construction and operation. These disciplines are or will become important also for farm operations and for management of natural resources.

Based on judgements made in other parts of the world, the forestry sector will become of growing importance in the future. Accordingly forest education, forest research and forest extension services must be increased in the future to favour:

- increased use of today's forests and of new ones established in the future.
- an increase in the yield and the quality of the forests through choice of proper management regimes (choice of species and provenances, regeneration methods, choice of spacing, early tending of young stands, thinning regimes, rotation lengths, amelioration)
- the multiple use of forests i.e. the production goal and the conservation of special eco systems to secure the survival of threatened species
- modernization of forest industries in order to promote the conversion of the forest raw materials to high quality products for domestic use and for export in a world market situation where quality, price and fitness for the ultimate use of the products will be very important.

As regards research and education in animal and veterinary sciences the panel would like to point out the importance of national and international cooperation. The funding system should

be such as to stimulate cooperation on multidisciplinary projects. The funding of applied research should take place in accordance with a strategic plan for the development of the animal production industry. As time goes on, more of the funds for such research projects should come from the Ministry of Agriculture and from the industry, and should be given on a competitive basis. It may be necessary to impose a levy on delivered products, to be reserved for research projects related to production.

The panel would have liked more of the research projects, especially at the Academies, to have a more basic approach. Areas not as well covered by research, and areas that are almost totally neglected, are listed under the different disciplines. It is the general feeling that rural development and the effects of agricultural production on the environment and the landscape need research attention. The panel has also pointed to the need for research on various aspects of farm and rural buildings, equipment for milk production and forestry operation. The dimension and organization of plant breeding research and development should be considered from a cost-benefit point of view.

Research and development work in molecular biology is relatively weak both in the animal and the plant sciences.

The panel felt that investigations into roughage conservation were not given high enough priority. Similarly, the panel did not observe research programmes related to the quality of animal products - milk, meat, eggs etc. except for investigations of contamination. The quality of raw animal products for consumption and processing ought to be an important research area for the agricultural research institutions.

Veterinary pathology seems to be a neglected area of research and education.

5.4 International Contact and Cooperation

Communication through journals (or data bases) is very important for research and science. We are glad to see the Lithuanian Journal of Agricultural Sciences, and we hope it will be possible for this journal to maintain an international standard. A highly qualified international referee system is necessary to maintain such a high standard. The scientists should be requested to submit publications to internationally well known journals or in the Lithuanian Journal of Agricultural Sciences. It is recommended that the institutions train researchers in writing scientific papers.

It is important to encourage persons with a high scientific potential to publish in acknowledged international journals. The creation of functional project groups is important and we recommend that the institutions attach importance to this level in their organization. In the current agricultural research in Lithuania, it is necessary to build up groups that appreciate the importance of international cooperation in research.

Doctoral candidates should be encouraged to write their theses as internationally publishable papers in an "international" language.

The situation at the libraries is probably one of the most serious obstacles to development of science and research. This situation calls for urgent measures. International advice should be sought to review the whole library system.

The research funding system should encourage international cooperation.

5.5 Doctoral Training

In order to raise the quality of research, as evaluated by international standards, it is important to recruit new, young, well educated and motivated scientists. Such recruitment is difficult, because of low salaries, and because budget cuts have led to a reduction of staff at the institutions.

Doctoral training in Lithuania has recently been reorganized in accordance with an "Anglo-American" PhD model. We have confidence in this model, which seems to work well in the agricultural sciences. We are happy to recognize that the candidates were included in project groups.

The panel expresses some concern that the time schedule for the doctoral programme is too optimistic, especially when the doctorates sometimes have to participate as teachers in undergraduate courses.

The panel was surprised that some research institutions had the right to confer dr.degrees in the same way as the Academies do. We have no serious objections to this practice as long as the Science Council exercises good quality control. It is important, however, that the institutions within each discipline cooperate on the education of the doctoral candidates by means of courses. It may even be necessary for the Baltic countries to cooperate on doctoral training. An alternative would be to seek cooperation with the Nordic system of doctoral training.

It is recommended that young scientists especially get an opportunity to visit scientific institutions abroad for 6-12 months, to get scientific stimulation, to establish networks and to improve their English.

6 Physics, Mathematics, Informatics

Panel members:

- Arnfinn Graue, Professor, University of Bergen, Norway, *Chairman*
- Lars Inge Hedberg, Professor, Linkoping University, Sweden
- Peter Klæboe, Professor, University of Oslo, Norway
- Torleiv K10ve, Professor, University of Bergen, Norway
- Tormod Riste, Professor, Institute of Energy Technology, Norway

6.1 General Remarks

6.1.1 Physics in Lithuania

Physics, possibly more than any other natural science, has a special relationship with most other disciplines and many industries. Physics has a symbiotic connection with other fields, notably biology, chemistry, material science, earth and planetary science, medicine and engineering. New scientific disciplines have arisen at the interface of physics with one or more other sciences. Geophysics, biological physics and microelectronics, for instance, are sustained by the endorsement of physics.

Advances in physics influence our way of thinking and provide technologies that change our everyday lives. Hence it is in the interest of all nations to have an active community of physicists engaged in research and education. Lithuania is fortunate in having a long tradition in physics, and has reached a level that many other small countries can envy. Lithuania, however, like some other countries, has isolated most of the forefront research from its educational institutions. The effort to remedy this situation, i.e. to tighten the education-research connection, should be continued. The restructuring must be done with care, however, in order not to lose the competence that has been built up.

It is generally agreed that condensed matter physics and material science are cornerstone disciplines of high technology and modern industry. In most countries these disciplines constitute 30-40 % of all physics, in Lithuania even more. Some of the activities that the group saw during its visit have the potential for technological spin off. The establishment of more companies, with or without the connection to a science park, will be necessary for keeping the large number of qualified personnel active. The survival of such companies will depend on successful marketing abroad. It seems rather obvious, however, that some of the technical installations in solid state electronics are oversized, and the staff too many and will have to be reduced.

The group found some of the best and nationally most relevant activities in disciplines at the interface of physics. Examples are the chemical and ecological laboratories that monitor and do research on pollution problems. The work is important also for neighbouring countries and should be continued with close international contacts.

6.1.2 Mathematics in Lithuania

Mathematics has been a part of human culture ever since the age of Antiquity, but its importance has never been greater than now. The explanation is, that although mathematics strictly speaking consists of free intellectual constructions, these usually have been developed in response to the need for mathematical models in science and technology.

The increasing importance of mathematics is largely a result of the development of computers and computing. Computations that earlier required years to carry out can now be done in fractions of a second, which makes it possible to numerically solve problems that previously were outside the realm of the possible. This development requires ever new mathematical and numerical methods, and such progress is as important for the increase of computing capacity as the development of the computers.

There is a fruitful interaction between mathematics on the one hand, and the physical and technical sciences on the other. Sometimes the latter find that a mathematical theory that has been created by pure mathematicians is precisely what is needed in order to solve a problem. This application can then stimulate mathematicians to further research.

A consequence is that every modern, highly industrialised country needs to have a high level of research in the mathematical sciences. This is also necessary in order for the universities to be able to provide the mathematical training that is essential for engineers and many other contributors to the economic and cultural development of a modern society.

The impression of the panel is that the level of mathematical research in Lithuania is high, and that the volume of research and number of researchers is normal for the size of the country. The provincialism that is noticeable in many former Soviet republics has been successfully avoided.

However, there are large structural problems to be dealt with. The most obvious one is the lack of research at universities other than Vilnius University, and that the Institute of Mathematics and Informatics has a large number of highly qualified researchers who do not teach. For example, the Kaunas University of Technology should be building up its research potential in mathematics. This is the university that trains the engineers that will be the future leaders of industry, and a strong mathematics department is indispensable if it is to be able to fulfil its role as a major technical university.

A smaller difficulty is the excessive specialisation in probability and mathematical statistics (which also partly explains the high level of research). This problem has been solved successfully by Lithuania in the past by sending gifted students to foreign centres. This policy should be continued.

6.1.3 Informatics in Lithuania

Informatics is and will increasingly be an important subject, also in Lithuania. It is a necessary background for many other subjects at the universities. On the other hand, computers are used increasingly in almost all areas of society and the need for qualified computer scientists is bound to increase.

There is a large variation in the amount and quality of the research carried out at the various institutions and by research groups. The best groups do solid work at a high level. There are a number of problems, however. An increasing demand by business and industry for people qualified in informatics has resulted in a drainage of good researchers from the universities and institutes. Moreover, many of those who remain have outside jobs. This clearly affects the research effort, something that is also reflected in the relatively small number of international publications. This situation is understandable in the present economic situation, but will be harmful in the long run.

The equipment situation varies considerably from institution to institution. At a few places it is relatively good, but in most places it is very unsatisfactory, which makes it less attractive to work there and thus contributes to the drainage of personnel.

When some of the staff leave, this means more work for the ones that remain, which makes it even less attractive to stay. This is a vicious circle that needs a deliberate effort to break. In a similar (but less serious) situation in Norway ten years ago the government designated informatics as one of a few areas that were given extra resources for equipment and other expenses (salaries, travel, etc.) to attract good scientists and, as a result, to increase the output of qualified candidates for business and industry. A similar model might also work for Lithuania. To get the necessary output of both qualified computer scientists and research in the present situation requires that the resources in informatics (human and economic) should be concentrated in the universities.

6.2 Summary of Observations and Recommendations

6.2.1 Observations

Lithuania is passing through a serious period of transition, characterised not only by severe financial constraints but also by demanding challenges in restructuring the whole society. This includes activities within research and higher education.

Parts of Lithuanian research assessed by this panel are of a high international level. In some selected areas the research may even be characterised as excellent or very good. The scientific community represents an asset of major importance for revitalisation of the country.

The main research institutions in Lithuania are either Institutes or Universities. The Institutes were established in the Soviet era as large, highly specialised research institutions intended to play a strategic role in the former Soviet Union. In particular, this is the case for the physics research institutes, which were funded to a large degree by applied research contracts from industry and various scientific organisations, and from institutions that distributed military financial resources.

The Institutes were traditionally research and development institutions with relatively few Ph.D. students of their own. Today their scientists tend to involve themselves more in teaching

and training at universities, mainly at Ph.D. level. This teaching is initiated on a voluntary and individual basis or agreed in co-operation agreements between the Institutes and the Universities. The Institutes are now state-funded institutions in Lithuania.

There is a large difference in research conditions between the institutes on the one hand and the universities on the other. Most of the scientific personnel at the universities have teaching as their main or only duty. The average teaching load, measured in hours per year, is high. This stands in some contrast to the claim that the student/teacher ratio is low.

The Ph.D. programmes have recently been changed. About 1.5 years is required to be spent on courses and about 3.5 years on research. This means that Ph.D. studies take 5 years at least, which is long by international standards. In some Universities there is a high drop-out rate of students.

Resources available for university institutions from the ministries are spent on salaries and maintenance of buildings. Very little is left for teaching material and research. Nearly all the institutions are today experiencing severe cuts in both budget and personnel.

Many research groups have old and worn out equipment. This is most noticeable at the universities. Experimental research groups suffer from an extreme lack of funds in particular.

Libraries cannot afford to subscribe to even the most essential international scientific journals. The stock of books cannot be updated. Computer equipment badly needs to be upgraded, and international and national networking has just started.

In many groups, the average age of professors and scientists is high. Some university professors have not done active research for many years.

A number of young scientists have left the research institutions because of very low salaries.

What we saw of the office and laboratory accommodation for the scientists was mostly spacious enough, but the maintenance, lighting and heating left much to be desired.

The scientific community used to have very good collaboration with partners in the former Soviet Union, and few contacts with the Western world. Now many scientists have lost their collaborators in the Eastern countries.

Lithuanian physics research teams previously had a large portfolio of development contracts with industry in the Soviet Union, for designing of prototype equipment, in particular for industry in Lithuania. Much of this industry has now disappeared, and the present Lithuanian industry does not provide a sufficient basis for collaboration of this magnitude.

Integration of Institutes and Universities seems to be difficult. The main obstacles are related to the large differences in research opportunities and to the high teaching load at the universities. There is also competition between research groups regarding the involvement of Ph.D. students in research projects.

In Lithuania, organisational reforms are impeded because the universities and research institutes have their separate legal status and system. Structural reforms are difficult owing to the

high degree of autonomy of the Institutes and Universities.

The fragmented structures and rigidity of Institutes and Universities very often represent barriers to collaboration and optimal use of human resources.

The leadership at Institutes and Universities in general, was more occupied in finding means to continue their work within the established institutions, than to addressing the main question of how to reorganise the whole scientific community in a realistic and optimal way.

6.2.2 Recommendations

A long-term plan should be developed for Lithuanian research and higher education.

It is very important to find a correct balance between the universities and the research institutes. The basic research should be placed at the universities. This will lead to optimal use of resources and help to secure a high level of the research at the universities and also provide a firm basis for the Ph.D. programmes. This applies to the Institute of Mathematics and Informatics and also the Institute of Theoretical Physics and Astronomy.

On the other hand, for the applied institutes (Institute of Physics, Semiconductor Physics Institute) the situation is rather different. The size of their laboratories makes a move difficult. Moreover, in the future too, much of their activity must be directed towards industry, and it may be easier for them to play an important role in this context if they are independent institutions. On the other hand, these institutes must in the future expect to receive less support from the government and more from industry. However, for these institutes too, some integration with the universities should be encouraged. Written agreements between the institutions should be negotiated as soon as possible, regulating both research opportunities and teaching load.

The volume of science in some of the areas discussed below should be gradually reduced. This applies in particular to parts of physics. On the other hand, the spectrum of science needs to be widened considerably over some time. This applies both to basic and to applied research. To meet the future need of the Lithuanian society it is of vital importance to reach a balance as soon as possible.

Measures should be taken to develop an appropriate balance between basic and applied science, for the benefit of the future needs in the Lithuanian society.

The geographical imbalance in research centres, in favour of Vilnius, should be remedied. Some of the industry-related activities should be transferred to Kaunas, Siauliai and other regions.

The fragmented organisation of research, both in Institutes and Universities, should gradually be reduced in order to facilitate closer collaboration between research teams and individual researchers.

Meanwhile, precautions should be taken to secure continuation of the scientific work being

done by the best research teams. In the short term, an emergency programme should be set up to meet the most basic needs.

A system where active research groups are given priority through support from a Research Council is highly recommended, and would undoubtedly enhance scientific productivity.

In many countries the Ph.D. programmes and the university studies are generally shorter. The panel questions whether it is wise of Lithuania to lengthen these studies, which raises the costs and makes the scientists older before they complete their Ph.D.

A task force should be set up with the mandate of finding means to encourage more students to enter, and to stay, in the studies of mathematics, informatics, and physics.

International research collaboration should be stimulated and given high priority. This applies not only to collaboration with the western world, but also to new or former partners in eastern countries.

Participation in international conferences, seminars and workshops is now very limited because of the constraints imposed by the present economic situation, but economic support for such foreign travel should be given high priority.

Modern computer networks do much to break the isolation, and it is of major importance to strengthen and develop these networks, nationally and internationally.

The availability of modern computer facilities, software and access to data bases, should also be receive high priority. This would improve the quality and increase the output rate of Lithuanian research.

A higher rate of publication in high quality international scientific journals is strongly recommended. This would contribute to making Lithuanian scientists and their research better known to foreign colleagues.

By extending their international contacts the researchers would also be able to draw upon the financial resources of a larger scientific community, and in this way alleviate some of the consequences of the Lithuanian economic problems. This applies to public programmes, like EU-funded research programmes and other international and national programmes, and programmes funded by private agencies like the Soros foundation. It is especially recommended that, as partners of larger research projects, the scientists try to obtain support also for basic needs at home.

Increased collaboration between the Baltic states and the Nordic countries would be greatly beneficial for both parties. Even the marginal financial support in recent years has proved to be of great importance. Increased financial support should include not only travelling costs, but also some of the basic needs of the research institutions in the Baltic states.

7 Biology and Geology

Panel Members:

- Jon Bremer, Professor, University of Oslo, Norway, *Chairman*
- Sigbjørn Possum, Professor, University of Oslo, Norway
- Knut S. Heier, Professor Emeritus, previous Director of the Geological Survey of Norway
- Inger Nordal, Professor, University of Oslo, Norway

7.1 General Remarks

With only four members in the committee to cover so wide and disparate fields of research, it is beyond our competence and capacity to give accurate descriptions and make detailed analyses of the many active research groups and numerous devoted research workers involved.

Our comments are therefore to a large extent based on general impressions, where our expertise rests mainly on familiarity with the research process rather than expert knowledge of the specific research projects. One of the problems was that some institutions had published only a small part of their work in English. In general we have interpreted extensive publication in international journal in English as a sign of strength of the group. Some of the judgments and comments in our report will inevitably be incomplete or inaccurate, but we hope not misleading.

We realize that Lithuanian research workers are struggling with a difficult period of transition, aggravated by the currently severe economic situation of the the country. Separation from the Soviet research system confronts them with three fundamental problems. First, the design of the research system and the size and scientific profiles of several of the research institutes may have been well suited for an interconnected network of large institutions distributed throughout the Soviet Union, but are inappropriate for a small national state. Second, no institutions and traditions have been developed for peer review selection procedures. As indicated below, we consider this essential for ensuring high quality research. Third, with the collapse of the Soviet research system, it is more important than ever for Lithuanian scientists to become integrated into the scientific community that bases its communication on the English language, the lingua franca of modern science.

Our principal advice refers to these three problems: the research institutes should be linked more closely to the universities and academic teaching, more efficient procedures should be established for stimulation of high quality research, and increased emphasis be put on publication of articles in English in international journals. The reasons for these recommendations, and some of their consequences, will be discussed briefly below.

7.1.1 Integrating Basic Research with Academic Teaching

To explain why such integration is considered necessary it is important to clarify the functions of research, in particular its relation to academic teaching. In our view, the purposes of research is:

1. To generate knowledge (basic research), and
2. To adaptat this knowledge in the utilization of national resources and creation of new indu-
stries, and to solve environmental and industrial problems (applied research).

The boundaries between basic and applied research are not clearly defined, but the distinction nevertheless useful. Although applied reseach often contains elements of basic research, most applied research is not easily conducted in universities and teaching institutions, but is normally performed in separate state research institutions and private companies. The main criteria for successful applied research are that it leads to economically successful products and/or solu-
tions to environmental or industrial problems.

Basic research in the sciences is international and adds details to a common body of inter-
national knowledge. Most of the problems addressed by one scientific group are usually being
studied simultaneously by other groups in the international scientific community, and will
therefore sooner or later be solved independently of the efforts of a particular laboratory or
group. Therefore, in small countries like Lithuania and Norway, basic research will easily be
regarded as a luxury if it is organized in isolated institutions with no other functions.

Participation in high quality international research is essential, however, for understanding how
new knowledge is generated and for being kept updated about the frontiers of knowledge.
Basic research is therefore fundamental to academic teaching, where the primary aim is to
transmit to the student the understanding of how new knowledge is created. Thus, high quality
tuition founded on research is a prerequisite for the production of scientifically competent staff.
Scientifically well trained personnel are indispensable not only to applied research institutions,
but also to human and veterinary health care systems and to the public administration. They are
needed to solve the many new problems facing modem societies. Because active research is the
ticket of admission to international research, such researchers are also in a position to import
ideas by drawing on the vast common pool of knowledge possessed by the international scien-
tific community.

The number of students at the universities is surprisingly low in Lithuania compared with
western countries. We predict that this situation soon will change and that the universities
should prepare for an increasing number of students, particularly at the M.Sc. and Ph.D. levels.
More teachers will thus be needed in all departments. It is therefore necessary to be cautious in
making drastic reductions in the number of staff at the research institutions, particularly of
younger scientists, since they represent an invaluable source of future teaching personnel. The
distinction between teachers and researchers should probably be abolished.

The conclusions to be drawn from these considerations on the functions of basic research are:
first, that a modern society is dependent upon a relatively high level of research activity in the
basic sciences; second, that this activity must go on in all disciplines of science relevant to a
modern society; and third, that research in the basic sciences in general must be linked to the
universities and academic teaching obligations.

7.1.2 Establishment of more Efficient Selection Procedures

A fourth conclusion is that mechanisms must be created to ensure that the science is of sufficiently high quality. This cannot be done through instructions from central authorities, but must be based to a large extent on selection, that is, preferential channelling of resources to the best among competing scientists and groups. In every country, only limited resources are available for research, and there is normally strong competition for the money available. Universities have to fight for their share. The distribution of research funds by research councils with active scientists as members, or by similar bodies in private foundations, would help to ensure the highest return from the invested money, in terms of research quality. Furthermore, in the absence of peer review, basic research will tend to lose in the competition with applied research. Because we consider it important, we shall elaborate on this point.

Just as a central economy without feed-back mechanisms for real demand is wasteful, a research system based mainly on top-down steering of the science is inefficient. Good science, a combination of originality, general validity and solidity, is rarely produced on command. Only the active scientists with intimate knowledge of their own research field have sufficient insight to make decisions on what is worth pursuing, to know where the frontiers of knowledge lie at the moment, what is technically feasible, and where their own research group, taking into account its strength and its limitations, can contribute to the international collective research effort. The different groups within the institute or department should therefore enjoy a certain level of autonomy in their choice of projects and their funding.

In general, research fields or programmes must be broadly defined, to allow for competing groups to be active within the field or programme. Applications from the groups for grants are scrutinised by experienced, actively working scientists, who evaluate not only the merits of the proposed project, but also the efficacy and success of the research group. Under optimal conditions this selection mechanism is highly efficient, but requires the existence of several viable, competitive groups among which to select. This can be a problem when the funds that can be channelled into research are severely limited, such as is the situation in Lithuania today. However, the unit of selection for funding should not be large institutes or departments, but groups and laboratories within the larger units, in order to secure feed-back to and reward for individual effort and talent

Perhaps the most important consequences of a peer review system are increased autonomy for the individual laboratories and greater emphasis on individual projects, i.e. on units too small to be of interest to the politician or bureaucrat. Greater focus on the individual groups enhances the potential to select and stimulate the best projects and the most talented scientists. Reducing the power of directors and heads of departments, and delegating responsibility to the individual scientist does not necessarily lead to fragmentation of the larger units, since internal collaboration tends to promote the competitiveness of the groups.

The system described above is not an alternative, but an adjunct to funding per capita via the ordinary budgets of the institutions. We realize that the current economic situation in Lithuania is so difficult that there is hardly enough money to pay salaries or heat buildings. However, we still consider it important that steps be taken to establish a peer review system. This has the additional benefit of protecting the basic sciences, with their long-term projects, from the tendencies in a top-down managed system towards an imbalance in favour of applied research involving short-term, practical projects.

7.1.3 English as the International Language of Science

Today most basic and much applied scientific research of high quality is published in English in refereed international journals. The use of the national language is necessary in teaching and for information to the public. However, to test the quality of research, the results have to be exposed to the scrutiny of the editorial boards and referees of international journals. The ability to publish in international journals is therefore an important, although not the only, criterion of a high quality research group.

The proportion of articles published in English and the establishment of contacts to the west varied widely among the different institutions, departments and groups. An apparent obstacle to improvement seemed to be insufficient knowledge of English. We noted the widespread practice of translating scientific textbooks from English to Lithuanian and printing them locally. The practice may make otherwise expensive foreign textbooks more cheaply available to the students, but it seems wasteful for scientists to spend time on this kind of work, and it has the obvious drawback of the students not having to read scientific literature in English.

7.2 Specific Comments

7.2.1 Institute of Ecology and Institute of Botany

- The research being done at these institutes is relevant to the management of natural resources of Lithuania. However, the distribution of tasks between the Institute of Ecology, the Institute of Botany, the universities, the agricultural research institutions, and the authorities responsible for management of natural resources, needs to be discussed.
- The quality of the research personnel appeared to be satisfactory, but the institutes should make an effort to increase the use of modern methods of molecular biology, and to publish more of their research in international journals.
- Maintenance of premises and equipment is poor. The internal organisation of the institutes seems to be too fragmented and should be reviewed.

7.2.2 Institute of Immunology

- Investment in first class immunological research should be given high priority by any nation with the ambition of developing a high standard health system in human and veterinary medicine. Therefore, immunological research must continue to receive substantial support.
- In most other countries immunological research is an integrated part of the medical and veterinary faculties at the university. The reason for establishing an immunological research institute separate from these faculties is not clear, and closer integration into these faculties should be considered.
- The institute has not yet succeeded in producing internationally competitive research. It is recommended that the institute should concentrate on fewer projects and make an active effort to attract young scientists.

7.2.3 Institute of Biochemistry

- The Institute of Biochemistry has succeeded to a large extent in becoming integrated into the international system of basic research, both by cooperating with research institutions in other countries, and by publishing some articles of high standard in international journals.
- To some extent its activities have been integrated into Lithuania's system of education. This integration should be continued.
- Considering the large size of the institute, its scientific productivity is not entirely satisfactory, partly because of poor economy. We hesitate to recommend reductions in staff, since the institute's teaching potential will be needed for the education of an anticipated larger number of students in the near future.

7.2.4 Institute of Geology

- The work being done at the Institute of Geology is relevant to the management of Lithuania's natural resources. Most of the work is descriptive, and is typically done by National Geological Surveys of western countries. The distribution of tasks between the Institute of Geology, the Geological Survey of Lithuania, and the Institutes of Geology, Mineralogy and Engineering Geology at Vilnius University should be reconsidered.
- The quality of the research personnel is satisfactory, but publishing in international journals should be increased and encouraged.

7.2.5 Faculty of Natural Sciences, Vilnius University

- The teaching at all departments is very relevant to national educational needs. The number of students, particularly at master and Ph.D. levels is low in all departments. The faculty has to prepare for a much higher number of students in the future.
- At most of the departments the research was not of satisfactory quality, partly due to lack of money. Comments on the performance of the different departments follow.

Department of Plant Physiology and Microbiology

The research in this department is traditional, and nothing is published internationally. The research is not of satisfactory standard.

Department of Biochemistry and Biophysics

Significant parts of the research (with several doctoral theses) are of satisfactory standard and are published in international journals. The scientific projects may be too varied to reach a general satisfactory level, especially in the present financial situation.

Department of Botany and Genetics

The research in this department is traditional and too diversified with weak international links. Some of the useful applied research is closely related to the research being done at the Institute of Botany and the Institute of Ecology.

Department of Zoology

Useful applied research is done in the department. The distribution of tasks between the Department and the Institute of Ecology should be considered. Interesting basic research is being done, but international publications are lacking. The research is therefore not satisfactory.

Department of Geology and Mineralogy

The research in the department is quite satisfactory, with some international publications. The research and teaching should be coordinated with these activities at the Institute of Geology.

Department of Hydrogeology and Engineering Geology

The research is descriptive and of unsatisfactory quality. Very little is published in international journals. To improve the education it is important to strengthen the scientific profile of the department. In hydrogeology this could be achieved by transferring this type of activity from the Institute of Geology to the Department.

(Department of Hydrology and Climatology and Department of General Geography and Cartography were not evaluated.)

7.26 Institute of Biotechnology

- Much of the research done at this institute, both basic and applied, is of outstanding quality. The institute has had significant commercial success with its research-based products and plays a supportive role for research at other Lithuanian institutions. The institute should therefore continue to receive very substantial support, since it serves as a locomotive for modern biomedical research in Lithuania.

7.27 Faculty of Environmental Sciences, Vytautas Magnus University

- In the foreseeable future, this new faculty will depend for its teaching on cooperation with other Lithuanian research institutions. However, some quite satisfactory research is already being done in the faculty.

7.3 Summary of Recommendations

In small countries like Lithuania (and Norway) most of the basic scientific research should be done in the academic teaching institutions, to ensure up-to-date curricula and teaching founded on research. The present independent research institutes should be divided into sectors concerned mainly with management and sectors concerned mainly with basic research. The latter should be integrated with the universities.

The universities should prepare for an increasing number of students in the future, particularly at the M.Sc. and Ph.D. levels. More teachers will therefore be needed in all departments. The distinction between teachers and researchers should be abolished. Research funds should be distributed on the basis of competing applications to a research council with active scientists as members (peer review), and with the task of supporting high quality research and creating a reasonable balance between basic and applied research. Results should be published in international journals in order to expose the projects to the scrutiny of editorial boards and referees from the international scientific community.

8 Philosophy, Modern History, Political Science, Sociology

Panel Members:

- Knut Midgaard, Professor, University of Oslo, Norway, *Chairman*
- Ingemund Gullvag, Professor, University of Trondheim, Norway
- Sigurd Skirbekk, Professor, University of Oslo, Norway
- Nils Morten Udgaard, Foreign Editor in the Norwegian daily newspaper *Aftenposten*, and Professor, University of Bergen, Norway
- Thomas Chr. Wyller, Professor, University of Oslo, Norway

8.1 Analysis and Evaluation

Owing to its turbulent history, especially the fifty years of Soviet occupation and rule, Lithuania seems to be currently involved in extensive efforts of nation-building and state-building, and of strengthening the consciousness of cultural identity and rediscovery of the nation's historical past. At the same time, Lithuania is striving to cope with serious social and economic difficulties.

Of major importance in the Lithuanian situation are the problems inherent in the transition from a generally Soviet-centred system in economy and production, research, education etc., to a system more open to influences from the rest of the world, especially the West. The organization of research and higher education in Lithuania and tendencies observed in Lithuanian research in the humanistic and social sciences, may to some extent be a result of this situation. The division between universities and independent, state-funded research institutes has obviously been inherited from the distinction made during the Soviet period between universities and Academy-affiliated institutes or specialized research institutes. In the efforts to become liberated from the heritage and constraints of the Soviet period it may be natural to focus on Lithuania, but this could entail a risk of concentrating on Lithuania to such a degree that the rest of the world is neglected.

The emphasis on historical research in some fields other than History, and on empirical investigations without theoretical reflection in History or Social Science, may also be consequences of the Soviet period. The notion that the overall framework was conclusively established, and that the main problems, for example in Philosophy and Social and Political Theory, had been solved within the ideologically correct and acceptable framework, might encourage historical investigations at the expense of systematic ones, and empirical research instead of theoretical inquiry.

Yet another effect of the Soviet period is that Russian is the most widely mastered and understood foreign language.

However, historical causes, if so they be, are not justifications. Implicit in the preceding

remarks are certain evaluations: The present organization of the system of research and higher education, with large research institutes independent of the universities, may have disadvantages; and research, at least in some areas and institutions, seems to focus too much on history at the expense of systematic research, seems to be too empirical at the expense of theory, and too much confined to Lithuania. Moreover, a command of English, the international medium of communication for researchers in most parts of the world, is lacking in many scientific groups in Lithuania.

The division between universities and research institutes implies a division between teaching and research, in spite of a certain tendency on the part of institute researchers to contribute to the teaching at the universities on a personal and voluntary basis and for extra pay, and even if university teachers do manage to do some research in spite of their very heavy teaching load. Research and teaching should be better integrated, to the benefit of both. Contact with good students can inspire good research, and contact with teachers doing good research tends to foster good students. This is a positive circle. However, this circle is disrupted by the very heavy teaching load for university teachers, and separate research institutes where many of the researchers have little or no contact with students.

We found some differences between the universities as regards teaching conditions. For example, there seems to be a better balance between time spent on teaching and time available for research at Vytautas Magnus University. On the other hand, this university still has a disproportionately large number of part-time teachers who spend little time at the university and hence contribute little to the environment for the students.

After fifty years of Soviet ideological domination and direct rule by Moscow, Lithuanian scholarship and research has to face the challenge of establishing national priorities that are conducive to substantial reorientation and improvements. In the view of the panel, a significant expansion of links to relevant centres of research and learning in the West is of utmost importance, and especially so in Philosophy, History and the social sciences, including Political Science, Sociology, Economics and Law. In no other disciplines has the negative impact of Marxist ideological control over a period of two generations been stronger. During that time significant developments occurred in Philosophy, History and the social sciences in the West. It is essential to catch up on these developments and become fully part of existing international networks; scholarly communities in Lithuania will have to make a sustained and concerted long-term effort.

At the same time, part of the effort to develop Lithuanian scholarship must consist of maintaining links to Russian and Ukrainian communities that are of scholarly substance and relevance, thereby exploiting the relative advantage possessed by many Lithuanian scholars, in terms of language and well established contacts.

Emphasis on the maintenance and expansion of international relations should not mean neglecting one's own national history and identity. In particular, it seems important to cultivate the Lithuanian language, also in scholarly and scientific work, after so many years of downgrading. Any tendencies towards encapsulation, however, must be counteracted.

Diversity, plurality and scholarly competence should be the catchwords for the renewal of Lithuanian scholarship in our fields of study. On the other hand, we still recommend that some national priorities be worked out.

8.2 Recommendations

8.2.1 The Structure of the System of Research and Higher Education

Some of the independent institutes, such as the Institute of Labour and Social Relations, are mainly or entirely concerned with applied research; others, like the Institute for Philosophy, Sociology and Law and the Institute of History, do basic research but may also make reports on specific issues of public concern. The institutes for applied research which, if they are to do a good job, should also be allowed to do some basic research, should presumably be preserved and be financed by the users - whether they be the government, industry or private organizations. Our main concern, however, is with the institutes primarily doing basic research. Some of these have very large staffs, some of whom are engaged in projects of doubtful scientific interest, and which in any case hardly merit the amount of man-years allocated to them. Whereas the institutes and institute projects are over-staffed, some of the university departments, on the other hand, seem to be under-staffed. This impression is reinforced if one considers the teaching load of the teachers at some departments. This may be as high as 25 hours per week; which by far exceeds the teaching duties ordinarily imposed at Western universities, European or American. In the light of this situation it is strange that university teachers manage to do any research at all. In spite of this, we found that in some cases university departments do research of higher quality and of greater importance than that of corresponding independent institutes.

In our opinion the universities should become more heavily involved in basic research, and the independent institutes should be gradually diminished. This could be achieved in particular by transferring positions from the institutes to the universities, primarily when the present holders retire.

Like all university posts, the transferred positions should entail both teaching and research duties; but the teaching load for university teachers should be reduced to Western levels, the degree of reduction depending amongst other things on the quality and amount of published research, and the reductions earned should constitute a basis for allocation of extra resources. At the same time, sabbaticals should be granted at reasonable intervals, to provide time for renewal and concentrated research work.

The independent institutes could be turned into a combination, on a smaller scale, of institutes for applied research and one or more centres for advanced study, the latter based on smaller staffs and strict criteria for selection of members, probably with only temporary research positions linked to specific projects.

8.2.2 Conditions for High Quality Research and Teaching

We would like to elaborate a little on the conditions necessary to achieve high quality research and teaching.

With regard to the institutes of applied research, two points must be made:

First, high quality applied research depends upon competence which can only be built up and maintained if enough room is allowed for fundamental studies in theory and methodology, and even for basic research. How much is "enough" is not decided once and for all. Some high-quality institutes of applied research in the West, however, find that 15-20% of the working time should go to such fundamental studies. In a country like Lithuania today, it is particularly necessary for researchers to update themselves in theory and methods. We suggest therefore, that the regulations should include a provision stipulating that 25 % of the total working time should be spent on fundamental studies and basic research.

Second, the composition of the advisory and steering bodies may be significant with regard to working out plans, and to both stimulating and directing the staff of the institute concerned. It is by no means a matter of course that the present rules regulating the composition of these bodies are the best ones. For this reason, we recommend that the composition of the advisory and steering bodies be reconsidered with a view to ensuring institutes of high quality.

Let us now consider the conditions for achieving high quality at the universities:

Generally, it is important to stimulate university teachers, first, to do research at a high level themselves and next, to advise recruits, to enable them to do good research. This stimulation can be achieved by making certain benefits available depending on the scholar's work as a researcher and as an advisor. One relevant benefit could be the position of full professor, another could be time or other resources, for example equipment, for scholarly work.

The panel therefore recommends that the time spent on advising students on their research work should be deducted from the time allocated for other teaching obligations, according to a given rule.

Moreover, the panel recommends that other resources, for example money for equipment, should depend upon the quality and amount of published research, and on how much of the advisory function has actually produced results (by counting the number of doctorates resulting from the teacher's advisory function during the period concerned).

Precise rules exist for both kinds of compensation, or reward, at several university departments in Norway.

The two incentives recommended so far are relevant both for the period before a scholar has earned the maximum reduction in teaching obligations, and afterwards. Let us then consider a rule that is relevant to the former period only.

The panel recommends that reductions in teaching obligations should depend on whether research work has led to peer-reviewed publications, and the advisory function has led to doctorates.

These types of incentives are meant as relevant *examples*. They should be made more precise, and should be supplemented by others. The general point is that it is necessary to think through what systems of incentives would do most to promote scholarly improvements in the various disciplines and at the various institutions.

8.2.3 Orientation of Research

In many areas and at many institutions the research is focused too much on Lithuania, Lithuanian history, Lithuanian philosophy, Lithuanian science in the 19th and 20th centuries, Lithuanian sociology, etc. Interest in Lithuania is understandable in the present situation, but too great a proportion of the resources are spent on such topics.

Furthermore, in some fields and institutions there is an inordinate emphasis on historical topics at the expense of systematic inquiries. For example, at the Institute of Philosophy and Sociology a large number of the staff are doing historical research in philosophy, and even contemporary philosophy is treated as a field for historical investigation: the history of contemporary philosophy.

In humanistic and social disciplines like History, Sociology or Political Science, emphasis is placed on empirical research and data collection, but theoretical and methodological reflection tends to be weak.

We recommend some reorientation of the effort in accordance with the above analysis and evaluation.

8.2.4 Criteria of Scholarly Competence

The present system of research and higher education in Lithuania is based on two research degrees: the degree of *doctor*, and the degree of *dr. habil.* The former qualifies for the position of *docent* at a University and the latter for the position of *professor*. We question the fruitfulness of having two doctorates. First, experience from Western countries indicates that it is unnecessary. Second, we wonder to what extent it is conducive to good and fruitful research to have to write a second dissertation. In our opinion, writing articles for international peer-reviewed journals is likely to be more fruitful: to be evaluated in this way is a real challenge, and a test of the quality and relevance of one's work.

We fear that if the *dr. habil.* degree is maintained the prevailing traditions and criteria may contribute to unfruitful research. Such an effect is especially likely during a period of reorientation, characterized by new promising avenues of research with which the established *drs. habil.* are not familiar. Finally, there seems to be a crisis linked to the *dr. habil.* degree in Lithuania, at least in the disciplines we have studied. We have been struck by the fact that there tend to be only few *drs. habil.* left to award the *dr. habil.* degree, and those that remain tend to be close to the age of retirement, if not already passed it. The panel recommends that the system of two doctorates be reconsidered with a view to raising the level of the ordinary doctorate and cancelling the *dr. habil.* degree. As a sequel to this proposal we recommend that the criteria for becoming qualified for a professorship be reconsidered. More specifically, we suggest that one criterion should be to have published at least two articles in international peer-reviewed journals.

8.2.5 Expanding the Exchange Programmes

The panel recommends that the existing programmes for exchange of scholars between Lithuania and other countries should be systematically expanded. This is necessary in order to give students and researchers an adequate education; study programmes should be reformed

with a view to making it easier to combine studies in Lithuania with studies abroad. Substantial expansion of the existing exchange programmes is also necessary in order to give established researchers belonging to older age-groups an opportunity to develop further as scholars, and to establish useful contacts abroad. Knowledge of the "state of the art", and familiarity with international research communities, are prerequisites for doing a good job both in teaching and in research - and not least for good leadership. In this connection, it is especially important to expand exchange programmes with the West.

8.2.6 Renewal of Leadership

It follows from the recommendation above that the criteria by which persons are picked out for leading positions should reflect present and future conditions and needs. More specifically, scholarly and linguistic qualifications are necessary for communicating with advanced scholarly communities in other countries, particularly in the West. The panel was struck by the dynamism and rising quality of institutions and groups where such criteria were clearly met.

It should be emphasized in this connection that the leaders of institutions of research and academic education should be given enough freedom to enable them to reward and exploit revealed professional and administrative talent.

8.2.7 Broadening and Strengthening Linguistic Competence

Too many of the leading figures at the institutions we visited were unable to talk to our group in a Western language. More specifically, several members of the various institutions could not speak or understand English. The mastery of English varied considerably, however. Some scholars were fluent in English, some had sufficient grasp of this language to be able to communicate, while others had to rely on interpreters and could apparently speak only Lithuanian and Russian (perhaps Polish).

Clear decisions must be made and broad efforts undertaken to improve the ability of research personnel and administrators to communicate with Western research communities as well in a Western language.

English has now become established as the key language of international scientific and scholarly exchanges and must receive priority treatment. In addition, every scholar should master at least one other foreign language fairly well. As mentioned above, Russian and Polish should not be neglected. At the same time, the command of another Western language in addition to English may provide very useful, or even necessary, access to relevant sources, literature and research groups.

Our experience from Norway, also a small language community, is that mastery of at least one foreign language is a precondition for advancement in research, and that the mastery of other international languages is of great and often decisive benefit for the research being done. In this context, Social Science, Philosophy and even History are in the same position as Natural Science, Technology and Medical Science.

We recognize that the language question, more specifically the acceptance of Lithuanian as the new official language, was very important for the national liberation of Lithuania in the years 1989 to 1991. However, any tendency towards chauvinism as regards language would, in our

opinion, be detrimental to the intellectual, social and political development of the independent Republic of Lithuania. It would weaken the ability of Lithuania to understand and to influence its cultural and political environment, and would thus represent an element of danger for the future independence of the republic.

We recommend that English courses which at least give all students sufficient competence to read textbooks and attend lectures in English, should be made obligatory during the first or second year at university. These efforts can and should be combined with a long-term development of Lithuanian as a language of science and scholarship; thus, key textbooks on university level ought to be available in Lithuanian.

8.2.8 Enhancing Theoretical and Methodological Competence

Research is hardly conceivable without some theoretical and methodological elements. What these elements should be, however, is a matter of debate and controversy, especially in History and Social Science.

During its site visit, the panel met different attitudes concerning what the relationship between empirical inquiries and generation of theories should be, ranging from a rather sceptical attitude to anything beyond common sense empirical studies, to a rather strong commitment to specific theoretical perspectives. Fortunately, we met scholars who were able to deal with basic problems in a diversified and very competent, even impressive, way.

The panel is convinced that both in History and in Social Science more attention should be paid to basic theoretical and methodological problems, so as to avoid both the pitfall of empirical research that has little explanatory power, and one-sided interpretations based on, and leading to, dogmatism. For Lithuanian research as for other research, the aim should be to contribute to international cumulative research, and to the international scholarly dialogue. This aim can hardly be reached without becoming familiar with contemporary theoretical contributions, which should be studied in the light of classical contributions.

The panel recommends in particular that steps should be taken to encourage cooperation between historians and social scientists on the one hand and philosophers on the other, in particular analytically oriented philosophers.

8.2.9 Democracy and its Conditions

Political institutions and political life in a democracy depend upon enlightened citizens. Thus, certain forms of knowledge and understanding have to be present if democracy is to thrive. Which disciplines and which topics are most important in different contexts is a matter for discussion. Suffice it to emphasize here that the disciplines for which this panel is responsible, Philosophy, History, Political Science and Sociology, are all highly relevant. Economics and Law can certainly be added. This should be taken into consideration making priorities.

8.2.10 Plurality, Diversity, Competition, Cooperation

The panel recommends a national university policy which would allow the new universities in Kaunas and Klaipeda to develop in a way that ensures a plurality and diversity of scholarly interests, perspectives and methods, as well as contact both with centres in the international

scholarly community and the different segments of Lithuanian society. This development should take place at a moderate pace, so as to make it possible to build up high-quality groups of researchers with a profile of their own. Even so, the development must be deliberate and steady.

We found the Vytautas Magnus University of Kaunas and the new Klaipeda University to be extremely dynamic, and to represent the kind of new thinking and openness to the world that are prerequisites for renewal and improvement of academic research in Lithuania. Possibly Norway's own experience points to some of the benefits of diversification and competition: The establishment of new universities, and the further development of existing ones in regional centres like Bergen, Trondheim and Tromsø, have contributed to improvements and innovations in Norwegian research and academic life, and have countered the danger of stagnation in research and teaching, and in the communication with the national and the international communities which the universities are supposed to serve.

The panel expects Vilnius University to remain the most important centre of teaching and research in Lithuania, owing to its rich traditions of learning, its considerable intellectual power, and its ties to important universities abroad. We are convinced, however, that the deliberate development of the other existing universities, and the resulting healthy competition between them, will be most beneficial to intellectual life and developments in Lithuania, and even to the future standing of Vilnius University. Such a development will also help to increase the number of students and thus the proportion of students in the population, a proportion that is currently lower than in comparable countries, and lower than it ought to be.

There is not only a need for diversity and competition, but also for cooperation. In particular, there will always be a need for cooperation, both within the various disciplines and between scientists and scholars working at different institutions, in regard to common problems and needs. Experience from the social sciences in Norway as regards to the building up of satisfactory data bases and the supply of data to individual researchers, is relevant. The development of an institutionalized pattern of cooperation between researchers and research institutions is a major challenge in Lithuania, as elsewhere.

8.3 Summary

Considering the significance of research - and of the communication of its results - for personal, professional, cultural, social, economic and political developments; considering, moreover, the conditions prevailing in Lithuania, not least because of 50 years of Soviet occupation and rule; considering, finally, the dependence of future research on students being taught by scholars who are doing good research themselves and who, in this research, are inspired by good students; the panel recommends:

- a gradual but substantial transfer of positions and associated resources from the former Academy institutes to the university sector, primarily when the present holders of these positions retire, strengthening university faculties and departments as centres of basic research combined with higher education, and transforming the former Academy institutes into a combination, on a smaller scale, of institutes for applied research and one or more

centres for advanced study, the latter based on smaller staffs and strict criteria for selection of members, and probably with only temporary research positions linked to projects;

a reduction of the teaching load of university teachers to Western standards, the degree of reduction depending on the quality and amount of published research, and on the number of students being advised in connection with their work towards a doctorate; the introduction of regular sabbaticals at reasonable intervals, to provide enough time for research work, and thereby establish a basis for high-quality research; and, as a prerequisite, reforms and measures which would tend to reduce the number of hours that students have to spend attending lectures;

the introduction of rules to the effect that, first, the time spent on advising students on their research work can be deducted from other teaching obligations and, second, other resources, e.g. money for equipment, will depend upon the quality and amount of published research, and on the amount of advising that has actually produced results (counting the number of doctorates resulting from the teacher's advisory function during the period in question);

adoption, in the regulations of institutes of applied research, of a provision stipulating that a certain share of the working time, e.g. 25 %, be reserved for fundamental studies in theory and methods and for basic research; and a reconsideration of the composition of advisory and steering bodies, with a view to ensuring institutes of high quality;

reconsideration of the system of two doctorates, which seems unnecessary and perhaps even unfruitful, with a view to raising the level of the lower doctorate and cancelling the dr. habil. degree; moreover, as a sequel, a reconsideration of the criteria of competence for the position of a full professor, introducing as one criterion the publication of at least two articles in international peer-reviewed journals;

a determined national policy of plurality, diversity and competition and, at the same time, a moderate national policy of division of functions in the university sector, strengthening the expanding and dynamic institutions in Kaunas and Klaipeda, and giving the old centres of science and learning, rich in traditions and intellectual power, sufficient elbowroom for reform and new developments based on professional and administrative talent;

the development of an institutionalized pattern of cooperation, within the various disciplines (or groups of related disciplines), between representatives of the various institutions, to consider common problems and needs, such as the building up of data bases and supply of data to individual researchers;

a comprehensive policy aimed at further integration of Lithuanian research and scholarship into the international scholarly and scientific community;

- more specifically, provisions and measures aimed at ensuring a good command of English, and a relatively good command of at least one other major foreign language, including Russian, in the student body, and adequate opportunities and incentives to encourage established teachers and researchers to improve their command of one of the major Western languages, in particular English;
- moreover, an incentive structure that promotes active participation in international networks, projects and conferences;

- similarly, an incentive structure for publishing papers in international peer-reviewed journals, e.g. giving special weight to such publications when considering reductions in the teaching load, and introducing the publication of at least two articles in international peer-reviewed journals as a criterion for becoming qualified for a professorship (cf. above);
- similarly, reforms in study programmes with a view to making it easier to combine studies in Lithuania with studies abroad;
- not least, in History, a reorientation to place more emphasis on world history, international history, and comparative history, - but, not overlooking the significance of an adequate understanding of the history of one's own nation, which also includes topics that are still quite close and still evoke strong emotions;
- similarly, in Philosophy and in social and political studies, greater focus on systematic research in cases where a historical approach has dominated, - but, not overlooking the significance of the historical dimension of social and cultural phenomena;
- and similarly, in historical, social and political studies, which should be given high priority, because of their significance for the future of democracy, deliberate and systematic efforts should be made to combine an empirical approach with well-founded theoretical and methodological reflection and with an ability to relate one's own problems and findings to classical and contemporary theoretical contributions, so as to contribute to cumulative research and to the international scholarly dialogue.

9 Baltic, Slavonic and Germanic Languages and Literatures

Panel Members:

- Jostein BØrtnes, Professor, University of Bergen, Norway, *Chairman*
- John Ole Askedal, Professor, University of Oslo, Norway
- Jan Peter Locher, Professor, University of Bern, Switzerland
- Terje Mathiassen, Professor, University of Oslo, Norway
- Ingunn Lunde, Research Fellow, University of Bergen, Norway, *Secretary*

Evaluation and Recommendations at National Level

Based on interviews *at faculty level*, and on the documentation provided by the institutions concerned, we should like to present the following general assessment of the current state of the humanities in Lithuania:

9.1 Research Organisation

In the years after independence, the Lithuanian system of post-graduate studies has undergone a radical reorganisation. After their MA, the candidates now go on to a five-year study for their D. phil. During the first two years of their D. phil. studies, the candidates have to prepare themselves for a number of examinations in subsidiary subjects (at least 7, of which 5 are mandatory, 2 optional). The panel doubts the desirability of elementary examinations at doctoral level. At this stage, the candidates should be able to concentrate on their scholarly work and to expand their knowledge according to their own needs, without having to sit for examinations like undergraduate students.

In contrast to the Anglo-American system, there is a second doctoral degree corresponding to the German "Habilitation". Normally, one has to defend one's "Habilitationsschrift" in order to become a professor. Moreover, a faculty cannot produce its own doctors without a Dr. habil. in the subject

Whereas the introduction of a new MA and D. phil. has brought the Lithuanian system into line with modern research recruitment in most Western countries, the introduction of a Dr. habil. has a retarding effect on the recruitment of young scholars. On the one hand, it takes years for a scholar to be able to present his or her "Habilschrift", and on the other hand an institution with no Dr. habil. in the field is prevented from producing new doctors.

Against this background one may ask whether the second doctor's degree could not be replaced by simpler forms of assessment, more on a par with Anglo-American or Scandinavian

(Swedish and more recent Norwegian) routines? This would require a general qualitative upgrading of the remaining single doctoral thesis.

In spite of the reorganisation of the whole university education system, the panel got the impression that Lithuanian universities have retained the old Russian system of fixed courses at all levels up to and including the MA degree. To an outsider, many of these courses seem to be too elementary and somewhat superfluous. If these courses are one of the reasons for the unduly heavy teaching load, it might be better to activate the students to enable them to carry on their studies on their own, thus giving the academic staff more time for research. The panel was struck by the amount of scholarly work being done at the Lithuanian Institute of Culture and Arts, where the staff have no more than two hours teaching per week. We think this is a clear indication of how much time and energy is consumed by teaching at the universities.

A reduction in the amount of fixed courses would also have the effect of preparing the students for a scholarly career in a more realistic way than the present system does, since in many ways it is a continuation of secondary-school teaching.

9.2 Research Conditions

9.2.1 Funding

The institutions under assessment are all funded by the Lithuanian state. The state is responsible for staff salaries, as well as funds for equipment and the running of the institutions in general. Some departments currently receive additional financial support from, for example, the Soros foundation, British Council, American Center, TEMPEST, etc., but this support, however welcome, can only be auxiliary and is earmarked for short-term projects.

Closer budget control may be necessary to control that the available funds are directed towards research and teaching.

9.2.2 Staff and Working Conditions

Without exception, all the institutions responsible for the humanities in present-day Lithuania suffer from underfunding. Above all, the panel is worried about the extremely low salaries of the academic staff, most of whom are forced to have two, often three jobs in order to be able to earn a living. Thanks to their enthusiasm and devotion to their subject, Lithuanian scholars manage to cope with the situation in an admirable way, but to outsiders it is quite clear that in the long run, this is a squandering of human resources. An immediate effect of this underpayment of academic staff is that the institutions have serious difficulty in recruiting young people. An alarming number of their best candidates are scared away from an academic career that is unable to provide them with a decent income. The tendency is particularly worrying in the field of foreign languages, but the information received by the panel gives reason to conclude that the humanities are currently suffering from a general brain-drain caused by the extremely bleak economic prospects of a scholarly career.

For social reasons, the persons employed at present should under no circumstances be laid off, but in the long term a reduction of the staff appears unavoidable, as more modern technical facilities are introduced.

The present teaching load seems unacceptable and should be reduced as the teaching equipment is modernized and modern textbooks and teaching materials become more available. We observed in Lithuania a solid tradition of writing textbooks.

9.2.3 Equipment

Underfunding also directly affects working conditions at the institutions, for example, through lack of adequate equipment, above all personal computers, not only in the university departments, but at the Institute of Lithuanian Language, at the Institute of Lithuanian Literature and Folklore, and at the Lithuanian Institute of Culture and Arts. At these institutions, scholarly work is greatly hampered by this lack of computers, particularly the task of transferring invaluable linguistic and folkloric material from card files to modern electronic storage systems. In the faculties of the humanities at all the universities involved in the evaluation, personal computers, today regarded as an indispensable part of a scholar's equipment, are still a rarity. At Klaipeda, for instance, the Faculty of the Humanities has one computer, situated in the Dean's office.

In addition to the disastrous deficiency of computer equipment, some of the institutions with special needs - for example the Institute of Lithuanian Language and the Institute of Lithuanian Literature and Folklore - collect their material by means of recording equipment that is both obsolete and second-rate, with the result that invaluable linguistic and folkloric material collected at a time when traditions are dying out is of such a poor quality that precious scholarly information is lost

9.2.4 Library Facilities

After independence, the Lithuanian universities lost their institutionalised contacts with Soviet libraries and their regular supply of literature from Russia. At the present time, the purchase of new books has had to be reduced to a minimum, scholarly journals have had to be discontinued, and it is out of the question to subscribe to new ones. This has created an untenable situation, not only for foreign language departments, but for Lithuanian scholars in general. Moreover, in spite of the work being done to establish an automated information system at the Library of Vilnius University, "huge investments are needed and hard work must be done to achieve the computerization level existing in European universities" (cf. Analysis of Data Equipment Needs in Vilnius University (Project), Vilnius 1994, p. 3).

The shortage of computer equipment, and consequently the lack of individual access to modern library facilities such as internet search and computerized catalogues, have far-reaching repercussions for all the institutions involved, not the least in their efforts to break out of the isolation imposed on the country when it was part of the Soviet Union, and to become integrated in the international scholarly community.

9.25 Publication

Because of the precarious economic situation since independence, publication has become very difficult, for institutions as well as for individual scholars. Lack of funding means that manuscripts have to be put aside indefinitely. In a scholarly community that has been under Soviet control for so long, and where there is consequently so much to catch up on, this is not only frustrating for individual scholars and groups, but also fatal for the recovery of Lithuanian humanities as an essential element of the country's national culture.

In most Western countries, even in philology, it is taken for granted that publishing in a variety of renowned periodicals, in most cases in English, is a token of high quality.

This may be true to a certain extent in firmly established circumstances. However, in a country like Lithuania it is often more urgent, in our view, to publish for the "home market". This applies the first place to important sources or interpretations, since the relevant texts have often not been accessible for thirty or even fifty years: Baranauskas was known only in a most fragmentary way. The works of Zenge, a poet of European format, were not available at all, Sruoga was not accessible as a literary critic of international stature, etc., etc. The new periodical *Lietuvos Kultūros Tyrimai* (*Studies in Lithuanian Culture*), issued by the Institute of Culture and Arts in Vilnius, is taking a valuable step in the right direction. The assimilation of Western literary criticism and approaches, in Lithuanian, as manifested in this periodical, is of equal importance.

Publications in Western journals, in English or other languages, will follow as a consequence of Lithuanian scholars' integration into the international academic community.

9.26 International Contacts and Networks

Next to the endeavours to bring the national heritage back into the centre of the Lithuanian humanities after the years of occupation and suppression, internationalization is a main concern at all the institutions that took part in the evaluation. The panel was very impressed by what is being done in spite of very limited means. However, we can also fully understand the frustration of the academic staff in all fields of scholarship at not being able to do more, especially to build up new competence by sending young candidates abroad and inviting foreign scholars for longer or shorter stays at the institutions. The limitations imposed by the lack of means are particularly frustrating when one sees what can be achieved by Lithuanians who have been able to attend post-graduate courses and doctoral programmes abroad, for example, the candidates from the Department of English Language and Literature at the Vytautas Magnus University in Kaunas who are currently completing their theses at the English Department of the University of Bergen.

9.27 Forms of Research

In the institutions under assessment we found a combination of individual research and group projects. As mentioned above, we were impressed by the work being done, both individually and in groups, considering the heavy teaching load of the academic staff of the university faculties. Time-consuming teaching and administration may be the reason for the sketchy character of much of the published work, sometimes amounting to presentations of only three to eight pages, which in the humanities tends to imply something rather too slight.

Lithuanian scholars are well aware of the fact that during the years of Soviet occupation they were unable to keep up with theoretical developments in the humanities outside the Soviet Union. In spite of this, however, we found surprisingly little interest in the development of modern methodology and theory, the great exception being the new Lithuanian Institute of Culture and Arts. On the whole, the panel was struck by a tendency to rely on old and well-tried methods, combined with highly conventional formulations of problems, both in Lithuanian philology and in foreign-language studies. We even observed a certain lack of theoretical awareness, for example, in connection with the New History of Lithuanian Literature now being prepared at the Institute of Lithuanian Literature and Folklore. We found very little response to our question about the theoretical framework of the project. The answer was that "the main thing is to get the material out". However understandable such a stance may be in the present situation, it seems strange to ignore the theoretical problems posed by an undertaking such as the creation of a new history of Lithuanian literature. By the same token, scholars who define their own work as reception studies showed little or no awareness of modern reception theory. Their work was characterized by a somewhat old-fashioned scholarly approach to "Tolstoy in Lithuania" and similar themes. In this connection we feel inclined to make a few specific proposals:

The Faculty of Humanities at Vilnius University should be provided with a professorship of general linguistics. (In this connection it is tempting to mention that, at present, approximately 120 people are engaged in teaching German and English for special purposes, but not a single person is a specialist in modern linguistic theory.)

Despite the close connection between Lithuanian and Indo-European, a broader perspective might be well served by a separate chair (professorship) for general Indo-European studies.

A more specific proposal concerns the development of computational linguistics. Since there is an expertise in this field in Kaunas, and in Siauliai, it might not be a bad idea to try and initiate a co-operation programme between these two institutions in this particular field, as a first step towards a future network.

9.3 Research Priorities

9.3.1 Areas Well Covered by Research

These areas are those taken care of by the Institute of Lithuanian Language, the Institute of Lithuanian Literature and Folklore, and the Departments of Lithuanian Language and Literature at the universities. It should be clear, however, from what has been said about funding that in order to continue such comprehensive projects as the great Dictionary of the Lithuanian Language, the new History of Lithuanian Literature, and the collection, storage and publication of Lithuanian proverbs and folk ballads, adequate financial support is essential, especially since all these projects require the collected material to be transferred to electronic storage systems. This implies that not only must these institutions be provided with the appropriate electronic equipment; there is also an acute need of scholars with the competence to use the new systems.

9.3.2 Areas Less Well Endowed with Resources

These areas comprise classical philology and modern languages, except Russian. Since independence, the demand for scholars in these fields of study has risen sharply, while the number of competent scholars is far too low to cope with the situation, and those who have been able to qualify have all too often been forced to conduct their scholarly work in isolation from the international centres and modern trends of research.

At the same time, recent historical events have led to a drop in the numbers of students at the Russian departments. This decline in numbers is rather worrying, and the academic staff often seem to be at a loss about what to do. One would have thought that the new situation would give them more time for scholarly work, but this again requires a profound change of attitude towards their subject, Russian now being a foreign language whose literature has to be studied in a different way from when Lithuania was part of the Soviet Empire. In this situation it is important that Russian scholars find their new bearings and that students are encouraged to take up Russian studies from new points of view.

9.3.3 Areas Almost or Totally Neglected

Among areas that are almost or totally neglected the panel was struck by the absence of studies related to the problems of interaction and integration and conflict between the different cultural traditions of Lithuania: Latin, Polish and Russian, and in the East also German. There is a clear tendency to approach these cultures as separate entities, or in the form of contrastive studies, Lithuanian culture being universally identified with the Lithuanian language and regarded as a monolithic system. The problems of cultural heterogeneity and cross-fertilisation seem to be virtually untouched.

9.4 Recommendations

9.4.1 Research Organization

The panel's view is that research is well organised at Lithuanian universities and institutes, and we are impressed by what is being done in spite of extremely difficult conditions.

9.4.2 Research Conditions

Although it is not within the mandate of the panel to make any statements about wages policy, we are of the opinion that *Lithuanian scholars are grossly underpaid*. Their precarious financial situation is the immediate cause of most of the problems that we discovered within the Lithuanian humanities. As a result of the situation, competent *young candidates are reluctant to take up an academic career*, and state institutions - both universities and institutes - lose out in competition with the private sector. This academic brain-drain because of low pay is a fact that was mentioned during all our interviews. It threatens the very existence of a vigorous Lithuanian scholarly community.

Against this background, the panel *strongly recommends* that adequate measures be taken to

improve the situation.

9.4.3 Research Priorities

Since independence Lithuanian humanities have given priority to 1) the recovery of Lithuanian culture, which was suppressed under the Soviet period, and to 2) the development of a Lithuanian school of modern scholarship within modern-language studies, in particular English, French, and German.

The panel regards this policy as well justified and *strongly recommends* that the necessary means be made available to enable academic staff to realise their projects. At the same time we would also *strongly recommend* that the high level obtained in Russian philology is retained in the future.

9.4.4 International Contact and Co-operation

The panel *strongly recommends* that the present endeavours to internationalise Lithuanian scholarship in the humanities be continued and strengthened.

Lithuanian researchers in such fields as English, Germanic and Romance philology should be actively encouraged to broaden their scope from themes related to the Lithuanian state of affairs towards ones of more general, international interest. Having studied the bibliographical material critically, we can only state that, in these fields, there are very few references to publications that attract wider international interest. Lithuanians should not be content with informing themselves about what is going on in the world - they should also contribute to it.

Neither should the increasing importance of non-European, in particular East Asian, cultures be excluded.

On the other hand, we also feel that attention to preoccupation with Lithuania's immediate is important, and should be continued rather than discouraged or even discontinued. We have in mind the various kinds of interrelations, linguistic and cultural, that exist between Lithuanian on the one hand, and Polish, Byelorussian and Russian on the other.

9.4.5 Notional Co-operation and Division of Labour

The three institutes devoted respectively to Lithuanian language, literature and folklore, and culture and the arts, are doing work of national importance and should be maintained with essentially the same tasks. Co-operation between institute and university - at present of a rather ad hoc character - should be encouraged and might in the future assume a more systematic form.

Having two independent institutions with basically the same tasks in a town the size of Kaunas appears to us highly uneconomical. The Vilnius branch in Kaunas should be incorporated into the corresponding faculty of the Vytautas Magnus University, which would then, hopefully in an economic way, be provided with the resources necessary for modernizing research and teaching in the domain of the humanities in Kaunas.

Because of its size, its resources and its traditions, the Faculty of Humanities in Vilnius itself is

an academic core institution in Lithuania. However, it may be in need of a certain amount of reorganisation.

The smaller institutions in Klaipeda and Siauliai function well and are also innovative. If possible, they should be provided with more resources to enable them to develop according to intentions and expectations. We consider it likely that the reorganization that will have to take place in Kaunas will pay off in a way that will make it possible to transfer funds to these two institutions.

Apart from the division of labour that already exists between Institutes and Faculties, the panel *recommends* the further decentralisation of research, to bring the faculties of the new universities on a par with the old faculties and institutes. Systematic national co-operation and division of labour should occur as a result of competition between the institutions, network centres should be allocated according to degree of excellence achieved at different places.

The various special purposes departments should not be retained, but should be made subdivisions of the respective departments of English and German philology. This reorganisation should be made with a view to reallocating resources to fund research. We also see no need to keep the study of national languages (English, Russian, German) organisationally apart from the study of the respective national literatures within the university system. In our view, the present highly specialised departments seem to be uneconomic and possibly even an impediment to interdisciplinary work.

9.4.6 Doctoral Training

The panel gives its full support to the reform that has been carried through in university education. However, we would *recommend* that the present doctoral programme be revised, in particular the first two years, with a multitude of subjects and exams. The purpose of the revision would be to bring the programme more into line with the Anglo-American system than it is at present. By the same token, the panel *recommends* that the necessity of a second doctoral degree be reconsidered and that other ways of qualifying academic staff for a professorship be introduced instead or as alternatives. This would facilitate the much needed introduction of doctoral programmes at the new universities (Klaipeda and Siauliai), where there seem to be unnecessary obstacles to doing so, at present.

In our view, doctoral programmes should to a considerable extent have large-scale projects linked to them, or be linked to such projects, to facilitate co-operation and promote the development of whole academic environments. We want to stress, however, that doctoral programmes and, more generally the recruitment of young researchers, should not only be seen as a means of filling vacancies, but also in the context of academic actualisation and the desire to provide Lithuanian academic research and teaching with new international expertise. Means will have to be found to allow young Lithuanian scholars do part of their qualifying work abroad.

10 Medical Sciences

Panel Members:

- Egil Gjone, Professor, University of Oslo, Norway *Chairman*
- Per Brandtzaeg, Professor, University of Oslo, Norway
- Anne Rahbek Thomassen, Chief of Medicine, Randers Centralhospital, Denmark
- Tor Waaler, Professor, University of Oslo, Norway

10.1 Summary of Observations

When carrying out our task of assessing research in the medical field, our panel was fully aware that Lithuania is currently passing through a very difficult period of transition. This has not only imposed serious financial limitations on various types of development. At the same time most sectors of society apparently need to be substantially reorganised. One such sector is the whole health care system, with its many interconnected problems related to capacity, specialisation, education and research. The current process of restructuring and strengthening this sector must understandably be a formidable task.

As for research in the medical and related sciences, parts of which have been assessed by our panel, we were struck by the marked differences in quality and productivity that were observed between groups and departments. The reason for the differences was not necessarily the degree of general or practical importance of the topics or fields under examination. In several fields, for example in cardiology, we were impressed by the high standard of projects and results. Some other subjects and fields, such as pharmacy for example, appeared to be very underdeveloped. There are probably several, complex reasons for such dramatic differences. The local financial circumstances may differ, for one reason or another. Thus there seem to be considerable variations as regards the degree of success in attracting foreign support for research projects. Also, it appears that - before Lithuania became independent - some fields and subjects had developed a more solid base than others had for their continued research work.

It seemed to us that the universities and their departments were in a particularly difficult situation, with a very strained economy. We were informed that very little money was left for teaching materials and research, when salaries and the most urgent building maintenance tasks had been met. The strain on the universities and their staff, who have a very heavy teaching load and limited opportunities for research, is a critical element for the successful development of research in a number of fields, including medicine. It is common experience that well functioning universities are particularly well suited for the role of "national locomotive" in a country's research system.

One problem that we were told about, and which struck us as being of central importance, was the alleged lack of possibilities of using the (scarce) allocated funds in accordance with locally identified priorities.

Another difficulty that was repeatedly stressed during our site visits was the poor quality of the research equipment, with old and worn out instruments in many places. Computers, for example, are one type of equipment that definitely needs to be upgraded. Again, the equipment situation appeared to be particularly problematic at the universities, which adds to their difficulties in filling a role as key institutions in the national research system. It must be added that the total efficiency of the universities is further hampered by the very difficult situation for their libraries, which do not have the means to subscribe to international journals.

Our panel holds the view that a well educated, active and wisely disposed scientific community represents an important asset for the development of a good health care system, with all its practical, educational and scientific problems. Therefore, we were concerned to learn about the recruitment problems, since many young scientists were reported to be leaving their research positions, apparently mainly for economic reasons.

In most cases, the loss of previous developed close contacts and patterns of collaboration with the scientific system in the former Soviet Union has not been compensated by sufficiently well developed contacts with western scientific communities. Some departments and groups have established satisfactory and well functioning connections of this type. However, further and more general development in this direction is slow, one reason evidently being inadequate knowledge of English, which is the internationally dominating language in science.

Our panel found the total pattern of departments, institutes and establishments engaged in medical research to be somewhat fragmented and less than the best. There seemed to be several barriers to new patterns of collaboration, with more optimal use of resources. We should thus like to see closer contact and better collaboration between the groups and departments contained within - and the ones that operate outside - the university system. We feel that some structural reforms are desirable, but noted a number of obstacles to any major reforms in the field. These obstacles are apparently related both to tradition, and to differences in the legal status of the institutions and in the existing and established research opportunities. Development towards a more optimal structure of the whole system of institutions engaged in research, in the medical field and in other fields of science, is clearly desirable. We realise, however, that such a development would involve a number of problems, and would thus represent a most formidable challenge to the Lithuanian system of research and higher education.

10.2 Summary of Recommendations

In assessing a substantial part of the research in medicine and related fields in Lithuania we were left with the impression that there were large variations between faculties, departments and research groups as regards their status and the quality of their scientific work. Another dominating impression is that the whole structure of the system for research and higher education in Lithuania is somewhat fragmented, with less than optimal coordination and cooperation between individual units. These and other impressions gained through our observations of institutions in medicine and related fields lead us, like other panels, to recommend that:

- a strategic, long-term plan be worked out for the whole Lithuanian system of research and higher education.

The plan should aim at defining a more optimal institutional and inter-institutional structure for the entire system of research institutions in Lithuania. Another main goal for the planning would be to secure, giving due regard to national priorities, the best possible use and distribution of the available resources, in terms of both manpower and funds. Such a general plan could also include schemes of recruitment, and possibly also a plan for distribution of training opportunities abroad.

In connection with the above proposal for general and long term planning, we would also definitely recommend:

- strengthening the universities as key institutions in the system of research and higher education.

This should include both internal and external changes. Internally there are, at least in the medical field, room for rationalization and better collaboration between units within the same speciality (e.g. within clinical chemistry, pathology, cardiology, endoscopy etc.) It would be advisable to let the two medical Faculties/Academies make their own proposals as regards such internal changes.

- We also favour institutional changes that would give the Medical Faculty of the University of Vilnius and the Kaunas Medical Academy more overall responsibility for national research in medicine and related fields.

This means finding ways of attaching the relevant independent institutes within the medical field to the universities. It is hoped that suitable forms of attachment and interplay would promote better coordination of the national efforts in medical research and education. One organisational detail that struck us here was the limited contact between the "Lithuanian Oncology Centre" and the university. The centre maintains a high standard and is doing very good work. We recommend that:

- special attention be given to the future position of the valuable "Lithuanian Oncology Centre". The objective should be to find an acceptable formula for collaboration between the Centre and the University of Vilnius, which would obviously strengthen university functions both in research and in education.

To us, and compared with Western terminology, the name "Kaunas Medical *Academy*" is rather strange. The term *Academy* is not usually used in the Western world for institutions engaged in ordinary medical and related types of education. We would recommend that the name of this institution be re-considered, with a view to finding a name more in line with Western institutional terminology.

- When strengthening the universities, special attention should be given to the libraries, owing to their central function in the information process. Good libraries are of the utmost importance for both clinical work and all research activities.

With the limited resources available we recommend that library services at the universities be centralized. Access to international journals and data services should be improved, as well as the ability of university personnel to use these services. It seems that schemes for improving and strengthening the libraries constitute an area where foreign assistance and

cooperation might be especially helpful.

- As for the education in medicine, we wonder whether Lithuania has too much educational capacity. With about one doctor per 200 inhabitants it seems that the coverage is higher than in than most other countries. Given some reduction in the number of students, the teachers would be relieved, of part of their heavy teaching load, and would have more time for research.
- We recommend that a research council system be established in Lithuania. Such a system could be used as a channel for distributing a sizeable share of the total resources available for research. Distribution of funds ought to take place on the basis of scientific merit
- We recommend that effective measures be taken to stimulate the publication of scientific results in renowned Western journals. One condition for success in this respect is to improve the general knowledge of the English language in the research community. Until the educational system can secure more general improvement, an important step might be to make expertise in English writing available to most research workers.
- In order to be able to comply with the fundamental international rules and principles in the field, we recommend that ethical panels for biomedical research be established in Lithuania. Ideally such panels should be established both at regional and at local level. Advice on the composition and rules for such panels could easily be obtained from Scandinavian countries.
- The panel recommends that steps be taken to strengthen the whole discipline of pharmacy.

Our panel found that pharmacy was in a particularly difficult situation. This in turn has negative consequences for services throughout the whole system of medicine.

The Faculty of Pharmacy at the Kaunas Medical Academy was in a desperate financial situation, and was thus incapable of adjusting its educational programme to meet the increasing demand for adequate pharmaceutical competence. We therefore recommend that development and improvement of pharmacy be given special attention.

Our panel finally recommends that certain activities be established or improved:

- We thus recommend that education of occupational therapists (ergotherapists) be started,
- that psychosomatic units, separate from psychiatric departments, be started within the somatic hospitals,
- that outpatient departments, in addition to their role in education, should be invited to carry out research together in cooperation with the main clinical departments to which they belong.
- We also recommend that the organisation of research in clinical disciplines at the faculties should be re-considered. One possibility is to have separate research units within, for example, internal medicine, surgery, pediatrics, rheumatology etc., which would operate in well planned interplay with their clinical departments.

11 Economics and Law

Panel Members:

- Einar Hope, Director General, Norwegian Competition Authority and Professor, Norwegian School of Economics and Business Administration, *Chairman*
- Kare Lilleholt, Professor, Norwegian School of Economics and Business Administration
- Svein Longva, Director General, Statistics Norway, Professor
- Fredrik Zimmer, Professor, University of Oslo

11.1 Some General Remarks and Observations

The Lithuanian economy is undergoing a fundamental transition from a centrally planned and strictly regulated economy to a society based on market economy principles and ideas. The transition has had dramatic consequences and has, undoubtedly inflicted large substantial costs on society, but it has also to a large extent been a "creative destruction" process, opening up for innovation, initiative and action throughout society.

The transition has also had a strong effect on research and research institutions in general in Lithuania. Research in economics and law has probably been even more strongly affected than most other research areas, given the immediate need for research-based knowledge and competence in connection with the economic and legal reforms that have been implemented as an integral part of the transformation process.

Research in economics and law in Lithuania has to be evaluated in such a context, and so should recommendations with respect to research organisation, research strategy and research policy. In particular, one should be conscious of the inclination to base recommendations and conclusions on policies too much on the research model with which the panels are familiar from their own society and the resources available there for research. The problems associated, for example, with establishing new institutions and systems to handle the allocation of resources through markets, supplanting the old system of central planning in a quantitative, production-oriented system, or creating private property rights after decades or absence of such rights, should be clearly understood and appreciated both from an economic and a legal point of view.

The reorientation of research in economics and law which has taken place as a consequence of the economic and legal reforms has had positive as well as negative effects. On the positive side the reform work has stimulated economic and legal research in general, and applied and policy oriented research in particular. Researchers have participated actively in developing research-based knowledge to improve the decision-making process in industry and government, they have been appointed to various forms of government committees to prepare the reforms, and they have acted as professional advisers to both private and public parties. This has stimulated research on, for example, decentralised market organisation, principles of property rights etc., which was almost non-existent under the former regime. Academics have also had to take on the task of writing textbooks and other forms of teaching material for

students, which had to be developed more or less from scratch under the new system. This has undoubtedly been an important learning mechanism in itself, and has contributed to a better understanding of the economic and legal principles upon which the reform of society has been based.

However, there are also some negative aspects associated with the change in the research orientation and priorities. In general, basic research has suffered from the emphasis on applied and policy-oriented research. Research of this kind is often of such a short-term and practical nature that it verges on consultancy. This could create an imbalance between research with a short-term compared with a long-term perspective, and between applied and basic research.

In our opinion, there is currently an imbalance between basic and theoretically oriented research on the one hand, and applied and directly policy-oriented research on the other hand in Lithuania. In a long-term perspective, this imbalance could have an adverse effect on Lithuanian research in economics and law. Sufficient attention should be given to this issue in a research policy context.

There is a strong commitment to research from research institutions and from individual researchers, but, in general, the possibilities and facilities for doing research are not so favourable. At the universities the teaching load is heavy and has increased, partly as a consequence of the economic and legal reforms. The inflow of students to new fields, for example, management and business administration, combined with the general lack of teaching material both at undergraduate and graduate level, has imposed heavy demands on the capacity and the resources of the universities, with research being to a large extent "crowded out" as a result. Research facilities in terms of libraries, computer equipment etc. are, generally speaking, insufficient and outdated and need to be upgraded.

Some institutions have developed networks and exchange programmes with foreign institutions, but there is still a considerable potential for development. These are important means of promoting communication and interchange of research ideas and results, which again can help to raise the quality of research in Lithuania.

At some institutions the age distribution of the research personnel is unfavourable. The high average age of the research staff could imply that the probability of some members being actively engaged in research is high too, and also that some have not adjusted their research and teaching priorities to the new environment brought about by the economic and legal reforms. The low salary offered to young research personnel by universities and research institutes is a major obstacle to being able to attract young, high-quality personnel to research, in competition with the private sector. The low remuneration of research activities also creates incentives for the most productive researchers to engage in activities outside the respective research institutions.

More emphasis seems to be placed on a policy of competition among institutions rather than cooperation. Competition is an important means of spurring initiative and efficient use of resources, but is of limited relevance in the present state of research and research organisation in the Lithuanian society. Forms of cooperation between universities, and especially between universities and the independent research institutes, should be developed in order to secure better overall use of the scarce resources currently allocated to research. This also goes for research institutes which have either been established by ministries or are closely associated

with governmental bodies.

Language represents an important barrier to international research communication, even with the other Baltic states. Only a small part of the research in economics and law is communicated and published in a major foreign language. This situation is gradually improving, however.

Taken into account the prevailing situation of research organisation and resources in Lithuania, Lithuanian research in economics and law is performing fairly well, with respect to both magnitude and orientation. Some research is of good quality measured by international scientific standards, but there is considerable variance across institutions and research groups. In general, the quality cannot be said to be entirely satisfactory at present. This is the assessment upon which we base our recommendations.

11.2 Recommendations

We strongly recommend that:

- a national long-term plan, with a time perspective of, for example, five years, should be developed for research and research education in economics and law in Lithuania. This overall plan should define research priorities, contain measures to secure a better balance between basic and applied research, and allocate research resources to the various institutions. If necessary, a separate body should be established to be responsible for this task, for example, a council for social sciences.
- cooperation among research institutions should be strengthened and appropriate forms of cooperation should be developed to secure better use of existing resources and to raise the quality and productivity of research. In particular, cooperation between the independent research institutes and the universities should be strengthened.
- consideration should be given to concentrating research activities in fewer and larger units than at present, in order to take advantage of potential economies of scale and scope in research organisation. New institutes for applied or policy-oriented research should not be established by the government before a serious effort has been made to take advantage of the research facilities, broadly defined, of the existing institutions.
- measures should be taken to increase recruitment of doctoral students and to facilitate progress in the doctoral programmes with a view to increasing their efficiency.
- efforts should be taken to increase collaboration with foreign universities in order to update the research personnel on scientific developments and raise the quality of research by exposing Lithuanian research to international research environments and standards.
- measures should be taken to disseminate research-based knowledge in economics and law from market-based systems in other countries with basically the same economic and legal conditions as in Lithuania, and adapt this knowledge to the conditions and needs of the Lithuanian society in order to facilitate the current process of transition.

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- measures should be taken to disseminate research-based knowledge in economics and law from market-based systems in other countries with basically the same economic and legal conditions as in Lithuania, and adapt this knowledge to the conditions and needs of the Lithuanian society in order to facilitate the current process of transition.

We recommend that:

- the research organisation of the universities at faculty level should be reviewed with a view to organising applied research, including contract research, more efficiently.
 - a warning should be voiced against establishing new studies at university level, without these studies being firmly based on research, and combined with research activities.
- « measures should be taken to strengthen the knowledge of foreign languages, especially English, among research personnel, in order to facilitate communication with the international research community.
- a retraining scheme should be introduced for teaching and research personnel without sufficient training in modern theory and analysis of economics and law to serve a market economy.
 - research in management and business administration should be strengthened, to improve the quality of teaching and the foundation of knowledge for the practical management of companies in Lithuania, including small firms.
 - the position of the University of Vilnius should be strengthened with respect to both graduate education and research in law.
 - research facilities such as libraries, computer equipment etc. should be upgraded. We understand, however, that this is a policy that will have to be implemented over time, considering the severe financial restrictions which the research sector in Lithuania is facing at present.

12 Engineering Sciences

Panel Members:

- Inge Johansen, Professor, Norwegian University of Science and Technology, *Chairman*
- Klas Cedervall, Professor, Royal Institute of Technology, Sweden
- Kristian Lien, Professor, Norwegian University of Science and Technology
- Jan Overli, Professor, Norwegian University of Science and Technology

12.1 Technological Research in Lithuania

In any country, technological research is linked directly to economic and social development. If it is to be considered relevant, even free technological research at universities has to be "applied" and linked to the future and present problems of the country itself, and of the world around it. Since technology is the basis for ever more complex systems (in production of goods, energy production, telecommunications, transport) that have an impact on our everyday lives, our environment, and our future, technological research requires a constantly more solid foundation, since also the social, ethical and environmental consequences must be addressed.

Technological research in Lithuania has to be evaluated in such a context. The dramatic changes that took place during the liberation of Lithuania had a very direct impact both on the economy and on engineering research. It is impossible to make recommendations on research policy and strategy without understanding the dynamics in the society as it was after liberation. Before 1990, Lithuania was a part of the USSR, and was one of the most industrialized parts, with a good infrastructure. In the planned economy of the USSR, Lithuania was given the role of building up a rather advanced type of industry, especially mechanical, electrical and electronic industry. It was also given an important role as a research pool for the Ministries of Defence and Military Industry.

This provided very good opportunities for certain sectors of engineering research in Lithuania, both at the technical universities and at the institutes. Mechanical, electrical and electronic research was well financed through research contracts with the Ministries in Moscow. Industry was also developed in the same technological fields, presenting further challenges to the research community.

Therefore, during the Soviet period these research areas seemed to be relatively well off, with good funding and challenging problems to work on. This has given Lithuania a research base on which to build today, and is thus of positive value.

It is not a value without obstacles, however, and we must discuss the most important ones. First, the Soviet technology was not western technology. This was the case in most research fields. The main reason for this was lack of up-to-date instrumentation and lack of open communication with western countries. In this respect the lack of computers and advanced computer technology was especially important.

However, during our visits to the different research groups in Lithuania, we found obstacles of a more fundamental nature. One of them was the very way research projects were organized during the Soviet period. The research groups themselves had no responsibility in the whole chain from fundamental research, through applied research, innovation, developing prototypes, and making the technology function in its final objective.

In most cases the Lithuanian research groups, and probably other research groups in the Soviet Union as well, had a responsibility to deliver a research report and perhaps work out a prototype for a certain application. In most cases, what happened after that was of no concern to the research groups and often also outside its knowledge. The responsibility ceased suddenly when the "research results" were delivered.

In the West it is certainly also the case that most researchers do not follow their results all the way to practical application. But there is an open process, and business-minded scientists can leave science, take their innovations out to industry and put their ideas to practical use.

It is important to understand the difference between the earlier Soviet period and the present situation. In the opinion of this panel, the heritage from the Soviet period has tended to make the Lithuanian scientist too tied up in his own research world, his publications and research reports, and in qualifying himself within that system.

The Lithuanian mechanical, electrical and electronic industry was also part of the the Soviet system. Research groups important to that industry obtained more direct experience of industrial design and manufacturing. It is very unfortunate for the development of applied research that after the liberation this industry has experienced rough times and has suffered a substantial decline. As one example, in 1994, production in the electronic industry was about 40% of the volume in 1990. Many of the firms have gone bankrupt and are generally in poor financial shape, with no resources for investment and development.

Thus, it is not only the sudden lack of research contracts from the Ministries in Moscow that have disappeared, but also R&D contracts from the national industry. It is no wonder that the research groups in the field discussed here, are pessimistic. At the same, they are making a brave effort to become part of western research and to define their role in the new situation.

Before elaborating on the above we will consider the situation for research related to the technological infrastructure of the country.

In spite of the generally weak economic situation that arose, research related to the technological infrastructure was encouraged after the liberation. Before 1990, Lithuania was part of the USSR, and infrastructural problems were solved or administered from there. After liberation, Lithuania had to take on complete responsibility for its own infrastructure, such as roads and transportation, energy generation and distribution, telecommunications, water supply and environmental management. Before, these areas were only partly in the hands of Lithuania. As a consequence, R&D that was important for these areas had to be given priority. The outcome can be seen in several places. At VTU, a Faculty of Transportation and a Faculty of Environment have been established in order to meet the new demands. At the Faculty of Radioelectronics at KUT, work is being done on how to connect the national telecommunication system to the international systems. At almost all faculties and institutes, staff are working on establishing national technical standards.

It can be concluded that research groups working on the infrastructural problems of the country have found a meaningful place in the tremendous task of building up a new Lithuania, and are working hard on these problems, despite a lack of equipment of western standard and other resources.

In technological research connected to industrial development it must be said that most research groups are vigorously trying to find their new role. Many research groups are looking back to the "good old days" with generous research contracts from a Ministry, and have not yet found a substitute for this type of financing.

Exceptions can be found, however. The most striking example is the R&D environment supporting the textile industry; i.e. the Faculty of Manufacturing Technologies at KUT and the Lithuanian Textile Institute. After 1990 the Lithuanian Textile Institute has had to survive with no financial support from the government except for the equipment and buildings they received free. In order to survive, the Institute, supported by technology from the Faculty, developed advanced products, and produced and marketed the products themselves. The institute has soon to decide whether it should develop into a company for advanced textile products, or should return to being an institute focusing on R&D.

This case demonstrates how untraditionally Lithuanian research may have to act in order to maintain and further build up competence, and in order to find its role in the free market.

12.2 Characteristics of Technological Research

In the scientific community there is a strong *commitment to research* as such, and research in technology and science is regarded as important for the country.

The positive side of this attitude is that it has led to good research groups in science and technology, some of them up to western standard, even with the handicaps they have to overcome, such as lack of up-to-date equipment. The negative side is that it seems to have separated the research community from the rest of society and has not inspired interest for the use and the implementation of research results.

In order to improve the interaction, mobility of professionals between universities and research institutes on the one hand, and industry and government agencies on the other, should be encouraged. One step in that direction is to let the doctoral education serve as preparation for a job both in industry and at a university or research institute. Industry will need more professionals at doctoral level in order to be competitive. Another step would be to increase cooperation with industry on projects of importance for specific industries.

Technology research in general should be better defined, and should have clear objectives with a basis in a strategy for the development of industry and the infrastructure of the country.

Lack of equipment and of communication with the West has been, and still is a major negative factor for good quality research in Lithuania. For this reason doctoral candidates

in Lithuania experience very little difference from the Soviet period when carrying out their research tasks today. Before, the problems was low quality equipment of Soviet make and lack of open communication with western research. Today the poor economy prevents the research groups from buying up-to-date equipment and having contact with the west.

In this situation it would be very helpful to establish exchange programmes with other countries, for example the Nordic countries, for students and researchers. It would certainly also be very helpful to improve the knowledge of English. Since English is the main tool of communication within technological education and research, the lack of knowledge of English is a serious obstacle to receiving impulses from the West. One important step would be to use English textbooks in engineering education.

Another way would be to utilize the data networks, such as Internet, where educational material can be found. In this respect, the Norwegian initiative of getting Lithuania connected to Internet has been useful, and in several places it was said that this had been a positive help.

Sometimes, technological research in Lithuania seems to focus the theoretical research on problems that appear to have *little impact on the development of significant technology*. In some cases we could see that good theoretical knowledge was used on making refinements to products, rather than on addressing technological problems of major economic and social value.

The *education at KUT and VTU* is the basis for the engineering profession and technological research in Lithuania. The educational system is well developed, but can be further improved.

In recent years, faculties responsible for narrow technological fields have been merged into larger and more broadly defined faculties. This will facilitate a more general type education and new fields of research. This development is positive, and should continue for some time to come. During this process it is also important to include subjects that address the interaction between technology, working life and society, including economy, management, the environment and ethics.

At the same time, too many specialized technological subjects are offered as electives. In most cases the core curriculum should be enlarged, the number of specializations reduced, and the project-oriented part of the education emphasized. This would perhaps also give the professors more time for research. Today the time available for research was said to be 30% on average.

The *division of responsibility between the institutes and the universities* was a matter of discussion in Lithuania. Before 1990, the Institutes specialized in research and had no educational responsibility. Today they have some responsibility for the education of masters and doctors. It can be seen from Table 1 however, that the Institutes are still not very active, except for habilitation of their own doctors. It can be questioned whether the process of habilitation should receive high priority. If this practice is continued, much more emphasis should be placed on the habilitated doctor haven proven his/her competence in guiding young researchers in their doctoral work.

In the panel's view, it is important to establish close connections between research and education. This would imply good utilization of the available resources to provide good quality education to young people. It would also give the research institute a continuous influx of young scientists. Without graduate students research groups tend to stagnate. Most of the world's basic research is carried out as fruitful collaboration between professors and their students. Except for the very large institutes with clear infrastructural responsibilities, the institutes should be incorporated into or closely linked with the universities, and should have clearly defined teaching duties.

Research in Lithuania is *directed more towards products than productivity*. In all the reports we received, no research projects were related entirely to productivity. This may be a heritage from the Soviet period, where productivity may not have been regarded as important. In a free market situation, however, productivity and quality are of utmost importance. Even though production and production planning were important parts of the Faculty of Management at KUT (which this panel did not visit) these subjects did not seem to be efficiently integrated with the technological R&D nor given high enough priority. At VTU, subjects related to productivity seemed to be even more neglected.

Projects on manufacturing, productivity and quality that link faculties of management with faculties of engineering and industry should be encouraged. The "Leaders of the Manufacturing Program" at MIT could be used as a model.

Most Lithuanian scientists have *& poor knowledge of English*. Among young people, fluency in English is often quite good. English is the international language of communication in the field of technology. Therefore, English should be given the status of first foreign language for engineering students. Professors should be offered and encouraged to take crash courses in English.

The importance of having a good knowledge in English is demonstrated by the fact that, in many cases this was looked upon as the most essential qualification in the job market.

Several faculties and institutes were making an active effort to *develop metrological standards* for Lithuania that would conform with international standards. This was necessary after the break with the Soviet Union, since no other national institutions were qualified for this task. This panel regards it as positive that the research community has taken on this task at this time. It shows the flexibility of a good university system. When this work is completed, however, it is necessary to plan how the work on metrological standards should be organized on a permanent basis.

12.3 Recommendations

It is very important for a sound economic and social development of a country that basic technological research is of high quality and relevance. Technological research must be related to the challenges in industry and governmental agencies, and should be a basis for innovation, productivity and quality in all types of production. It must also include the societal, environmental and ethical aspects of technology.

It is *strongly recommended* that the universities should start up or substantially strengthen teaching and R&D in fields that promote production, productivity and sale of industrial products:

- Greater weight should be attached to subjects related to management, productivity, production planning and efficient use of capital in the light of the present labour and capital costs in Lithuania. It will require a special effort to optimize the use of technology, capital and labour in production in Lithuania, especially because the cost of labour is much lower than in the West. Activities in these fields will also further strengthen the Lithuanian textile industry, which is strong at present and has a potential for growth. They will also stimulate electronic, electrical and mechanical industry, where Lithuania also has a potential.
- Chemical Engineering, Process Technology and Process Control should be strengthened substantially. This is necessary in order to optimize Lithuanian process industry and use energy efficiently.
- A new Faculty for Industrial Design should be established. This should focus on the needs of the customer, and on user-friendliness in connection with all types of industrial products.

These are important qualifications for the type of industry where Lithuania should have a good chance of success, which is the manufacture of consumer products in selected areas.

- An *Industrial Innovation Centre* and a *Centre for Industrial Development* should be created. KUT as the technical university with longest tradition and the one most oriented toward industry, might be a good place for these centres.

At the Industrial Innovation Centre the focus should be on encouraging professionals from the faculties and institutes to create their own businesses based on their own ideas. The Innovation Centre should assist in the preparation of business plans, give advice on establishing a company and, on a small scale, offer equity to new or strongly expanding companies, to staff members that want to go out in business and to graduate students. The Innovation Centre should also hold courses in Entrepreneurship and be generally responsible for creating links with the technical universities, the institutes and industry.

The Centre for Industrial Development should take on projects in development strategies, management, productivity, quality and level of innovation in close and active cooperation with industrial firms. The Faculty of Management and the faculties in the different technological fields must be actively involved in the Centre.

The panel believes that in the long run, Lithuania has a potential for specialized mechanical, electrical and electronic products and for mass production in selected fields.

It is *strongly recommended* that a strategy for energy research receives special attention. This is because of the very strong dependence on the Ignalina Nuclear Power Plant, which at present supplies most of the energy required by the country.

It is *strongly recommended* that Lithuania should make various efforts to increase contact with western technology. Important initiatives to that end are:

- English should be made compulsory for 1st year students and the professors should be strongly encouraged to take crash courses in English.
- The possibilities provided by the data networks (like Internet) to obtain course material and establish research contacts with other countries should be exploited more vigorously.
- The possibility of obtaining low cost international editions of Engineering textbooks in English, for sale in Lithuania (and other parts of Eastern Europe) based on the model used in South Asia, should be investigated.
- Bilateral exchange programmes with western countries should be developed for students and researchers.
- The Baltic countries should cooperate more closely, and should join forces in establishing good cooperation with western countries.

It is *recommended* that the engineering education be based on fewer and larger faculties, that the core curriculum in each faculty be enlarged and that the number of electives and number of specializations be reduced. This will focus the engineering education on learning general methods and how to solve new technological problems, rather than on specialized education for a specific trade. Such a step would make the engineers more flexible and more motivated to enter new engineering fields later on, as needed.

The panel was impressed with the drive in this direction at KUT, and is of the opinion that the two technical universities should cooperate on developing their study programmes.

Attention should also be focused on subjects for engineering students which deal with economy and management, and with the environmental and ethical aspects of technology.

The output of the doctoral candidates is low in relation to their number. This matter should be dealt with.

Students should also be invited to take their share of the responsibility for the management of the faculties and for developing study programmes.

It is *recommended* that efforts should be made to achieve a better age and sex distribution among the teaching and research staff.

Appendix



Appendix 1

VALSTYBINE MOKSLO, STUDIJU IR
TECHNOLOGIJU TARNYBA

LITHUANIAN AGENCY FOR
HIGHER EDUCATION. RESEARCH
AND DEVELOPMENT

17 February, 1994

The Research Council
of Norway
P.O. Box 2700 St. Hanshaugen
N 0131 Oslo
NORWAY

The Norwegian Council of
Universities
Harald Haarfagresgt. 17,
N-5007 Bergen
NORWAY

Dear Sirs,

The Lithuanian Agency for Higher Education, Research and Development as the Governmental body in charge of science and studies in the Republic of Lithuania has the honour to ask you for support in the field of evaluation of Higher Education and Research institutions.

Following the suggestion, which has been made by representatives of Nordic Council of Ministers at the Nordic Conference on Education and Research in Lund (Sweden) 3-4 February, 1994. being informed about rich experience and competence in expertise we would ask you for cooperation.

We are aiming to ensure the objectivity and value of expertise, therefore we would like to invite the team of experts from your country to participate in the examination. If possible, to play a coordinating role in activities of foreign experts.

We have already got some proposals from individual consultants from Australia. Sweden. United States of America.

The evaluation of higher education and research institutions of Lithuania is to be accomplished by Lithuanian experts as well.

We would be ready to discuss the methodology and procedure of cooperation in the evaluation, first, we are ready to make inventarization of Lithuanian Science and Studies in 1994. Second, we are eager to create a system of evaluation for the future development..

Looking forward to establishing fruitful cooperation.

Please. accept. Sirs. the assurances of my highest consideration.

Director

Dr. Jonas Puodžius

Appendix 2

AGREEMENT ON EVALUATION OF RESEARCH IN LITHUANIA

between

**THE ROYAL NORWEGIAN MINISTRY OF
EDUCATION, RESEARCH AND CHURCH AFFAIRS**

and

**THE MINISTRY OF EDUCATION AND SCIENCE OF
THE REPUBLIC OF LITHUANIA**

1. The Royal Norwegian Ministry of Education, Research and Church Affairs in co-operation with the Ministry of Education and Science of the Republic of Lithuania, undertakes to perform an evaluation of research in Lithuania in 1995, under the Terms of Reference and other conditions given in the present Agreement.
2. The Research Council of Norway has been delegated the responsibility on the Norwegian side for the evaluation. The Research Council will hereinafter be referred to as the Norwegian partner. The Ministry of Education and Science of the Republic of Lithuania will hereinafter be referred to as the Lithuanian partner.

Terms of Reference

3. The aim of this evaluation project is to contribute to the Lithuanian Research Authorities' efforts in planning the future development of Lithuanian research.
4. Based on reports from Lithuanian research institutions, on international publications of Lithuanian research, and on site visits and interviews, panels of scientists are in their respective areas of research requested
 - to present an evaluation of Lithuanian research, including identification of research, groups of scientists and institutions at a high international level;
 - to make recommendations for the further development of the evaluated areas of research, particularly with regard to international cooperation, doctoral training and research cooperation in Lithuania.
5. The evaluation panels should evaluate all institutions within the Field(s) of Research which they are covering, on the condition that necessary information is provided. Fields of Research and institutions to be evaluated are laid down in a separate Protocol signed by the Norwegian and Lithuanian partners. This Protocol forms an integral part of the present Agreement

Organization of the Evaluation

6. Before 5 January 1996, the final report from the evaluation should be presented to the Lithuanian partner. Plan of progress is laid down in the separate Protocol referred to under point 5.
7. The Norwegian partner has the overall responsibility for the evaluation. Financial and administrative responsibilities will be shared by the Norwegian and the Lithuanian partner according to the present Agreement.
8. The Norwegian partner has appointed an advisory board for the evaluation. The Lithuanian partner has appointed a commission on evaluation of research and higher education. The advisory board and the commission should see to a necessary planning and coordination between the partners during the evaluation.
9. The Norwegian partner has engaged a project manager for the evaluation. The Lithuanian partner has appointed a main contact in Lithuania for the evaluation.
10. The Norwegian partner will appoint 8 evaluation panels who will accomplish an evaluation within areas of research according to this agreement. Each evaluation panel will have 3 to 5 members. Altogether, the panels will have about 30 members. The panel chairs are from Norway. Preferably, one member of each panel should come from a third country.
11. The Lithuanian partner will appoint a scientist as an associate for each evaluation panel. The associate should provide necessary additional information for the panels.
12. Guidelines for the evaluation panels will be prepared by the Norwegian partner and the Lithuanian partner in cooperation.

Financial and Administrative Responsibilities

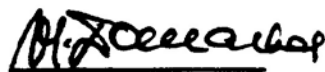
13. The Norwegian partner undertakes to cover all expenses incurred in Norway in connection with the evaluation, including
 - honorarium of panel members,
 - travel expenses to/from Lithuania for the evaluation panels and for Norwegian staff.
 - printing of final report in English from the evaluation,
 - shipping of 1.500 copies of final report to the Lithuanian partner.
14. The Lithuanian partner undertakes to cover all expenses incurred in Lithuania in connection with the evaluation, including
 - board and lodging for evaluation panels and Norwegian staff,
 - travel expenses within Lithuania for evaluation panels and Norwegian staff,
 - honorarium of Lithuanian assistants and associate members for the panels.

The site visits of the evaluation panels will be of 5-8 days duration.

15. The Lithuanian partner undertakes to appoint an assistant for each evaluation panel. The assistant shall follow the panel and otherwise take care of practical arrangements during their site visits.
16. The Lithuanian partner undertakes to appoint a contact person at each of the institutions to be evaluated. The contacts are, in cooperation with the Norwegian project manager and the main contact in Lithuania, responsible for the forming of programmes for the evaluation panels at their respective institutions.

From Lithuania:

Vilnius, *12/4*..... 1995



Vladislavas Domarkas
Minister of Education and Science

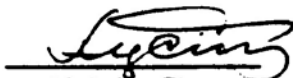
From Norway:

Oslo, *22/3*..... 1995



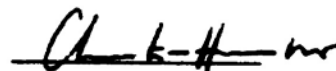
Gudmund Hernes
Minister of Education,
Research and Church Affairs

Vilnius, *12/4*..... 1995



Algirdas Cizas
Director, Centre for Quality
Assessment in Higher Education

Oslo, *22/3*..... 1995



Christian Hambro
Director General, The Research
Council of Norway

Appendix 3

EVALUATION OF RESEARCH IN LITHUANIA

PROTOCOL DEFINING

I. AREAS OF RESEARCH AND INSTITUTIONS TO BE EVALUATED

H. PLAN OF PROGRESS

I. Areas of Research to be Evaluated

With reference to point 5 in agreement on evaluation of research in Lithuania between the Royal Norwegian Ministry of Education, Research and Church Affairs and the Ministry of Education and Science of the Republic of Lithuania.

The evaluation panels should evaluate all institutions within the Field(s) of Research which they are covering.

Areas of Research to be evaluated by each panel are as follows:

Panel 1	Agricultural Sciences
Panel 2	Physics, Mathematics and Informatics
Panel 3	Biology
Panel 4	Modern History, Political Science and Philosophy
Panel 5	Language and Literature (Baltic, Slavic and Germanic)
Panel 6	Medical Sciences
Panel 7	Economics and Law
Panel 8	Engineering Sciences

The list of institutions to be evaluated by each panel are given in an appendix to this protocol.

The list of institutions may be subject to alteration, if the chairman of the evaluation panel and the Lithuanian associate request so, and the two parties agree. Alterations must be agreed upon before 1 May 1995.

II. Plan of Progress

With reference to point 6 in agreement on evaluation of research in Lithuania between the Royal Norwegian Ministry of Education, Research and Church Affairs and the Ministry of Education and Science of the Republic of Lithuania.

The Research Council of Norway and the Ministry of Education and Science of the Republic of Lithuania aim at the following Plan of Progress for the evaluation of research in Lithuania. The parties undertake to do their best to accomplish the plan.

1. Before 10 March 1995, the Lithuanian partner should appoint a contact at each of the institutions to be evaluated.
2. Before 10 March 1995, the Lithuanian partner should appoint a scientist as an associate for each evaluation panel.
3. Before 17 March 1995, the Norwegian partner should submit to the Lithuanian partner a draft of guidelines for the evaluation panels.
4. Before 24 March 1995, the Lithuanian partner should present updated versions of the self-assessment reports from the research institutions
5. Before 31 March 1995, the Norwegian partner should appoint chairmen and panel members of the evaluation panels.
6. Before 7 April 1995, the evaluation panels can make requests for necessary additional information from the institutions to be evaluated.
7. Before 7 April 1995, guidelines for the evaluation panels should be agreed upon by the Norwegian and the Lithuanian partner.
8. Between 1 May and 1 July 1995, the site visits in Lithuania for the evaluation panels will take place, except for two of the panels, which will have completed their site visits by 15 September.
9. Before 15 August 1995, the Norwegian and the Lithuanian partner should discuss other actions to be accomplished.
10. Before 15 September 1995, draft reports from the evaluation panels should be sent the Lithuanian partner and the evaluated institutions for comments. Time-limit for comments is 15 October 1995.
11. Before 1 February 1996, the final report from the evaluation should be presented to the Lithuanian partner.

From Lithuania:

Vilnius, 1995

Vladislavas Domarkas
Minister of
Education and Science,
Republic of Lithuania

From Norway:

Oslo, 1995

Christian Hambro
Director General,
The Research Council
of Norway

APPENDIX OF PROTOCOL:

INSTITUTIONS TO BE EVALUATED BY EACH PANEL

Panel 1: Agricultural sciences

- 11 Lithuanian Institute of Animal Science
- 12 Forest Research Institute
- 13 Lithuanian Institute of Horticulture
- 14 Lithuanian Institute of Veterinary
- 15 Lithuanian Institute of Agriculture
- 16 Lithuanian Institute of Land Reclamation
- 17 Lithuanian Institute of Agricultural Engineering
- 18 Faculty of Veterinary Studies of Lithuanian Academy of Veterinary Studies
- 19 Faculty of Animal Husbandry Technology of Lithuanian Academy of Veterinary
- 1.10 Faculty of Agronomy of Lithuanian Academy of Agriculture
- 1.11 Faculty of Forestry of Lithuanian Academy of Agriculture
- 1.12 Faculty of Agricultural Engineering of Lithuanian Academy of Agriculture
- 1.13 Faculty of Water and Land Management of Lithuanian Academy of Agriculture

Panel 2: Physics, Mathematics, Informatics

- 21 Institute of Mathematics and Informatics
- 22 Institute of Physics
- 23 Semiconductor Physics Institute
- 24 Institute of Theoretical Physics and Astronomy
- 25 Faculty of Physics of Vilnius University
- 26 Faculty of Mathematics of Vilnius University
- 27 Faculty of Physics of Vilnius Pedagogical University
- 28 Faculty of Mathematics of Vilnius Pedagogical University
- 29 Faculty of Informatics of Kaunas University of Technology
- 2.10 Faculty of Fundamental Sciences of Kaunas University of Technology
- 2.11 Faculty of Informatics of Vytautas Magnus University
- 2.12 Faculty of Physics and Mathematics of Siauliai Pedagogical Institute

Panel 3: Biology

- 3.1 Institute of Botany
- 3.2 Institute of Ecology
- 3.3 Institute of Immunology
- 3.4 Institute of Biochemistry
- 3.5 Institute of Biotechnology
- 3.6 Faculty of Natural Sciences of Vilnius University
- 3.7 Faculty of Environmental Research of Vytautas Magnus University
- 3.8 Lithuanian Institute of Geology

Panel 4: Modern History, Political Science, Philosophy

- 4.1 Institute of Lithuanian History
- 4.2 Faculty of History of Vilnius University
- 4.3 Faculty of Humanities of Klaipeda University
- 4.4 Faculty of History of Vilnius Pedagogical University
- 4.5 Faculty of Humanities of Vytautas Magnus University
- 4.6 Institute of Philosophy, Sociology and Law
- 4.7 Faculty of Philosophy of Vilnius University
- 4.8 Faculty of Catholic Theology of Vytautas Magnus University
- 4.9 Faculty of Social Sciences of Vytautas Magnus University
- 4.10 Institute of Social and Humanitarian of Kaunas University of Technology
- 4.11 Institute of Labour and Social Research
- 4.12 Institute of International Relations and Political Science of Vilnius University

Panel 5: Language and Literature (Baltic, Slavic and Germanic)

- 5.1 Institute of Lithuanian Literature and Folklore
- 5.2 Faculty of Philology of Vilnius University
- 5.3 Institute of Culture and Arts
- 5.4 Institute of Lithuanian Language
- 5.5 Faculty of Humanities of Vytautas Magnus University
- 5.6 Faculty of Lithuanian Language of Vilnius Pedagogical University
- 5.7 Faculty of Philology of Siauliai Pedagogical Institute
- 5.8 Faculty of Humanities of Klaipeda University
- 5.9 Faculty of Foreign Languages of Vilnius Pedagogical University
- 5.10 Faculty of Slavonic Studies of Vilnius Pedagogical University
- 5.11 Kaunas Faculty of Humanities of Vilnius University

Panel 6: Medical Sciences

- 6.1 Institute of Experimental and Clinical Medicine
- 6.2 Faculty of Medicine of Kaunas Medical Academy
- 6.3 Faculty of Stomatology of Kaunas Medical Academy
- 6.4 Faculty of Pharmacy of Kaunas Medical Academy
- 6.5 Faculty of Medicine of Vilnius University:
- 6.6 Institute of Biomedical Research of Kaunas Medical Academy
- 6.7 Kaunas Medical Academy Institute of Cardiology
- 6.8 Kaunas Medical Academy Institute of Endocrinology
- 6.9 Kaunas Medical Academy Institute of Psychophysiology and Rehabilitation
- 6.10 Lithuanian Onkological Centre
- 6.11 Museum of the History of Lithuanian Medicin and Pharmacy

Panel 7: Economics, Law

- 7.1 Institute of Economics
- 7.2 Police Academy of Lithuania
- 7.3 Faculty of Economics of Vilnius University
- 7.4 Faculty of Law of Vilnius University
- 7.5 Faculty of Business Management of Vilnius Technical University
- 7.6 Faculty of Economics of Lithuanian Academy of Agriculture
- 7.7 Faculty of Administration of Kaunas University of Technology
- 7.8 Faculty of Management of Kaunas University of Technology
- 7.9 Faculty of Economics and Management of Vytautas Magnus University
- 7.10 Law Institute of Lithuania
- 7.11 Department of Statistics, Research Division
- 7.12 Lithuanian Information Institute

Panel 8: Engineering Sciences

- 8.1 Faculty of Mechanical Engineering of Kaunas University of Technology
- 8.2 Research Center "Vibrotechnika" of Kaunas University of Technology
- 8.3 Faculty of Fundamental Sciences of Vilnius Technical University
- 8.4 Faculty of Manufacturing Technologies of Kaunas University of Technology
- 8.5 Faculty of Mechanics of Vilnius Technical University
- 8.6 Faculty of Transport Engineering of Vilnius Technical University
- 8.7 Faculty of Chemical Technology of Kaunas University of Technology
- 8.8 Lithuanian Food Institute
- 8.9 Faculty of Civil Engineering of Kaunas University of Technology
- 8.10 Faculty of Civil Engineering of Vilnius Technical University
- 8.11 Faculty of Environmental Engineering of Vilnius Technical University
- 8.12 Institute of Architecture and Construction
- 8.13 Institute of Thermoinsulation
- 8.14 Faculty of Radioelectronics of Kaunas University of Technology
- 8.15 Faculty of Electrotechnical and Control Systems of Kaunas University of Technology
- 8.16 Faculty of Electronics of Vilnius Technical University
- 8.17 Lithuanian Energy Institute
- 8.18 Lithuanian Textile Institute

Appendix 4

Presentation of Advisory Board and Evaluation Panels

Board

Dr. Anders Omholt. *Chairman*

Anders Omholt, b. 1926, holds a Dr.Philos. degree from the University of Oslo, where he was Professor of Physics from 1963 to 1971. Since then he has been Director of Research at the Confederation of Norwegian Industries (1971-77), Director General of the Department of Research, Ministry of Church and Education (1977-78), Director General of the Norwegian Research Council for Science and the Humanities (1978-87), and Head of the Governm. Environmental Agency for the Oslo Area (1988-92). Since then he has been doing consulting work and has chaired a number of committees in the Research Council. Omholt is Memb. NASL*.

Professor Terje Mathiassen

Terje Mathiassen, b. 1938, holds a Dr.Philos. degree from the University of Oslo, where he has been Professor of Slavic and Baltic Linguistics since 1985. He was Head of the Department of Slavic and Baltic Studies in 1976-77. He has been guest researcher at the University of Illinois and UCLA, guest lecturer at the universities of Illinois, Stockholm and Tromsø, and has paid numerous shorter and longer visits to Lithuania and Latvia over the last 20 years. Prof. Mathiassen is Memb. NASL.

Professor Eivind Smith

Eivind Smith, b. 1949, holds a Dr.Juris. degree from the University of Oslo, where he is Professor of Public Law, and a former Director of the Department of Public and International Law. He is member of Academia Europaea and associated member of the International Academy of Comparative Law. He has been Visiting Professor, Guest Lecturer etc. in a number of foreign countries. Further, Prof. Smith has been President of the Governmental Commission of Inquiry for the Municipality of Oslo. Prof. Smith is Memb. NASL.

Professor Bjarne Arentz Waaler

Bjarne A. Waaler, b. 1925, holds a Dr.Med. degree from the University of Oslo, where he was Professor of Physiology from 1962 to 1992. He has been guest researcher at the universities of Birmingham, Gothenburg and Lund, and guest lecturer at various universities, including Harvard and Oxford. He was Dean of the Medical Faculty from 1974 to 1977, and Rector at the University of Oslo from 1977 to 1984. Since 1989, Prof. Waaler has been president/vice-president of NASL.

Member of the Norwegian Academy of Science and Letters.

Panel 1 Agricultural Sciences

Professor Nils Ragnar Standal. *Chairman*

Nils R. Standal, b. 1932, holds a Dr.Agric. degree from the Agricultural University of Norway, where he has been Professor of Animal Science since 1987. From 1990 to 1992 he was Head of the Department of Animal Science. He has been a member of the Executive Board of the Agricultural Research Council of Norway. From 1986 to 1988 he was Animal Production Officer at UNs FAO in Rome. He has participated in projects for FAO and WFP in several African, Asian, Latin-American and European countries.

Professor Olav Arne Bævre

Olav Arne Bævre, b. 1947, holds a Dr.Scient. degree from the Agricultural University of Norway, and has been professor at the Norwegian State Agricultural Research Stations since 1992. Since 1984 he has been Head of the Kvithamar Research Station, the Norwegian Crop Research Institute. Since 1992 he has been member of the General Council of the Norwegian State Agricultural Research Stations He has been guest lecturer at the Agricultural University of Norway and the University of Trondheim.

Professor Harry Eriksson

Harry Eriksson, b. 1931, holds a Ph.D. degree from the Swedish University of Agricultural Sciences, where he has been Professor of Forest Yield Research since 1988. He is Scientific Leader of the Research Forest of Tonnersjoheden in South Sweden. He has served as head of an IUFRO working party, member of the Technical Committee of COST Action in the European Union, and member of the advisory group GRUBIO at the Swedish National Board for Technical Development

Professor Inger Nafstad

Inger Nafstad, b. 1936, holds a Dr.Med.Vet. degree from the Norwegian College of Veterinary Medicine, where she has been Professor of Veterinary Pharmacology and Toxicology since 1985. From 1978 to 1980 she was Visiting Professor at the University of Nairobi, Kenya. From 1993 to 1995 she was Senior Scientific Adviser on the preclinical efficacy and safety of drugs at the Norwegian Medicines Control Authority. Prof. Nafstad is member of the Norwegian Legal Council of Veterinary Medicine and Memb. NASL.

Professor Lars Sjøflot

Lars Sjøflot, b. 1935, holds a Dr.Scient. degree from the Agricultural University of Norway, where his appointments have included Professor of Agricultural Engineering and Head of the Research Department. He has been guest researcher at Max Plank Institute in Germany, North Carolina State University and the Swedish National Institute of Occupational Health. Since 1992, Prof. Sjøflot has been employed at the Centre for Development Studies, Eastern Europe Section, the Agricultural University of Norway.

Panel 2 Physics, Mathematics, Informatics

Professor Arnfinn Graue. *Chairman*

Arnfinn Graue, b. 1926, holds a Dr.Philos. degree from the University of Bergen, where he has been Professor of Physics since 1971 and Rector from 1984 to 1990. He has had numerous

assignments in national and international boards and committees, among others Chairman of the Norw. Rectors Conference, member of the Permanent Committee of the European Rectors Conference (CRE), President of the Finance Committee of CERN, and member of the INTAS Council of Scientists. Prof. Graue was awarded the German Bertelsmann Prize in 1990.

Professor Lars Inge Hedberg

Lars Inge Hedberg, b. 1935, holds a FiLDr. degree from Uppsala University. Since 1984 he has been Professor in Applied Mathematics at Linköping University. He has been guest researcher in Leningrad and Moscow, and has held visiting appointments at the universities of Nancy, Michigan, Indiana and California. Prof. Hedberg has among other been Chairman of the Swedish Mathematical Society and has had several assignments in the Swedish Natural Science Research Council.

Professor Peter Klæboe

Peter Klæboe, b. 1929, holds a Ph.D. degree from the University of Oklahoma and a Dr.Philos. degree from the University of Oslo, where he has been Professor of Chemistry since 1983. He has been Visiting Professor at the University of Maryland and the University of Tübingen, and has been granted extended leave for research and guest lectureships at several universities in USA and Europe. Prof. Klæboe is among others titular member of committee 1.5, Physical Chemistry, Intern. Union of Pure and Applied Chemistry. He is Memb. NASL.

Professor Torleiv Klove

Torleiv Klove, b. 1943, holds a Dr.Philos. degree from the University of Bergen where he has been Professor of Informatics since 1984. He has been Head of the Department of Informatics for two periods. From 1985 to 1988 he was Project Manager at the Christian Michelsen's Research Institute, Norway. He has been granted extended leave for research at Adas Computer Laboratories and Cambridge University, and has spent altogether 3 years at the University of Hawaii.

Professor Tormod Riste

Tormod Riste, b. 1925 - died 12 November 1995. Prof. Riste held a Dr.Philos. degree from the University of Oslo. From 1953 he was employed at the Institute of Energy Technology, where he was Head of the Physics Division from 1966 to 1992. He was guest researcher, lecturer and referee at several universities and research institutes in Europe and USA. Other assignments have included being Chairman of Panel of NATO Advanced Study Institutes, and Chairman of Research and Education within Swedish Nuclear Technology. Prof. Riste was Memb. NASL.

Panel 3 Biology, Geology

Professor Jon Bremer, *Chairman*

Jon Bremer, b. 1928, holds a Dr.Med. degree from the University of Oslo, where he has been Professor at the Department of Medical Biochemistry since 1972. He was chairman of the Department from 1975 to 1978. He has been Visiting Professor at the universities of Indiana and Wisconsin, USA, and at the Universidad Catolica de Chile, in Santiago. From 1979 to 1981 he was Chairman of the Medical Section of the Norwegian Research Council for Science and the Humanities. Prof. Bremer is Member NASL.

Professor Sigbjørn Possum

Sigbjørn Possum, b. 1945, holds a Dr.Med. degree from the University of Oslo, where he has been Professor at the Department of Anatomy since 1992. He has done periods of research at the universities of Oxford and Manchester. Since 1990 he has been member of the board for the Biotechnology Centre in Oslo. Prof. Possum is currently member of two evaluation groups for biotechnology and cell biology at the Norwegian Cancer Society and the Research Council of Norway. Prof. Possum is Memb. NASL.

Professor Knut S. Heier

Knut S. Heier, b. 1929, holds a Dr.Philos. degree from the University of Oslo, where he was Professor of Geochemistry and Director of the Mineralogical-Geological Museum from 1968 to 1979. He has been Post Doctoral Fellow at Rice University, USA, Senior Fellow at the Australian National University, and Visiting Professor at the University of California. From 1974 to 1994, Prof. Heier was Director of the Geological Survey of Norway, where he currently holds a position as consultant. He is Memb. NASL.

Professor Inger Nordahl

Inger Nordahl, b. 1944, holds a Ph.D. from Uppsala University. Since 1987 she has been Professor of Plant Geography at the University of Oslo. She has done periods of research in USA, England, Germany, Iceland, Italy, Russia, Switzerland, Ethiopia, Kenya, Malawi, Tanzania, and Zimbabwe, and botanical field work in several European and African countries. Prof. Nordahl has among others been member of the Council for Natural Science Research, the Norwegian Research Council for Science and the Humanities. She is Memb. NASL.

Panel 4 Philosophy, Modern History, Political Science, Sociology

Professor Knut Midgaard. *Chairman*

Knut Midgaard, b. 1931, holds a Mag.art. degree from the University of Oslo, where he has been Professor of Political Science since 1975. From 1976 to 1978 he was Chairman of the Department of Political Science at the University. He has been Visiting Professor at Uppsala University. Prof. Midgaard was Chairman of a committee appointed by the Norwegian government in 1982 to evaluate research institutions in the field of international relations. He is Memb. NASL and a member of the editorial board of the Journal of Theoretical Politics.

Professor Ingemund Olav Gullvag

Ingemund O. Gullvag, b. 1925, holds a Dr.Philos. degree from the University of Oslo. Since 1971 he has been Professor of Philosophy at the College of Arts and Science, University of Trondheim. He has been Chairman of the Department of Philosophy and was Vice-Rector of the College from 1975 to 1978. He has done periods of research at various universities, incl. Cambridge, Yale, Harvard and California, and has been Visiting Lecturer at the universities of Alberta and Maryland, and Copernicus University, Poland. Prof. Gullvag is Memb. NASL.

Professor Sigurd Skirbekk

Sigurd Skirbekk, b. 1934, holds a Dr.Philos. degree and has studied Sociology, Psychology and Ethnology at the University of Oslo and at Stanford University. Since 1971 he has been employed at the Department of Sociology at the University of Oslo, where he has been Head of the Department for two periods. He has done research and published works on the sociology of knowledge and on cultural issues. His doctoral thesis was an analysis of a hundred

years of public moral debate in Norway.

Professor Nils Morten Udgaard

Nils Morten Udgaard, b. 1940, holds a Ph.D. in International Relations from the London School of Economics, and is currently Foreign Editor in the Norwegian daily newspaper *Aftenposten*. From 1984 to 1986, Prof. Udgaard was State Secretary and foreign policy adviser to the Norwegian Prime Minister. Since 1991 he has been Adjunct Professor in Modern History/International Relations at the Department of Russian Studies, University of Bergen. He has been guest lecturer at several universities in Norway and abroad.

Professor Thomas Christian Wyller

Thomas Chr. Wyller, b. 1922, holds a Dr.Philos. degree from the University of Oslo where he was Professor of Political Science from 1968 to 1992. He has been guest lecturer and researcher at Scandinavian universities, the London School of Economics and Political Science, and the University of British Columbia. From 1959 to 1965 he was head of the Norwegian Association of Political Science. Prof. Wyller has contributed to Norwegian media on political and cultural affairs, for more than half a century.

Panel 5 Baltic, Slavonic and Germanic Languages and Literatures

Professor Jostein Børtnes. *Chairman*

Jostein Børtnes, b. 1937, holds a Dr. Philos. degree from the University of Bergen where he has held the Chair of Russian Literature since 1984. He has been Head of the Russian Department for many years and Dean of Faculty during the period 1991-93. He holds a part-time professorship at the University of Tromsø and has given numerous guest lectures at home and abroad. He has been lecturer in Slavonic Studies at the University of Cambridge and was simultaneously Director of Studies at Sidney Sussex College. Prof. Børtnes is Memb. NASL.

Professor John Ole Askedal

John Ole Askedal, b. 1942, holds a Cand.Philol. degree in Russian and German from the University of Oslo, where he has been Professor of German Linguistics since 1985. He has been Visiting Professor at College de France, and Guest Lecturer and Researcher in Germany, Denmark, Belgium, France, Switzerland, Poland, Slovenia, Czechoslovakia, Latvia, Japan and USA. Since 1994, Prof. Askedal has been CJPL representative for Norway. He is Editor of *Norwegian Journal of Linguistics*. Prof. Askedal is Memb. NASL.

Professor Jan Peter Locher

Jan Peter Locher, b. 1934, holds a Dr.Phil. degree from the University of Bern, where he is Professor at the Department of Slavic and Baltic Languages and Literatures. He has been Director of the Institute since 1987. From 1974 to 1983 he was Supervisor for the Russian Language at Higher Institutions in the Italian speaking part of Switzerland. Since 1973, Prof. Locher has been member of the Research Group for Slavic and Baltic Languages with the International Slavic Research Committee.

Professor Terje Mathiassen

(see presentation of board)

Research Fellow Ingunn Lunde. Secretary

Ingunn Lunde, b. 1969, holds a Cand.Philol. degree in Russian and Classics from the University of Bergen. At present she is a Research Fellow at the Department of Russian Studies, with a doctoral thesis on *Christianity and the Rhetoric of Antithesis in 19th-century Russian Literature*. Ingunn Lunde has spent prolonged periods of study at the University of Tbilisi, Georgia, the University of Bonn, and in Moscow.

Panel 6 Medical Sciences

Professor Egil Gjone. Chairman

Egil Gjone, b. 19225, holds a Dr.Med. degree from the University of Oslo, where he was Professor of Internal Medicine from 1969 to 1993. He has been Medical Director General and Administrative Director General at the University Hospital, the National Hospital, Norway. Dr. Gjone is Founding Editor of Scandinavian Journal of Gastroenterology, past Chairman of the Medical Section of the Norwegian Research Council for Science and the Humanities, and past Chairman of the Medical Group of the Norwegian Academy of Science and Letters.

Professor Per Brandtzaeg

Per Brandtzaeg, b. 1936, is Professor and Chairman at the Department of Pathology, University of Oslo, and Head of the Laboratory for Immunochemistry and Immunopathology at the Department of Pathology, the National Hospital. He has made approximately 240 teaching contributions at postgraduate courses and has held 435 invited lectures or seminars at various universities and societies. He is Managing Editor and Editorial Board Member of several international journals, and he has been awarded several international prizes for medical research.

Professor Anne Rahbek Thomassen

Anne R. Thomassen, b. 1948, holds a Dr.Med. degree from the University of Arhus and is a specialist in Cardiology and Internal Medicine. At present she is Director of Medicine at the Medical Department, Randers Central Hospital, Denmark. Prof. Thomassen is member of the Danish Central Scientific Ethical Committee, and she has been chairman or member of a number of working groups who have established national guidelines for cardiac evaluation of surgical patients, for exercise testing and for treatment of dyslipidaemia etc.

Professor Tor Waaler

Tor Waaler, b. 1927, holds a Dr.Sc.Nat. degree from the Federal School of Technology in Zurich. Since 1969 he has been Professor of Pharmaceutical Technology and Biopharmacy at the University of Oslo. From 1976 to 1979 he was Vice-Dean at the Faculty of Science, University of Oslo, and from 1986 to 1989 Director of the School of Pharmacy. He was awarded a Gold Medal from the Norwegian Academy of Science and Letters in 1968 and from the Pharmaceutical Society of Norway in 1975. Prof. Waaler is Memb. NASL.

Panel 7 Economics, Law

Professor Einar Hope. Chairman

Einar Hope, b. 1937, holds a Ph.D. in Economics from the Norwegian School of Economics and Business Administration, where his assignments have included Director of the Institute of Industrial Economics, Director at the Centre for Applied Research, and President at the Centre

for Research in Economics and Business Administration. At present he is Director General of the Norwegian Competition Authority. Prof. Hope has done periods of research at various universities, including Stanford, Cambridge, Bayreuth and Cologne.

Professor Kare Lilleholt

Kare Lilleholt, b. 1952, holds a Dr.Juris, degree from the University of Bergen. He has been Assistant Professor and Professor at the universities of Oslo and Bergen, and since 1993 has been Professor at the Department of Law, the Norwegian School of Economics and Business Administration. Prof. Lilleholt has participated in several government committees, including committees appointed to prepare regulations on landlord and tenant law, and consumer contracts for the building and purchase of houses.

Professor Svein Longva

Svein Longva, b. 1943, holds a Cand.Oecon. degree from the University of Oslo. From 1984 to 1990 he was Director of Research at Statistics Norway, and from 1989 to 1992 he was Professor of Economics at the University of Bergen. At present he is Director General of Statistics Norway. Prof. Longva has also been Chairman of the Government Commission on Living Conditions in Norway, member of the board of the Nordic Economic Research Council and member of the International Statistical Institute.

Professor Frederik Zimmer

Frederik Zimmer, b. 1944, holds a Dr.Juris, degree from the University of Oslo, where he has been Professor at the Faculty of Law since 1987. He has been Dean of the Faculty since 1995. From 1981 to 1993 he was Chairman of the Oil Tax Assessment Board, and he has been Head of the Governmental Commission to study various features of the Norwegian value-added tax. Prof. Zimmer is currently Chairman of the Appeals Board at the Central Office for Taxation of Large-Sized Companies.

Panel 8 Engineering Sciences

Professor Inge Johansen. *Chairman*

Inge Johansen, b. 1928, holds a Dr.techn. degree from the Norwegian Institute of Technology, where he has been Professor of Electrical Engineering (1959-76) and Rector (1976-84). He has been Managing Director of the Norw. Council for Scientific and Industrial Research (1985-90). Further, he has served as Chairman of the Council for the Foundation for Industrial and Technological Research, SINTEF. He has been a Research Consultant for the Ford Motor Company and a Visiting Professor at MIT. At present he is a partner in the Sr.Group.

Professor Klas Cederwall

Klas Cederwall, b. 1936, holds a Techn.dr. degree from Chalmers Institute of Technology, and has been Professor at the Royal Institute of Technology, Sweden, since 1976. He has cooperated on research projects with the University of Addis Abeba, Ethiopia, and has been Visiting Professor at the University of Novosibirsk. Prof. Cederwall has also served as Consultant for Scandinavian Engineering in Algeria, Consultant for Boliden AB in Brazil and UNESCO Consultant in Mozambique.

Professor Kristian Lien

Kristian Lien, b. 1958, holds a Dr.ing. degree from the Norwegian Institute of Technology,

where he has been Nordic Research Professor in Separation Processes since 1990. He has been Visiting Professor at the Danish Institute of Technology, Scientific Adviser for the Foundation of Industrial and Technological Research, and Scientific Adviser for Kvsrner Engineering, Norway. He has also been member of the International Programme Committee for the ISPE Conference in USA, 1995.

Professor Jan Overli

Jan Overli, b. 1939, holds a Ph.D. from Cranfield Institute of Technology. Since 1992 he has been Professor of Thermal Energy at the Norwegian Institute of Technology. From 1981 to 1991 he worked for the Norwegian STATOIL, among others as Senior Vice President of the Division of Research and Development. Further, Prof. Overli has served as Chairman of the National Steering Committee for Offshore Technology, and member of the National Committee on Environmental Research in Norway.

Appendix 5

Lithuanian Associates for the Panels

Panel 1	Professor Leonas Kadziulis	Science Council of Lithuania
Panel 2	Professor Lainutis Telksnys	Institute of Mathematics and Informatics
Panel 3	Professor Algirdas Skirkevicius	Institute of Ecology
Panel 4	Professor Romanas Pleckaitis	Faculty of Philosophy, University of Vilnius
Panel 5	Professor Vytautas Kubilius	Institute of Lithuanian Literature and Folklore
Panel 6	Professor Pranas Grybauskas	Kaunas Medical Academy
Panel 7	Professor Jonas Cisinskas	Faculty of Economics, University of Vilnius
Panel 8	Professor Antanas Ziliukas	Kaunas University of Technology

Appendix 6

Questionnaire on Self-Assessment of Lithuanian Research and Higher Education Institutions

(prepared following to the decree No.40p of the
Government of the Republic of Lithuania, January 20,1994)

Headlines

1. AIMS AND TASKS OF THE INSTITUTION AND THEIR IMPLEMENTATION
 - 1.1 Basic (to be state-supported) aims of the institution
 - 1.2 Basic tasks of recent years, their implementation, failures and their reasons
 - 1.3 Data on the statute
 - 1.4 Councils (senates) of the institution and its subdivisions
 - 1.5 Information on self-inspection of the quality of research, academic and administrative activities of the institution and on the mechanisms (functioning and predicted) of improving the activities.
 - 1.6 Change in the title and subordination of the institution during 1989-93
 - 1.7 Basic structural changes in the institution during 1992-93 and those predicted in the nearest future (their reasons and consequences expected)
 - 1.8 The established and planned to be established structural units of the institution having the rights of a legal entity (personal enterprises, institutes etc.)
2. MATERIAL BASIS
 - 2.1 Buildings at the institution's disposal
 - 2.2 Balance value of the equipment of laboratories for research and studies
 - 2.3 Computational equipment
 - 2.4 Libraries
 - 2.5 List of the most valuable (unique) equipment
3. INCOME AND EXPENDITURE, 1993
 - 3.1 Income
 - 3.2 Payment from state subsidies
 - 3.3 Payment from other finances
 - 3.3 State scholarships for studying persons
 - 3.5 Expenses to acquire the means for research and studies
 - 3.6 Operating expenses
4. EMPLOYEES
 - 4.1 Research and academic staff

- 4.2 Technical staff for research and studies
- 4.3 Other staff
- 4.4 Research and academic staff according to the age, research degree, research (academic) title

5. SCIENTIFIC ACTIVITIES.

- 5.1 Number of researchers for whom this institution (faculty) was the main working place at the end of the year
- 5.2 Number of candidates for the Doctor's degree
- 5.3 Research degrees acquired
- 5.4 Scientific publications
- 5.5 Reports in scientific conferences
- 5.6 Patents taken out
- 5.7 Inventions registered
- 5.8 The basic scientific problems solved, the most important results of their solution in 1989-93, main publications and putting into practice (it must be substantiated why the problem is being solved)
- 5.9 Bibliography and publications of scientists for whom this institution (faculty) is the main working place and of candidates for the Doctor's degree, 1992-93 (monographs and papers in journals should be given separately)
- 5.10 The list of not yet published works, but presented to the editors in 1992 and 1993 by scientists for whom this institution (faculty) is the main working place and candidates for the Doctor's degree (monographs and papers in journals should be given separately)
- 5.11 List of reports made at international conferences in 1992-93 which must be formed following the same rules as in 5.9
- 5.12 Premiums, awards received in 1992-93 for research works
- 5.13 Purposive grants for research works received in 1992-93
- 5.14 Contracts concluded (or continued) in 1992-93 to carry out the ordered research works which value is no less than 5.000 Lt
- 5.15 Participation in international programmes of research and higher education in 1992-93
- 5.16 New technologies, software and manufactured products
- 5.17 A list of patent and invention rights allocated in 1992-93
- 5.18 Scientific popularization and publicistic writing
- 5.19 Research oriented co-operation with higher education and research institutions of Lithuania
- 5.20 Participation of scientists in the activities and publishing work of international research organizations
- 5.21 Participation of scientists in the activities and publishing work of Lithuanian research organizations
- 5.22 Employees of State research institutes who in 1993-94 are teaching in higher education institutions
- 5.23 Publishing activities of the institution
- 5.24 Conferences arranged by the institution
- 5.25 International co-operation of the institution (membership of the institution in international organizations of research institutions, agreements with foreign institutions)
- 5.26 International exchange of scientists, teachers and students in 1993
- 5.27 A list of monographs, proceedings and textbooks published by the institution in 1992-93

- 5.28 A list of Lithuanian and international research conferences arranged by the institution in 1992-93
- 5.29 Awarding of research degrees and research academic titles in 1992-93
- 5.30 Other significant (in the opinion of the institution) information on the institution's research activities

6. HIGHER EDUCATION

- 6.1 The basic reorganization innovations of higher education implemented in 1992-93
- 6.2 The main information of the existing system of inspecting the quality of higher education
- 6.3 Information on the system of improving professional skill of teachers
- 6.4 Basis of higher education (auditoriums, training laboratories, computer classrooms etc.)
- 6.5 Other significant (in the opinion of the institution) information on teaching activities of the institution
- 6.6 Methodical activities of the faculty of the institution
- 6.7 Study programmes in the academic year 1993-94
- 6.8 Departments of the faculty, subjects taught and teachers in the academic year 1993-94

7. STUDENTS

- 7.1 Students of the basic studies
- 7.2 Candidates for the Master's degree in the academic year 1993-94
- 7.3 Additional post-graduate professional studies in the academic year 1993-94
- 7.4 Social maintenance of students

Appendix 7

Guidelines for Preparation of the Panel Reports

I. General

1. The evaluation panels are requested to prepare their reports in accordance with the present guidelines. However, practical and other conditions might necessitate certain deviations from the guidelines. The reports will comprise descriptive parts as well as evaluations and recommendations. When making their comments, the panels should take into consideration the general, economical and structural conditions under which the institutions and their research groups have been and are working.
2. The institutions and areas of research to be evaluated by each panel, are laid down in the protocol of the agreement on evaluation of research in Lithuania, between the Royal Norwegian Ministry of Education, Research and Church Affairs and the Ministry of Education and Research of the Republic of Lithuania.
3. The panels are in each of their respective areas of research, requested to execute evaluations on three levels:
 - Group level
 - Institution level
 - National level
4. With regard to recommendations for further development, the panels are on all three levels of evaluation requested to use the following terminology to indicate the relative importance of each recommendation:
 - recommends
 - strongly recommends
5. The reports from the panels should be based on reports from Lithuanian research institutions, on publications of Lithuanian research, on site visits and interviews, and other information provided.
6. The structure, details and lay-out of the panel reports are presented separately.

II. Introduction

7. Each report is identified by the number of the panel and the field(s) of research covered.
8. The introduction of the report should include the following:

- summary in brief
- list of institutions evaluated
- information available for the panel

List of panel members and programme for site visits should be presented in appendix.

III. Group level

- Each report on individual research groups should begin with a listing of scientific positions at present, amount and character of scientific publication, number of doctoral theses in 1994, and director. Further, a brief description of principal activities should be given.
- For the evaluation of the research groups the panels are requested to:
 - evaluate, by international standards, the quality of research and extent of experimental and theoretical research;
 - evaluate the scientific and national relevance of the research;
 - evaluate the sufficiency of and appropriateness of research positions, equipment and other resources.
 - evaluate the extent of contact and cooperation with other research groups nationally and internationally.
- The panels are requested to give an evaluation of the overall quality of the research carried out by the group, by using the following terminology:

Outstanding Research at a high international level; of international interest with impact within its subfield and with publications in internationally leading journals; the researchers have a good international reputation within their subfield.

Satisfactory Research at a good international level with publications in internationally well-known journals; the researchers are recognized and cited in their fields.

Not quite satisfactory Research that only partially is of good international standard and only partially is published in well-known journals.

Not satisfactory Research of insufficient quality.

IV. Institution level

- Each report on institution level should begin with a brief description of organization and a listing of positions at present, number of scientific publications and doctoral theses in 1994, and number of students. Further, a brief presentation of the development and present situation of the institution should be given.

13. For the institutions the panels are requested to evaluate and recommend on the following points:

- The scientific and administrative staff:
 - qualifications and the size needed in order to carry out research;
 - age profile of scientific staff;
 - international contact and recognition;
 - mobility;
 - recruitment of scientists and scholars.

- Accommodation and scientific equipment:
 - adequate for the research in question and other obligations.

- Financial situation of the institution:

- International contact and cooperation:
 - joint programmes and exchange of scientists with research institutions in other countries, bilateral and or through multilateral programmes;
 - programmes for mobility of scientists;
 - networks.

- Research priorities:
 - priorities and relevance of priorities.

- Planning and management of research
 - short-term and long-term planning;
 - management of research programmes and activities.

V. National level

14. On the national level of each area of research evaluated, the panels are requested to give general appraisals/descriptions of:

- Research organization
 - development in recent years, situation at present, and perspectives.

- Research conditions
 - system of funding.
 - consequences of development in recent years with regard to e.g. brain-drain, publications etc.

- Research priorities
 - areas relatively well covered by research.
 - areas less well endowed with resources.
 - areas almost or totally neglected.

15. On basis of the general appraisals/descriptions and the evaluations on group and institution level, the panels are, where appropriate, requested to make recommendations with regard to the further development of:

research organization.
research conditions
research priorities
international contact and cooperation
national cooperation and division of labour
doctoral training
others

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