

Summary of the report  
QUALITY AND RENEWAL 2007

*An overall evaluation of research at Uppsala University*

*2006/2007*



UPPSALA  
UNIVERSITET

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# Preface



In September 2006 the Vice-Chancellor of Uppsala University, Professor Anders Hallberg, initiated an overall evaluation of research at all faculties of the University. The objective was to identify strong research activities and activities with potential to develop into new strong areas of research. The evaluation was expected to assist the University management in the decision-making process for future strategic measures and to offer departments and faculties support in their quality development work.

The Vice-Chancellor invited me to plan and direct the evaluation. A plan for the project, named KoF07, a Swedish acronym for *Quality and Renewal 2007* was presented to, and approved by the University Board on October 26, 2006. The core of the evaluation was a peer-review process, where distinguished scholars of the international research community were invited as members of expert panels to review departments of Uppsala University during a spring semester week of 2007. Preparation before the site visits was based on written material provided by the departments. As a separate exercise, a bibliometric study of publications from Uppsala University in the period 2002-2006 was carried out by external expertise.

As evident from the present report, the evaluation reveals considerable strengths in many fields and disciplines of the University, and it elucidates areas with potential for future success. It also points at weaknesses and offers advice on actions for successful development. This document serves several purposes, a very important one being realized when it is used as benevolent and qualified advice in the ongoing development of research activities in the various faculties and departments.

I want to express my appreciation for the professional and competent work of the deans, department chairs, faculty members, and others in carrying out the tasks that have been required from them by this evaluation exercise. The commitment to the task of the panel experts, their qualified assessment work and their generous sharing of advice and good ideas is highly valued. Finally, the capabilities and friendliness of my collaborators in the project management and evaluation office have made this work not only doable but also a great and enjoyable experience.

Uppsala October 1, 2007

A handwritten signature in black ink, appearing to read 'Joseph Nordgren', written in a cursive style.

Joseph Nordgren  
KoF07 project leader

# Executive summary

During the academic year 2006/2007, an evaluation of the research at all faculties of Uppsala University has been carried out in order to assess the quality of research and to identify opportunities for renewal. The evaluation was conducted in a peer-review process, where distinguished scholars of the international research community were engaged in reviewing the research. As a separate exercise, a bibliometric study of research publications for the period 2002-2006 was carried out by external expertise. The peer-review was based on written background material containing self-assessments, documents presenting facts and figures of department activities, and lists of publications. In order to acquire an in-depth opinion about the status and future plans of the various departments, all panels spent a week at Uppsala University conducting site visits, during which they met and interviewed faculty members and Ph.D. students. The review work was distributed on 24 different expert panels with an average of 7 panelists per panel, in total 176 panelists. 11 panels were assigned to Humanities and Social Sciences, 7 panels to Science and Technology, and 6 panels to Medicine and Pharmacy. Each expert panel had a chairperson who was responsible for the panel work and for the writing of a report summarizing the assessments and conclusions of the panel. Prior to the site visit, the panel chairs were asked to give their viewpoints on the tentative schedule of the site visit proposed by the departments. A staff member of the University administration was assigned to each panel as a panel guide to assist in various matters during the site visit. The panel report, which was written in a format defined by a template, was due in a draft form at the end of the site visit, and at an exit interview on the last day, the main conclusions were presented by the panels to the respective department chairs. The main objective of the evaluation exercise was to identify strong research activities in specialized areas of expertise as well as in multi-disciplinary constellations and to offer advice on activities with potential to develop into new strong areas of research. Apart from direct research quality assessments, a number of different aspects were asked to be elucidated: (1) Research environment and infrastructure; (2) Networks and collaborations; (3) Opportunities for renewal and emerging science; and (4) Actions for successful development. The evaluation was intended to provide the University management with reliable background material for the decision-making process for future strategic projects and also to offer departments and faculties support in their quality development work. Quality assessments were, as far as possible, made in terms of comparing

with international standards as known and defined by the panel experts using a set of recommended ratings given in the Terms of reference document: (1) Top-quality or world-leading; (2) Internationally high standard; (3) Internationally recognized standard; and (4) Acceptable standard. Most panels used the recommended ratings, although some panels in the field of Humanities and Social Sciences expressed some difficulties to do so. Out of the 75 departments and units evaluated the panels identified research activities of the highest quality level, *Top quality or world leading*, in well over 20 departments. These departments are distributed over all three disciplinary areas. The highest quality rating was given to more than 50 specific groups or activities. A few departments as a whole are mentioned to perform at a level no less than *Internationally high standard*. The number of cases for which panels discuss research activities or groups mentioning *Internationally high standard* is about 100. Furthermore, some panels judge research to be of very high quality without explicitly using the recommended quality ratings. The rating *Internationally recognized standard* is found at approximately the same frequency for different research activities throughout the panel reports. Mentioning of research of *Acceptable standard* is found somewhat less abundantly, and in rare cases the panels discuss activities that are assessed not be quite up to acceptable standard. It should be reiterated here that the main task of the panels was not to grade all research, but to identify particularly strong research, emerging science and opportunities for renewal. The panels paid attention to the renewal aspect of the evaluation, being aware of the age-heavy demographic profile. They suggest that upcoming retirements be used to strengthen existing, strong efforts or to redirect research. Also, the panel reports often discuss structural conditions and their implications for successful development. Some of these comments refer to issues of a general nature, such as career paths, mobility, opportunities for teachers to do research, mechanisms for funding, etc. Regarding organizational matters comments on sub-critical size and fragmentation as well as potential for more collaboration and lack of strategic planning of research appear in a number of cases. Some panels point out that there is revenue to be collected from optimizing organizations and by increasing collaborations as well as by sharing facilities. As a separate part of the research evaluation, researchers at Leiden University carried out a bibliometric study on department level of research publications from Uppsala University in the period 2002-2006. The study does not apply to all research since it requires a sufficient number of publication in international journals indexed in the Web of Science databases in order to allow normalized citation scores to be calculated with reasonable accuracy. Therefore, the faculties of Humanities are not included in this study, and for a number of the departments of the faculty of Social Sciences, the statistical significance of the scores is limited. For most departments in the areas of Science and Technology and Medicine and Pharmacy, where publication practices are more suitable for such analyses, citation scores show statistical significance. The number of publications in the

period 2002-2006 by researchers who were employed at Uppsala University as of September 2006 was almost 20,000. Of these a bit more than 40% are in the Web of Science databases. These articles are to a dominating extent published by scholars in the disciplinary areas of Science and Technology, and Medicine and Pharmacy. Researchers in the Humanities and Social Sciences (including Educational Sciences) on the other hand have larger shares among non Web of Science articles, book chapters, books, edited books, reviews and book reviews. The number of Web of Science publications was 8,502. These obtained 45,209 citations, self-citations excluded, i.e. on average they were cited 5.32 times. One third of the publications had not been cited at all, while 228 papers belonged to the five per cent most cited papers in their field. The impact of the research in relation to journal sets was 1.06 for the University as a whole, i.e. Uppsala researchers had a 6% advantage to the world average. Above the University average were Social Sciences (1.25), Mathematics and Computer Science (1.17), Medicine (1.08), Chemistry (1.08), Earth Sciences (1.07) and Engineering (1.07), while Pharmacy (1.05), Biology (1.01) and Physics (0.89) were below. The impact of the research in relation to the research field(s) was found to be 1.25, a 25% advantage of Uppsala scholars. Above the University average were Biology (1.36), Chemistry (1.35), Engineering (1.35) and Social Sciences (1.26) and below Medicine (1.22), Physics (1.17), Mathematics and Computer Science (1.11), Pharmacy (1.11) and Earth Sciences (0.94). The bibliometric study also shows that Uppsala scholars on average publish in journals that have an impact that is 17% above the world-average. Again there were variations between fields in the University. Above the total average were Biology (1.35), Physics (1.32), Engineering (1.26), and Chemistry (1.25), and below Medicine (1.13), Pharmacy (1.06), Social Sciences (1.01), Mathematics and Computer Science (0.95) and Earth Sciences (0.88). It could be noted that the University of Leiden team that conducted the study found that Uppsala researchers are well connected to high quality research groups. They state that users of UU knowledge tend to be cited highly themselves, which indicates that UU work is used by researchers of high impact, at the edge of the research frontier.



# Part I: The Project



# 1. Introduction

In the post-war period, research and higher education have become increasingly significant activities all over the world. They are often seen as a means to achieve economic growth and prosperity. As a result, the number of institutions for research and higher education as well as the number of researchers and students has increased considerably. This in turn has made resource allocation more complicated and in many countries led to efforts to evaluate research and higher education (see e.g. Geuna 1999, Martin and Geuna 2003, OECD 1997). In some countries, like the United Kingdom, this has led to a relatively elaborate system for evaluating the standards of research and higher education (see e.g. Curran 2000 and Elton 2000). In Sweden, evaluations of research started out in the late 1970s as the Council for Research in the Natural Science (NFR) started evaluations of the various disciplines under their jurisdiction (see Government Bill 1981/82, p. 37 and NFR 1981). They were followed by similar evaluations within the other research councils. The Council for Research in the Humanities and Social Sciences (HSFR), for instance, undertook evaluations of economics (Engwall 1992), history (Danielsen *et al.* 1988) and sociology (Allardt, Lysgaard and Bøttger Sørensen 1988). These evaluations by the councils for research have continued ever since. However, they have not had any direct links to funding of research. Since the early 1990s, universities and university colleges have also been subject to evaluations by a central body, first the Office of the University Chancellor (*Kanslersämbetet*) and later in 1995 the National Agency for Higher Education (*Högskoleverket*). The former organization was evaluating the procedures for quality improvement, while the latter focussed on the quality in various disciplines. Although, the quality evaluations were primarily directed towards the educational programmes, the reports from them touched upon the quality of research. In addition to these national initiatives, local evaluations of research in order to reallocate resources within individual universities have been undertaken, such as the BASTU project at Uppsala University (see e.g. SAUNA IV). In the same spirit, Vice-Chancellor Professor Anders Hallberg announced an overall evaluation of the research within Uppsala University as he took office in the summer of 2006. He thus proposed to the University Board to launch the project *Quality and Renewal 2007* (Kvalitet och Förnyelse 2007 or in short KoF07). The University Board decided to go ahead with the evaluation following the plans outlined in a presentation by the proposed project leader, Professor Joseph Nordgren, on October 26, 2006. The KoF07

evaluation aims at probing the international standing of research at all faculties in order to identify strong activities and opportunities for renewal. The evaluation has engaged a large number of distinguished scholars from many different countries, and it has put considerable weight on the site visits. It includes an advanced bibliometric study that has been carried out as a separate exercise independent from the assessment based on written documents and site visits. The KoF07 evaluation thus represents a new way of evaluating academic research in Sweden.

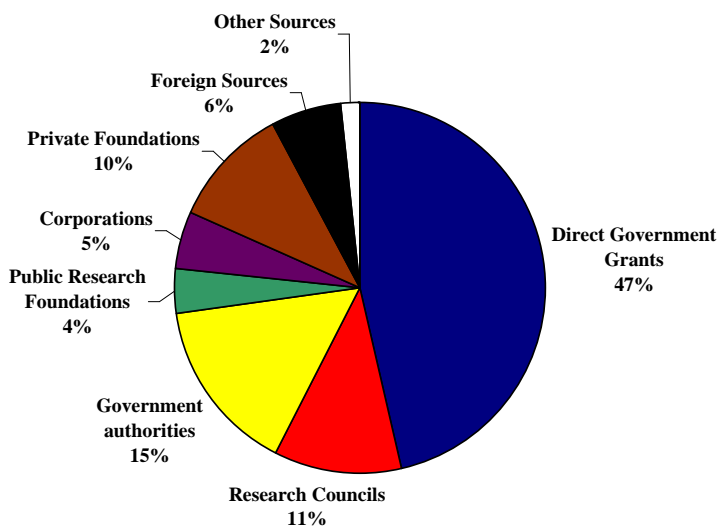
The main part of the present report comprises the panel reports that were produced after the site visits. However, before turning to these, the report will put the evaluation in context by briefly summarizing the Swedish system of research and some characteristics of Uppsala University. In addition, the project design is described, and some observations from the panel reports are presented and discussed. A summary and the full version of the bibliometric study is available in the full report.

## 2. The Context of KoF07

### 2.1 The Swedish system in brief

The Swedish system for research can be said to be based on the Humboldt principle that research and higher education should go hand in hand. The number of research institutes is therefore very limited and the research which is not pursued by industry is concentrated to universities and university colleges. There are 16 institutions with university status and 16 university colleges. Of the former, Uppsala University and Lund University are the oldest founded in 1477 and 1668, respectively. In the late nineteenth century, they were followed by the ones in Stockholm (1878) and Gothenburg (1891), and in the twentieth century an additional six universities were added (Umeå, Linköping, Karlstad, Mid-University, Växjö and Örebro). Furthermore, there are six stand-alone institutions with university status: three institutes of technology, a medical school, a business school and a university of agriculture and forestry. Most of the mentioned institutions are public. The three exceptions are Chalmers Institute of Technology in Gothenburg, the Stockholm School of Economics and the Jönköping University College (see further Engwall and Nybom 2007). The funding of academic research in Sweden in 2005 amounted to about € 2 billion, of which almost half was allocated to science and technology and almost one third to medicine. The government funding, which accounted for 75% of the total budget, was distributed as direct government grants and through project grants (see Figure 2.1). In addition, there were non-government funding through various foundations and other sources. Almost half of the funding (47%) was direct government grants. 26% came from government authorities and research councils, while the remaining funding (27%) arose from private foundations, foreign sources (mainly the European Union), corporations, public research foundations, etc.

In terms of the discussion in the field of sociology of science (see Gibbons *et al.* 1994; Nowotny *et al.* 2001; Slaughter *et al.* 1997), the research funding in Sweden can be characterized as a mix of Mode I and Mode II. Mode I represents academic, investigator-initiated and discipline-based research, while Mode II is context-driven, problem-focused and interdisciplinary knowledge production. The latter is indeed penetrating to a considerable extent. Three signs of this can be seen. First, politicians often use utilitarian arguments for spending funds on research. Second, a number of utilitarian oriented funding bodies have been founded. Third, for some time there has been a demand from government on researchers to communicate their results to the general



*Figure 2.1:* Sources of research funding in Sweden 2005 (Total Funds  $\sim$  € 2 billion). Source: Statistics Sweden. Research and Experimental Development in the Higher Education Sector 2005 (UF13SM0601)

public. However, at the same time Mode I is still significant. The evaluation of research is one indication of this. Another is the increasing use of citations and journal impact factors as indicators of research quality. Finally, it is clear that recruitment decisions are primarily based on scientific performance, although teaching performance and other criteria are nowadays taken more into consideration than earlier.

In terms of recruiting, it is important to note that the Swedish procedures for recruitment differ somewhat from those of other countries, particularly the United States. First of all, there is no tenure track system. Instead there is a double career system with one track (tenured lecturers), primarily directed towards teaching, and another track (non-tenured post-doctoral positions for four years and tenured chairs) with research and teaching. Along the first track, lecturers may apply for promotion to professor when they have reached the qualifications to hold a chair. The promotion does not automatically give research time, however. Instead lecturers and promoted professors are supposed to apply for research funding through the different funding bodies mentioned above. It should also be kept in mind that departments are not expected to take an active role in the selection among applicants for academic positions. Appointments are primarily bureaucratic procedures based on the evaluation by external experts.

The trends for the basic research funding has been that the government has moved from a system with very specified direct grants to one in which the direct grants are less specified but decreasing relatively. At the same time, there has been an increase in project grants. This started out in the 1940s as Councils for Research began to arise. In the beginning of the twenty-first century, these research councils were merged into one body, the Swedish Research Council (*Vetenskapsrådet*). In addition to this organisation, there are a number of other bodies financing research as mentioned above. A trend in recent years has been that they all have the ambition to go for larger and longer-term grants through the selection of “Centres of Excellence”, “Strong Research Environments” etc., sometimes requiring concerted efforts by a number of different research groups and the proposal endorsed or even signed by the university management. An issue of conflict in project funding, particularly with private foundations, has concerned overheads.

To sum up, Uppsala University is one of 16 Swedish institutions with university status. It is acting in a system in which academic teaching and research are kept together and in which three fourth of the funding for research is coming from government. An increasing part of these resources is distributed after project applications, especially for Science and Medicine research. Recently, funding bodies have tended to concentrate resources through the provision of larger grants.

## 2.2 Uppsala University in brief

Being the oldest university in Northern Europe, Uppsala University has long traditions and has played an important role in the higher education and research in Sweden. At its foundation in 1477, the teaching of the University was directed towards philosophy, law and theology. Teaching lasted a few decades into the sixteenth century, but ceased for most of the remaining part of the century. In the seventeenth century, donations from the then King, Gustavus (II) Adolphus, provided improved conditions for the University and a renewal occurred, particularly marked by activities in medicine and the natural sciences by professors like Olof Rudbeck. In the early decades of the eighteenth century, the natural sciences became even stronger with subsequently well-known professors such as Torbern Bergman, Anders Celsius and Carl von Linné. In the early nineteenth century, this epoch was followed by an increased emphasis on the humanities, and in the latter part of the century, by expansion in medicine and the natural sciences. In this period, several new institutions were created: the Observatory (1853), the Chemical Laboratories (1859), the Hospital (1867) and the University Building (1887). The number of students was still rather small (1,500 in 1870), and it was not until after Second World War that a real growth was seen. In 1960, the number

of students was 8,000, and in 1970, it was 21,000. Presently, there are 40,000 undergraduate students and 2,500 graduate students. At the same time, the different disciplines in the University have developed considerably and a number of new disciplines have been introduced. It is therefore fair to say in relation to this expansion as well as to the above condensed history of the University that, over its long time of existence, it has been subject to considerable change and renewal. KoF07 should therefore be seen in this historical context. (See further Lindroth, 1976 and Annerstedt). In terms of the present organization of the university, its top management consists of the Vice-Chancellor, the Deputy Vice-Chancellor and the University Director. The first two have been selected involving a collegial process within the University, while the recruitment of the University Director is more of a labour market process. The Government appoints the Vice-Chancellor after a proposal from the University. The Deputy Vice-Chancellor and the University Director, on the other hand, are appointed by the University Board (*Konsistoriet*). The latter presently has a majority of Government-appointed members, eight persons, while faculty members are represented by four, among them the Vice-Chancellor, and the students by three persons. In addition, representatives of the three labour unions have the right to be present and to speak. The chairperson of the board used to be the Vice-Chancellor, but this system was changed in 1998 when the then Social Democratic Government decided to appoint external individuals as chairpersons (see further Engwall, 2007). Since a new Government has taken office in the fall of 2006, universities and university colleges have obtained the freedom to select board members themselves and to have these selections confirmed by the Government. In addition to the Board, the Vice-Chancellor, the Deputy Vice-Chancellor and the University Director, Uppsala University has had three Vice-Rectors for almost ten years. They are elected among peers and have the responsibility for the disciplinary domains of 1. Humanities and Social Sciences (Faculties of Theology, Law, Languages, Arts and Social Sciences), 2. Medicine and Pharmacy, and 3. Science and Technology. In addition, the Dean for Educational Sciences is a member of the top management team of the University. All in all the University contains nine faculties and about 70 departments. They have together about 6,000 employees, of which 500 (8%) are professors and an additional 2,000 (55%) are involved in teaching and research. The total annual budget of the University presently is € 425 million, of which 60% is allocated to research and graduate education. The € 170 million allocated to undergraduate education is spent on delivering an average of 21,000 FTE (*full time student equivalents*) per year within some 35 programmes for beginners, about 45 master programmes, and close to 2,000 single-subject courses. The € 255 million for research and graduate education, in turn, annually results in about 5,000 academic publications and some 400 doctoral exams. In order to stimulate quality in education and research, the University has student exchanges with nearly 500 universities and approximately 3,000 international research collaborations throughout the

world. Uppsala University can thus be said to have long traditions and over the centuries has undergone many transitions and changes. From a small institution primarily focusing on philosophy, theology and law, it is today a multidisciplinary organisation with a considerable number of students and employees. It is producing a substantial number of graduates and research publications through extensive international collaborations.

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## 3. The KoF07 Project

### 3.1 Introduction

The primary goal of KoF07 was to identify strong areas of research and successful research constellations at Uppsala University. Furthermore, it aimed at finding emerging science and identifying opportunities for new research by probing the standing of research at Uppsala University in national and international perspectives. The evaluation was not primarily aiming at comparing different disciplines within the University. The evaluation was set to provide means to strengthen the quality of the scientific activities by offering reliable background material for the decision-making process for future strategic projects. It would also offer departments and faculties support in their own work on formulating plans for future research. Probing renewal and innovation in academic research is generally more difficult than assessing past performance. It is, however, a most important task, not least since numerous retirements of senior researchers are foreseen in the years to come. The results of the assessments of the expert panels on opportunities for renewal are therefore expected to be of vital importance for the strategic planning of research at the departments. It will offer departments and faculties support in their work to continue to encourage, develop and provide backing for good research. There was a wish from the university management for the evaluation not to extend into the fall semester of 2007, which called for both a quick start of the project and a high pace of progress. As can be seen from Figure 3.1, the project started in mid-September 2006 and was given about a year to be accomplished. In the following subsections, the different steps, shown in Figure 3.1, will be described in further detail.

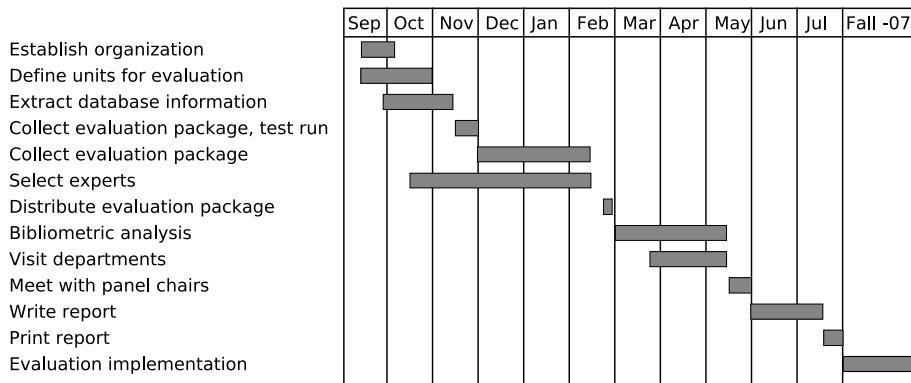


Figure 3.1: Time Schedule

## 3.2 Project organization

### 3.2.1 Project management

As mentioned above, the project was launched by the Board of Uppsala University and the Vice-Chancellor (see Figure 3.2). It was managed by a *project management* team with the following members:

- Project leader: Professor Joseph Nordgren, Department of Physics
- Deputy project leaders: Professor Lars Engwall, Department of Business Studies  
 Professor Anne-Sofie Gräslund, Department of Archeology
- Evaluation office: Mr. Per Andersson, MSc, University Administration  
 Dr. Maivor Sjölund, Unit of Quality Assessment  
 Dr. Marcus Agåker, Department of Physics

The work was monitored by a *reference group* consisting of the heads of the three disciplinary fields (the Vice-Rectors), the Dean of Educational Sciences, the Head of the Unit for Quality Assessment, and a research student representative. The members of this group were:

- Professor Lars Magnusson, Vice-Rector Humanities and Social Sciences  
 Professor Jan-Otto Carlsson, Vice-Rector Technical and Natural Sciences  
 Professor Ulf Pettersson, Vice-Rector Medical and Pharmaceutical Sciences  
 Professor Caroline Liberg, Dean Educational Sciences  
 Associate Professor Annika Lundmark, Head Unit of Quality Assessment  
 Mr. Mattias Wiggberg, Ph.D. student, Department of Information Technology

The project team was supported for the *external panel visit administration* by Academic Conferences (*Akademikonferens*), a joint organization between Uppsala University and the Swedish University of Agricultural Sciences. In addition, the University administration provided research secretaries who accompanied the different expert panels during the visits at the departments.

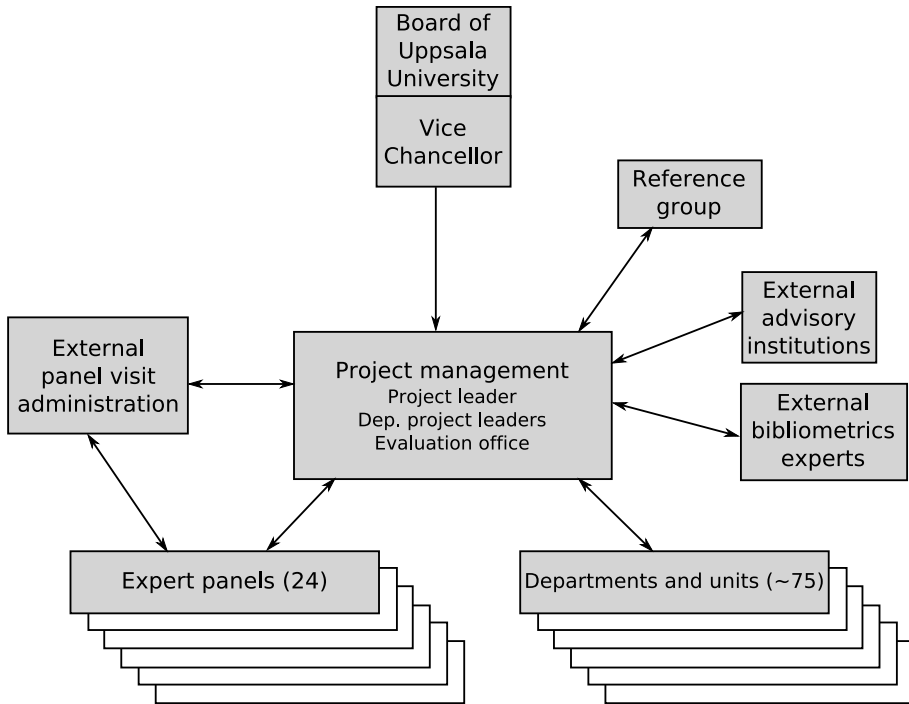


Figure 3.2: Project Organization

*External bibliometrics experts* were engaged to carry out a bibliometric study of Uppsala University research publications in the last five-year period, namely the CWST of Leiden University in the Netherlands. In addition, advice has been sought from *external advisory institutions*. Informal contacts with them have aided in some stages of the project. The experiences from the research assessment at Helsinki University in 2005 have been particularly useful.

The objects of the evaluation have been about 75 *departments and units*. These have been evaluated by 24 *expert panels*. The latter have been recruited internationally but have all contained one Swede in order to provide knowledge about the Swedish system. The size of the panels varied (see further below).

### 3.2.2 Method of evaluation

The main point of the evaluation was conducted in a peer-review process, where distinguished scholars of the international research community were engaged in reviewing the research. As a separate exercise a bibliometric study of research publications for the period 2002-2006 was carried out by external expertise. The peer-review was made by eminent scholars of the international research community who reviewed the departments during a one-week site

visit at Uppsala. In preparation for the visit they studied a written background material provided by the various departments. The background material contained self-assessment documents, facts and figures of department activities, and lists of publications. The extended site visits were considered necessary in order to acquire an in-depth opinion about the status and future plans of the various departments and research groups. The review work was distributed on 24 different expert panels with an average of seven panelists in each panel, in total 176 panelists. 11 panels were assigned to Humanities and Social Sciences, 7 panels to Science and Technology, and 6 panels to Medicine and Pharmacy.

As a separate exercise, a bibliometric study of research publications in the period 2002-2006 was carried out by external expertise. The result of the bibliometric study was not made available to the panels. It was instead the intention to get an independent comparison of the quality ratings as represented by the two different methods. In addition, the trust in the validity and applicability of bibliometry varies between disciplinary areas, which was another argument for separating the two different kinds of evaluation.

Each expert panel had a chairperson who was responsible for the panel work and for the writing of a report summarizing the assessments and conclusions of the panel. Prior to the visit, the panel chairs were asked to give their viewpoints on the tentative schedule of the site visit proposed by the departments. A staff member of the University administration was assigned to each panel as a panel guide to assist in various matters during the site visit. A panel report was written in a format defined by a template, and the main conclusions were presented by the panels to the respective department chairs at an exit interview on the last day.

### 3.2.3 Project portal

The project used an internet portal in order to collect and distribute information to departments and panel experts, as well as providing a means to host an evaluation specific webpage. The portal tool used was Designtech's Project-Coordinator® X [[www.designtech.se](http://www.designtech.se)]. This is a project coordination tool specially developed to handle large projects with many collaborators located at geographically dispersed sites. There are tools for webpage design, document management with version handling, drag and drop features, project planning, calendar, Gantt reports, user grouping, simple e-mailing systems etc. The portal operates through a web based interface where a login page, with the option to have a more extensive public webpage, gives access to a secure environment on a server where documents and other information can be stored and accessed. The secure part of the portal consists of an internal homepage (optional) and a working mode where the different portal tools and document archive can be accessed.

During KoF07 primarily the planning tool, the document management and the web page tool were used. A public webpage provided general information about the project such as a general description of the evaluation process, the time plan and project organization, department division on panels etc. These pages were quite static during the evaluation process and only minor adjustment of this information was made. One page, specifying the panel members, was added once these were selected.

An internal page provided specific information and instructions as well as links to downloadable documents. Here, a progress report was given informing about the status of the evaluation. These pages were subject to changes during the evaluation process to fit the needs of the current stage. The primary changes were made in the transition from the department self evaluation submission phase to the panel member access phase. During the department self evaluation phase, each of the department chairs was assigned a user with the privilege to upload the self evaluation documents to the portal. New versions of the documents submitted at a later stage were handled by the portal's internal version handling system so that it was always the latest version that was available in the archive. The self evaluations were then linked to specific panel pages as they were without editing. In the second phase, panel members were assigned users to access the portal and the self evaluation documents. Other documents like *Terms of reference* and a *Panel report template* were provided on these pages (see further below). Panel chairs could access the working mode of the portal to allow uploading of documents, which was not used to a large extent, though. The other panel members could only access the internal home page and take part of the information provided there and access the documents through the links.

The project portal offered an efficient means to collect and distribute information and documents. It facilitated the work of the panelists in terms of reading background material as this was available from any location with internet access.

### 3.3 Defining units for evaluation

The basic unit for evaluation was a department, as the department is the legal unit in the university organization and thus suitable for handling the various phases of the evaluation process. A formal decision structure is needed, since formulating a condensed written material that describes the research profile of a department may require elements of negotiation as a department comprises several quite independent research groups. In several cases, the research profile of a department turns out to be too scattered in terms of its research profile to make a department unit a suitable choice. Instead, subsections of some departments have been grouped together with other departments or subsections of departments to form suitable clusters of units for evaluation by a certain

expert panel. In other cases where departments are more homogeneous even several departments have been grouped together in a cluster suitable for evaluation by one panel. A number of cross-disciplinary centers without department status have also been evaluated as separate units.

The distribution of departments, parts of departments and centers on the 24 different panels is available in the full report.

## 3.4 Evaluation package

The evaluation was designed to optimize the relation between information value and work load for the departments, and to provide a condensed and informative background material for the panelists prior to the site visits. In particular, it was designed to stimulate a process where faculty at the departments would work together to arrive at a common description of ongoing research at the department, as well as to formulate visions for the future. It is envisaged that this very process in itself would be a beneficial component in the quality development work.

Three sets of documents were prepared and provided to the panelists: (1) a self-assessment exercise; (2) a document presenting a number of quantified quality factors; and (3) a document presenting facts and figures. The forms of these documents can be found in the full report.

### 3.4.1 Document A: Self-assessment

The first document comprised a written description of ongoing research activities and plans and visions for the future, as a self-assessment by the departments. In order to achieve condensed written material, the amount of text was limited in proportion to the number of full time equivalent (FTE) researchers, so that, for instance, a department of 100 FTE researchers could use 36,000 characters in total and list maximum 30 publications that particularly well represented the research described. In addition, the entire publication list was available to the panels through the internal database OPUS.

### 3.4.2 Document B: Quantified quality factors

The second document contained an account for achievements, assignments and other factors that can be assumed to express a degree of quality. Furthermore, these factors are accounted for in terms of frequencies, so that, for instance, the number of plenary talks at international conferences is stated. The detailed lists are not given, but could be asked for by the panels. Even though each individual factor (or indicator) should not be ascribed very high importance, the over-all picture may provide some hints to the quality level of the research at a department.

### 3.4.3 Document C: Departments - facts and figures

The contents of the third document were extracted from the common databases at the university. It offered a brief account of the situation at the departments with respect to staff, research exams, publication rates and economic conditions.

*Number of staff* was given in terms of full time equivalents (FTE) for the categories chair professor, promoted professor, associated professor (*docent*), postdoctoral staff, doctoral student and other personnel. Information about the fraction of research staff was also provided. Total number of employees at the departments was presented as well as average age and percentage of females for the different categories of staff. All figures were given as of September 2006 and for comparison also as of September 2001.

The account for *research exams* concerned Ph.D. and Licentiate exams per year for the periods 1995-2000 and 2001-2006. Fraction of female, age at examination and net study time were also presented.

The *publication rates* at the departments were provided with a division into different categories, i.e. monographs, journal articles, conference proceedings, etc. Figures for the years 2001 to 2006 were presented.

The *economic conditions* of the departments were presented in terms of total revenues, total costs and revenues for a few major categories like undergraduate teaching, direct funding of research and research education, and external funding for research. Figures for 2006 were provided with figures for 2001 for comparison.

### 3.4.4 Terms of reference

The anatomy of the KoF07 research evaluation is described in the *Terms of reference* document (see the full report). It was used as a steering document for the expert panels. The document was supposed to be read together with the documents *Evaluation documents A, B and C* (see the full report) and *Instructions to Departments for the planning of panel site visits* (see the full report).

The *Terms of reference* document gave a background to the evaluation exercise and stated the objectives and described the method adopted. It furthermore presented evaluation criteria and recommended mode of work of the panels. The quality ratings to be used in the document were defined in terms of relative standing with respect to international standard, and recommended ratings were *Top quality or world leading; Internationally high standard; Internationally recognized standard; Acceptable standard*. The application of the quality ratings was to a high degree based on the knowledge and definitions of international standings of the panel experts, as they were experienced evaluators at the international level. As the main objective of the evaluation was to identify strong research and interesting opportunities for renewal, it was not mandatory to grade all research, although the panels were asked to

comment on actions for development. They were asked to address activities with clear potential for improvement. As the unit of evaluation was department rather than individuals, the panels were asked to qualify the extent of activities in the respective rating.

The document also described the working arrangements of the expert panels, the particular responsibilities of the chair and other matters of importance for the evaluation task.

### 3.4.5 Panel report template

A template for the individual panel reports was provided in order to achieve a sufficient degree of conformity between the different panel reports, and to make sure that the most important set of questions was addressed by the panels (see the full report). The items that the panels were asked to comment on were:

- General assessment of the department/unit
- Quality of research
- Research environment and infrastructure
- Networks and collaborations
- Opportunities for renewal and emerging science
- Actions for successful development
- Other issues

The panels were also asked to comment on other issues that they considered of importance for the quality work at the University.

## 3.5 Selecting experts

The strategy for the recruitment of the expert panels was to have a number of all-international panelists complemented with one member from another Swedish university than Uppsala, preferably from a research field adjacent to the central field of the panel. The panel chair should be a very well recognized generalist researcher with high degree of integrity and experience.

The assignment of expert evaluators for academic research is a delicate task in the sense that panelists should have a high degree of competence and skills along with integrity, and trust by the researchers to be evaluated. Therefore, the procedure to select experts needed support among faculty members and still resist claims of challenging issues. The method adopted worked through invitations from deans to departments to nominate evaluators according to a search profile. The nominees were screened by the project management with respect to challenge issues, and in only a few cases, nominees were found to be disqualified due to too close associations. A document defining the specified requirements for scholars to be nominated is found in the full report.

To cover the various research directions and special fields represented by the departments and groups assigned to a particular expert panel between 5

and 11 panelists were engaged in each of the 24 different panels. In total, there were 176 panelists engaged in the evaluation. The time schedule for the evaluation project required that experts be assigned only a few months before the site visits. The over-all acceptance rate for invited panelists was 47% and for panel chairs 35%. Variations between panels were considerable. For one panel all the original candidates accepted, while another one had only an acceptance rate of 30%. The rate decreased with time to the approaching site visits. It can be noted that the acceptance rate for women was lower in the case of chair assignment and as Swedish panelist. The selected panel experts are presented in the full report.

### 3.6 Site visits

In order to assess strengths and weaknesses, and in particular potential strengths and weaknesses, it was considered a vital ingredient in the evaluation to allow panel experts to devote enough time to department visits. Therefore, an extended site visit was planned, also since it was planned for the panels to write their report during the visit. In general, the panels submitted a draft report before leaving, and the final report was delivered two weeks after the visit.

Each of the 24 different expert panels paid a one-week visit to Uppsala University, with five working days except the arrival day (see the full report). The visits were organized in three different work weeks, March 26-30, April 23-27, and May 7-11. A preparatory meeting with the panel chairs and the Swedish panelists was held on the evening of the arrival day, Sunday, before a reception dinner with all panelists. This meeting allowed the evaluation management to introduce the chairs to their role as leaders in the evaluation process, as well as to offer the chairs a possibility to ask questions and to be updated on new information.

For the panel members, the site visit started on Monday morning with an introduction to the evaluation process and a guided tour of the University Museum in Gustavianum. After lunch, presentations of the faculties were given by the deans, and the panels were given time to plan their visits during the week. At this internal meeting of the panels, the panel guide from the university administration was present.

Tuesday, Wednesday and Thursday were devoted to department visits and internal panel meetings. After 3 p.m. the panels held internal meetings at a department or at the hotel. The detailed time schedules for department visits were worked out by the departments in communication with the respective panel chair.

The last day of the visit included a final internal meeting of the panel to finish the draft of the panel report. In the last part of the meeting, department chairs and deans were invited to an exit interview, where the panel chair gave

a summary of the findings, conclusions and recommendations of the panel. The site visit was concluded after a common lunch with deans and chairs.

### 3.7 Meeting with panel chairs

A separate meeting with all the panel chairs was organized immediately after the last week of site visits. The meeting was held at a conference facility in the small town of Sigtuna between Uppsala and Stockholm. The University management was invited to this meeting as well as the faculty and section deans. The objective was to bring up issues of multi-disciplinary and cross-faculty nature that might not have been attended to in a satisfactory way and also to offer a further opportunity for the deans to discuss with the panel chairs about matters relevant to their respective areas.

### 3.8 Bibliometric study

As a separate part of the research evaluation, a bibliometric study of research publications from Uppsala University in the period 2002-2006 was undertaken. The study was carried out by external expertise, the CWTS at Leiden University. The expert panels were not provided with the results of this study, and in fact the study was mainly conducted after the submission of the panel reports.

The separation of the bibliometric exercise from the peer-review evaluation was deliberately chosen in order not to bias the assessment work of the panels. Furthermore, the validity of bibliometry is varying among the different disciplinary areas of research, owing to the varying publication traditions. In this discussion there is no disagreement that the output of publications constitutes a reasonable measure of performance. The differences in points of view concern the channels for publications, and how these differences should be handled. While journal articles in English constitute the main form of publication in the natural science and medicine, articles and books in other languages than English are a common form of dissemination of ideas among scholars in the humanities and in several fields of the social sciences.

Particularly for science and medicine, the significance of journal publication has increased successively since the 1950s through the development of bibliometrics, which has implied that journal impact is constantly evaluated through the citation behaviour of scholars. This in turn has implied that bibliometrics are used to evaluate individual scholars and research groups, and it has also become a key element in various rankings of universities that are becoming more common.

The results of the bibliometric study are presented in the full report.



**Part II:**

**Summary of the results**



## 4. Expert panel evaluation

In the following a summary of the results of the evaluation is presented. It has to be underscored that this summary by necessity cannot express the views of the evaluating panels in full. Although the authors have tried their best to make short, representative summaries, the manner in which pieces of information from the panel reports have been selected may still contribute somewhat to the overall impression. It is therefore very important to go to the panel reports for the full picture. The panel reports are presented in the full report.

### 4.1 General observations

#### 4.1.1 Introduction

The main charge to the panels was to identify strong research and opportunities for renewal, and to a high degree, they have delivered the information sought after. They find more than 50 research activities that they give the highest quality rating. These are found in over 20 departments distributed over the three disciplinary areas, Humanities and Social Sciences (HS below), Science and Technology (ST below), and Medicine and Pharmacy (MP below). A few departments as a whole are mentioned to perform at a level no less than *Internationally high standard*. The number of cases when panels discuss research activities or groups mentioning *Internationally high standard* approaches 100. Furthermore, some panels judge research to be of very high quality without explicitly using the recommended quality ratings. The rating *Internationally recognized standard* is found at approximately the same frequency throughout the panel reports. Mentioning of research of *Acceptable standard* is found less abundantly, and in rare cases the panels discuss activities that are assessed not be quite up to acceptable standard. It should be reiterated here that the main task of the panels was not to grade all research, but to identify particularly strong research, emerging science and opportunities for renewal.

It has to be noted that the panel reports vary in terms of the attitude of the panels towards grading the evaluated departments. Some are very clear on giving grades to departments and research groups, while others provide more general assessments. A few panels within the Humanities and the Social Sciences have been particularly hesitant to use grades, and have found difficulties in applying the recommended quality ratings. As pointed out by one panel in the Humanities:

The proposed expressions for the quality rating of originality and significance given in the document ‘Terms of reference for expert panels’ are not particularly well suited for the assessment regarding the disciplines [covered by our panel]. This goes particularly for the category mentioning ‘world-leading research’. (HS Panel)

Panels in the Humanities consider too much to be published in Swedish and encourage transfer to international and even electronic publishing. For instance:

We found a rather high degree of internal publishing to be the custom in many units. While we do not wish to dispute the relative, and in some cases absolute, merit of in-house (i.e. Uppsala University) series and journals, we do think that it would be good policy to encourage a higher degree of internationally competitive publication with outside publishers. (HS panel)

It is no doubt imperative to keep the national language in constant use in academic writing, to ensure a state-of-the-art level for Swedish terminology in the disciplines involved. But a great deal of scholarly and scientific findings needs to reach the larger international scholarly community. Reasons for this cut both ways, i.e., they demand controllability and they demand diffusion. It seems to the panel that parts of Uppsala University have not adopted concerted measures to ensure or even encourage the use of more widely spread languages in presenting its scholarship to the world. Procedures for stimulating publication in non-Swedish languages seem to vary from unit to unit. (HS Panel)

In the introductory presentations before the site visits, the task of identifying strong research was sometimes described in terms of finding “golden nuggets”. In some cases panels have explicitly mentioned “golden nuggets” in their reports, and it is then often a combined assessment of high quality, potential for successful development, and even other aspects, such as niche-like conditions.

The panels paid considerable attention to the renewal aspect of the evaluation. They are well aware of the almost ubiquitous, age-heavy demographic profile, and they often choose to see this as an opportunity for renewal. Thus, in many cases they suggest that upcoming retirements be used to strengthen existing efforts or to redirect research. Also, the panel reports often discuss structural conditions and their implications for development of successful research. For some departments, there are frequent mentioning of words like sub-critical size and fragmentation in this context as well as a need for more collaboration and lack of strategic planning of research. In a number of cases the panels address questions regarding career opportunities and tenure track; incentives for course development; distribution of teaching load. One panel points out:

The very high teaching load of the tenured personnel should be lowered. Such teaching load must be among the highest in the world. We suggest that the teaching load should never exceed 67% on the average for all tenured researchers [...] When the output or production is nevertheless high, we suppose that many researchers are adding substantial personal free time to their paid job. (HS panel)

Some panels submitted their reports before their departure from Uppsala, although most used the option to get another two weeks for additional editing. Each department was given an opportunity to comment on its report, and this led to minor revisions with respect to factual errors or misunderstandings.

Not astonishingly, the reports vary in their characteristics. They vary in size and in terms of contents. As far as the size is concerned, the average report contained 33,300 characters, the shortest 11,300 characters and the longest 77,800 characters. Averages vary somewhat between the areas of research: 31,500 for the Humanities and Social Sciences, 35,100 for Medicine and Pharmacy and 38,600 for Science and Technology. To a limited extent the length of the reports correlates with the size of the evaluated groups.

Discussions with panel members revealed some difficulties on their part to understand the institutional setting of the Swedish system, particularly the procedures for recruitment and funding. This was reinforced by the fact that translations of titles vary among and even within departments. The panel reports reveal a number of critical remarks on conditions governing the university system as they appear at Uppsala University, although they are likely to be relevant also for other universities in Sweden. These will of course provide important information for the relevant research groups and their leaders in the university hierarchy. In the following, a number of remarks of a general character are brought up to illustrate this discussion. They can be divided into three groups.

- Recruiting
- Funding
- Organizing

#### 4.1.2 Recruiting

A common theme dominating the reports is a concern regarding the possibilities to recruit a new generation of well-qualified scholars. Many panels have noted that Uppsala University is facing a *change of generations*:

The demographic profile presents a problem in that many of the most significant researchers will retire within the next few years. (HS Panel)

The leading professor plays a dominant role in the management of the group. This is a risk. Given that he is to retire shortly, a succession plan is needed to assure the continuation and the strategic development of the group. (MP Panel)

A few exceptions to this state of affairs can be mentioned, however:

The staff is well balanced with respect to age, experience and research interests [...] The work of senior scholars is well complemented by the work of young devoted researchers. (HS panel)

The age distribution of the scientists is well balanced between senior expertise, driving mid-career persons and young promising talents to develop. (ST Panel)

Many of the panels that point out *the need to recruit successors* to the retired researchers stress the need to plan for this transition. They recommend the University to be very proactive in this process:

Plans for long term renewal beyond the next five years need to be developed. (HS Panel)

this opportunity requires strategic, rather than uncoordinated, hiring and a critical analysis [...]. (ST Panel)

The panel recommends that retirements should be anticipated well ahead of the time of retirement, such that a successor in the same or different research area (according to the department's strategy) may be able to take office even before the retirement of his colleague. (ST Panel)

These points are well grounded but their implementation may be in conflict with present rules of the Swedish recruitment system, which implies that openings should be broadly defined, and departments should not be involved in the selection process. This circumstance is acknowledged by one of the panels in the following way:

The attitude to a strategy beyond this transitional period seems fairly laidback, perhaps due to a combination of structural peculiarities: One [...] being the *lack of control over important input factors* connected to funding and systematic recruitment from below. (HS Panel)

In the same spirit a number of panels have offered critical comments on the Swedish academic career system:

The career system should be developed. The double career tracks, especially the positions primarily for teaching should be reconsidered (HS Panel)

The introduction of promoted professors has generated a series of difficulties [...] that will gradually reduce the competitiveness of Swedish research. (ST Panel)

the doctoral students were worried about their long-term academic prospects after completing their doctoral studies. [...] The panel shares this concern (HS Panel)

A particular concern of the panellists is *the limited research time for faculty members*:

Few in permanent positions at the UU have research as part of their obligation (or right). Hence, research activity at UU of Uppsala [sic!] is vulnerable depending on few chair positions. (HS Panel)

To raise the level and the scope of research the teaching load (usually a high 80% among tenured personnel) should be lowered. (HS Panel)

Lectureships with very high teaching load are too common in the Swedish system. (ST Panel)

The panels also point out the negative effects of *the low mobility* in the Swedish academic system:

The lack of competition about the research positions, on the one hand, and the lack of mobility, on the other hand, inevitably result in a risk of moderate quality of research in the long run. This also impedes critical thinking and renewal. (HS Panel)

The panel was a little disturbed by what they perceived as a tendency towards internal appointments for chairs and emphasises that dynamic new blood is a key to making the most of the potential clearly available in Uppsala. (ST Panel)

All in all, panels are thus concerned about the possibilities for Uppsala University to manage its renewal. They stress that the University faces a drastic transition period with a large number of retirements. The University is recommended to consider this an opportunity for renewal by careful recruitment

planning for the next decade. The implementation of this piece of advice may require creative thinking of the University leadership, but above all, changes in the whole system for recruitment and promotion in Swedish universities and university colleges. The critical remarks by panels regarding the existence of double career tracks, heavy teaching loads and inbreeding make such changes very urgent.

### 4.1.3 Funding

The comment by one of the panels cited above pointing to the negative effects of “*lack of control over important input factors*” applies to the funding of research as well. A major problem in this context, closely linked to the system of double career tracks, is the *separation of funding between teaching and research*. The panels are critical towards this arrangement and suggest a pooling of resources:

Budget rules allow, and according to our informants, makes necessary to separate teaching and research. For an active research-based university this is a serious obstacle and the university leadership should eliminate such separation wherever possible. To strengthen academic leadership and to create more dynamic autonomous units at the university, the different units should get a lump sum funding according to well defined criteria. The allocation of resources to different activities should be delegated to the basic units. (HS Panel)

The department should pool its faculty funding for education and research. This will make it easier to lighten the teaching load for the young faculty and to leave them more time for research. (ST Panel)

Presently, such an arrangement is not consistent with the rules. Information from the Government-appointed expert working on the future resource allocation system seems to indicate that these rules may be changed in the future. The university should therefore be prepared to handle such a significant change in the allocation of resources.

A related comment from one of the HS panels concerns *the instability of research funding*. In their view thus:

A sufficient part of the *funding should be basic, long-term and stable*, making a predictable recruitment policy possible. This goes for an extended number of doctoral students, particularly in those areas where this recruitment base is quite narrow, and also for an extended range of post-doctoral fellowships for the most promising candidates. Such a policy requires a more long-term strategy for the future profile and development of the department. (HS Panel)

Likewise, a panel in the science and technology domain underlines the lack of internal resources for research:

Most division heads (chair professors) expressed concerns about insufficient funding through the faculty, thus confirming the impression of the panel. Increasing it is on one hand considered necessary to safeguard continuity and on the other to pursue projects in basic research. (ST Panel)

It is also pointed out by one of the HS panels that the present system with a significant role for external funding takes considerable time from research as well as pushes researchers into areas, which are fashionable, rather than stimulating them to pursue long-term research programs:

There is another danger combined in the preoccupation with renewal. It is a fact that large parts of the young scholars permanently have to apply for grants and subsidies – thereby losing much time for research. This can entail the consequence that some of the *alleged innovations follow short-living fashions which fit the desires of funding institutions more than the development [research]*. (HS Panel)

Another HS panel, however, is more positive towards the external grants and proposes the university to develop a system with matching funding:

UU should consider introducing an incentive structure recognizing and awarding attainment of external funding of research. A system of matching funding should also be considered (this is often a requirement by external funding agencies). (HS Panel)

In the same spirit two panels suggest that the University revise its system for charging *overhead costs* in order to avoid or reduce negative effects:

All the *departments suffer from great overhead-costs* for the funds they raise from outside. On the one hand there is a push for more applications for money, on the other hand the benefits of this time-consuming communicative work are endangered by too heavy “university taxations”. While it is obvious that the University charges an overhead for the external grants, the current system does not appear to treat departments quite fairly. It would be advisable for the University to develop a policy of charging overheads that would be fair and benefit both the University and its departments receiving external grants. (HS Panel)

Overhead money should have a more specific return route, which would make overheads less obtrusive, especially for groups that pay more overheads than they receive research funds from the faculty. This should be rewarded in some kind by the university, e.g. by more faculty funds for basic research. (ST Panel)

One panel even points out that the present system for resource allocation have led to sub-optimization:

The highly distributed funding model used at UU results in suboptimal performance. [...] the panel has observed that the completely decentralized funding system applied by Uppsala University has a large number of adverse effects. Perhaps the most visible of these is the obsessive preoccupation of most faculty members with the effect of any of their decisions on their budget and the sometimes perverse or conservative strategies that they develop to keep the budget they presently have. (ST Panel)

A panel in medicine went even further stating that the present system for resource allocation is unjust:

The panel discussed the Faculty's funding model that implies that groups are dependent, among others, on the impact of journals in which papers are published. This system is unjust and not motivating for certain areas and indeed under discussion. (MP Panel)

In conclusion, panels thus point out problems in the Swedish funding system and plead for more stable and long-term funding for research. They also comment on problems associated with external funding and the possibilities for the University to reflect over its resource allocation procedures. In that context, improper use of bibliometrics has been questioned by some panels.

#### 4.1.4 Organizing

Like in many other evaluations, the panels of KoF07 have a number of comments on the organizing of research. A particularly common comment in the reports has been that *research units are too small* and that they lack critical mass. This is true for the panels for all three research areas of the University:

While the research is of high international quality and concentrates on central [...] issues, the groups are pretty small. (HS Panel)

important to maintain a critical mass of highly qualified research talent necessary to fulfil future research ambitions. (HS Panel)

We detected a number of “one-man shows”, i.e. scientific topics in highly competitive fields treated by a single researcher or a very small group, often not well integrated in the main activities of the division/department. (ST Panel)

All the units are small and none of them achieves a critical mass, which is particularly important for an inherently multidisciplinary field. (ST Panel)

As one participant put it, ‘this is a group of researchers rather than a research group’. One has difficulty finding the synergy within the department. (MP Panel)

In relation to this issue, several panels, more frequently in the field of science and technology, stress the need to *increase collaboration* with colleagues at other Swedish academic institutions:

Extended collaboration [...] with the other leading groups [...] would allow further improvement of the quality of the group. (ST Panel)

The Department should strengthen collaboration with other Swedish universities and research institutes. This is particularly important for those groups that lack critical mass and for sub-disciplines in which international-level expertise exists outside the Uppsala University. (ST Panel)

Traditionally, individual action has been much praised. Today, attention must also be praised to academic collaboration and research leadership, creating important informal structures within the departments. (HS panel)

The university must find mechanisms for transfaculty cooperation, facilitate and encourage departments to take advantage of teaching resources from other departments at other faculties. It should furthermore encourage and facilitate the creation and running of multi- and cross-disciplinary centers common to more than one faculty. (ST Panel)

In the same spirit *efforts for internationalisation* are suggested:

There is unrealised potential for bringing in overseas researchers with their own financial support. This may in the long term improve international networks and thus serve as a good basis for future international research projects. (ST Panel)

Finally, we would encourage the departments to engage internationally to an even further extent, including action at the European level (in particular the EU countries) [...]. EU funding is no doubt a raising factor. (HS panel)

International collaboration appears to be opportunistic rather than strategic. [...] The group could benefit from a strategic approach that includes visiting professors, and post doctoral studies in other countries. (MP Panel)

In order to achieve more focus and critical mass, some panels in medicine and pharmacy ask for *stronger academic leadership*:

Strong leadership is essential to ensure change. The panel felt strongly that the arrangements should be re-examined so that the Dean has funds and authority to implement change. (MP Panel)

there is a tendency to want to set up their own research group often based on reactive funding. Strategic leadership is therefore of great importance. (MP Panel)

Others point to the need to create a *consistency between informal and formal structures*:

[A structural peculiarity is] the *discrepancy between symbolic and formal leadership* (HS Panel)

It is important that one creates consistency between the informal and formal bodies within the Department. (ST Panel)

All in all, the comments boil down to a plead for *more strategic thinking*:

The strategy for future research orientation has to be developed including a prioritisation of topics and showing the possible synergies between the divisions. (ST Panel)

Our view was that the Faculty should engage in a strategic review, not only of research, but also of structure and funding mechanisms, so that means could be found across the faculty for significant investment in areas perhaps not connected to a single department. (MP Panel)

Some panels also explicitly point out the lack of such thinking presently:

The attitude to a strategy beyond this transitional period seems fairly laidback (HS Panel)

The panel is concerned about the lack of a long-term strategy and an action-plan regarding research areas to be covered in the future, research priorities, ways of responding to the European and international demands, etc. (HS Panel)

The groups' plans for the next 5-10 years often felt like 'more of the same elsewhere' rather than building an innovative research line based on past and present strengths. (MP Panel)

One of the HS panels, however, does not limit its comments to the governance of departments but has also two comments on the University as a whole:

The UU does not appear to have a culture of keeping track of its resources and their uses, nor of the outputs. This is an obstacle to effective planning and strategic change. (HS Panel)

The organising of the research in research groups promotes collaborative research efforts and interdisciplinary research. To avoid introducing a fourth administrative level at the university, UU should consider abolishing departments as an organising unit for research. Educational programmes could be organised at the faculty level. (HS Panel)

In terms of organizing the research, many panels thus point to the need to create larger units inside the University in order to achieve critical mass. They mention several examples of groups that are too small or individuals who are mainly working by themselves. It is therefore suggested that collaboration within departments is reinforced but also that the Uppsala scholars increase their joint work with colleagues in Sweden and throughout the world.

#### 4.1.5 Conclusions on general observations

In reading the panel reports, a great deal of valuable information has been disseminated in the University. It is true for individual scholars, research group leaders, department heads, deans and the University leadership. Needless to say, a considerable part of this information concerns the lower levels of the University. However, as shown above, there are also a number of comments that has to be taken seriously also at higher levels, as a matter of fact even by policy makers. It is evident that the panellists have found peculiarities in the Swedish system both regarding recruiting and regarding funding. They therefore suggest changes to be made. Inside the University, they plead for a more long-term perspective with a stronger focus on strategic choices regarding future research directions. Needless to say a change in that direction would be facilitated by changes in the systems for recruitment and funding.

## 4.2 Humanities and Social Sciences

The disciplinary area of Humanities and Social Sciences at Uppsala University consists of five faculties: Arts, Languages, Theology, Social Sciences and Law. In addition there is a separate faculty of Educational Sciences. The panels found that the research level and the level of productivity of the departments of these six faculties are generally quite impressive. Comments regarding research environment and infrastructure were often positive.

### 4.2.1 Arts

The Faculty of Arts basically consists of two parts: Aesthetic-Philosophical disciplines and Historical-Philosophical disciplines. It also hosts three interdisciplinary units: Centre for Gender Research, Centre for Multiethnic Research and the Programme for Holocaust and Genocide Studies. The first mentioned group of disciplines and the Centre for Gender Research was evaluated by panel 8, and the second group and the other two special units by panel 9 with the exception of the division of Egyptology that were evaluated by panel 7.

#### **Aesthetic-Philosophical Disciplines**

##### *Department of Philosophy*

The department consists of three divisions, Ethics and Social Philosophy, Logic and metaphysics and Aesthetics. The researchers of the department are divided into five research groups: 1) Philosophy of language, 2) History of philosophy, 3) Philosophy of science, 4) Practical philosophy and 5) Aesthetics. Panel 8 considered the general features of the research to be a concentration on central philosophical issues, ambitious international publishing policy, extensive international research networks, and interest in interdisciplinary research cooperation. The research was classified as being of high international quality, especially in groups 2 and 4. As renewal projects, the panel pointed to “Understanding Agency: Conceptions of Actions”, “Human Nature and Value in Western Tradition”, “Questions of Continuity in Wittgenstein’s Thought” and “Philosophical Aspects of String Theory”. It pointed to the possibility to essentially improve the research capacity through a new position in the philosophy of mind as well as new post doc research positions.

##### *Department of Art History*

Panel 8 considered the research in the department as active and diversified. It found medieval art studies especially strong and at an international level. Renewal is already taking place, i.a. through the projects “Art and society”, “Art and ideology” and “Art and identity”. In addition there are very promising cross-periodical studies. The international networking, however, according to the panel could be more consciously planned and elaborated. More academic

capacity is needed, particularly junior faculty number and number of Ph.D. students.

#### *Department of Literature*

Panel 8 found the Department of Literature to be a rich intellectual environment. Its spread of research was considered impressive, as the volume of published output. The department does, however, seem slightly hesitant to define itself very actively along lines that would render its research profile more visible to the outside world. The panel recommends that the department moves more proactively, creating teams rather than projects on the individual level to get a synergy effect. Sociology of literature and rhetoric are two valuable additions to the department's profile. The panel hopes that a chair of rhetoric will be created in order to stabilize this area as a research field in Uppsala.

#### *Department of Musicology*

The Department of Musicology, according to panel 8, puts special emphasis on historical awareness and reflexivity, while at the same time it upholds a dedication to researching music in a contemporary perspective, thus following leading international levels of theoretical and methodological concerns. The research is of high international standard, especially strong on 17<sup>th</sup> century music (the Düben collection) through the use of computer techniques. The panel finds that this activity could become a growing centre of a very fruitful cooperation between scholars. Concerning renewal, it is obvious to the panel that 20<sup>th</sup> century music should be given attention. The possibility for increasing the international impact of the department further is at hand due to shift in staff.

### **Historical-Philosophical Disciplines**

#### *Department of ALM*

The department of ALM (Archive Science, Library and Information Science and Museum and Cultural Heritage Studies) is young and in a rapid phase of expansion, especially due to Library and Information Science. The research effort is, according to panel 9, still very small and the amount of available resources is below a critical size, but research activities are expanding. The quality is good. At present, the biggest need is research within digital media and bibliometrics. Due to the humanistic approach of the department, the panel also finds it important that metatheoretical issues concerning the ALM disciplines be considered.

#### *Department of Archaeology and Ancient History*

The Department of Archaeology and Ancient History consists of four sub-disciplines with different research traditions and aims: Archaeology, Classical archaeology and ancient history, Egyptology and African and comparative archaeology. GIS and landscape perspectives, questions concerning mentality

and religion are common interests, and panel 9 therefore recommends more collaboration between the sub-disciplines. It also points out that the recruitment of younger scholars is necessary, since most of the staff is close to sixty. Both African archaeology and Egyptology are considered to need one more academic teacher.

*Archaeology (North-European):* Panel 9 points out that Nordic Archaeology has been traditionally very strong in Uppsala, in particular in Late Iron Age-Viking Age, but also other periods. The sub-field has been strong in formulating interesting research perspectives with historical implications and is also one of the archaeology departments in Scandinavia that has made the most use of textual material. An MA program in laboratory archaeology and GIS and landscape perspectives is being run in collaboration with Stockholm University. The panel found the research to be of internationally recognized standard to internationally high standard.

*Classical Archaeology and Ancient History:* The panel has noted that many different individual research projects ranging from Bronze Age to Late Antiquity are being carried out. Ancient history is in part heavily integrated in Classical archaeology. The research is considered to be of internationally recognized standard to internationally high standard.

*African and Comparative Archaeology:* This subfield of archaeology, panel 9 points out, has been supported by substantial external funding over many years. As a result, it has been possible to start a completely new direction which has wide-reaching contacts and important ramifications both within Uppsala and abroad. The significant GIS profile of the department stems from this branch of archaeology. The Ph.D. students, both Africans, Swedes and others, have had considerable success. According to the panel, the research is of top-quality, world-leading.

*Egyptology:* Panel 7 observes that the output in publications consists of numerous articles and book reviews and a remarkably high number of doctoral dissertations. The publications are generally of internationally recognized standard, if not high standard. Some should be considered top-quality. Some members of the unit would prefer to be located among the philologists. There is a certain lack of focus as to research areas, which may be due to the fact that the personnel are too limited in number.

#### *Department of History*

Panel 9 states that history has a long and glorious tradition at Uppsala University, which is a source of pride for the department. But it is also a history of continuous change. Today the department represents a generalist ideal in contrast to the former heavy specializations. The panel finds the so-called base groups joining researchers of all levels with common interest commendable. The research is of internationally recognized to high standard. The intention to increase post-doc positions when the number of Ph.D. students decreases is

likely to lead to a reorientation of ongoing research, but no policy for renewal has been documented.

#### *Department of History of Science and Ideas*

History of Science and Ideas, panel 9 points out, is a young discipline, which has become one of the most attractive ones in the humanities. There are groups of scholars discussing history of science, history of medicine, history of philosophy, history of political ideas but also media research and studies in technology and science. Since the time of Sten Lindroth, scholars from this department have become prominent in Swedish culture. The research activities are generally of an internationally recognized standard, some of it comes close to the highest level. The new Chair professor of History of Science is trained as a physicist as well as a historian; he will be able to considerably renew the science history parts of the research program. The department should be supported with one or two more positions as assistant professors.

#### *Department of Cultural Anthropology and Ethnology*

The Department of Cultural Anthropology and Ethnology consists of two divisions, former independent departments. According to panel 9, there is a common interest in questions about changing identities and multiculturalism. In the studies undertaken, there is a repeated return to conflict, exclusion and vulnerability. The ambition is an applied anthropology/ethnology with an impact on social practice at the local level. The panel found the quality of research to be of an internationally recognized standard, some of it of high international standard.

In the division of Cultural anthropology research has been undertaken in Africa, Asia South and North America and the Saami area. All in all the Uppsala anthropologists have, in the view of the panel, produced noteworthy and innovative scholarship. Research into Saami reindeer pastoralism has developed into research in political ecology.

In the division of Ethnology, the research in particular concerns new modes of urbanism and multiculturalism with transnational connections as well as research on children, youth and women conducted in collaboration with local authorities. The panel found a strong and innovative theoretical foundation, especially in gender studies and studies of late modern urban societies.

### **Interdisciplinary Units**

#### *Centre for Gender Research*

The Centre for Gender Research, in its current form established in 2003, is by panel 8 characterized as a dynamic, supportive and very good work and research environment. It is interdisciplinary and should include social as well as biological perspectives on gender. The research is of international standard in the eyes of the panel. The research topics are of international interest and of high relevance scientifically as well as from a societal perspective. Currently

too much is published only in Swedish, but the role as an interdisciplinary meeting point will lead to internationalizing the publishing profile. The opportunities for renewal appear excellent. The new excellence funding enables targeted hiring of Ph.D.-students and post-doctoral researchers. The centre could, according to the panel, get a more active role by collecting and making available a continuously updated database of on-going gender research and gender expertise at Uppsala University.

*Centre for Multiethnic Research & the Programme for Holocaust and Genocide Studies*

The additional two separate units are research units, but they also contribute to the teaching in several departments. Panel 9 stated that the quality of the research activity certainly meets internationally recognized standard. Much of the research on the Balkans seems very innovative. The research on multiculturalism in Sweden has also been highly regarded and much needed from a national perspective. The individual scholars are active in international and national networks and are often requested by the media to comment on important ethnic and political matters.

#### 4.2.2 Languages

After mergers between departments, the Faculty of Languages presently consists of four departments: English, Linguistics and Philology, Modern Languages, and Scandinavian Languages. They were evaluated by panels 6 and 7. On the whole the panels found university infrastructure to be adequate, even good to excellent.

##### **Department of English**

The Department of English contains divisions of English Literature, American Studies, English Linguistics and of Celtic Studies. The first three were evaluated by panel 6 and the last one by panel 7. They found as a general problem that important posts are vacant or are in the process of being filled.

*English Literature*

Panel 6 found that the strengths of the unit for English Literature are to be found in two areas: the Renaissance and Early Modern period and the early 20<sup>th</sup> century. Much of the work is of internationally recognized standard. Concerning renewal, much will depend on the new Chair professor, probably there will be an increased use of computer analysis and a possible turn toward ecocriticism.

*American Studies*

According to panel 6, the unit for American Studies is a unit with a distinctive identity and pioneering new methodologies. It comprises two sub-units,

American Literature and SINAS, the study of American history and society. Much of the work is of an internationally recognized standard, some of it coming up to high international standard. The panel emphasises that Uppsala has the only Chair of American Literature in Sweden. The dual emphasis on literature/culture and recent history has led to collaborative research and publications. Computer based research of questions of authorship as related to developments in society and promising research into verbal-visual phenomena are pointed out as lines of renewal.

#### *English Linguistics*

The work in the unit of English Linguistics is by panel 6 generally considered to be of internationally recognized standard. According to the panel, the work in English historical linguistics at Uppsala University is even outstanding and well-known internationally. Researchers from this sub-unit are involved in a number of forthcoming innovative projects.

#### *Celtic Studies*

Given the resources available, panel 7 considers the research of the unit of Celtic Studies impressive, of internationally high standard. Good use has been made of the Erasmus and Socrates networks: Swedish students have studied in the Celtic countries and Irish students have come to Uppsala. Renewal is possible only if the staffing situation changes for the better.

### **Department of Linguistics and Philology**

The Department of Linguistics and Philology includes divisions of Turkic and Iranian Languages, General Linguistics and Computational Linguistics, Latin, Greek and Byzantine Studies, Indology and Comparative Indo-European Studies, Assyriology, Semitic Languages. The Department was evaluated by panels 6 and 7.

#### *Turkic and Iranian Languages*

In the view of panel 6, it is a fortunate position that both Iranian and Turkic languages are included in the division, with the result of a fruitful cooperation. The research on Balochi, Karaim and typology of the Turkic languages is specially emphasized by the panel. It is considered of internationally high standard, which is also said about the studies on Nogay. Language documentation, especially when it comes to endangered languages, is seen as an important part of an activity that seems very promising. The diversified high-quality research activities within Turkology give this division the potential of becoming one of Europe's leading centres of Turkic studies. However, in order to attain this goal, the panel points out, the cultural aspects of Turkic studies should be strengthened by research in Turkish or Turkic literature.

### *General Linguistics*

The division of General Linguistics is by the panel 6 characterized by the combination of typological studies and studies of language acquisition with reference to corpora. Much of the research is of an internationally recognized standard, some of it, especially in lexicology and typology, reaches a high international standard. A mix of older and younger researchers provides a good research environment. The planned research on Specific Language Impairment in collaboration with the Department of Speech and Language Pathology at the Faculty of Medicine is considered a promising area of new research. A new psycholinguistics laboratory is found to be needed for this research.

### *Computational Linguistics*

The division of Computational Linguistics, panel 6 states, builds on the long-term experience of research in computational linguistics and natural language processing at Uppsala University but enriches it with up-to-date methodology and trends. The work of senior scholars is well complemented by the work of young devoted researchers. The research is graded as top quality, world leading. The strongest points are automatic syntactic analysis, advanced methodology in machine-translation research and corpus-based research for applied purposes like machine translation, e-learning and automatic language understanding. There is a high potential for future development and activities. The division has an extensive international network of collaboration. The most promising new research direction is connected with the plans for a Linnaeus Grant project, which aims at establishing a strong research environment where computational linguistics, general linguistics and individual languages will cooperate interdisciplinary for the whole faculty. This project is highly recommended by the panel.

### *Latin*

Panel 7 found that the research in the Latin unit has a strong diachronic profile with an emphasis on Neo-Latin studies. The editing, translating and commenting of texts has a long tradition and is very valuable. The work is deemed to be of internationally high standard with world-leading research within the field of scientific Neo-Latin. A joint project, the Ancient Tradition, is an extremely successful constellation of Greek and Latin. The new department of Linguistics and Philology is described as a success. The panel encourages the unit to maintain its successful interdisciplinary collaboration locally as well as internationally.

### *Greek and Byzantine Studies*

Panel 7 regrets the situation that the Chair of Ancient Greek is vacant. As a result, the Chair of Byzantine has to carry out the duties of both chairs. Uppsala University is well known internationally for its pioneering work on Byzantine hagiography, now supplemented by work on secular Byzantine literature. The

quality of research is graded as high, within the Byzantine field of top-quality, world-leading. Greek could also be impressive, but only if the Chair of Greek is filled.

#### *Indology and Comparative Indo-European Studies Linguistics*

The Chair professor, panel 7 points out, is a leading authority internationally in the study of medieval epic and narrative literature in the languages of eastern India. The work of the unit is of very high international standard. A South Asia Seminar is a first step towards a closer collaboration with several other departments within the university. India is emerging fast as one of the leading countries of the world, both economically and politically. There is a need for Sweden to train specialists of India in various fields of life. According to the panel, the Oriental Programme (*Orientalistikprogrammet*) should be widened and supported. Sanskrit and classical Indian culture are indispensable for understanding Hindi and modern India and Asia at large. It is vital that teaching and research in classical Indology does not suffer from the expansion of the unit's activities towards modern studies.

#### *Assyriology*

Panel 7 notes that the discipline is recognized as a national responsibility to be fulfilled by Uppsala University. The academic staff consists of one promoted professor, and the panel wants to see one more staff position. There is long-term collaboration with the important collection of cuneiform inscriptions of the Vorderasiatisches Museum in Berlin. The research is considered to be of internationally high standard. The unit has a strong international network and is now involving itself in the highly innovative initiative Urban Mind. This is a framework for scholars who work with the ancient and modern Near East and surrounding areas, involving research groups with different but related themes.

#### *Semitic Languages*

The unit of Semitic Languages is by panel 7 found impressive, in terms of both scholarly breadth and depth. The current research projects cover a vast area of topics from grammatical issues such as circumstantial qualifiers in Semitic to modern literature in the Gulf States, discourse analysis of Arabic TV programs and religious imagery and tradition in modern Palestinian and Israeli Hebrew literature. The quality of research is of internationally high standard, some publications are truly excellent. The research activities are highly impressive and deserve all the support they can get.

#### **Department of Modern Languages**

The department is composed of four units: Slavic Studies, Finno-Ugric Languages and Literature, German, and Romance Languages. They were all eval-

uated by panel 6, which gave the general recommendation that the units (former independent departments) should have a more active collaboration.

### *Slavic Studies*

Panel 6 points out that the focus of the division of Slavic Studies on diachronic linguistics and philology is unique in Sweden. There is collaboration with outstanding scholars from all over the world. The productivity is high or even very high. Much of the research is of an internationally recognized standard. Research on Church Slavonic translations, the translations of newspapers into Middle Russian and Russian-Swedish lexicography reaches a high international standard. Research on Polish literature shows the potential of reaching a high international standard.

### *Finno-Ugric Languages and Literature*

The main emphasis of research in the unit of Finno-Ugric Languages and Literature, panel 6 writes, is on the four Finno-Ugric languages spoken in Sweden, Saami, Finnish, Hungarian and Estonian. According to the panel, most of the research is produced by individual researchers who do not seem to have much collaboration. The unit has a long and internationally reputed tradition in Saami studies. Much of the research is of an internationally recognized standard. Research on Saami and Estonian and also the minor Finno-Ugric languages and cultures reach a high international standard. The study of old Saami texts held at Uppsala University is unique and should be strengthened.

### *German*

The unit of German has, according to panel 6, a strong tradition in language history, which has been developing in new directions incorporating theoretical and methodological perspectives from modern linguistics. The research is of an internationally recognized standard. The strong diversification is a strength according to the unit itself but a possible problem in the view of the panel. A good point is the interdisciplinarity between linguistic and literary research. A new project “Language and society in the 17<sup>th</sup> century” opens up new possibilities. The unit could try a bit harder to create international networks.

### *Romance Languages*

Panel 6 found that the dominant research focus in the unit of Romance Languages is on modern French linguistics. The work is of an internationally recognized standard, some research areas (referentiality, proper names and modality) are of an internationally high standard. The situation and projects within French linguistics offer a unique possibility for renewal. There are clear synergy possibilities between the two areas; epistemic expressions and electronic discourse. Cooperation with the Department of Linguistics and Philology might be particularly fruitful.

## **Department of Scandinavian Languages**

### *Scandinavian Languages*

The department, panel 6 states, builds on long and proud scholarly traditions, particularly in language history and comparative linguistics, strengthened in the 1970s with sociolinguistics and text analysis. Much of the work is of an internationally recognized standard. Some of the research in socio-linguistics and discourse analysis is of high international standard. The synergies between the different parts of the department might be strengthened. The plans for taking part in the Linnaeus Grant project are highly recommended. Concerning renewal, there is a pronounced interest in studies of the new multicultural and multilingual societal situation in Sweden.

### *Runology, Early Scandinavian Languages and Onomastics*

In the area of Runology, Early Scandinavian Languages and Onomastics, panel 7 found a smooth cooperation among staff members in various constellations and in a number of subjects. The panel even had difficulties to point to any apparent weaknesses in the onomastic and historical team of the department. The staff publishes very broadly and edits an impressive number of periodicals, several of them leading publication channels in their fields. The research seems to be well balanced and diverse in its approach; it should be classified as top-quality.

## **4.2.3 Theology**

The Faculty of Theology, consisting of 5 divisions and one centre, was evaluated by panel 11. The panel's overall impression was positive. It found a good spirit of willingness to find new ways and to study new subjects with a marked contemporary interest of the academic society and the society at large. Nevertheless, the panel recommended that the great variety of research going on in most disciplines should be focused in fewer research areas in order to create synergy. A request of publications by *all* scholars was put forward, and it was stated that publications are needed in Swedish as well as foreign languages. Publication in highly esteemed refereed journals should increase.

Panel 11 also pointed to the need to consider the number of disciplines. The faculty should think thoroughly about the organisation into disciplines and work for a strong and committed interdisciplinary cooperation, inside and also outside the department. The panel's recommendations are to establish research groups and to a lesser degree depend on individual research. In addition, the panel also had many suggestions to develop the Ph.D. education: start closer collaboration with other theological faculties abroad (supervision, etc.) and explore the possibilities to recruit a larger number of post-doctoral scholars. Furthermore, the international cooperation in some of the sections could be strengthened.

In terms of the quality of research, panel 11 grades it from acceptable standard to internationally high standard. Specific comments on the divisions and centres are:

- *Biblical Studies*: No general remark on research, due among others to the weak self-assessment, something which calls for improvement.
- *History of Religions*: Needs for further international networks and collaboration.
- *Church History*: Has a too narrow scope.
- *Mission Studies*: Describes plans that look promising.
- *Sociology and Psychology of Religion*: Fruitful in the past, promising ideas for the future.
- *Centre for Religion and Society*: Strong and result-oriented research group.

The three most promising future research directions are considered to be “Contemporary Biology, Media and Worldview Formation”, “The Impact of Religion: Challenge for Society, Law and Democracy” and “Religion, Peace and Conflict Research”. The panel also finds the possible research on “Didactics, Pentecostal Studies” of interest, but adds that the plans so far are not very distinct.

The role of the Karin Boye Library in relation to the Carolina Rediviva Library needs to be clarified. The faculty should support a highly profiled research library.

#### 4.2.4 Social Sciences

The Faculty of Social Sciences basically contains three groups of departments: Behavioral Sciences, Economic Sciences, and Political Sciences. The departments of the two latter groups are jointly located in *Ekonomikum* and *the Old Square*, respectively, while those in the first group will be moved together in a not too distant future. In addition, the Faculty of Social Sciences has an interdisciplinary Institute for Housing and Urban Research located in Gävle. In summarizing the panel reports, we will use the mentioned three-part division.

The research of this faculty was reviewed by panels 1-5 as follows: 1. Economics and Statistics; 2. Business Studies, Social and Economic Geography, Institute for Housing and Urban Research; 3. Education, Curriculum Studies, Pedagogy, Sociology, Media and Communication, and Domestic Sciences; 4. Government, Peace and Conflict Research and Eurasian Studies; 5. Psychology. Economic History, which is also a department of the faculty of Social Sciences, was evaluated in panel 9 together with several departments belonging to the faculty of Arts.

#### **Behavioural Sciences**

The Behavioural Sciences at Uppsala University comprise three departments, i.e. the departments of a. Education, b. Sociology, and c. Psychology. In ad-

dition, the Division Food & Nutrition in the Department of Domestic Studies has a link to this group of disciplines. This also applies to the Faculty of Educational Sciences (see below).

#### *Department of Education*

For the Department of Education, panel 3 notes that the research profile is diverse. However, the research is found to be well organized in four research groups dealing with educational policy and educational philosophy, interaction and experiences in educational settings, higher education, and social practices, respectively. Of these, the two first mentioned are identified as golden nuggets by the panel. For the future, the panel recommends further creation of research groups, increased collaboration and theoretical and methodological development. The overall impression of the panel is that the research in this department holds internationally high standard.

#### *Department of Sociology*

For this department, panel 3 recognizes that research in gerontology has an international reputation and points out research about childhood, youth and disability as golden nuggets. However, it also points out that further advances require strategic decisions. More specifically, the report stresses the risks of the bias towards policy relevance in the research and advocates a stronger emphasis of social theory, history of social thought and research methods. The panel also identifies that research teams are mostly working on their own and therefore advises them to collaborate to a higher extent. In order to handle panel advices, it is suggested that the leadership be strengthened and that the department obtain better support.

#### *Department of Psychology*

Panel 5 reports a very positive picture of the department and states that it “as a whole is an outstanding department with several research constellations with highest international competitiveness”. It also states that it “is one of the very strongest in the Nordic countries with several top-quality research areas”. Among areas of research, the panel particularly mentioned: 1. infant perceptual-motor behavior, 2. human judgment, decision making and higher-level cognition, 3. affective neuroscience research, and 4. longitudinal studies on socio-emotional development. In addition, there are “a number of individual researchers who conduct science at an internationally high standard and contribute significantly to the scientific output of the department”. The latter research is directed towards chemoreception based perception and cognition, socio-emotional development, cognitive behavioral treatment of chronic illnesses, music and emotion, and personality and prejudice. Overall the research has to a large extent been financed through external grants, a circumstance which the panel considers a sign of quality recognition. At the same time, the panel is critical towards the standard of the infrastructure of the de-

partment and points to a need for improvements in that respect. For the future it points out the need for strategic thinking as significant department members are retiring. In that context, they see particular potential in the areas of infant cognition, emotional processing related to music perception, cognition, human development, and psychopathology. The panel even raises the question about a restructuring of the Department into larger focused research units. It also recommends collaboration with psychometric and statistical expertise as well as the co-organizing of courses with sister departments in Stockholm.

#### *Department of Domestic Studies*

For the *Division Food & Nutrition in the Department of Domestic Studies*, panel 3 declares that it had difficulties in making a well-founded judgment of the research. Nevertheless, it saw potential for development and considered the unit “a golden nugget in itself”. However, it also pointed out that the unit is very small and it is therefore recommended that the university take steps to make it more robust. The *Division Textile Studies*, evaluated by panel 8, will in the near future be moved to the Faculty of Arts, department of Arts. The assessment of the division is a bit problematic, as the research is assessed to be of international standard, but “deserves to be highlighted as a ‘golden nugget’ of the faculty”. The researchers have developed a highly qualified interdisciplinary approach. The empirical material present in Uppsala is unique and world famous. The division needs more academic staff in the nearest future.

### **Economic Sciences**

The Economic Sciences include the Departments of Business Studies, Economics, Economic History, Social and Economic Geography and Information Sciences.

#### *Department of Business Studies*

Panel 2 pointed out that although the Department of Business Studies contains a number of research groups “it strongly functions as an integrated department”. Within this overall framework, there are five research groups: 1. International business, 2. Marketing, 3. Management and Organization, 4. Accounting and Finance, and 5. Entrepreneurship. Of these the first three have, as pointed out by the panel, long traditions, while the last two are later additions. The latter is particularly true for the entrepreneurship research, which was initiated in 2005 through an endowed chair. In evaluating the quality of the research the panel found that the first three groups (international business, marketing, and organization and management) hold an internationally high standard. For accounting and finance it was concluded that the group “is in an early stage of development that has potential to grow into a credible research group”. For the time being the group was assessed to have an acceptable standard. Finally, the Entrepreneurship group was considered to be too recent to rate, although the prospects seemed promising. In terms of the future develop-

ment, the panel recommended further efforts to develop the research profile, particularly through increased internationalization. It also expressed a certain concern regarding possible difficulties to recruit competent persons in order to maintain and develop the research.

#### *Department of Economics*

Panel 1 reports that the research in the Department of *Economics* is focusing on three areas: labor market economics, public economics and macroeconomics. This research is found to be “somewhere in between world leading and internationally high standard research”. In addition, there is research in micro-econometrics and environmental economics, which is also “of high quality”. Furthermore, the panel is very positive towards the overall organization of the department and particularly its Ph.D. program, which is considered to be among the top ones in Scandinavia. It also points out that faculty members have a high output with publications in excellent journals. For the future, the panel advises the department to increase its internationalization by attracting international long-term senior visitors and increasing the visits abroad by faculty members. It is also pointed out that for the future crucial recruitment processes, the present Swedish system is far from optimal, as it takes too long time and does not permit strategic thinking. The panel is particularly worried about the insecurity of young scholars, especially of women of a child-bearing age.

#### *Department of Economic History*

In their general assessment, panel 9 labeled the Department of Economic History “as one of the central institutions of economic history in Northern Europe”. It grouped the research in the Department into three groups: 1. general social and economic history, 2. labor market and welfare policies, and 3. financial and business history. The panel considered most of the research to be of a high international standard. The latter is according to the evaluators particularly true for the research on labor markets, financial and business history. It therefore endorses the planned development of a Centre for Financial and Business History, which would act in a field presently characterized by a very dynamic development. This would also stimulate further cooperation within and outside Uppsala University. For the future, the panel expresses some concern about the possibilities to recruit competent people.

#### *Department of Social and Economic Geography*

Panel 2 ascertains that the two main research fields of the Department of Social and Economic Geography are: 1. Economic geography and 2. Population and Social Geography. Both these groups have an internationally high standard according to the panel. The first field implies a focus on innovation, clusters and industrial dynamics. In Uppsala, it has been institutionalized within the Centre for Research on Innovation and Industrial Dynamics

(CIND), which in the words of the panel “has gained an excellent international reputation, being a vigorous and dynamic research group within its specialization”. Population and social geography, on the other hand, covers topics such as urbanization/counter-urbanization, rural and urban planning, residential segregation and settlement policies, on which the group has been quite successful in publishing internationally. In addition to the two mentioned major research fields, there is also, what the panel labels as “one more loosely connected group, consisting of three subunits”, i.e. a. Transformation socio-spatial process in the East and Central European landscape, b. Development studies, and c. Applied environmental impact assessment. The panel considers research in this group to be of acceptable standard. For the future the panel expresses some concern regarding the succession process. A recommendation is therefore that “mentoring and developing successors and an active succession planning in general should be given high priority”.

#### *Department of Information Sciences*

After a merger in 2000, the Department of Information Sciences has three divisions: statistics, media and communication, and informatics. These three units have been evaluated by three different panels (1, 3 and 18). Nevertheless, they seem to share the opinion that the present organizational solution is not optimal and that none of the three divisions has a critical mass. Restructuring is therefore recommended.

As far as the *Division of Statistics* is concerned, panel 1 identified ongoing research in the areas of econometric/time series analysis, biostatistics, structural equation modeling and geophysics. However, the panel also points out that the three last mentioned areas have declined in importance as a result of retirements of faculty members. Most striking to the panel is the fact that the research in the area of structural equation modeling, a flagship during the time of K. G. Jöreskog and still widely used world-wide, has not been kept at previous levels. The panel members also point out that biostatistics has long traditions at Uppsala and constitutes an important field for collaboration with the medical faculty. Presently, it is considered to hold an acceptable to an internationally recognized standard. For the future, the panel recommends the recruitment of a professor of biostatistics to be located in the Department of Mathematics or close to epidemiology research. Best appreciated by the panel is the research into econometric/time series analysis, which is considered to hold an internationally high standard. The panel recommends the merger of this group into the economics department. Finally, the standard of geophysics is not discussed, since it is likely to disappear with the retirement of its single active member.

In terms of the *Division Media and Communication*, panel 3 indicated problems to provide a well-founded judgment of research quality due to its composition. Nevertheless, it was anyway clear to the panel that the research of the division is quite disparate. The panel also concluded that “the division under

its present conditions is not able to reach an internationally recognized standard”. It is therefore of the opinion that the division would need better support from the university and another organizational solution.

Finally, panel 18 considers the *Division of Information Science* a too weak research environment. The panel therefore recommends restructuring. It suggests that the unit of Human-Computer Interaction be moved to the Information Technology Department within the Faculty of Science and Technology. In addition, it suggests “discontinuation or profound reorientation of the activity in the group called ‘Computer Science’”.

## **Political Sciences**

Political Sciences are located around and in the neighborhood of the old square in Uppsala. In all there are three departments: Department of Government, Peace and Conflict Research, and Eurasian Studies.

### *Department of Government*

Panel 4 divided the research in this department into five main areas: 1. democracy and democratization, 2. political economy and the welfare state, 3. political sociology, with political participation and citizenship, 4. developmental issues and 5. international relations. It points out that this broad research profile is a result of obligations for one of the few major political science departments in Sweden as well as a tradition of great autonomy of individual scholars. In terms of publications, the panel found a certain change from the heavy monographs towards the publication in high ranked international journals. All in all, the panel characterized the Department as “a vital research environment with extensive output on a high level” with openness to internal as well as external cooperation. However, it also pointed to a need for “a clearer and more integrated leadership structure” particularly in relation to the upcoming retirement of significant players in the Department.

### *Department of Peace and Conflict Research*

This department is relatively young in terms of research with two chairs, one established in 1985 and the other one in 2003. Panel 4 has noted that its research agenda has particular focus on “the causes, processes, and consequences of the organized violence” and that the research is highly dependent on external funding. It also points out that the Department has a strong international orientation in terms of exchange as well as publications. Internationally, the Department is particularly known through the Uppsala Conflict Data Program (UCDP), which is a highly cited database of wars. The panel encourages the Department to continue the work with UCDP and states that it has the potential to become a flagship for the University. However, at the same time the panel stresses the need to invest in “the development of a coherent and intellectually challenging research agenda”.

### *Department of Eurasian Studies*

The department in itself is an example of renewal since it was transformed as late as in January 2006 from an orientation towards East European Studies. Panel 4 characterizes the Department as “an area-focused interdisciplinary research centre” with a basic research orientation towards systemic change and comparative institutional developments and pathological developments in the former Soviet space (“The Silk Road Program”). In addition, through Ph.D. students from different departments, there is ongoing research on political development, nationalism, regional cooperation, mass media, crisis management, security and foreign policy, as well as the emergence of the rule of law. In terms of publications, it observes a mix of international peer reviewed publications and policy-oriented documents. For the future, the panel points to the opportunities to exploit the expertise in Russian studies as well as on the Caucasus and Central Asia. It envisages a strong potential in the combination of basic research and policy oriented research.

### **Institute for Housing and Urban Research**

The Institute for Housing and Urban Research, established in 1994, is a multidisciplinary institute in Gävle with researchers from a number of disciplines within the social sciences. Human geography, political science, sociology and economics are those best represented in the institute. In addition, there are also researchers from psychology, anthropology, ecology and economic history. The research is primarily directed towards housing economics and policies, urban life and city planning, ethnic and gender relations and sustainability. The results are to a considerable extent published in international journals. It is also noted by the panel that staff members, particularly the geographers and the sociologists, contribute to their department in Uppsala through joint appointments. It is also pointed out that the multidisciplinary environment is helping “researchers to broaden their approach, gain a deeper understanding of the topic and test concepts used in their discipline”. For the future, the panel endorses the plans for an Uppsala Centre for research on social integration and segregation. Finally, the panel points out that the cross-disciplinarity makes it difficult to assess the different research groups. They therefore conclude that “the institute as a whole is regarded by the panel as having an internationally high standard”.

### 4.2.5 Law

Panel 10 was generally “quite impressed by the overall quality and quantity” of the research in the *Department of Law (Faculty of Law)*. However, they also expressed concern about the limited size of research groups, the research time of faculty and the lack of long-term strategy. As for the latter, the panel recommended a future focus on four areas, all with an international orientation: 1. Combination of international private law and family law, especially with

its multicultural aspects, 2. Combination of international human rights law, European law and constitutional law, 3. Comparative and interdisciplinary approaches to legal history, and 4. Combination of criminal law, European law and international law. The international orientation is also emphasised in their recommendation to the Faculty to invite foreign scholars for longer periods and to increase the visits abroad by faculty members. Even if the panel finds that the Faculty is linked to national and international networks, it suggests an increasing cooperation in joint research projects. In addition, the panel recommends an increase in the recruitment of doctoral students.

#### 4.2.6 Educational Sciences

The Faculty of Educational Sciences contains seven units involved in education and training for teaching. The faculty collaborates with more than thirty departments from six faculties within the university. There are two departments, which were subject to the KoF07 evaluation: the Department of Curriculum Studies and the Department of Studies in Education, Culture and Media.

##### **Department of Curriculum Studies**

In reviewing the Department of Curriculum Studies, panel 3 was struck by the fact that the Faculty of Educational Sciences is not recognized as a scientific field in the university. This observation led it even to state that “[t]his can not be considered fair or serious, that the university treat one of their faculties as an exception, and still expect research”. The panel found two research groups: “Studies of Language Practice” and “Studies of Meaning Making in Educational Discourses”. None of them has substantial internal research resources, and therefore the panel was impressed with the research performance under these circumstances. This has been accomplished through external grants and collaboration in networks.

##### **Department of Studies in Education, Culture and Media**

Panel 3 identifies the Department of Studies in Education, Culture and Media as a scientific laboratory highly inspired by the work of Pierre Bourdieu with research oriented towards the sociology of culture and the sociology of education. In terms of quality, the panel considered the department a “golden nugget” and therefore endorsed its Linnaeus application. It is noticed that the unit has a large network which differs from others by not being primarily oriented to the Anglo-Saxon research community. In addition, the panel welcomes the initiative of the department to collaborate with other units in the University at the same time as it also points to the risks associated with the retirement of the present leading figure.

## 4.3 Science and Technology

The research of the Faculty of Science and Technology was reviewed in seven different panels: 12. Mathematics, 13. Physics, 14. Chemistry, 15. Biology, 16. Earth Sciences, 17. Engineering Sciences, and 18. Information Technology. There were cases of cross faculty review events, such that e.g. the computer science activity belonging to the Faculty of Social Science was evaluated by panel 18.

The general assessments of the panel reports usually give a brief description of the departments in terms of research directions, size and organization etc., although, in some cases they also express assessments in more general terms regarding specific achievements, synergies, collaborations, etc. Appreciative mentioning of successful management of research organization and implemented research strategies is occasionally made.

Generally, research activities were graded according to the recommended quality rating, with the lowest grade usually at the level of acceptable international standard (the main task was to identify strong points, and it was not mandatory to grade all research). The panels identified a number of research groups that they consider to be pursuing research of internationally very high quality, usually referred to as world leading or top quality. Ratings that fall short of what was considered potentially high quality were often specifically commented on in terms of suggestions for improvement.

Comments regarding research environment and infrastructure were often quite positive, although one finds examples of potential for improvements. These concern, for instance, better exploitation of synergies offered by increased contact and collaborations between groups; lack of incentives to develop suitable graduate courses; the composition of the work force in terms of senior researchers, junior researchers, postdocs and research students. The present infrastructure available to researchers of this faculty is generally commended although questions on future upgrade and renewal are raised in a few cases.

### 4.3.1 Mathematics and Information Technology

#### **Department of Mathematics**

Panel 12 found that the Department of Mathematics is presently in a difficult situation as its activity is seriously obstructed by personal conflicts. However, the panel expresses a positive view and points to the fact that younger researchers seem to be little affected by the situation and are in fact doing outstanding research.

The quality of research is internationally respected according to the panel, and one identifies a few activities of top quality. In particular the research by S. Janson is mentioned to be of top quality, as well as research in the fields of analytical number theory and topology. The research infrastructure needs

consideration regarding age profile and staff composition. A careful plan for replacement of senior scientists is needed, and one needs to strengthen the staff with respect to junior faculty and postdocs. The group structure is fragmented which does not promote either cross-fertilization or attracting major grants, and one recommends creating larger groups. Networking is very good and joint research is fruitful, but the panel notices that EU involvement is lower than it should be.

The panel finds it necessary to strengthen a number of activities in important fields. Two of the fields mentioned to be underrepresented are statistics and nonlinear partial differential equations. As to actions for successful development, the panel urges the University to consider the organizational model for the department and implement a clearer structure. Among other issues, the panel addresses the proposal of a Centre for Applied Mathematics. It endorses the idea and discusses important elements of such structure, such as links to Scientific Computing and other activities at the University.

### **Centre for Image Analysis**

The Mathematics panel concludes that the interdisciplinary research at the centre maintains high international standard and appreciates that results are published at a steady rate in high quality international journals and good conference proceedings. The panel notes a good gender balance at the centre, but also that the number of permanent staff is small in comparison with temporary staff.

The infrastructure and research environment of the centre is considered to be excellent. Networking and collaboration is noted to be in place with important research partners both nationally and internationally. The panel considers the regrouping of remote sensing and GIS activities to the centre to be an important opportunity for renewal, and it points at interesting possibilities in life sciences and in a future Centre for Applied Mathematics. The panel recommends intensifying cooperation with groups in discrete mathematics and scientific computing.

### **Department of Information Technology**

The Department of Information Technology was found by panel 18 to host research activities of at least international recognized standard, with several groups in par with the international top level or even of world leading standard. Mentioned in the top level category are research efforts in Verification, Computer Architecture, Systems Identification and Signal Processing and in Memory Management Techniques. The department shows good acceptance rate for its proposals to national funding sources, whereas EU-funded research is fairly small.

The panel emphasizes that evaluation of research in computer science and technology based only on journal publication may offer a deceptive view as impact is more often expressed in other ways in these fields, such as confer-

ence proceedings, awards and books. It raises concern that too much weight on journal publication may prompt faculty to work along lines that may be less productive than necessary.

The panel makes a number of observations that are considered important for the operation of the department. Effects of the distributed funding model used, the way the research groups are organized, the distribution of teaching duties, and lack of collective strategies are addressed. Issues concerning the appearance of similar research activities in another department, as well as in a different faculty were also specifically discussed.

Recommendations given include the development of a medium-term research strategy; parallel recruitments to fill upcoming senior faculty vacancies in accordance with the strategy; adding competences in a few defined areas of research. The panel offers advice regarding a few interdisciplinary centers, and in particular, it expresses its view on measures needed to further develop the Bioinformatics centre, which it considers to be an activity of central strategic importance.

#### *Division of Scientific Computing*

Panel 12 found the Division of Scientific Computing to be a well-organized unit, with good gender balance and with internationally active researchers. Furthermore, it found a clear strategy of the unit with challenging and important problems studied often motivated by external contacts.

The quality of the research is considered by the panel to be of internationally high standard with elements of top quality activities. Opportunities to reach world leading position on a broader basis are regarded possible. The panel appreciates that the unit is involved in real applications of its methods and software, and it recommends further development towards realistic models involving complicated geometries employing large-scale computation.

The networking of the unit is seen as well developed both regarding local and international connections. The panel endorses the plans for renewal and emerging science that include “Multi-scale analysis”, “High dimensional problems”, “Design optimization and inverse problems”. It believes that serious contributions can be made in these fields.

#### 4.3.2 Physics

Panel 13 notes that physics and astronomy activities at Uppsala are divided into five different departments and concludes that this is largely for historical reasons. It appreciates that all departments are now located at the Ångström Laboratory, but also notes that this does not necessarily lead to interactions. It urges senior faculty to actively promote such interactions. The panel endorses the plans to reduce the number of physics departments to two and believes that this should soon be followed by a complete combination of the five departments.

The panel found that the physics research groups are highly interactive both within Sweden and in the international community. It appreciated excellent presentations by talented female young scientists, but notes that female representation in permanent faculty is quite low. The panel believes that fully funded faculty positions covering both research and teaching would make the working conditions at the University more attractive, in particular for female researchers. More well defined career paths to permanent positions are also expected to be more attractive for female candidates.

The panel strongly endorses the idea of the Centre for Accelerators and Instrumentation (CAI), which, as the panel expresses it, would capitalize on a strong tradition but also represent renewal looking at the on-going instrumentation projects by very talented people. In this context, the panel notes that Sweden is in a special situation as it does not have equivalents to many foreign countries' research institutes where such highly specialized equipment can be built, and that CAI could make Uppsala provide a unique resource for the country as a whole.

The importance of developing an adequate computing infrastructure is underscored by the panel, as there are many activities in the departments that depend critically on the access to powerful computational resources. It states that a computing infrastructure should be developed as a hierarchical facility, where local resources, department services, nationwide and international grid-type solutions are in balance.

The panel comments, as do many other panels, on the distribution of teaching vs. research for different categories of researchers. It also raises some concern regarding questions of critical mass in different activities, and suggests that a prioritization process be implemented. Another addressed issue concerns the availability of technical assistance for the physics departments, which has been strongly reduced over the years. The sophistication of modern physics equipment implies that graduate students and faculty cannot generally take on these duties at a sufficiently high level without seriously hampering their time for creative research.

### **Department of Theoretical Physics**

In the Department of Theoretical Physics, panel 13 identified research that has had enormous impact in the field of string theory, obviously of world-leading quality. Other areas of research at the department were also assessed to be first rate and to have international impact.

The panel was concerned about a tendency that professors leave after a few years. It recognizes that this may be a sign of high quality of individuals but it underlines that it is important to make positions more attractive, e.g. by distributing teaching load in a different way.

The panel makes comments that the department shows excellent international collaborations and interactions; that it has world-class junior faculty; the interaction locally is less developed, which could be remedied after a de-

partment merger; that it recommends upcoming hires to open up directions related to phenomenology that are more linked to experimental activities at Uppsala.

### **Department of Nuclear and Particle Physics**

Panel 13 splits the Department of Nuclear and Particle Physics into two: *Nuclear Physics* and *Particle Physics*. It also comments specifically on the *Energy resource activity* in the department.

#### *Nuclear Physics*

The panel recognizes that the nuclear physics group assumed a leadership role in the previous LEAR program at CERN, and that it was involved in research of internationally high standard regarding near-threshold meson production at the CELSIUS storage ring. After the recent closing of the national laboratory in Uppsala, the group is now preparing for experiments at COSY in Jülich and GSI in Darmstadt.

The panel finds a satisfactory infrastructure in terms of personnel composition, but for the future it requires that suitable fillings of upcoming senior positions be made. The panel underlines that the four collaborators presently involved in the electron cooling development should be transferred to the Centre for Accelerator and Instrumentation. International collaborations and interactions are well developed through various European engagements.

#### *Particle Physics*

The panel notes that the group of Particle Physics has strongly focused its future research on well thought-out choices of activities within two world-leading international programs; the ATLAS high energy physics collision experiment at CERN and the ICECUBE neutrino detector for astrophysics in Antarctica. The panel finds that the Particle Physics group collaborates in world-leading international research projects, and that it has good balance between accelerator-based physics and astrophysics. The strong engagement in experimental systems has a long tradition and it is considered being optimally exploited and maintained, and the initiative concerning the Centre of Accelerators and Instrumentation is again applauded. The panel notes that the subgroups are fairly small with respect to the ambitious goals, and that it might call for reinforcements and increase in collaborative activities.

The degree of international cooperation is traditionally very strong, for obvious reasons. The panel is also pleased with the national collaboration assuming a leading role. The local interaction between experimentalists and theorists is also regarded as excellent.

#### *Energy Resource Research*

The energy resource research within the department of Nuclear and Particle Physics focuses on the world supply of oil and natural gas. The panel notes

that the group is active in the International Association for the Study of Peak Oil and Gas and has organized its first international conference. It is suggested that this activity might find a more suitable environment in the merged physics department or in a Centre for Energy Research, if such a unit is created.

### **Department of Neutron Research**

The panel finds that the Department of Neutron Research is the smallest physics department and it focuses on applied nuclear physics research with direct relevance for nuclear energy. The work is carried out in close contact with Swedish nuclear power industry, and it is directed towards e.g. safe spent fuel handling and materials diagnostics. There is also international engagements, e.g. at JET for fusion related research.

The research is considered to be of national importance and holds internationally recognized standard, especially in the fusion physics community. Besides the excellent collaboration and interaction with Swedish nuclear power industry, there are well recognized contributions to European and world-wide nuclear energy and especially fusion related projects. The panel finds it to be to their credit that they derive much of their funding from outside sources.

Recommended measures for successful development include closer collaboration with energy-related research at the Department of Physics, and expanded activity in accelerator driven nuclear power systems at specifically mentioned facilities is suggested as a means of renewal.

### **Department of Astronomy and Space Physics**

The panel finds outstanding competence and enthusiasm at all levels in the Department of Astronomy and Space Physics. It identifies activities of world-class quality and world-leading status, especially in the field of spectroscopy of low mass stars. The search for extra-solar planets has made this activity highly interesting, and planetary research, within as well as outside our solar system, is a specialty of the Uppsala group. Other activities of high quality concern e.g. numerical modeling of stellar atmospheres. The collaboration with the Space Physics Institute is positively noted, as well as various international collaborations.

The panel endorses the department's plans to focus on three activities: extra-solar planets, low-mass stars and galaxy formation. It notices that also this department benefits from the newly started Centre for Accelerators and Instrumentation as development of better instrumentation is a key strength with international recognition.

The panel sees opportunities for renewal in two new initiatives; the establishment of a Centre for Advanced Studies of Planetary Systems and the development of a new group based on the Swedish solar telescope on the Canary Islands. Caution must be exercised, though, to secure enough financial means not to impinge on existing activities or other future developments. The plan to build a planetarium in Uppsala is supported by the panel.

## Department of Physics

The panel notes that the Department of Physics has a particular strength and tradition in developing new instruments and associated spectroscopic techniques and application areas. Synchrotron radiation plays an important role, and it is noted that this department plays a key role in the development and pursuit of the MAX-lab national laboratory in Lund. Furthermore, the panel notes that a further strength is theoretical modeling in condensed matter physics and in other disciplines. The panel also points out the activity in the didactics of physics, which it considers a unique research focus in Sweden.

The local as well as global collaboration is regarded as excellent, and the extensive use of major international experimental facilities is appreciated. The panel suggests that the administrative structure as represented by the Physics I-V programs, the Theoretical Magnetism and the Physics Education Research be organized into groups more representative of the actual subject divisions, e.g. magnetism, interfaces and low-dimensional materials, energy related materials, experiment methodology, theoretical modeling molecular and soft matter, and physics education.

The panel underlines the necessity to make carefully selected hires when present senior faculty retires in the years to come. It is stressed, though, that entering new areas should not stretch personnel and laboratory resources too thinly over too many projects. In the area of theory, the panel welcomes new initiatives in method development. It regards filling the upcoming vacancy by a hire in many-body theory a positive step.

### 4.3.3 Chemistry

Panel 14 finds a number of research activities of very high quality in different fields of chemistry at Uppsala University. It chooses to discuss actions for successful development in the framework of Chemistry as a whole at the university. It proposes a number of strategic measures to help Chemistry become even more competitive, attract more students and increase its international visibility. The first recommendation is to streamline the administrative structure in order to maximize flexibility and effectiveness. The second measure proposed is to install two new international MSc programmes in order to attract additional students by aggressive promotion internationally. Two further pieces of advice concern the forming of mentoring committees for junior faculty and to provide seed money for new cooperation.

The panel also discusses whether the theoretical chemistry and modeling activities that are of high quality and dispersed in various departments and programs should be organized in a more central structure in order to optimize its resources and performance.

### **Department of Biochemistry and Organic Chemistry**

The panel was impressed by the quality, breadth and depth of the science as well as of the local and global interactions and the suitable age profile of the Department of Biochemistry and Organic Chemistry. The quality assessments for research at the department yield ratings ranging between the two highest levels, with world leading labels for the senior scientists. Regarding networking and collaborations the panel states that they are satisfactory.

The department is in a phase of renewal, and it is the opinion of the panel that one should work towards reaching critical mass in the different activities. Enhanced collaboration between the groups is necessary to fully take advantage of the technologies used. The department is regarded as ideally placed for an international MSc course in chemistry.

### **Department of Photo Chemistry and Molecular Science**

The new Department of Photochemistry and Molecular Science was commended for its multidisciplinary approach in the endeavor to unravel the elementary steps of the photosynthesis process, more specifically on the generation of hydrogen from water and light. The panel found a good balance with respect to staff categories and gender. The quality of the research was considered to be very good with senior members in world leading class. Regarding networking and collaboration, the panel concluded that it is exceptionally good, locally as well as internationally.

The panel suggests that an international master's program in the area of energy chemistry would be an attractive option to increase the student base.

### **Department of Physical and Analytical Chemistry**

#### *Physical Chemistry*

The panel concludes that the unit of Physical Chemistry is in a transition period and assessments are therefore more difficult. It notes, however, that these units more than others offer opportunities for renewal within the framework of chemistry in Uppsala. The panel found research at internationally high level as well as on internationally recognized level. Questions regarding location suitability of groups are discussed, as well as delocalization vs. centralization of theoretical modeling. The panel considers a possible concentration of modeling activities to be a hidden strength at Uppsala, and the upcoming vacancy in theoretical chemistry is regarded a key component.

#### *Analytical Chemistry*

The unit of Analytical Chemistry is considered to show an optimum balance between fundamental and applied research. The panel concluded that the research related to liquid separations and mass spectrometry in life sciences is of internationally high standard. The panel is concerned that in order to safeguard the continuity of the high quality of research, the necessary steps to fill the current vacant chair should be taken.

### *Surface Biotechnology*

The unit of Surface Biotechnology is stated to be well equipped and to have developed a number of powerful techniques and methods with high practical relevance. The research is regarded as being of internationally high quality and of great impact. Cooperation is well developed, also with industry. The panel sees a clear link to analytical chemistry and potential for an important role in a future biomolecular separation and analysis unit. The vacant chair is considered a potential strategic tool in optimizing the profile of such a new unit.

### **Department of Materials Chemistry**

The panel points out that this department, which is the largest one in chemistry, hosts a variety of expertise and that it is responsible for a large part of chemistry teaching. It states that the infrastructure is excellent, and it finds high quality research, e.g. in the polymer science unit and also several opportunities to contribute significantly to forefront science, such as battery research. The panel endorses the profiling towards functional materials on all scales as initiated by installing several groups with young research leaders. Collaborations and networking are considered well-developed and one suggests further enhanced collaboration with materials science in the physics section.

Opportunities for renewal are noted to exist and should be used to strengthen Materials Chemistry in Uppsala. The two chairs that will become vacant in a couple of years are key elements in this process. Decisions on these will define new research lines and one should carefully consider suitable combinations of research groups to reinforce the renewal process.

### 4.3.4 Biology

#### **Department of Bioorganic Chemistry**

Panel 15 assessed the research at the Department of Bioorganic Chemistry, which is the smallest biology department, to meet internationally high standard. The department is noted for its structural studies using high-field NMR spectrometry. The panel felt that future demanding studies would probably require instruments at other laboratories as the in-house instruments will not be competitive. The department is part of various national and international collaboration networks, and it is considered to be well placed for assuming a role in developing new methodologies in RNA and DNA biology. As to actions for maintained quality and successful development, the panel asks for a definition of future directions that takes more account of problems studied by other groups locally.

### **Department of Cell and Molecular Biology**

The Department of Cell and Molecular Biology, one of the biggest with six research programs and about 115 staff members, was characterized by panel 15 as well managed and well-performing, although also here one thought there was room for improved synergies between the programs and even between groups of the same program. Three of the programs were considered pursuing research of world leading quality, namely Structural Biology, Biophysics, and Molecular Biology. Other programs were assessed to be performing at internationally recognized to internationally high level.

The research environment is regarded to offer good seminar programs, and the RNA centre network seems beneficial for local collaborations. Still, the panel sees potential for improvement in this respect. International collaboration is at a good level with participation in various EU networks and joint international funding and frequent international visitors.

The panel discusses actions for successful development in terms of funding, recruitments and relocation and points at some activities with crucial needs. Relocation is suggested in a few cases motivated by conditions of sub-critical mass or sub-optimal environment.

### **Department of Evolution, Genomics and Systematics**

The Department of Evolution, Genomics and Systematics is praised by the panel for the way it nurses collaboration and obtains synergies between programs. Furthermore, the premises, facilities and joint seminar programs and strong postdoc training are commended in mentioning their role for the success. The panel identifies two of the programs to be performing at top quality/world leading level, namely the Molecular Evolution and Evolutionary Biology programs. The other three programs are considered to be of internationally high or internationally recognized standard.

The research environment is considered to be very good, and strong encouragement to develop shared facilities is judged to ensure that work is undertaken most efficiently and with appropriate expertise. Networks are seen to be well developed and functioning both locally and internationally. Finally, the planned actions for successful developments presented by the department were entirely endorsed by the panel, including the merger of Systematic Botany and Systematic Zoology into a single program of Systematic Biology.

### **Department of Physiology and Developmental Biology**

The Department of Physiology and Development Biology was found by the panel to be relatively heterogeneous. It therefore concluded that there was potential for development of synergies between its sub-departments and also with respect to other departments. This was considered particularly true for junior researchers in the sub-department of Developmental Biology and Genetics in addition to the existing outstanding international network. The panel

finds that top quality or world leading standard is met for two of the sub-departments, Development Biology and Genetics, and Evolutionary Organismal Biology, whereas the other two sub-departments perform at internationally high to internationally recognized level.

The panel considered the infrastructure in this department to be very good. Renewal opportunities exist, especially in Environmental Toxicology where three faculty and junior faculty positions are to be recruited shortly. According to the panel, a reconsideration of the composition of the department might be part of actions for successful development.

### **Department of Ecology and Evolution**

The panel considers the Department of Ecology and Evolution, one of the biggest with 110 staff members, to be coherent and to offer research education in a collaborative environment. The plans to get all programs physically located at the EBC are strongly endorsed. The panel identifies work of very high standard, for the work on plant adaptation approaching world leading level, and other activities are assessed to be of internationally high to internationally recognized standard.

The panel commends the EBC as a competitive research platform that offers a unique basis for training and cutting edge research. It particularly values the infrastructure that allows for integration of molecular tools into ecological and population biology research. The programs have good networks and collaborations at national and international levels. As mentioned, the physical merging of all programs will strengthen the local collaboration and facilitate the use of molecular tools.

### **The Linneaus Centre for Bioinformatics**

The Linneaus Centre for Bioinformatics was evaluated by panel 15 (Biology) as well as panel 18 (Information Science and Technology). The biology panel assessed the centre to perform at an internationally recognized level, and it emphasizes the work in computational genetics as particularly exciting. The staff composition is considered suitable; the centre is well connected to national facilities for large scale computing, and it is well set regarding national and international networking. The panel considers the centre to be a core activity with great potential as there is an urgent need for improved database integration and tools for data access. It also states that in order to be successful, the centre should be sensitive to the needs of the local biological community.

Panel 18 expresses its view on measures needed to further develop the Bioinformatics centre. It considers the centre to be an activity of central strategic importance. Therefore, the panel points to the need of finding a long-term place for the centre.

### 4.3.5 Earth Sciences

#### **Department of Earth Sciences**

Panel 16 considers the Uppsala department to be one of the most complete academic institutions in Europe, as it comprises such a broad range of sub-fields. It characterizes the department as solid and internationally well recognized, finding itself in a phase of positive development. A few activities are regarded as world-leading. This applies to activities in Paleobiology, Explosion Seismology, and Electromagnetic Geophysics. Meteorology is given a quality rating between internationally high standard and world-leading. A number of other activities are of internationally high standard according to the panel. In some cases, the panel points to cases where there is great potential for development, but also threats against maintaining quality unless suitable measures are taken.

The panel underlines the importance of conveying to decision makers an awareness of the value of earth sciences to the Swedish society. It recommends that a strategy document be formulated mapping out a programme to improve coordination at the department and strengthen department profile. This document can serve as an initiative and form a link to a national strategy document for the field.

The department is recommended to strengthen collaboration with other Swedish universities, especially for sub-critical groups and activities that lack specific, essential competence. Means to improve research productivity can be found by enhancing cooperation within the department such as by launching a few multi-disciplinary research projects engaging participants from several groups. The panel also found a need for the department to improve the visibility of its research to industry and to develop partnership with companies and organizations.

### 4.3.6 Engineering Sciences

#### **Department of Engineering Sciences**

In reviewing the Department of Engineering Sciences, which constitutes an entire section of the faculty, panel 17 observed that this department attracts considerable external funding. The panel also identified a number of research activities that it considers to pursue top quality work, such as the research activities on Spin glasses, Electro-Chrome Materials, Thin Film Deposition Modeling, Electricity Generation Systems, Mass Spectroscopy and Tribology. Furthermore, the panel regards the large number of start-up companies emanating from the department in recent years as indicative of relevant problem selection and high quality work, although it also points to potential problems in separating company and academic activities.

The panel is impressed by the excellent experimental infrastructure and underlines the importance of building on this in the strategic planning for the fu-

ture. Comments are provided regarding various activities that are very small-scale. The panel therefore raises concern whether the sub-critical size of operations will allow international competitiveness in some cases, and suggests merger actions. The panel proposes that the mass of the most promising activities be increased with the goal to achieve the level of “European Centre of Excellence”.

The panel points to the age profile of researchers in the department with several senior scientists soon to be retired, which calls for the formulation of strategic plans. In this context, one identifies a number of opportunities for renewal. There is, according to the panel, a need to recruit young talents, preferably from outside Uppsala, to fill upcoming vacancies in the same field or in other fields according to the results of the strategic planning. The panel is concerned that retirement sometimes seems to be used as a savings instrument rather than as a tool for renewal. As many other panels in this evaluation, this panel finds that the financial system is too inflexible and tends to hamper change and development.

Other comments concern the question of forming an engineering faculty, a proposal that the panel finds in order; it notes that the names of activities are sometimes non-descriptive or possibly misleading; it suggests that cooperation with the Physics Department be strengthened; it notes that national and European collaborations could be expanded; it is concerned that Ph.D. students sometimes have difficulties in finding appropriate courses, and that there seems to be lacking incentive to develop such courses.

## 4.4 Medicine and Pharmacy

The research in this disciplinary area was reviewed by six different panels: 19. Pharmaceutical science, 20. Pre-clinical sciences, 21. Social medicine, 22. Clinical sciences, 23. Neuroscience, and 24. Genetics and Pathology.

Generally, research activities were graded according to the recommended quality rating, although there are exemptions where panels have applied their own quality scales. Comments on research environment and infrastructure often concern sub-critical group size, exploitation of synergies and collaborations between groups, locally and globally. Also, infrastructure, access and organization are addressed in several cases.

### 4.4.1 Medicine

The panels identify a number of research activities of very high or world-leading quality, and also quite a few of high and recognized international standard. Activities that fall short of high standard are often commented on in terms of impediments for successful development, such as issues regarding sub-critical group size, fragmentation and lack of interaction between research

groups, as well as lack of focus and strategic planning. Other comments concern money allocation, e.g., that the ALF money allocation should be more based on competition; that career counseling is needed to identify those with good research potential.

### **Department of Medical Cell Biology**

Panel 20 concludes that the Department of Medical Cell Biology is carrying out research of very high quality, although the overall quality appears uneven. A main activity is in the area of diabetology, regarded as of high international standard, with the insulin secretion research particularly appreciated. However, the panel considers the research profile to be too broad and recommends more focus on key issues, as well as improved local and international collaboration. Other activities in this department include research on respiratory, kidney and gastrointestinal diseases, and in this context the panel raises the question of whether an integrated department for physiology and pharmacology would be beneficial for the medical faculty. The research environment is considered to have a good focus on diabetes and hormone secretion research, but other areas seem to suffer from sub-critical mass or insufficient funding. The panel draws attention to a pending retirement that calls for consideration.

### **Department of Medical Biochemistry and Microbiology**

Panel 20 considers the Department of Medical Biochemistry and Microbiology to be an excellent and well-administered department with good senior/junior and gender balance. Although there are several small groups with diverse interests, many of these collaborate in a constructive way. Substantial collaboration with industry has contributed to funding of research in the department. The panel judges the quality of research in this department to be high, including world-leading status in some cases, such as for the Glycobiology research and activities in Functional Genetics. Recommendations point to the need to fill vacancies from upcoming retirements in a way that complements and underpins ongoing research, rather than populating completely new areas of investigation.

The panel brings up the idea that this department possesses such high standing in its research that it might lend itself for a Centre of Excellence focusing on a specific area. Glycobiology would be one candidate area for such a centre, according to the panel, and others are also mentioned.

Panel 24 also offers comments on research activities in tumor biology and genetics in this department. The panel identifies the presence of established scientists producing good science as well as young promising researchers, the scientific success of which remains to be seen.

### **Department of Public Health and Caring Sciences**

Panel 21 regards the focus of the research in the Department of Public Health and Caring Sciences to be “of enormous societal interest, growing recognition

and a large scientific as well as applied potential". It identifies a number of strengths possessed, primarily concerning databases and longitudinal studies. Furthermore, it finds research quality of activities ranging from high international standard, the bioethics centre being one unit with particularly high appreciation and a "golden nugget" candidate, to acceptable standard.

A number of issues likely to be relevant for further quality improvement and renewal in the department were stated. Among those, some lack of conceptual framework and strategic planning was mentioned. It was suggested that synergies be sought between research groups, given that different groups had similar themes. The panel addressed the relation of the department's work within the political arena as a potentially important point. It strongly endorsed appointing a research director to take a lead in developing an overall strategy and a quality management program.

This department was also reviewed by panels 22 and 23, focusing on clinical nutrition respectively on geriatrics. The report given by panel 22 is limited to stating that the new department head shows promise and that the department is involved with societally important issues. Panel 23, which focused on geriatrics, on the other hand, observed an enthusiastic attitude in a well-focused unit enjoying synergies between the different groups. It assessed the quality of research to be of very high international standard, and it saw potential for breakthroughs in diagnosis and treatment of neurodegenerative disorders. It recommended closer coupling to the department of neuroscience.

### **Department of Women's and Children's Health**

Panel 22 reviewed research activities in a number of departments involved in clinical sciences, among them the Department of Women's and Children's Health, which it found to be composed of many separate groups. The panel reflects on whether some activity, like Paediatric inflammation, which it finds exciting, would be better located in a more general department with common interests. It is noted that due to the demographic profile, there are a number of upcoming vacancies that could create opportunities for reorganization and regrouping of the department.

Panel 22 uses a scale of their own to assess research quality, which it combines with bold font style in order to express its assessments as a combination of quality and potential. The way the site visit was eventually organized gave limited time for the panel to meet each and every one of the many groups of the departments assigned to this panel. This is reflected in the report, which presents a fairly brief exposition of assessments according to the method mentioned. The report identifies research of very high quality, such as International Maternal Health and International Child Health, and it comments on promising activities of young researchers.

### **Department of Oncology, Radiology and Clinical Immunology**

As for several other departments, panel 22 makes the comment on Department of Oncology, Radiology and Clinical Immunology that it is composed of many disparate groups. Although the panel finds it difficult to understand the rationale behind it, it finds research of very high quality among the groups, in particular the clinical immunology activity, which it considers as a “golden nugget”. It notes the high strength in imaging, and it comments on its concern with the sale of the PET centre.

### **Department of Surgical Sciences**

In their review of the Department of Surgical Sciences, panel 22 was impressed by the high quality of many of the research programmes. Among the 13 research units of the department, there were several that received high grades on the self-invented scale of this panel, the highest being given to Endocrinological Surgery and Orthopaedics. Some activities showed less impressive publication output in the eyes of the panel and seemed to suffer from limited funding or other hindrance for successful development.

### **Department of Medical Sciences**

The Department of Medical Sciences, composed of many different research groups appeared to Panel 22 to be organized in a way that duplicated certain efforts. It was suggested that amalgamation would be a way to go ahead with organization. The panel identified a few outstanding or high quality activities, and for example endocrine oncology and endocrine tumor biology were mentioned. Increasing collaboration with like-minded groups and seeking opportunities to share expensive resources were mentioned in several cases as means of developing research. The different activities were assessed by the panel in a brief way, owing to the very many small groups that were included in this panel’s review. Although a quality/potential rating (according to the panel’s own scale) was given for all groups, the amount of information offering advice for development is unfortunately rather limited.

Panel 24 evaluated two technology platforms of the Department of Medical Sciences, the SNP Technology Platform and the Expression Array platform. Both platforms are recognized by the panel to be well networked and have strong collaborations on campus, nationally and internationally. Furthermore, the two platforms are said to be true intellectual core facilities, lead by scientists who have a strong research activity.

### **Department of Neuroscience**

Panel 23 notes that the fusing of a number of basic science and clinical departments into one, the Department of Neuroscience, has created a situation of extreme diversity. Although the panel sees this diversity as a potential for creating multidisciplinary constellations, it thinks this has been realized only to a limited extent, positive examples being traumatic brain injury research

and feeding behavior and obesity. The panel rates the activities in clinical neurophysiology, developmental genetics, neurotrauma research, and pharmacology to be of high international standard.

The panel considers neuroscience in Uppsala at present to be too diverse and in need of defining a strategy that helps focus in this competitive field. It takes note of the fact that there are upcoming vacancies that bring opportunities for renewal in the research area. Furthermore, it identifies a need to develop the research infrastructure and to promote common use of expensive equipment, as well as core facility functions in specialized areas. It recommends focusing on a few thematic research areas as a way to define a strategy for the future, and as an example, it gives research on feeding behavior and related disorders.

### **Department of Genetics and Pathology**

Panel 24 stresses that it saw extraordinary high level of science in the Department of Genetics and Pathology. The breath of high quality research impressed the panel, which had no doubt that many of the groups represent international top quality. The molecular tools activity and the human protein atlas project were mentioned in this category. No activity in this department fell short of internationally high standard according to the panel.

The panel comments on problems associated with the lack of a tenure track system. It also points to the problem that some of the younger PIs (principal investigators) are not easily recognized as independent scientists by funding agencies, although it is clear that such innovative research needs a critical mass of sufficiently experienced scientists. Regarding actions for successful development, the panel suggested counteracting fragmentation tendencies by relocating activities, and it pointed to the development of institutional support for core facilities as a matter of importance for future success.

### **Ludwig Institute for Cancer Research**

Panel 24 praises the research at the Ludwig Institute as one of the best in the world of its kind, and it states that the scientific production of the Uppsala institute is superb. One of the unique aspects of the Uppsala Ludwig branch is said to be the combination of top class research within one unifying theme with very good research training. The panel appreciates the way the institute can stimulate the University environment to adopt some of its strategies and that different structures enrich the academic environment. On the one hand, classic departmental structures facilitate growth of small independent groups and a diversity of research avenues. On the other hand, focusing groups around large themes, as done at the institute, provides opportunities for significantly advancing the field. The panel takes note that external recruitment is dominating at the institute, as opposed to the university.

#### 4.4.2 Pharmacy

The research in the faculty of pharmacy was reviewed by panel 19. The panel identifies activities of excellent quality and innovative research, as well as areas in need of renewal in order to meet important missions of this faculty. Some impediments to fully realizing the faculty's potential are mentioned to exist in terms of non-optimal support allocation and career planning. Also, the potential for interaction within and outside departments, as well as across faculties was considered not fully developed. The panel wanted to see a faculty-wide strategic longer-term planning as well as succession planning in some case.

The research environment and facilities for Ph.D. students and young scientists was generally found to be good by the panel. Career opportunities with secure continuity was mentioned as a concern here as in many other departments at the university. Furthermore, the panel recommends investments in general facilities, such as high-level computer facilities and advanced analytical instruments, and it underlines that such efforts be made in a way that makes them widely available and promotes collaboration.

##### **Department of Pharmaceutical Biosciences**

The panel concurs with the strategic view of the Department of Pharmaceutical Biosciences that pharmaceutical informatics and neuropharmacology of drug addiction are two areas of vital importance for the future. It wants to add one area, that of drug safety, including research of pharmaceutical nanocarriers. The panel suggests that increased collaboration between the groups in proteochemometrics and pharmacometrics would be beneficial to the research in pharmaceutical informatics, and it endorses the plans for model-based research in this field. The panel considers the research in drug addiction to have great potential and to be of top quality including world-leading expertise in the study of opioid transport by various methods. The research in drug metabolism is appreciated by the panel to be of high standard, but is suggested to be carried out in closer collaboration between the different groups engaged in this field.

##### **Department of Pharmacy**

Research in the areas of social pharmacy and pharmacy practice is conducted in two groups in the Department of Pharmacy, and issues regarding critical mass and scope of interests are mentioned by the panel. It is recommended that the groups focus and concentrate on their strengths, and also that they collaborate and seek strategic collaboration in the faculty of medicine.

The pharmaceutical research activities are assessed to be of high quality and internationally recognized. Actions for renewal endorsed by the panel, aiming at improved external funding, include development of pharmaceutical physics

expertise such as collaborations within materials science, and also improved theoretical framework for solid dosage forms design and processing.

Biopharmaceutics research has a clear international standing according to the panel, and it enjoys adequate funding from industrial and public sources. Strengthening of activities is endorsed by the panel. The panel commends the group in drug delivery research for its efforts to focus on its strengths, and it notes that this group has a high international standing. It also considers the physical chemistry research to be a new promising activity that needs time to flourish.

### **Department of Medicinal Chemistry**

In reviewing the Department of Medicinal Chemistry, the panel recognizes the long tradition of excellent research in the area of pharmaceutical and biomedical analysis, though it notes an output decrease during the last years. Among the initiatives at hand for renewal and increased external funding, a clear choice of direction is advocated by the panel and a suggested field is metabonomics including biomarkers. The panel suggests that pre-emptive appointment action should be considered.

The panel regards pharmacognosy research as having a wide scope of activities that might be somewhat concentrated. Increased interaction with analytical pharmaceutical chemistry is encouraged.

The organic pharmaceutical chemistry division is considered to be a strong unit with impressive output and balanced scientific and applied activities. The panel endorses the plan to strengthen the group by two new professors, but it suggests alternative research specialty and underlines the importance to find a successor who can take over the leadership of the large research group.

## 5. Bibliometric study

### 5.1 Introduction

As mentioned in Part I the bibliometric analysis was conducted as a separate exercise, and the results were not available to the panellists. There were several reasons for this. One was not to bias the panels and another was related to the differences between disciplines in terms of publication traditions, which lead to varying applicability of bibliometry. Although the panel evaluation was not based on bibliometrics some panels commented on its use. One HS panel thus declared:

As part of the Quality and Renewal process a bibliometric study is undertaken by external expertise. A bibliometric analysis is a productive tool to measure research outcomes, channels of scientific publication, impact, research collaboration etc. However neither existing international nor national databases opens for sound bibliometric studies of scientific productivity and quality in non-English speaking countries, nor in non-English scientific publications. The existing databases do not account for different traditions of scientific publications. This is especially the case in areas of humanities and social sciences. (HS Panel)

Also a ST panel made a comment regarding the publication practices in information technology, where conference proceedings are regarded very important:

We are concerned that when only journal publications are used to evaluate faculty research, one not only gets the wrong picture of [the] research, but faculty are prompted to work along lines that may be less productive than they could be. (ST Panel)

### 5.2 Methodology

The bibliometric study has been carried out by M.S. Visser and A.J. Nederhof at Center for Science and Technology Studies (CWTS) at Leiden University in the Netherlands. The basis was the publications available in the Web of Science version of the Science Citation Index (SCI), the Social Science Citation Index (SSCI) and the Arts & Humanities Citation Index (A&HCI).

Data from these were extracted for the period 2002-2006 on the basis of a list of researchers with department affiliations, active at Uppsala University on September 26, 2006. In addition a check for consistency with the Uppsala University OPUS database was made.

In the bibliometric analysis a number of indicators were generated. The basic indicators were the number of articles published (P) and the number of citations recorded (C). These were then used to generate figures regarding average number of citations per publication (CPP) and percentage of articles not cited (Pnc). In order to put the citations figures into context they were related to two reference values: (1) the average citation rate of all articles in the journals in which the research unit is active (JCSm) and (2) the average citation rate of all articles in the subfields in which the research unit is active (FCSm). The relationship between a department's average citation rate (citations per paper, self-citations excluded) and the first mentioned reference value provides an index for the relative impact of its research in the journal set (CPP/JCSm). Correspondingly the relationship between the citation rate and the second reference value (CPP/FCSm) gives an index in relation to the research field. Scores of unity for these two indicators thus means that the department's papers have been cited at the same rate as the world average for the journal set and for the field(s) in question, respectively. A score of e.g. of 1.3 means that they have been cited 30% more.

In order to be able to generate these normalized citation scores, a certain minimum amount of publications subject to being indexed in the Web of Science databases is required. Many departments in the faculty of Social Sciences and all departments in the Humanities publish in a way that does not generate enough indexed publications in the databases to allow a statistically significant citation score to be calculated. This is mainly a result of differences in publication outlets (see below) and limitations in the data bases. It is therefore important to recognize that absence of departments in the results of the bibliometric study does not say anything about the quality of the research. Also, caution should be exercised for departments with low number of indexed publications.

### 5.3 Results

The bibliometric study shows that the number of Uppsala University publications in the period of 2002-2006 was almost 20,000. Of these a bit more than 40 per cent are in the Web of Science databases. These articles are to a dominating extent published by scholars in the disciplinary areas of Science and Technology, and Medicine and Pharmacy. Researchers in the Humanities and Social Sciences (including Educational Sciences) on the other hand have larger shares among non Web of Science articles, book chapters, books, edited books, reviews and book reviews. These differences in publication practices

are illustrated in figure 5.1. Note that the numbers for Ph.D. and Lic theses only account for theses by individuals who were employed at Uppsala University in September 2006, which is the general requirement for this study.

The number of Web of Science publications was 8,502. These obtained 45,209 citations, self-citations excluded, i.e. on average they were cited 5.32 times. One third of the publications had not been cited at all, while 228 papers belonged to the five per cent most cited papers in their field.

The impact of the research in relation to journal sets was 1.06 for the University as a whole, i.e. Uppsala researchers had a 6 per cent advantage to the world average. Above the University average were Social Sciences (1.25), Mathematics and Computer Science (1.17), Medicine (1.08), Chemistry (1.08), Earth Sciences (1.07) and Engineering (1.07), while Pharmacy (1.05), Biology (1.01) and Physics (0.89) were below.

Using the average impact in relation to the research field Uppsala researchers came out even better. The index was found to be 1.25, a 25 per cent advantage of Uppsala scholars. Above the University average were Biology (1.36), Chemistry (1.35), Engineering (1.35) and Social Sciences (1.26) and below Medicine (1.22), Physics (1.17), Mathematics and Computer Science (1.11), Pharmacy (1.11) and Earth Sciences (0.94). For departments with more than 50 WoS publications in 2002-2006 figure 5.2 provides information on the field normalized impact factor, number of publications and citations. The limit of 50 publications was chosen to yield statistical significance.

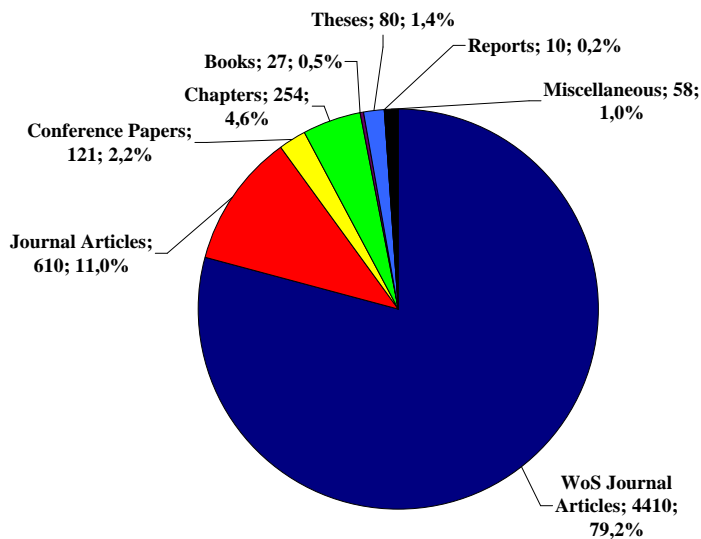
It could also be noted that the Leiden team found that Uppsala researchers are well connected to high quality research groups:

Users of UU knowledge tend to be cited highly themselves. This indicates that UU work is used by researchers of high impact, at the edge of the research frontier. (see the full report)

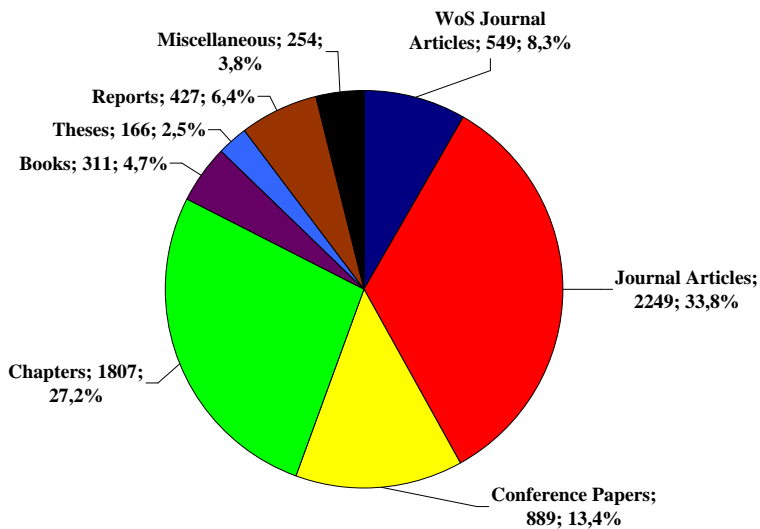
The bibliometric study also shows that Uppsala scholars on average publish in journals that have an impact that is 17 per cent above the world-average. Again there were variations between fields in the University. Above the total average were Biology (1.35), Physics (1.32), Engineering (1.26), and Chemistry (1.25), and below Medicine (1.13), Pharmacy (1.06), Social Sciences (1.01), Mathematics and Computer Science (0.95) and Earth Sciences (0.88).

In interpreting the presented results it should be kept in mind that the number of indexed publications in the analysis varies considerably between the disciplines. It varies from 340 for Earth Sciences to more than ten times as many (3,556) for Medicine.

All in all, the Leiden group presents a positive picture of the impact of Uppsala research and they conclude their report by stating:

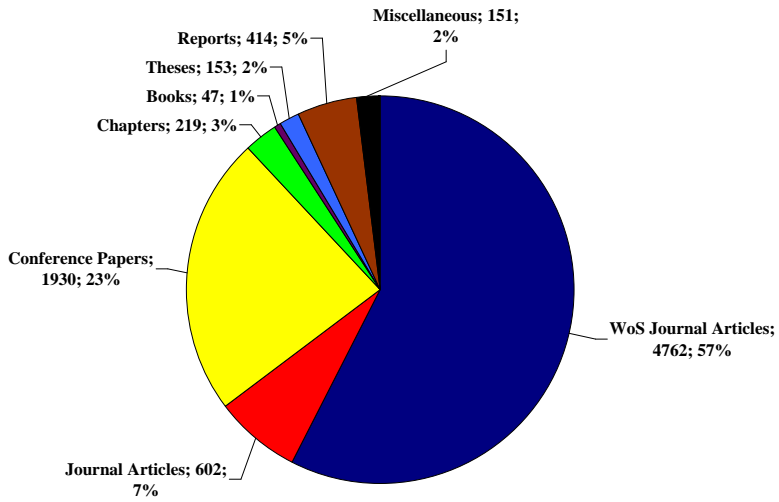


(a) Publication types for Medicine and Pharmacy 2002-2006



(b) Publication types for Humanities and Social Sciences 2002-2006

Figure 5.1: Publication types at Uppsala University 2002-2006



(c) Publication types for Science and Technology 2002-2006

Figure 5.1: Publication types at Uppsala University 2002-2006 (continued)



ducted. In their view there is not a clear correspondence between impact and scientific quality. They therefore point out that bibliometrics and peer review conclusion may differ. Reasons for such differences may be for instance classification of journals into subfields. Such problems occur particularly for fast-developing novel interdisciplinary areas.

Second, they point to the coverage of citation indices, which for certain areas may be less adequate. They therefore mention the need to also take into consideration publications that are not or no longer covered by the data bases.

Third, they mention the problem of time delays, which may differ between research fields:

It may take several years for a collection of papers to generate a high impact. We have analyzed research units that generated only a moderate impact at a time. When we updated the results after a few years, several research units showed a sharply rising curve. (see the full report)

Fourth, they point to other uncertainties due to the limitation of the population of researchers.

These caveats should of course be kept in mind in reading the Leiden report. Its authors seem to advise its readers to consider it as a complement to the Panel reports rather than to use its results in isolation.

