

Fifth Nordic Bibliometric Workshop

Program and Abstracts

Oulu, October 5 – 6, 2000

Edited by

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FOREWORD

The annual series of Nordic Bibliometric Workshops was continued in Oulu, Finland, on the 5th-6th October, 2000. The workshop was hosted by the Department of Information Studies at the University of Oulu and funded by Nordinfo. Nordic Bibliometric Workshops have been arranged since the year 1996 in the following places: Helsinki 1996, Stockholm 1997, Oslo 1998, and Copenhagen 1999 (CIS, Centre for Informetric Studies).

The purpose of this series of workshops is to give an overview of the current Nordic bibliometric activities in 1999-2000, to present recent bibliometric research in the Nordic countries, and to promote the contacts between the bibliometric research groups operating in the Nordic countries and their doctoral students. These targets were well reached by the workshop. The quality of the presentations was notably high, and the papers presented several fields of bibliometric research. Their focus was not only on research results, but also on methodological questions.

There were 18 participants on both days: 2 from Denmark, 1 from Estonia, 2 from Norway, 4 from Sweden, and 9 from Finland. These two days provided a rather exceptional possibility to discuss both topics of research and collaboration, and this possibility was fully utilized both during and outside the sessions.

This series of workshops definitely has a function in the field of bibliometrics in the Nordic countries. The advantages of these meetings include their light organization, which not only makes it possible to arrange them annually but also makes it easy to participate. The workshop also provides an opportunity to be in touch with Nordic colleagues, and to make the acquaintance of new ones, both foreign and domestic. It also gives review of the kind of research going on in different institutions, and to have the opportunity to present one's own work to a competent, friendly audience. The informal atmosphere and the expertise of the participants contribute to the discussion about the presentations and provide fruitful feedback to the authors. The series will be continued next year in Sweden, and I am looking forward to meet there both the participants of this year, and new names.

Terttu Kortelainen
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PROGRAM

Thursday, October the 5th		Chair: Peter Ingwersen
13.00-14.45	<p>Terttu Kortelainen, University of Oulu, Finland Practical information.</p> <p>Mirja Iivonen, University of Oulu, Finland Welcoming address.</p> <p>Olle Persson, University of Umeå, Sweden Bibliometric analysis of two national innovation systems - Finland and Sweden.</p> <p>Gunnar Sivertsen, Norwegian Institut for Studies in Research and Higher Education, Norway: Small and weak - or of another kind? Explaining Norway's position according to national indicators.</p>	
14.45-15.15	Coffee	
15.15-16.30	<p>Birger Larsen, Royal School of Library and Information Science, Denmark A set of diachronous indicators for research evaluation.</p> <p>Peter Ingwersen, Royal School of Library and Information Science, Denmark Scandinavian Psychiatry 1981-98 in a World and EU context.</p> <p>DISCUSSION</p>	
18.30 -	Dinner at Neptunus	
Friday, October the 6th		Chair: Olle Persson
10.00-11.45	<p>Dag W. Aksnes, Norwegian Institute for Studies in Research and Higher Education, Norway The problem of database coverage: A comparative study of ISI's coverage of research output at a Norwegian university.</p> <p>Peter Ingwersen, Royal School of Library and Information Science, Denmark Social Science Research Profile similarity in the ISI information space.</p> <p>Rickard Danell, University of Umeå, Sweden Stratification among Journals in Management Research.</p>	
11.45-13.15	Lunch	
13.15-14.15	<p>Hampus Rabow, University of Gothenburg, Sweden Bibliometrics in monograph cultures - Some methodological considerations.</p> <p>Ülle Must, Archimedes Foundation, Estonia Cooperation of Estonian research institutions: co-authorship and co-partnership pattern</p> <p>Bo Jarneving, University College of Borås, Sweden The cognitive structure of current cardiovascular research.</p>	
14.15-14.45	Coffee	
14.45-15.30	<p>Tapio Seppänen, MediaTeam, University of Oulu, Finland Joint research project in semantic information processing with the MediaTeam.</p> <p>CLOSING DISCUSSION</p>	

BIBLIOMETRIC ANALYSIS OF TWO NATIONAL INNOVATION SYSTEMS - FINLAND AND SWEDEN

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Abstract

This study is the most comprehensive bibliometric report of Finnish science carried out, and it is based on a long time series. It uses many types of bibliometric indicators to describe the scientific and technological activities of the Finnish research base. It draws attention to

- publication activities and international visibility and impact of Finnish scientific research
- domestic and international collaboration patterns, and
- indicators of technological innovation activities.

The major findings of the report include the following.

The report gives a very positive picture of Finnish science. The policy to strengthen the internationalisation of Finnish science seems to have been effective. Finland has increased its international publishing and has improved the international visibility and impact of its research publications. Overall, Finnish scientific publications are well above the world average in impact.

The positive trend in the international impact of Finnish science is associated with a dramatic increase in international collaboration. Today, 40 % of the Finnish publications are co-authored with researchers from other countries, while the corresponding figure was only half that in 1986. Researchers from EU countries have become major collaboration partners for Finnish researchers. Twenty percent of Finnish papers are co-authored with researchers from the EU-countries, and the share has grown significantly faster than the share of papers co-authored with researchers from North America. EU research collaboration and the EU Framework Programme for research and development have probably played an important role in the increase of scientific collaboration with other EU countries.

A SET OF DIACHRONOUS INDICATORS FOR RESEARCH EVALUATION

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Abstract

A methodology is presented for calculating the actual impact of research publications, and the impact of the used journals, as well as the impact in the same domain in selected countries, the EU and the World. Combining the actual impact with that of the domain makes it possible to construct a set of indicators that has the potential to eliminate the differences in publication and citation behaviour between scientific fields. The calculations of domain impact form the baselines against which the performance of the research groups is measured. This makes it feasible to carry out fair comparisons of the performance of different research groups, despite differences in research focus, research profiles and scientific field. The central part of the methodology, based on the calculation of diachronous Impact Factors, was presented on last year's workshop. This presentation focuses on the calculation of the baselines, more specifically on adjusting the baselines for each research group in a research evaluation according to their individual research profiles. The applicability of the indicators on samples (generally >40% of the populations) is also demonstrated, together with the necessary tests for statistical significance. Data gathering for the calculations take place in National Science Indicators, and in Science Citation Index in the online version. Although the presented methodology is applicable on samples they do demand considerable resources to apply in practise. Therefore the presented set of indicators is best suited for comparative analyses of research units where there is a demand for great detail and accuracy. The terminology concerning Journal Impact Factors and other types of bibliometric analyses are also discussed. It is argued that the use of the distinction between diachronous and synchronous analyses can resolve some of the confusion in the field, e.g. on the term 'Cited Half Life' being used for two different types of analyses.

THE INTERNATIONAL RESEARCH VISIBILITY AND IMPACT OF RESEARCH IN PSYCHIATRY FOR DENMARK IN SCANDINAVIAN, EU AND WORLD CONTEXTS

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This study covers the Psychiatric field 1981-98 and is based on data from National Science Indicators database (ISI, 1999). Although the number of international research publications and received citations in Psychiatry indeed has risen for Denmark and Sweden, both countries show stable World shares but suffer from decreasing world shares, in particular concerning publication activity for Sweden. In terms of absolute impact the Danish impact increases slightly from 1991 while the Swedish absolute impact declines constantly.

During the period the Netherlands and Finland increases their publication activity (or visibility) also relative to the World and EU. With respect to relative citation impact (RCI) Denmark follows the World development upwards - but at a lower level than the baseline. Sweden has in contrast lost a third of its RCI and falls behind the EU impact from 1993. The proportion of cited papers is declining in recent years for both Denmark and Sweden. This implies that fewer papers contribute to the citation impact than seen, e.g. in the Netherlands or EU.

Selected results:

Citations

- The EU world share is increasing steadily over the period reaching 30,6 %
- The US world share drops to 64 %
- Denmark and Sweden demonstrate longer periods of negative growth, the worst period being 1989-93
- From 1993 both Finland and the Netherlands overtake Denmark in absolute citations, the Netherlands already from 1989
- Sweden constantly loses citation world and EU shares, the latter share is halved, although Sweden receives more citations
- Denmark's EU share drops to 3,9 % from 6 % over the period - but citations increases in absolute numbers
- The Netherlands increases dramatically its shares from 1988

Absolute citation impact

- The expected average impact in Psychiatry - the World impact - passes 3,5 in 1989-92 and reaches 4 from 1992
- Both the Netherlands and Finland demonstrate a growth in absolute impact from 1991 passing 3,5 citations per publication
- The Danish impact is rather stable until 1991 and then increases close to 3,5

- Sweden constantly loses absolute impact from 1988 down to 3,2
- The US absolute impact increases to more than 5 citations per publication
- The EU impact increases only to 3,5, i.e. below the expected field impact

Relative citation impact - RCI

- The Danish RCI is rather stable from 1990 - following the world impact on index 0,9
- From 1988 Sweden has lost 1/3 of its RCI ratio, down to 0,8
- Denmark evolves around the EU average impact - index 1,0
- Sweden falls behind the EU average 1993-97
- Netherlands is located above the EU average from 1991

Cited papers

- for the entire period 1981-98 Denmark, Sweden and the Netherlands have approx. 80 % of their papers cited at least once - above the EU average on 77 %
- 1994-98 Denmark and Sweden only have 56 % of their papers cited - against 59 % for EU and 65 % for the Netherlands
- 1994-98 Norway have only 50 % of its papers cited.

THE PROBLEM OF DATABASE COVERAGE: A COMPARATIVE STUDY OF ISI'S COVERAGE OF RESEARCH OUTPUT AT A NORWEGIAN UNIVERSITY

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Abstract

Bibliometric indicators have to an increasing extent been employed in science policy processes and research evaluations. This presentation will address the question of how well bibliometric indicators represent the research production within various scientific fields. As object for our study we have selected the standard bibliometric product National Science Indicators on Diskette (NSIOD) produced by Institute for Scientific Information (ISI). By applying the CRIS-database FORSKDOK at a Norwegian university (University of Bergen) the coverage of this ISI-product has been examined. The study has been based on publication data gathered from FORSKDOK from 1997 and 1998.

By applying this database in which all different kinds of publications are registered, it has been possible to assess how the importance of different publication types, such as books and international journal articles, varies between the disciplines. Our preliminary results showed that in biomedicine, physics, and chemistry the large majority of the scientific production appeared in international journals. Medicine, biology, the earth sciences and mathematics/informatics also had a relatively strong orientation towards international journal publishing (41-51%). In contrast, such publishing is much less significant in the social sciences and the humanities (17 and 12%, respectively).

In respect to the international journal production, we identified large differences in the NSIOD coverage of this production. The highest degree of coverage is obtained for biomedicine and chemistry. In these fields more than 90% of the international journal production appeared in NSIOD indexed journals. For medicine, physics, and earth sciences the coverage was in the range of 81% to 88%. Biology and mathematics/informatics attained the lowest coverage among the natural sciences, 72% and 54% respectively. For the social sciences only 52% of the international journal production was covered. Thus, a significant share of the international journal production in the social sciences is not indexed in NSIOD. The results obtained through our study represent important background information concerning the representativity of bibliometric indicators in a Norwegian context.

MAPPING NATIONAL RESEARCH PROFILES IN SELECTED SOCIAL SCIENCE DISCIPLINES

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Introduction

National research profiles provide evidence of the foci of research in terms of publication or citation volumes within a country, institution, or other defined locations for a selected domain of science in a given time period. Such profiles are comparable across countries and time, and can be viewed and mapped as fingerprints of the *performed* or *interpreted research*. As a visualisation tool the maps may indicate developments of publication behaviour and official or hidden strategies of research and complement common quantitative S&T indicators.

Based on previous analysis results¹ we investigate the profile relationships for 17 OECD countries covering nine selected social science fields from the National Science Indicators (NSI) database, produced by ISI, 1999¹. The presented maps covering two periods, 1989-93 and 1994-98, essentially mirror the *ISI defined information space* in the international journal literature and its development. This space is admittedly biased by the Anglo-American research production. However, according to Nederhof and van Wijk², Hicks³, and Ingwersen¹, the internationalisation of the SSCI (and hence the NSI) database is increasing and makes an investigation of national profiles similarity interesting, in particular in association with the predominant US publication and citation profiles over time.

The purpose of the investigation is to map clusters of national publication and citation profiles over time and observe their dynamic development and relationships. A second aim is to test their usefulness in research monitoring, e.g., in relation to relative national citation impacts and the citation-publication profile correlation. The selected social science fields are used as test platform since they provide large variations in the profiles and of impact the countries in between.

Method

Four maps are constructed by means of the data set adhering from the NSI database¹ by means of MDS applying a cosine vector matrix (17x17 cells) as input for each map⁴. The publication and citation maps, respectively, are analysed and discussed over the two periods in a longitudinal mode. In the maps the size of the circles representing the countries indicates the volume of publications and citations respectively. Shades of black and grey indicate three scaling zones for the national impact factor (NIF).

The degree of *overlap* between a map of publication profiles and the corresponding map of the citation profiles at a given point in time represents a second dimension of analysis of cognitive correspondence. In case of a significant discrepancy between a pair of maps the correlation between the national profile

¹ Communication theory; Economics; Education; Language & Linguistics; Library and Information Science; Management & Business; Political Science & Public Administration; Social Work & Social Policy; Sociology & Anthropology.

pairs is tested by the Pearson coefficient r . The NIF values are listed with the corresponding coefficient score for each period in order to obtain an overview of the phenomena involved.

Selected Results

- The US world *publication share* diminishes from 64% to 59% 1989-98; correlation between profiles is high: $r = .988$ ($p = .005$).
- The US world *citation share* similarly decreases: 78% to 73% 1989-98; correlation between profiles is *very high*: $r = .999$.
- *Publication maps*: a central cluster exists of US, CA, UK, AUS, NZ in both periods
- 1989-93: two small clusters are found: NL, IT, SP, SE and more remote: FIN, DK, BE. other countries are scattered in isolation
- 1994-98: the two small clusters merge also including Japan and Switzerland; SE, FIN, DK form a sub-cluster
- *Citation maps*: 1989-93: a large diffuse central cluster (US/CAN centred) of all countries except DK, BE in one remote cluster and FIN isolated
- 1994-98: central cluster is split: SE, BE, DK, CH, IT clustered as in the publication map. NL and FIN circles with AUS the concentrated US/CAN/UK cluster. Other countries as single isolated systems.
- No distinct pattern is detected related to impact observations and clustering over time. However, the smaller remote European system around SE has gained impact.
- Lower Pearson coefficients show interesting correlation to relative NIF due to larger difference between national citation and publication profiles.

Conclusion

Mapping research profiles is seen as an alternative and complementary visualisation tool in R&D observations with substantial signal value and informative characteristics concerning national foci of research *and* as a tool for the assessment of a given information space dominated by a single country.

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STRATIFICATION AMONG JOURNALS IN MANAGEMENT RESEARCH: A BIBLIOMETRIC STUDY OF INTERACTION BETWEEN EUROPEAN AND AMERICAN JOURNALS

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Abstract

Two key features of science are its rapid growth and its continuous differentiation. The establishment of new journals can be seen as an expression of both growth and differentiation. In this study of the network among management journals, the focus is on relationship forms of differentiation, i.e. the relationship between stratification and specialization in a network of journals. The question asked in this study is whether the different position of American and European journals corresponds with different levels of specialization. A tendency toward such a structuration of the journal network would indicate an interregional integration of management research. Articles published in six of the most influential American and European journals covering the period from 1981 to 1998 have been downloaded. The findings in this study indicate that even though European journals formed a periphery in relation to the American journals in terms of clearly asymmetrical exchange relations, it was the European journals that seemed to be more comprehensive in scope. The tendency during the investigated period indicated differentiation in terms of segmentation rather than specialization.

COOPERATION OF ESTONIAN RESEARCH INSTITUTIONS: CO-AUTHORSHIP AND CO-PARTNERSHIP PATTERN

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Introduction

International collaboration has become a key characteristic especially in the small countries or less developed nations that lack a comprehensive and high quality domestic science base. In present situation it concerns also Estonia.

The paper will focus on the analyses of formed networks of Estonian research institutions.

Methods

Given analyses are made from the SCI 1991-1999 data, the data of participation in Fourth and Fifth Framework programmes of Estonian research institutions, as well as the self-analysis data submitted in the years 1997-to present by Estonian higher educational establishments for the implementation of Higher Education Quality Assessment.

Results

We can distinguish two periods in last ten years developments: Period 1991-1993, and 1994-1999.

- First period was a time of re-structuring of Estonian science. The co-operation predominates with various research institutions in Russia (17.3%), succeeded by Finland (17%), Germany (16%) and Sweden (12.2%). The circle of international co-operation was relatively narrow - four countries cover 62.5% of total capacity. In this period the participation in international co-operation programmes was exception not rule.
- In second period the capacity of joint articles with Russian scientists has dropped to 6.8%. Basically co-authorship geography is the same as in first period. First come researchers as co-authors from Finland (17.3%), Sweden (17%), Germany (12.2%) and the USA (9.6%). Although experts have recommended closer co-operation among the Baltic scientists, that exhortation has seemingly gone unheeded. The tendency is a continuous decrease in the proportion of the authors from the former SU republics as well as from East and Central Europe.
- From 1994 Estonian researchers had a possibility of participating in the EU 4 FP, from 1999 on they take part in the 5FP as fully qualified members. Framework programmes have opened up possibilities for substantially expansive co-operation. At the head of the leading group of the multinational co-partnership are United Kingdom, Germany, Finland, Sweden. In comparison with the data of publishing, considerably predominated by the leading group of four countries across years, the circle of co-operation partners is more widely dispersed.
- International co-authorship differs from field to field. In humanities there is no co-authorship at all. Also in sciences are big differences between fields. The most collaborative research fields are biomedical research (70% of articles with foreign co-authorship), clinical medicine (61%)

and earth and space research (56%). 53.4% of Estonian articles (SCI) is published in international co-operation.

Conclusions

Within a relatively short time (10 years from the restoration of independence) a rapid re-orientation from the sphere of SU science-system to that of European science has taken place.

Estonian development affirms basic scientometric rules as: a) the level of international co-authorship is determined by the size of the country (In Estonia's case - 53,4% of articles is published in international co-operation); b) the level of international co-authorship is influenced by "proximity" between countries, either physical (geographical) proximity or immaterial proximity stemming from cultural affinity in a broad sense (historical, linguistic), or by socio-economic factors. Restoration of international research contacts first with Finland, Sweden and Germany is, besides their geographical vicinity, related to either affinity of languages (Estonian and Finnish are close cognate languages) or traditions of culture (in 1632 King of Sweden founded a university in Tartu; up to the beginning of the 20th c. Estonia belonged to the German sphere of culture).

Finally

Collaboration needs communication. Estonia is the most Internet penetrated country in the Central-Eastern Europe and sixth in Europe after Sweden, Finland, Norway, UK and Slovenia. By the end of the last year, 25% of population have used the Internet (Finland 36%, UK 28%). It is very good starting point for international collaboration.

References

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THE COGNITIVE STRUCTURE OF CURRENT CARDIOVASCULAR RESEARCH

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Abstract

This paper presents a citation analysis of the cognitive structure of current cardiovascular research. A test sample of 500 recent bibliographic descriptions of publications on cardiovascular research was retrieved from Science Citation Index Expanded via Web of Science. On the basis of the analysis of this test sample 1710 bibliographic descriptions of publications from central journals on cardiovascular research were retrieved as a final set for further analysis. These were submitted to co-citation analysis, bibliographic coupling and quantitative analysis of title words. Tables and graphs reveal: (1) The journal co-citation structure based on the test sample; (2) the cognitive content and the bibliometric structure of 45 co-citation clusters; (3) the cognitive content and the bibliometric structure of 22 clusters. A predominance of different research aspects on coronary artery disease was found in clusters based on co-citations as well as in clusters based on bibliographic coupling. Clusters of the intellectual base that refer to thrombolytic therapy, cardioprotective agents, coronary interventions, nuclear cardiology – diagnosis, cardiology management, atrial fibrillation and risk factors contain the most recent co-cited publications. Publications based on bibliographic coupling were found to focus on coronary artery disease and intervention, vascular dysfunction and heart failure.

A JOINT RESEARCH PROJECT ON SEMANTIC INFORMATION PROCESSING IN MEDIATEAM

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The Internet databases of the future will contain massive amounts of multimedia data, including video, images, speech, and music. Search robot technology must be further developed for more usable and intuitive user interfaces for the handling of complex data. New indexing methods should evolve to a point where they enable automatic or semi-automatic functions that analyze and interpret data even at the semantic level. This will require extensive application of artificial intelligence and pattern recognition methods.

Several challenges are associated with the development of better user interfaces. For example, what kind of query language should be used for visual information? Or for data with a time dimension, such as voice and video? The potential solution might be non-verbal, for instance sketching methods for retrieving digital images with the desired overall shape. In the implementation of these ideas, then, what are the most effective matching methods? How about relevance metrics?

MediaTeam is a large research group in the Laboratory of Information Processing in the Faculty of Technology of the Oulu University (<http://www.mediateam.oulu.fi>). The group concentrates on multimedia communications research, one particular topic being content-based multimedia retrieval. The group has launched a cooperation project with the Information Studies Department of the Faculty of Humanities in order to develop future search engines. The main goals of this cooperation are the development of retrieval SW platforms (working over fixed and wireless networks), new database structures (organization, indexing), more usable user interfaces (text-based, graphics-based), and search algorithms (query languages, data analysis). A major issue is how to better understand the way in which users search for complex information, such as multimedia.

Today, the cooperation includes a series of meetings, the Journal Club, in which a review of the state of the art in associated literature is carried out by graduate and post-graduate students. The aim is to deepen our understanding of the most significant issues through discussions and preparation of lecture material. In addition, students of the course on Research Methods in the Information Studies Department are given tasks related to the project. Some of them will consider audio material, while others will look at images and videos, trying to figure out how users look for semantic content in the data. We also aim to use these students for the evaluation of prototype systems. In addition, we plan to launch a separate joint project with external funding in the near future.

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PHOTOS



Photo 1. Pentti Nieminen, Sara von Ungern-Sternberg, Birger Larsen, Ülle Must

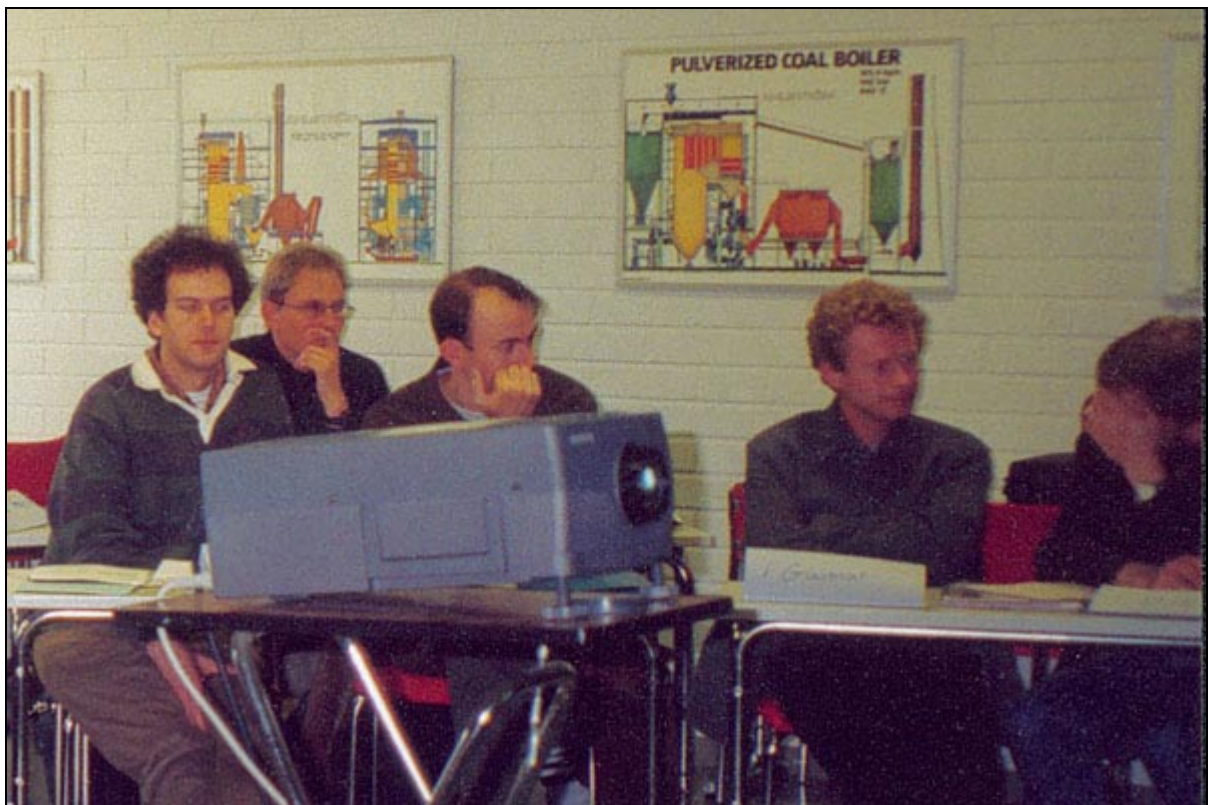


Photo 2. Hampus Rabow, Dag Aksnes, Rickard Danell, Gunnar Sivertsen, Olle Persson



Photo 3. Hampus Rabow, Olle Persson, Rickard Danell, Gunnar Sivertsen, Peter Ingwersen



Photo 4. Marko Saarijärvi and Birger Larsen



Photo 5. Peter Ingwersen