

Report from DRUID (Danish Research Unit for Industrial
Dynamics) August 1995-August 1999

Background material for the evaluation of the DRUID research programme edited by Research
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Preface by Professor Bo Carlsson

Chairman of the International Scientific Advisory Board for DRUID

As chairman of the International Scientific Advisory Board of the Danish Research Unit of Industrial Dynamics (DRUID), I have had the opportunity to follow the activities of the research group closely throughout the four years of its existence. I have visited the programme in connection with conferences and seminars at least twice a year. The background report presents a clear overview of the development over time of Druid's performance in terms of scientific publications, training of Ph.D. students, and interaction with users.

There are a few points in the report, which I think deserve particular emphasis, however. One is that the programme has succeeded in establishing itself as a prominent center and host for international exchange of ideas in the field of industrial dynamics. Perhaps the best indicator is the fact that most of the members of the advisory board, as well as other prominent scholars in the field, have attended several of the DRUID conferences. The lists of participants at the conferences included in the report show that many colleagues from all over the world who are in great demand as speakers have taken time off to go to Denmark not once but several times.

Another point, which might be difficult to discern from a written background report, is the high degree of qualitative success (not just quantitative) of the DRUID Ph.D. training. I have followed the individual development of a number of Ph.D. students connected to the research programme, seeing how they have developed their analytical and presentational skills from one year to the next. This is reflected in the papers they present and in the way they comment on papers by others. My impression is that the regular confrontation with advanced international scholars not only affords opportunities rarely available to Ph.D. students elsewhere but also constitutes an innovative and important element in their training.

Four years is not a long period when it comes to building a research Network. I hope that DRUID will get a chance to continue its important work. I see four areas of particular opportunity. First, DRUID has a rather unique constellation of research skills related to the economics of knowledge, learning and competence, and I hope that this track will be pursued even more vigorously in the future. Second, it has established a set of rich and diverse databases, which provide possibilities to analyze new issues in new ways, especially if the statistical expertise of DRUID were strengthened. Third, the results of applied research now coming from DRUID, including the DISKO-project, could motivate a more institutionalized interaction with users of research, especially public agencies and private firms. Finally, the Ph.D. programme has now reached a volume and a quality to justify the establishment of a research school in industrial dynamics that could be opened up to foreign and domestic students.

September 16, 1999
Professor Bo Carlsson
Case Western Reserve University
Dept. of Economics

Major achievements according to the Research Manager – where DRUID has made a difference:

New analytical perspectives on industrial dynamics have been developed through the interaction between the different research groups constituting the Unit. The macro perspective on innovation systems of the IKE-group in Aalborg has been enriched by the theory of the firm approach at CBS and vice versa. New perspectives developed within DRUID, coupling human resources with industrial networking, have important policy and strategy implications. The shared effort to understand what it means for business and policy that there is a move into a ‘learning economy’ has made it possible for DRUID-participants to play a role in developing and diffusing new analytical perspectives.

Productivity in terms of refereed publications has increased substantially and it has become much more oriented toward articles in refereed journals and books. There has also been a strong growth in policy oriented output aiming at Danish and international users in the public and private sector.

Visibility in the international community has increased. The home page statistics, showing the wide dispersion of the working paper series, the constant high level participation in DRUID-conferences and, not least, the citation analysis all point to a dramatic increase in the international visibility of the research. Already after four years, DRUID has become a recognised and central node in the global network of scholars working in the field of industrial dynamics.

The quality of research training has been enhanced. More than 20 Ph.D. students with DRUID-seniors as their tutors have benefitted from the interaction within DRUID and especially from the bi-annual conferences with high level international participation. As a result, most Ph.D.-students have produced their theses in English. Those who have already finished their theses have all got attractive jobs either in the university sector or in the private sector.

Interaction with users has been enhanced in terms of both frequency and quality. Most of the interaction takes place through individual projects and individual senior scholars and it is often sector specific and local. DRUID has created a framework for exchanging experiences and for quality control in this context. DRUID/DISKO has been involved in organising two unique high level policy workshops.

Infrastructure has been built and synergies have been exploited. The establishment and efficient use of the working paper series, electronic publishing, seminar series, guest professorships and the shared data bases have been made possible because of the synergy in the network. The most important dimension of the infrastructure is perhaps the highly competent international network now shared among DRUID-participants. Actually, lately, the network has increasingly been used to open up contacts for other Danish scholars and users.

September 15 1999
Bengt-Åke Lundvall
Department of Business Studies
Aalborg University

Introduction

The report covers activities for the period August 1 1995 – September 1 1999 and it is structured according to the instruction of the Board. The main emphasis is thus on presenting outcomes in terms of publications, Ph.D.-activities and communication and interaction with users. In eight separate appendices some specific activities are documented. Especially the data presented in appendix 1, 2, 5, 6 and 7 may be regarded as complementary to the output indicators given in the main part of the report:

Appendix 1: The DRUID Working Paper Series¹

Appendix 2: The DRUID-Conferences

Appendix 3: The DRUID Seminars

Appendix 4: Visiting Scholars

Appendix 5: DRUID Databases

Appendix 6: Home page statistics for DRUID and download of Working Papers

Appendix 7: Citations to the work by senior DRUID scholars

Appendix 8: Curriculum vitae for DRUID-staff

Appendix 9: Report from the 1998 meeting of the DRUID International Advisory Board.

Coverage of the report – defining DRUID-participant

The core of this self evaluation report presents an overview of activities and outputs covering *DRUID-participants*. They are divided into two groups: DRUID-staff and DRUID Ph.D.-students. In order to define who belongs to each of these groups we have used the following criteria:

Those who are included as 'staff' fulfil all the three criteria:

1. They have contributed to the realisation of the DRUID research programme with books, articles or working papers.
2. They have participated in at least one of the DRUID-conferences.
3. They have confirmed that they still regard themselves as 'druid-participants'.

Those who are included as Ph.D.-students fulfil all the following three criteria:

1. They have/have had a tutor among those registered as DRUID-staff.
2. They have worked on issues that fall within the DRUID research programme.
3. They have participated in at least one of the DRUID-conferences.

Three persons have moved from the category 'Ph.D.-students' to becoming 'staff' – Kirsten Foss, Keld Laursen and Mette Præst – within the period 1995 - 1999. They will appear in the staff category but they will also appear in the schematic presentation of Ph.D.-students in the section on Ph.D.-training.

¹ The DRUID Working Papers produced by Danish DRUID-members thus appear both in Appendix 1 and in the Report under the heading Working Papers.

Visiting scholars belonging to the DRUID-network and publishing some of their work in the DRUID Working Paper series have *not* been included among the DRUID participants. Their contributions to the programme will be reflected exclusively through the list of working papers in appendix 1. Dieter Ernst and Ron Sanchez have been included as CBS-staff because they have had a semi-permanent connection to DRUID for several years and contributed substantially to the research programme and to the DRUID-conferences.

With these definitions there are 27 persons currently registered as staff, whose activities are reflected in the report, and 25 PhD-students who have been or are currently connected to the research programme. For those defined as DRUID-staff a full CV is presented in appendix 8. The CV of Ph.D.-students is included in the section on research training in the form of a schematic presentation.

Copenhagen Business School

Staff:

Jens Frøslev Christensen, Professor, Department of Industrial Economics and Strategy
Dieter Ernst, Research professor, Department of Industrial Economics and Strategy²
Nicolai Juul Foss, Professor, Department of Industrial Economics and Strategy
Kirsten Foss, Assistant professor, Department of Industrial Economics and Strategy³
Peter Lotz, Associate professor, Department of Industrial Economics and Strategy
Keld Laursen, Assistant professor, Department of Industrial Economics and Strategy⁴
Peter Maskell, Professor, Department of Industrial Economics and Strategy
Ronny Sanchez, Guest professor, Department of Industrial Economics and Strategy
Finn Valentin, Associate professor, Department of Industrial Economics and Strategy
Per Vejrup-Hansen, Associate professor, Department of Industrial Economics and Strategy

Ph.D.-students:

Maj Munch Andersen, Department of Industrial Economics and Strategy
Henrik Bang, Department of Industrial Economics and Strategy
Arnold Boon, Department of Industrial Economics and Strategy
Jukka Kaisla, Department of Industrial Economics and Strategy
Juliana Hsuen, Department of Industrial Economics and Strategy
Kenneth Husted, Department of Industrial Economics and Strategy

² Guest professor at the DRUID programme for several years. First connected to AAU-DRUID and since 1997 Connected to CBS-DRUID.

³ Finished her Ph.D. in connection with the CBS-DRUID-programme in 1996. Assistant professor at CBS since 1996.

⁴ Finished his Ph.D. in connection with the AAU-DRUID programme in November 1998. Assistant professor at CBS since October 1998.

Mikael Iversen, Department of Industrial Economics and Strategy
Mark Lorenzen, Department of Industrial Economics and Strategy
Volker Mahnke, Department of Industrial Economics and Strategy
Anders Schmidt, Department of Industrial Economics and Strategy
Henrik Sornn-Friese, Department of Industrial Economics and Strategy

Aalborg University

Staff:

Esben Sloth Andersen, Associate professor, Department of Business Studies
Jesper L. Christensen, Assistant professor, Department of Business Studies
Bent Dalum, Associate professor, Department of Business Studies
Lars Gelsing, Associate professor, Department of Business Studies
Allan Næs Gjerding, Associate professor, Department of Development and Planning
Birgitte Gregersen, Associate professor, Department of Business Studies
Björn Johnson, Associate professor, Department of Business Studies
Klaus Lindegaard, Assistant professor, Department of Development and Planning
Reinhard Lund, Professor emeritus, Department of Business Studies
Bengt-Åke Lundvall, Professor, Department of Business Studies
Poul Thøis Madsen, Associate professor, Department of Business Studies
Peter Nielsen, Associate professor, Department of Economics, Politics and Administration
Gert Villumsen, Research librarian, Aalborg University Library and Department of Business Studies

Ph.D.-students:

Pun-Arj Chairatana, Department of Business Studies
Ina Drejer, Department of Business Studies
Kenneth Jørgensen, Department of Business Studies
Frank Skov Kristensen, Department of Business Studies
Mario Lopez, Department of Business Studies
Søren Nymark, Department of Business Studies
June Tolsby, Department of Business Studies
Olmann Segura Bonilla, Department of Business Studies
Marco Valente, Department of Business Studies
Leiner Vargas, Department of Business Studies
Anker Lund Vinding, Department of Business Studies

The Aarhus School of Business

Staff:

Poul Houman Andersen, Assistant professor, Department of international trade and business
Mette Præst, Assistant professor, Department of international trade and business⁵

⁵ Ph.D.-student at AAU until 1998, since 1999 assistant professor at Aarhus Business School.

Southern Denmark Business School*Staff:*

Poul Rind Christensen, Professor, Department of Organisation and Entrepreneurship, Centre for Small Firm Research.

Kristian Philipsen, Associate professor, Department of Organisation and Entrepreneurship, Centre for Small Firm Research.

DRUID-Secretariat:

Annelise Klüwer, Department of Industrial Economics and Strategy, CBS

Dorte Køster, Department of Business Studies, AAU

Jonna Mejlstrup Jacobsen, Department of Business Studies, AAU

Summary of the self-evaluation

Druid - an interdepartmental research unit with high international visibility

When DRUID was established the funding authorities emphasised that the evaluation of its activities would focus on three kinds of activities: scientific publications, Ph.D.-training and interaction with users. DRUID has been designed with these main objectives in mind. It has been built as an interdepartmental research unit with strong international network connections to high-quality researchers and research groups abroad.

The major method chosen to enhance productivity in terms of quantity and quality has been to create a supportive environment and infrastructure for senior scholars and Ph.D.-students. This is reflected in the allocation of finance. Only limited resources have been used to finance salary and specific research projects and much more to build infrastructure (to finance the Summer and Winter conferences, the data bases, the working paper series, the guest professorships, information infrastructure and administrative co-ordination, see appendices). DRUID has thus hosted and enhanced the quality and impact of several important specific research projects that have been financed mainly by other sources. Within and with support from DRUID Nicolai Foss has established a more specialised research group called RESPECT. Although *RESPECT* has been in existence for a very brief time, it has been a substantial success in terms of international impact, and certainly in terms of helping to consolidate an emerging shared frame of reference among a substantial number of DRUID staff.

RESPECT (Nicolai Foss)

RESPECT (Research in Strategy, Process and Strategy) is a research group within and financed by DRUID, formed by Professor Nicolai Foss in April 1998 and consisting of a number of faculty and Ph.d. students at the Department of Industrial Economics and Strategy (IVS), namely Kirsten Foss, Juliana Hsuan, Mikael Iversen, Hans Christian Garmann Johnsen, Jukka Kaisla, Keld Laursen, Mark Lorenzen, Volker Mahnke, and Henrik Sornn-Friese.

The purpose of founding *RESPECT* was to stimulate research in the intersection between economic theories of the firm and firm strategy among the members of the group. In particular, the group has been interested in the dynamics of economic organization. The primary activity of *RESPECT* has been to run a regular seminar series, with the participation of Neil Kay, Pavel Pelikan, Eric Brousseau, Peter Klein, Jack Vromen, Bruce Heiman, Aimé Heene, Costas Markides, Martti Vihanto, Peter Roberts, Robert Grant, Marjorie Lyles, David Harper, Bo Eriksen and Thorbjørn Knudsen. In addition, *RESPECT* arranged a major international workshop, 16-17 August on "Austrian Economics and the Theory of the Firm", with the participation of, amongst others, Brian Loasby, Richard Langlois, Ulrich Witt, Peter Lewin, Jerry Ellig, Shelby Hunt, Pierre Garrouste and Stavros Ionnides.

RESPECT has its own web-site: <http://www.cbs.dk/departments/respect/respect1.html>

Another research activity that has been hosted by DRUID is the work on evolutionary modelling led by Esben Sloth Andersen.

Evolutionary modelling, industrial dynamics and innovation systems (Esben Sloth Andersen)

Within DRUID, attempts have been made to extend the Nelson and Winter tradition of evolutionary modelling to explore core issues in complex industrial dynamics and innovation systems. The first task has been to document, implement and extend the Nelson and Winter models in a mathematical programming language (Maple, see DRUID WP 96-5) and in an efficient C++ based modelling environment tailor-suited for evolutionary economic modelling (see DRUID WP 98-5, based on the Dosi/Nelson/Winter TED-project, IIASA, Laxemburg). Both in Maple and in Lsd 2.0 several models have been implemented and explored by Esben S. Andersen and Marco Valente, in collaboration with Franco Malerba, Luigi Marengo, Bengt-Åke Lundvall, and Morris Teubal. The models cover demand-supply coevolution, horizontal and vertical division of labour and knowledge creation, and the formalisation of aspects of innovation systems and industrial cluster dynamics. Several papers have been published, but the main results are still in the pipeline for publication.

A third field of a rather unique competence relates to the work on the learning region (Peter Maskell) and empirical research on vertical supplier relationship (Poul Rind Christensen).

Learning Regions (Peter Maskell)

During the last two years DRUID has investigated the way in which sub-national territorial entities like regions and localities cope with the challenges and opportunities of the emerging knowledge-based economy. The main effort has been directed towards identifying options for regions with a weak representation of high-tech firms. The results have attracted some attention, and DRUIDs have been invited as key-note speakers to the OECD's conference on Learning Regions in Modena, Italy in 1998 and the European Commission's Conference on a closely related topic in Manchester, the UK, in 1999.

Supplier Associations - Relationship Building for Innovation (Poul Rind Christensen)

As part of the DRUID research agenda, several studies on the dynamics of Danish subcontracting and supply systems have been undertaken. In one set of studies the internationalization of Danish subcontractors has been analysed (see Andersen and Christensen, 1998 and 1999). Another set of studies has focused on a cluster of interrelated subcontractors in a regional setting (See Christensen and Philipsen, 1997 Christensen, Cornett and Philipsen, 1999).

Based on results and experiences from these studies, researchers from 'Centre for Small Business Studies' (CESFO) have initiated collaborative experiments under the heading of 'Supplier Association'. The initiative is taken together with the Industrial Development Agency and the Triangle Region. 'Erhvervsfremme Styrelsen' provides the financial means to undertake the pilot studies. This is done as part of the LOK initiative mentioned elsewhere.

DRUID has thus been a host for many different projects mostly financed from other sources than DRUID, including of course the host institutions. The international connections have

been crucial for the success of the unit. The strong links with leading scholars and research units abroad has stimulated productivity and enhanced the quality of the work.

DRUID original core competences and their development

When DRUID was established there were three core competences to build upon. One related to innovation theory and especially to the work on innovation as an interactive process and on innovation systems. I was located mainly in the Aalborg group (Andersen, Dalum, Johnson, Lundvall and others). Another one related to vertical integration and specialisation and especially to the spatial aspects of sub-contracting patterns. The main carriers of this competence were Poul Rind Christensen, Peter Maskell and Poul H. Andersen. The third core competence is represented by Nicolai Jul Foss, Frøslev Christensen and others at CBS and it relates to the theory of the firm and not least to systematic comparisons between different approaches in this field.

The DRUID research programme has been structured according to these three areas and they remain core competencies for DRUID. At the same time, there has been a certain renewal of the three areas reflecting the synergies obtained by combining them in one research unit. The theory of the firm has been brought into a dialogue with empirical analysis of organisational change and through the concept of national business systems it has been connected to the work on national innovation systems. The analysis of vertical relationships in the industrial system has also been connected to the innovation system approach. Finally the innovation system approach has developed empirical analyses that link changes at the level of the single firm to aggregate change at the system's level. This cross-fertilisation and renewal of the core competencies has been brought about by emphasising the importance of knowledge, learning and competence building as a common concern for the research unit as a whole. As a result, new core competencies have been built around the nexus 'the learning economy', 'the learning region' and 'the competence based firm'.

New directions of research have been stimulated, for instance through introducing new themes at the annual Summer Conferences. (The themes of the four summer conferences have been: Economics of knowledge, Competition and industrial dynamics, Concurring approaches to the theory of the firm and Innovation systems.) But no attempts have been made to direct individuals into specific projects that they do not want to pursue. This kind of soft management, is the only realistic in a Danish context, and it has proved successful in terms of the quantity and quality of output.

Output measures

The positive interest for contributing to the DRUID-research program has remained strong, the activity level of the researchers involved is high, and the output in terms of publications has been growing over time. The pattern of publication has changed so that more and more of the research output ends up in refereed journals rather than in working papers and reports (see Table 1 on page 23).

The strategy has also worked well in attracting highly motivated and active Ph.D.-students. The fact that almost 25 Ph.D.-students have chosen to link themselves to DRUID is quite

impressive taking into account that DRUID, as such, only finances one single Ph.D. (Jukka Kaisla). It is my assessment that the fact that they, twice a year (at the DRUID Winter and Summer conferences), have been exposed to the leading international expertise in their own field of research has been crucial for their training. They have thus, repeatedly, been expected to present their own work to, and comment on the work by, highly competent international scholars. This has resulted in the fact that almost all Ph.D.-theses are published in English and that many of the Ph.D.-students produce articles for refereed journals while they are still Ph.D-students. Almost all of them spend at least 6 months abroad as part of their training.

DRUID-scholars are strongly and increasingly involved in an interaction with users of research in the private and the public sector, in Denmark, as well as abroad. DRUID has initiated several important events that have brought its scholars together with lead users. The just finished DISKO-project hosted by DRUID is uniquely ambitious in terms of its interaction with policy makers, organisations and firms and much will happen in the near future, in this respect. But generally the interaction with users is specialised and built through a longer period of collaboration. Different DRUID-scholars thus have different user interfaces (e.g. while Jens Frøslev Christensen has a good network connection to R&D-managers in major Danish firms, Bent Dalum has extensive contacts with the electronics industry and the regional cluster of electronic firms in Northern Jutland, Peter Maskell interacts with the transport and construction industry and with the Copenhagen region and Poul Rind Christensen with the Kolding region and with producers of stainfree steel. My own and Jesper Lindgaard's contacts go to national as well as international organisations such as UNCTAD, OECD and EC.). The major function of the research unit has been to serve as a quality control for the interaction with users and to share contacts. This is a very important function, indeed.

Conclusion of the summary self evaluation

The major impact of DRUID has been to increase the quality of the Ph.D.-training, to create a high quality international network in the field of industrial dynamics and to establish a science-based interaction with policy makers. Specifically, DRUID has established itself as a leading international forum for new ideas on the growing importance of knowledge and learning for firms, network formation, industrial dynamics and economic development. *Without the synergy and scale effects coming from bringing together the most active Danish scholars of industrial dynamics from the different departments these positive effects on productivity, quality, utility and international visibility could not have been realised.*

Plans for a second generation DRUID

A second generation DRUID would make an attempt to reinforce these points of strength through further developing the organisational set-up and the competence pattern.

- DRUID will thus remain committed to the enhancement of the productivity and quality of the work of senior and junior scholars in the field of industrial dynamics and to the communication of relevant results to potential users.
- The analytical work on knowledge and learning in the economy will be strengthened and the present efforts to become the main international node in this area will be followed up. This points to a need to broaden the DRUID-expertise and to increase the collaboration

with scholars from other disciplines than economics, e.g. experts on learning and cognitive science. This will be complemented by giving more emphasis to the work on performance indicators and, specifically, the analysis of productivity developments at different levels of aggregation. This points to a need for broadening and deepening the expertise in statistical analysis and econometrics. Special emphasis will be given to international comparative work exploiting the databases of DRUID and its strong international network.

- A separate but connected DRUID-academy for training Ph.D. students has been established as a collaboration between the two major departments in DRUID (Department of Business Studies at Aalborg University and Department of Industrial Economics and Business Strategy at Copenhagen Business School). Following the advice of the chairman of the CIE Board, we have chosen to establish a separate academy based on the collaboration between two permanent units (Departments) rather than on a temporary structure (the DRUID network). But there will be a strong synergy between the two initiatives.
- The results coming out of DRUID-research have direct implications for private firms in industry – manufacturing as well as service firms - and for policy makers in different sector ministries and at the regional level. A permanent forum for interaction with users of research in the private and public sector will be established.

Commenting the output from DRUID for 1995-99

Publications

During the period 1995-99 there has been a significant growth in the amount and quality of publications (see **Section I**). 1997, 1998 and 1999 we have registered respectively 42, 42 and 71 refereed publications (see table 1 below) by DRUID-participants. The working paper series has grown in importance both quantitatively and in terms of the quality of contributions. It has become well known among scholars in the field of industrial dynamics all over the world.

The new books have received great attention. This is for instance true for the books edited by Nicolai Juul Foss and the book with Peter Maskell as first author. Within the category of refereed articles we find a growing number of contributions from Ph.D.-students and from new Ph.D.s. The publications from the DISKO-project and the Lundvall-Barras report on innovation policy have had a major impact on policy debates in Denmark and abroad.

I find this volume and pattern of publication quite satisfactory.

Ph.D. activities

In the period covered by this report, seven Ph.D.-students who participated in the DRUID-network have finalised their Ph.D.-studies by successfully defending their theses. At present there are close to 20 Ph.D.-students connected to the network. Of these, another five are expected to finish their theses in 1999 (see **Section II**).

The AAU-unit (Andersen, Dalum, Johnson and Lundvall) has for a five years period been part of a European consortium, ETIC, regularly organising Ph.D.-courses in the field of 'economics of technical and institutional change' and, individually, DRUID-seniors have contributed to Ph.D. training in other contexts.

The ETIC PhD programme (Bent Dalum)

The PhD programme on the *Economics of Industrial, Technological and Institutional Change*, ETIC, consists of a European network, which started to organise PhD seminars in 1993-94 (in Aalborg and Alsace respectively). Since 1995 an annual programme of 4 weeks of courses and seminar has been running on a permanent basis.

The core universities of ETIC are Bureau d'Economie Théorique et Appliquée (BETA), University of Strasbourg; Maastricht Economic Research Institute on Innovation and Technology (MERIT), University of Maastricht, and IKE, Department of Business Studies, Aalborg University and Science Policy Research Unit, University of Sussex. The European Union (DG XII) has supported ETIC in 1996-98 (420.000 ECU) and currently for 1999-2001 (200.000 ECU). DRUID has encouraged PhD students to participate. Nearly all of the IKE PhD students and some of the IVS/CBS PhD students have participated the 4-week ETIC programme.

The ETIC course/seminar programme consists of four modules of one week each:

1. Microeconomics of innovation, technology management and the theory of the firm.
2. Evolutionary modelling of technical change and economic dynamics.
3. Macro-dynamics of growth and trade in open economies.
4. Systems of innovation and technology policy.

Module 2 and 3 has been coordinated by IKE (Esben Sloth Andersen and Bent Dalum). The steering committee has a participant from each of the four founding core institutes; Bent Dalum is the IKE member. 120 PhD students has participated in the ETIC activities 1993-98. A major conference was organised in Strasbourg in October 1998 with a selection of contributions from the 120 students.

From a DRUID point of view the detailed plans of the DRUID Academy contains a (i) merger of existing PhD courses/seminars at CBS, (ii) the ETIC activities and (iii) several new courses/seminars. In parallel the ETIC members has applied the EU for funding of a "Marie Curie Training Site" to cover some of the costs for the PhD students staying abroad for longer periods. The DRUID Academy/ETIC plans are given high priority in the design of the future of the IVS/IKE collaboration.

Further information can be found at:

<http://www.business.auc.dk/ike/ike-attach/etic.html>

<http://cournot.u-strasbg.fr/divers/etic.html>

An important element in the DRUID Ph.D. training is the active participation of students in the annual DRUID Winter Conference where Ph.D.-students are expected to present work in progress and in the annual DRUID Summer Conference where they also are expected to present papers and act as discussants on papers by international scholars (See Appendix 2). The Ph.D.-students related to DRUID have been active in all these respects.

As can be seen from the scheme in Section II of the report, normally, Ph.D.-students spend some of their time abroad in order to broaden their scientific skills. Most of the DRUID Ph.D.-students are hard-working, mature and act convincingly, in international contexts. Two of those finishing their studies 1998 have been hired as assistant professors (adjunkter) outside the department where they were trained. Several of the others have been hired by knowledge-intensive business service firms.

Several new initiatives relate to Ph.D.-training. Nicolai Juul Foss has, with the support of DRUID, organised the sub-group called RESPECT specialised in developing theories of the firm. The group aims at Ph.D.-training and international collaboration in the field. During 1998 the AAU-unit was recognised by the social science faculty as the first local Ph.D.-training site in social science. Dalum, Andersen and Lundvall have been involved in the further development of the ETIC-programme and the aim is to establish it as a Marie Curie training site during 1999. Recently it has been decided to establish 'DRUID-academy' as a collaboration between CBS and AAU departments and with Peter Maskell as co-ordinator.

The DRUID Academy (Peter Maskell)

The DRUID Academy for doctoral training and education has been jointly established by the Department of Industrial Economics and Strategy, Copenhagen Business School, the Department of Business Studies, Aalborg University, and will start its operations by January 2000, planning to have around 20 Ph.D. students enrolled by the year 2003. The mission of the Academy is to establish itself as a leading European centre for doctoral education on the dynamics of technical, structural and institutional change based on theories of economic organisation, organisational competencies, competitive advantages, economic evolution and growth. The objective of the Academy is to develop scholars for careers in research at business schools or universities as well as in industry or government. The Academy supports doctoral conceptual and applied research within industrial dynamics and offers courses founded on the research agenda of the faculty. The Academy will utilise the fact that DRUID is one of the founders of ETIC - the European Doctoral Programme on the Economics of Technology and Institutional Change, recognised and economically supported by the DG XXII as a Research Training Network 1999-2001.

The Academy's conceptual and empirical work is organised around three scientific themes with a distinct focus on:

- Theory of the firm
- Inter-firm interaction
- Innovation systems

In 1998 a special scheme to stimulate new Ph.D.s to communicate results from their dissertation in the form of articles to journals has been established in collaboration with the departments and faculty in Copenhagen and Aalborg. When the dissertation has been delivered, and clearance given by the supervisor, Ph.D.-candidates can apply for a 3-month grant to write papers for refereed journals.

The efforts to get Ph.D. started early with publishing in journals have been quite successful. It can thus be seen from the listing in section I that 9 out of 23 Ph.D.-students have already published refereed articles and that, in 1999, 14 out of 40 refereed articles in journals had Ph.D.-students as authors or co-authors.

I find the Ph.D.-activities, and especially the quality of Ph.D.-students' work most satisfactory.

Interaction with users

There have been different types of user-oriented activities going on within DRUID (see **Section III**).

One major event was the high level workshop on *Innovation systems and Innovation Policy*, organised by DISKO and DRUID and with participation of Richard R. Nelson and of high level policy makers (General Directors) from the ministries of Industry, Research, Education and Environment, at Novi, Aalborg, May 11, 1998.

The DISKO-project

The DISKO-project has been divided into four distinct modules each focusing on a specific level of the innovation system:

1. Technical change, organisational change and human resource development within firms.
2. Product innovation and inter-firm collaboration.
3. Firms' interaction with the knowledge infrastructure and with factor markets.
4. Mapping knowledge intensity and knowledge flows in the whole economy.

Eight research reports – in Danish - from these modules and a number of papers in English have been published. Five Ph.D.-dissertations make use of the data gathered within DISKO. Two of the PhD.s involved have been fully financed by the Ministry of Industry and they have spent about 6 out of 36 months working in the Ministry.

The final report was published September, 1 this year (Det danske innovationssystem: Et forskningsbaseret debatoplæg om innovationspolitiske udfordringer og handlemuligheder). The results and recommendations were presented and debated at a unique gathering of users September 2. The workshop brought together high level users from different sectors (Erhvervsudviklingsrådet, Det Økonomiske Råd, Landsarbejdsmarkedsnævnet, Kompetencerådet, Danmarks nationale forskningsråd, Uddannelsesrådet, Rådet for teknologisk service all commented on the report). A broad dissemination of the results to users in the private as well as the public sector will take place the next couple of months. Already while the project was running, it had an impact on policy (e.g. some of its analytical results was used to motivate the LOK-programme) and it is expected that it will have further impacts in the future.

DRUID has been an excellent host of DISKO in the sense that it has made it possible to present results to Danish and foreign expertise along the way and make sure that the quality of the work is satisfactory. DRUID has also been useful in giving access to international research teams pursuing parallel work in other countries.

The publication of the Lundvall&Borras EU-report on innovation policy was followed by a number of talks given around Europe (UK, Portugal, France, Norway and Finland). And there is still a demand for more presentations on the basis of this report. Lundvall has been invited to Lisbon to present the report to the Head of the European Commission, Prodi, in February year 2000.

Several of the DRUID-members (Dalum, Maskell, Lundvall, Poul Rind Christensen and Jesper Lindgaard Christensen) are involved in regular interactions with users in regional, national and international contexts.

At the international level, there has been a direct interaction between DRUID and respectively EU DG XII, OECD-DSTI and UNCTAD-FDI/ST around different policy issues related to innovation systems and innovation policy (Lundvall, Maskell and J. L. Christensen have been contact persons but a number of DRUIDs have been involved).

At the local level in Northern Jutland, several DRUIDs have played a key role in connecting the University to the local industrial community especially in the field of mobile communication (Dalum, Præst and Villumsen).

NorCOM-The Regional Cluster of Telecommunications in North Jutland (Bent Dalum)

NorCOM is a club of approximately 25 firms and 2 knowledge institutions in the field of radiocommunications. The members represent the core of an industrial cluster, which is focused on two subfields. The first is production and development of mobile communications equipment (GSM/DCS/PCS, UMTS and closed landmobile communications systems), cordless systems (DECT) and modem and fax equipment for wired and wireless systems. Part of this subfield is also a mobile communications service provider. The second consists of production and development of various equipment for maritime communications and navigation, such as GMDSS systems, GPS based equipment, VHF and satellite communications (Inmarsat, Iridium).

The firms are in an international context SMEs. Employment at the three largest is Bosch Telecom Danmark 1400 employees, Sonofon 950 and EuroCom Industries 650. The knowledge institutions are Aalborg University (AAU) and the attached Science Park, NOVI. The Institute of Electronic Systems and Center for Personal Communications (CPK) are two large groups at AAU, known for their research capacity in radiocommunications and speech recognition.

NorCOM started in early 1997. There are around four plenary sessions a year. The meetings are focused on technical and business issues of relevance for the involved firms and researchers. The NorCOM activities are organised and financed by NOVI. From DRUID Bent Dalum and Gert Villumsen have been central in organising the NorCOM activities - and not least the NorCOM homepage - in cooperation with NOVI. From the DRUID point of view these activities consist of a very direct industry contact of a broad set of issues, as well as an incentive to direct research outputs, see e.g. the Dalum, Jacobsson et al. (1999) paper for the DRUID conference in Rebild in June 1999 and the contribution to the Elgar volume on *The Economic Challenge for Europe*. These two papers have dealt with comparisons of the regions of North Jutland and Western Sweden in terms of radiocommunications and medical electronics.

The NorCOM activities are currently updated at:

<http://www.norcom.dk/>

Peter Maskell has played a similar role in connection with the regional authorities of Copenhagen and Poul Rind Christensen in Southern Jutland. These activities will be pursued also in the future.

Business Cycles Forecasting in North Jutland (Bent Dalum)

During the most recent quarters, 4/1998 to 3/1999, three DRUID members from IKE (Jesper Lindgaard Christensen, Bent Dalum and Lars Gelsing) have participated with Professor Carsten Stig Poulsen, Department of Business Studies in a three year project on running a business cycle forecasting procedure for North Jutland. A representative sample of one thousand firms (a permanent panel) is asked every quarter about expectations on future employment, production, change of new orders, national and international competitiveness, etc.. The results have been widely published and discussed in the local media. Once a year a more detailed set of questions concerning innovative activity and finance have been posed for the panel.

The project (Nordjysk Konjunkturbarometer) has been financed by the regional Labour Market Council, The County Council and Spar Nord (a local bank). The four researchers act as an “group of analysts”, who draft all the published material after discussions with a panel representing the sponsors. The forecasts and summary of the main background empirical material is published at a specified date simultaneously at the following homepage and as press releases (by fax).

<http://www.business.auc.dk/njk/>

The current releases have established a substantial visibility in the general public. The methodologies behind the forecast will be documented and developed further in the near future. The aim is to create research outputs in recognised journals, as well as the current media releases.

Entrepreneurship Monitor (Poul Rind Christensen)

Global Entrepreneurship Monitor (GEM) was created in 1997 as a research collaboration headed by Babson College and London Business School. Research teams from 10 countries participate (G7 + Denmark, Finland and Israel). The research consortium is based on a mutual understanding of the key role played by entrepreneurs for the industrial dynamics in modern economic systems.

However, there is a lack of comparative data in order to undertake solid studies of the role of new entrepreneurship and new business formation in different national settings. Therefore the aspiration is to provide a solid comparative overview as to what conditions the huge differences in new business formation among the countries.

A comparative longitudinal perspective is at the core of the research design. It is based on interviews with 1000 individuals every year in each of the countries participating.

The aim is to study the dynamic and complex relationship between entrepreneurship and industrial transformation and growth. The aim of the study is also to provide an improved understanding of initiatives conducive to entrepreneurial activity.

Centre for Small Business Research (CESFO) has entered the project in order to provide a solid basis for studies of the entrepreneurial dynamics in Denmark compared to major global trends identified.

The Danish participation is co-financed by the ‘Erhvervsfremme styrelsen’.

Building a Cross Border Region (Peter Maskell)

DRUID (as represented by Maskell who wrote the background paper for the conference and by Lundvall as a speaker) played a major role in the significant and highly successful OECD conference on 'Building a Cross-Border Learning Region' where members of the Swedish and Danish government, members of parliament, leaders from industry, trade and the professions were brought together to discuss the development in the Øresund Region. By year 2000, a 16 kilometre long bridge and tunnel will be completed between the cities of Copenhagen in Denmark and Malmö in Sweden, significantly improving accessibility within this built up area of 2.9 million inhabitants, 1.1 million employees, and 123,000 firms. This will include a concentration of research facilities, technological and commercial expertise, and educational institutions previously unsurpassed in Scandinavia. The conference white paper was written jointly by Professor Peter Maskell, DRUID and Professor Gunnar Törnqvist, Lund University, and contained a preface by the Danish and Swedish Ministers of Education. It highlighted the ways in which the region might utilise its unique position to head the transformation from the traditional engineering industries of yesterday into a cohesive learning economy in the 21st Century.

Construction Industry (Peter Maskell)

The conceptual work carried out by DRUID has mainly taken its empirical evidence and illustrations from manufacturing industries and to some extent also from the service sector of the economy. Especially the electronics industry, the pharmaceutical industry, the furniture industry and the consultants have been areas of investigation. Other work has included the stainless steel industry and paper industry. However, it has increasingly been felt that many of the analytical models developed in DRUID might contribute significantly to the understanding of market processes in industries traditionally less studied in industrial dynamics. Headway has been made in the transport sector where a Ph.D. project is close to completion, but a larger effort has to be made in relation to the construction industry. Construction industry is of great significance to the national economy and the sector is now slightly bigger than manufacturing industry in terms of employment and turnover. Yet construction has not increased its productivity within the last 25 years. Previous efforts to enhance productivity have been largely in without success. DRUID is now engaged in helping the Ministry of Housing to build a new theoretical framework for understanding the sectors governance structure, inter-firm relationships, and innovation system. It is expected that the Government will back the conceptual work with four Ph.D. scholarships to the DRUID Academy for doctoral training and education.

As can be seen from the boxes presented above the interaction with users takes place in many different forms and with different aims. The role of DRUID is to make sure that the research on which user interaction is based is of good quality and of international standards. Given the general objectives of DRUID, I find the interaction with users quite satisfactory.

Databases as an output

One important result of the DRUID collaboration has been to bring together empirically oriented scholars with different orientations. This has made it possible to bring together and

increase the compatibility and accessibility of databases covering different sectors and dimensions of the economy. Among those are data bases including information on patenting and innovation, survey data on organisational change and inter-firm collaboration as well as input-output, trade and labour market statistics. Information on each of these data bases can now be found on the DRUID home-page (<http://www.business.auc.dk/druid/databases/>).

International visibility and impact

One set of indicators of productivity and quality refers to the publication pattern of DRUID-scholars. Another set refers to the *impact* of publications and registers the interest of users for the publications. We have added two indicators to illuminate this aspect. In Appendix 6 we bring the statistics on visitors to the DRUID-homepage as well as the statistics for downloading of the DRUID-working papers. In Appendix 7 we have gathered data on citations for 9 senior scholars belonging to the Unit for the period 1990-99.

The homepage statistics show a steep increase in the international interest for what is going on in DRUID 1996-99. It also documents that many issues in the DRUID working paper series now have quite a big circulation (1.000-2.000 prints per paper).

Appendix 7 is based on an analysis of the social science citation index referring exclusively to scientific journals and mainly to those in English language. It shows that there has been a strong growth in citations for the group of DRUID senior scholars since the establishment of the DRUID. While the aggregate number per year for the nine scholars involved was 22 1990-94, it was 67 1995-96 and 123 1997-99 (after excluding self citations and cross citations within the group). This is a strong indication of the growing visibility and impact of the work by DRUID-scholars since the unit was established.

The interaction with the international advisory board

For the first time the Summer conference at Rønne 1998 gave an opportunity to gather the international advisory board for a meeting. The outcome of the meeting – a report from the discussions with comments from the chairman, Bo Carlsson - can be found as Appendix 9. The meeting was extremely helpful in focusing the activities of DRUID. This was reflected the content of the major debate that was on how and in what respects DRUID makes a difference. DRUID was given a very high rating by the member of the board especially in terms of its network building function and in terms of the quality of its Ph.D.-students. The very fact that so many prominent scholars take time off to comment on the research programme indicates the importance they attach to the network function of DRUID.

Aalborg, September 14, 1999
Bengt-Åke Lundvall
Research Manager

Section I: Publications

Introduction

In what follows the written output from DRUID is presented under the following headings:

- a. Articles in refereed journals
- b. Articles in other journals
- c. Articles in refereed books
- d. Articles in other books
- e. Refereed books
- f. Other books including research reports
- g. Working papers
- h. DRUID Working Papers by international scholars
- i. Contributions to conferences

An attempt has been made to make sure that the same article or book only appears once as a refereed contribution. This also means that all contributions with several authors have been listed under one author only.

In table 1 the number of refereed contributions have been given for 1995, 1996, 1997, 1998 and 1999. Only contributions that have been accepted for publication have been included as 'forthcoming'.

Table 1: Number of refereed publications from DRUID-participants 1995-98

	1995	1996	1997	1998	1999
a. Art. Ref. J.	7	6	16	22	40
c. Art. Ref. B.	2	2	23	16	29
e. Ref. B.	0	0	3	4	2

Table 1 shows a strongly growing productivity not least when it comes to articles in refereed journals. While the figures from 1995 and 1996 may be of less interest because of the fact that the Unit started only mid 1995 the acceleration 1997-99 is worth noting. It is interesting to note (see below contributions marked 'p') that quite a number of refereed contributions have been authored or co-authored by Ph.D.-students. This confirms the impression that DRUID has promoted the maturity of Ph.D.-students.

a. Articles in refereed journals

("(p)" indicates Ph.D.-student)

1999:

ANDERSEN, E.S. (1999), "Multisectoral Growth and National Innovation Systems", *Nordic Journal of Political Economy*.

ANDERSEN, P.H. (1999), "Organizing international technological collaboration in subcontractor relationships: an investigation of the knowledge-stickiness problem", *Research Policy* 28,6, pp: 625 - 642.

ANDERSEN, P.H. & SØRENSEN, H.B. (1999), "Reputational Information: Its role in Interorganizational Collaboration", *Corporate Reputation Review*, Summer 1999, pp, 215-230.

ANDERSEN, P.H. & CHRISTENSEN, P.R. (1999), "The Pen & The Needle: Technological Collaboration in Global Subcontracting", *Forthcoming in Asia Case Research Journal*.

ANDERSEN, P.H. & CHRISTENSEN, P.R. (1999), "Interpartner Diversity in Global Subcontractor Relationships: Lessons from Novo Nordisk", *Forthcoming in European Journal of Purchasing and Supply Management (September issue)*,

CHRISTENSEN, J.F. & FOSS, N.J. (1999), "A Market-Process Approach to Corporate Coherence", in *Managerial and Decision Economics*.

CHRISTENSEN, P.R. & PHILIPSEN, K. (1999), "Evolutionary Perspectives on the Formation of Small Business Clusters - the Case of a Stainless Steel District in Denmark", *Entrepreneurship and Regional Development - an International Journal*.

DALUM, B., LAURSEN, K. (p) & VERSPAGEN, B. (1999), "Does Specialization Matter for Growth?", *Industrial and Corporate Change*, Vol 8, pp. 267-288.

DREJER, I. (p), KRISTENSEN F.S. (p), & LAURSEN, K. (p), (1999), "Cluster Studies as a Basis for Industrial Policy: The Case of Denmark", *Industry & Innovation*, Vol 6, No. 2, 1999.

ERNST, D. (1999), "Evolutionary Aspects of Technological Learning in East Asia's Electronics Industry. Catching-Up, Crisis and (Truncated) Industrial Upgrading", *Industrial and Corporate Change*.

ERNST, D., (1999), "Globalization and the Changing Geography of Innovation Systems: A Policy Perspective on Global Production Networks", special issue of the *Journal of the Economics of Innovation and New Technologies*, on "Integrating Policy Perspectives in

Research on Technology and Economic Growth”, edited by Anthony Bartzokas and Morris Teubal.

ERNST, D. & RAVENHILL, J. (1999), “Globalization, Convergence, and the Transformation of International Production Networks in Electronics in East Asia”, *Business & Politics* (UC Berkeley), Vol I#1.

FOSS, N.J. & CHRISTENSEN, J.F. (1999), “A Process Perspective on Corporate Coherence”, *Managerial and Decision Economics* (1999).

FOSS, N.J., PEDERSEN, T. & FORSGREN, M. (1999), “Accounting for the Strengths of MNC Subsidiaries: The Case of Foreign-Owned Firms in Denmark”, *International Business Review* 8: 181-196. (1999).

FOSS, N.J. (1999), “Austrian Economics and Game Theory: A Preliminary Methodological Stocktaking,” in *Review of Austrian Economics*.

FOSS, N.J. & LANGLOIS, R.N. (1999), “Capabilities and Governance: the Rebirth of Production in the Theory of Economic Organization”, *KYKLOS* 52: 201-218 (1999).

FOSS, N.J. (1999), “Edith Penrose and the Penrosians - Or, Why There is Still so Much to Learn From *The Theory of the Growth of the Firm*”, forthcoming in *Cahiers de l'ISMEA - Série Oeconomia* (1999).

FOSS, N.J. (1999), “Edith Penrose, Economics, and Strategic Management,” forthcoming in *Perspectives in Political Economy*.

FOSS, N.J. (1999), “Networks, Capabilities, and Competitive Advantage”, *Scandinavian Journal of Management* 155: 1-15 (1999).

FOSS, N.J. & FOSS, K. (1999), “Organizing Economic Experiments: the Role of Firms,” forthcoming in *Review of Austrian Economics*..

FOSS, N.J. (1999), “Pandoras æske, sorte æsker og den økonomiske virksomhedsteori”, forthcoming in *Nordiske Organisationsstudier*.

FOSS, N.J. (1999), “Perspectives on Business Systems”, *International Studies of Management and Organization* 29: 3-8 (1999),

FOSS, N.J. (1999), “Research in the Strategic Theory of the Firm: “Integrationism” and “Isolationism””, in *Journal of Management Studies*, September Issue.

FOSS, N.J. (1999), “The Challenge of Business Systems and the Challenge to Business Systems”, *International Studies of Management and Organization* 29: 9-24 (1999),

- LAURSEN, K. (p) (forthcoming) (1999), "The Impact of Technological Opportunity on the Dynamics of Trade Performance", *Structural Change and Economic Dynamics*.
- LAURSEN, K. (p) & DREJER I. (p) (1999) (forthcoming), "Do Inter-sectoral Linkages Matter for International Trade Specialisation?", *The Economics of Innovation and New Technology*.
- LINDEGAARD, K. & SEGURA, O. (p) (1999), "Joint Implementation in Costa Rica: A case study at the community level". December 1997. *Journal of Ecological Economics*, Forthcoming.
- LUNDEVALL, B.-Å. (1999), "National Business Systems and National Systems of Innovation, Special Issue on Business Systems", *International Studies of Management and Organization*, Summer 1999.
- LUNDEVALL, B.-Å. & NIELSEN, P. (1999), "Competition and transformation in the learning economy – illustrated by the Danish case", *Revue d'Économie Industrielle*, No.88, 1999, pp.67-90.
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- MASKELL, P. & MALMBERG, A. (1999), "The Competitiveness of Firms and Regions: 'Ubiquitification' and the importance of Localised Learning", *European Urban and Regional Studies* 6 (1): 9-26.
- NIELSEN, P. (1999), "HRM i praksis: Strategisk integration og kompetenceopbygning", *Arbejdsliv* nr. 3. (Udkommer i efteråret 1999).
- NYMARK, S. (p) (1999), "A study of flexibility and renewal in Danish companies", *Human Resource Development International*, vol. 2, no. 1, pp. 59-66.
- PRAEST, M. (p) (1999), "Changing Technological Capabilities in High-Tech Firms: A Study of the Telecommunications Industry", *Journal of High Technology Management Research*, vol. 9, no. 2, pp.175-193.
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SANCHEZ, R. (1999), "Implementing competence-based strategic management: Defining and identifying five modes of competence," forthcoming in *Long Range Planning* (1999),

SANCHEZ, R. (1999), "Modular architectures, knowledge assets, and organizational learning: New management processes for product creation," forthcoming in *International Journal of Technology Management* (1999),

STRANDSKOV, J. & ANDERSEN, P.H. (1999), "Contexts of Firm Internationalization. The Importance of Business and Ownership Integration", under review for *International Business Review*.

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KRISTENSEN, F.S. (p) & LUNDVALL, B.-Å. (1997), "Organisational change, innovation and human resource development as a response to increased competition", DRUID, 1997, 28 p. 97/16.

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(Department of Industrial Economics and Strategy)

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CHRISTENSEN, J.F. & FOSS, N.J. (1996), "A Process Approach to Corporate Coherence, juni 1996, DRUID Working Paper no. 96-7.

DALUM, B. & VILLUMSEN, G. (1996), " Are OECD Export Specialisation Patterns 'Sticky': Relations to the Convergence-Divergence Debate?", DRUID Working Papers No. 96-3, Aalborg University/Copenhagen Business School.

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MADSEN, P.T. (1996), "Offentligt indkøb og det indre marked - konsekvenser af EU-udbud med særligt henblik på innovations- og integrationsprocesser, (Public procurement and the single market - consequences of EU procurement for processes of innovation and integration)", Ph.D.-thesis published as Working Paper no. 186, Department for planning and development, AAU.

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LUND, R. (1995), "Ledelsesformer ved indførelse af ny teknologi" Working Paper 1995-3. Institut for erhvervsstudier. AAU. Okt. 1995. (Også optrykt i BØRSEN: Virksomhedens Strategi & Ledelse. Opdatering 1/96)

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98.7 LAM, A., "The Social Embeddedness of Knowledge: Problems of Knowledge Sharing and Organisational Learning in International High-Technology Ventures", (ISBN 87-7873-043-0)

98.7 LORENZ, E., "Societal Effects and the Transfer of Business Practices to Britain and France", (ISBN 87-7873-053-8)

98-22 LAM, A., "Tacit Knowledge, Organisational Learning and Innovation: A Societal Perspective", (ISBN 87-7873-060-0)

98-26 HOLMÉN, M. & JACOBSSON, S., "A method for identifying actors in a knowledge based cluster", (ISBN 87-7873-064-3)

98.7 RICHARDSON, G.B. "Production, Planning and Prices", (ISBN 87-7873-065-1)

97-2 LANGLOIS, R.N. & FOSS, N.J., "Capabilities and Governance: the Rebirth of Production in the Theory of Economic Organization", (IS BN 87-7873-020-1)

97-4 RICHARDSON, G.B., "Economic Analysis, Public Policy and the Software Industry", (ISBN 87-7873-023-6)

97-5 BORRUS, M. & ZYSMAN, J., "You Don't Have to Be A Giant: How The Changing Terms of Competition in Global Markets are Creating New Possibilities For Danish Companies", (ISBN 87-7873-024-4)

97-6 TEUBAL, M., "Restructuring and Embeddeness of Business Enterprises-Towards an Innovation System Perspective on Diffusion Policy", (ISBN 87-7873-025-2)

- 97-7 ERNST, D. & GUERRIERI, P., "International Production Networks and Changing Trade Patterns in East Asia: The case of the Electronics Industry", (ISBN 87-7873-026-0)
- 97-8 LAZARIC, N. & MARENGO, L., "Towards a Characterisation of Assets and Knowledge Created in Technological Agreements: Some evidence from the automobile-robotics sector", (ISBN 87-7873-027-9)

i. Contributions to conferences

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DALUM, B., HOLMÈN, M., JACOBSSON, S., PRAEST, M., RICKNE, A. & VILLUMSEN, G. (1999), "The Formation of Knowledgebased Clusters in North Jutland and Western Sweden", Paper to the DRUID Conference on National Innovation Systems, Industrial Dynamics and Innovation Policy, Rebuild, June.

VEJRUP-HANSEN, P., LAURSEN, K. & MANKE, V. (1999), "Firm growth from a knowledge structure perspective", paper presented at DRUID's Summer Conference on National Innovation Systems, Industrial Dynamics and Innovation Policy, June 1999.

VALENTIN, F. (1999), "Does inter-firm collaboration make a difference" in Proceedings from The 8th International Conference on Management of Technology, IAMOT 1999. Cairo, March 15-17, 1999.

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VINDING, A. L.(p) & KRISTENSEN P.S. (1999), "Importance of Collaboration Partners in Product Development", Paper presented at the Conference "Coopèration Industrielle: Diversite et Synthese, Paris, May 2-3.

VINDING, A. L. (p) & KRISTENSEN, P.S. (1999), "Important Collaboration Partners in Product Development", Paper presented at the, DRUID summer Conference, Rebuild June 9-12.

1998:

ANDERSEN, M.M. (p) (1998), "Evolutionary and Resource Based Theories on Interorganisational Learning", Paper presented at the, *DRUID Winter Conference*, Middelfart, January 8-19, 19 p.

CHRISTENSEN, J.F. (1998), "Pursuing Corporate Coherence in Decentralized Governance Structures. The Role of Technology Management in Multi-Product Companies", Paper prepared for the DRUID Summer Conference, *Competencies, Governance and Entrepreneurship*, Bornholm, juni.

CHRISTENSEN, P.R. (1998), "Challenges and pathways for SME subcontractors in an era of world wide restructuring of supply chains", Contribution to the International Geographical Union - Commission on the organisation of industrial space, 1998 residential conference: *Small and medium-sized enterprises in a changing world. Seville*, 24-28 August, 23 p.

CHRISTENSEN, P.R. & PHILIPSEN, K. (1998), "Entrepreneurship as Organizing", Contribution to, *the Xth Nordic Conference in Small Business Research*, Växjö, June, 19 p.

DREJER, I. (p) (1998), "The Role of Technological Linkages in a Leontief Scheme - From Static Structures to Endogenous Evolution of Technical Coefficients", Paper presented at the, *DRUID Winter Conference*, Middelfart, January 8-10.

DREJER, I. (p) (1998), "Technological Interdependence in the Danish Economy - A Comparison of Methods for Identifying Knowledge Flows", paper prepared for the, *Twelfth International Conference on Input-Output Techniques*, New York, 18-22 May.

DREJER, I. (p) (1998), "Technological Interdependence in Danish Economy A Comparison of Methods for Identifying Technology Flows", Paper presented at the, *DRUID Winter Conference*, Middelfart, January 8-10, 23 p.

DREJER, I. (p) (1998), "Technological Interdependence in National Systems of Innovation - a study of embodied R&D flows in 7 OECD countries", paper prepared for the, *ETIC conference*, Strasbourg, October.

GJERDING, A. N. (1998), "Energy and Environmental Workshop", organised by the Department of Development and Planning, Aalborg University, Aalborg (Denmark), October 21-24, (Discussant),

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JØRGENSEN, K. (p) (1998), "Information Technology and Organizational Change - A casestudy in a Danish subsidiary company", paper presented at the *DRUID Winter conference*, Middelfart, January 8-10, 23 p.

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KAISLA, J. (p) (1998), "Market Process and the Firm: Some Indications of Rule-following and Entrepreneurship Under Genuine Uncertainty", presentation at the, CISTEMA seminar on *Austrian Economics*, Copenhagen, June 22, 27 p.

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LAURSEN, K. (p) & DREJER, I. (p) (1998), "Do Inter-sectoral Linkages Matter for International Export Specialisation?", Paper presented at the, *DRUID Winter Conference*, Middelfart, January 8-10, 20 p.

LORENZEN, M. (p) (1998), "Information Cost, Learning, and Trust", paper presented at the DRUID Conference, *Competences, Governance and Entrepreneurship*, Bornholm, June, 24 p.

LOTZ, P. (1998), "Industry Structure Dynamics and the Nature of Technology in the Hearing Instrument Industry", Presentation of paper at, *the Annual EARIE Conference*, København, September.

LOTZ, P. (1998), "The Economics of Industrial Structure and Innovation Dynamics", paper presented at the, *UNU/INTECH International Conference*, Lisboa, Oktober.

MADSEN, P.T. & KRISTENSEN, P.S. (1998), "Foreign and Danish Collaboration Partners on Product Development in Small Danish Manufacturing Firms", Paper prepared for presentation at, *the 10th Nordic Conference on Small Business Research*, in Växjö June 14-16.

MAHNKE, V. (p), AADNE, J.H. & VENZIN, M. (1998), "The search for inspiration among the ABC's in strategic management", working paper presented at, *the Strategic Management Society Meeting*, Orlando.

MAHNKE, V. (p) & AUGIER, M. (1998), "How Do Aspiration Levels come About? Bounded Rationality and Dynamic Search", presented at SCANCOR - Conference, *Samples of the future*, Stanford, 25 p. (Printed in conference proceedings),

PRAEST, M. (p) (1998), “Demarcation of Technological Competence Groups: Methods, Problems, and Future Opportunities”, Presented at the 4th *International Conference on Competence Management*, Oslo, June.

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PRAEST, M. (p) (1998), “Processes of Technological Competence Accumulation: A Synthesis”, Presented at the DRUID conference on *Competences, Governance and Entrepreneurship*, Rønne, Bornholm (Denmark), June.

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PRAEST, M. (p) (1998), “An Empirical Model of Firm Behaviour: A Dynamic Approach to the Accumulation of Technological Competencies”, Presented at the *DRUID Winter conference*, Middelfart, January, 31 p.

SEGURA, O. & JOHNSON, B. (p) (1998), “Forest Services and Property Rights from an Innovation Point of View”, Paper presented at the *Fifth Biennial Meeting of the International Society for Ecological Economics (ISRR)*, Santiago de Chile, November 15-19.

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SEGURA, O. (p) (1998), “Una mezcla necesaria: comercio-ambiente”, Paper presented in the First Academic Colloquium of the Americas. The topic was: *ALCA, Competitividad Agrícola y recursos naturales renovables*, March 12-14.

SORNN-FRIESE, H. (p) (1998), “The Genesis and Progress of Embeddedness in Business Studies”, Paper presented at, the SCANCOR Conference *Samples of the Future*, Stanford University, September 20-22.

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VALENTE, M. (p) (1998), "Technological Competition: a Qualitative Product Life Cycle", Paper presented at the, *DRUID Winter Conference*, Middelfart, January 8-10, 33 p.

VALENTE, M. (p) (1998), "Technological Innovation and Demand-based Market Structure", proceedings of the *ETIC Conference*, Strasbourg.

VALENTE, M. (p) (1998), "Technological Innovation and Market Structure - A Simulation Model", paper presented at the, *International J. Schumpeterian Society Conference*, Vienna, June 13 -16, 26 p.

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ANDERSEN, E.S. (1997), "Multisectoral Growth and National Innovation System", Paper presented at the workshop "*Innovation, Policy and Society*" arranged by the Nordic Journal of Political Economy, Oslo, 5-6 December 1997. Submitted to Nordic Journal of Political Economy.

CHRISTENSEN, J. (1997), "A two-sided view on financing innovative, small firms", Paper for *The Second International Stockholm Seminar on Risk Behaviour and Risk Management*, Stockholm 9-12 June 1997, 15 p.

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FOSS, N.J. (1997), "Incomplete Contracts and Economic Organization: Brian Loasby and the Theory of the Firm", in Proceedings from "Conference in Honour of Brian Loasby", University of Stirling, August 27-29.

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GELSING, L. & NIELSEN, K. (1997), "Promoting Inter-Firm Networks in industrial policy – Danish Evidence", *DRUID winterconference, 8th.-10th. January 1997*.

GREGERSEN, B. & JOHNSON, B. (1997), "The Role and the Potential Diversity in the European Integration Process", Paper presented at the international conference on "Technology Policy and Less Developed Research and Development Systems in Europe", arranged by UNU-INTECH in Seville, 17-18 October, 1997, 18 p.

JØRGENSEN, K.M. (p) (1997), "Information Technology and Organisational Learning", 24 p.. Konference i Budapest, Organizational Responses to Radical Environmental Changes: 13th EGOS Colloquium.

LUND, R. (1997), "Experiences Regarding Efforts Towards Integrating Different Functional Sections within Firms", in 1st. *International Conference on Technology, Policy and Innovation*. Macau, 1997, 8 p.

PRAEST, M. (p) (1997), "A dynamic approach to the accumulation of technological competencies", *7th International Forum on Technology Management* conference held in Kyoto, Japan, November 1997, 231-239 p.

PRAEST, M. (p) (1997), "The dynamics of capability groups and firm behavior: Short and long run reaction patterns", *R&D Management in the 21st Century: Theory and Practice*, conference held in Manchester, UK, July 1997, 39 p.

Section II: Ph.D-activities

a. Ph.D.-Students

There have been 25 Ph.D. students connected DRUID over the whole period 1995-99. Of these 7 have defended their thesis. Another 5-6 students are expected to do so this fall. At the end of the year, there will be thus be around 10-12 Ph.D.-students connected to DRUID. All of those listed below have participated in activities organised by DRUID and had DRUID-seniors as supervisors. Their stage of study and other relevant information has been gathered in the table below.

Table 2: Ph.D-students connected to DRUID 1995-99 (stage of completion, theme of dissertation, affiliation, including international affiliation and source of finance).

	Period	Dissertation theme	Participation in training	Affiliation – Stay abroad	Finance
Alfaro, Leiner Vargas	January 1998-March 2000	Innovation and competitiveness in the electricity sector in Costa Rica	DRUID-conference S98	IES - AAU	Danida - Foreign Affairs
Andersen, Maj M. Ph.D.-defence took place in June 1999	January 95 – November 98	Firm Trajectory Change through Interorganisational Learning – The Economic Organisation of the Greening of Industry	DRUID conf. W95, S96, W97, S97, W98, S98, W99, S99 EAEPE Summer School, July 1998, Ireland.	IVS - CBS	Ph.D.-stip. FFL
Bang, Henrik	August 93-	Strategic Management of Innovation in Constructive Firms	DRUID conference W95	IVS-CBS	Ph.D.-stip FFL
Boon, Arnold	June 94 -	Economic Organisation of Systemic Innovations in the Agribusiness Complex	W96	IVS & SJI	SJI
Pun Arj Chairatana	Maj 99-Maj 2002	The Agro-Innovation System in Thailand	DRUID- conference S99	National Science and Technology Development Agency, Thailand SPRK, Univ. of Sussex	Ph.D-stip. FFL
Drejer, Ina	February 96 – October 99* Ph.D. –defence will take place October 1999	Aspects of technological interdependence – an analysis of the role of external knowledge and knowledge intensive interaction in technological development and innovative activity	DRUID- conference S96,W97, W98, S98 W99, S99 Course: Structural equations, Aalborg University.	IES – AAU Visit to University of Western Sydney Macarthur, Australien, 8-16 March 1998.	Ph.D.-stip. FFL.

	Period	Dissertation theme	Participation in training	Affiliation – Stay abroad	Finance
Foss, K. Ph.D. defence took place September 1996	December 1991-April 1996	Transaction costs and production costs paths: The case of the Danish Fruit and Vegetable Industry	Druid-conference W95, S96, S98, W99,		
Husted, Kenneth Ph.D. defence took place October 1998	April 94 – marts 97	Industriell forskning: styring og autonomi		IVS-CBS	CISTEMA & Dept. of Industrial Economics and Strategy.
Hsuan, Juliana	Ph.D.-guest November 98 – September 99	Modularization in New Product Development: a Market Access Strategy	Druid conference W98, W99	IVS-CBS	Helsinki School of Economics
Iversen, Mikael	December 96 - December 99	Organization of industrial synergies	DRUID-conference W97, S97, S98 & W99 Design and Completion of Ph.D. 100 hr. Ph.D. course Empirical Analysis in Business Studies. 200 hr. Ph.D. course	IVS - CBS	Ph.D.-stip. FFL
Jørgensen, Kenneth	May 96-October 99	Organizing new technologies in loosely coupled systems.	DRUID conference S96, W97, S97, W98, S99 Ph.D. course: "Case study Research and Narratology" at Aalborg University	IES – AAU Stanford University April-September 1998	Ph.D.-stip Min. of Ind.
Kaisla, Jukka	March 98 - March 2001	Studies in the theory of economic organisation	DRUID- conference S98. Participated in 2 international conferences.	IVS-CBS	DRUID
Kristensen, Frank Skov	May 96 – April 99*	Innovation in services – taxonomy and analysis	DRUID conference S96, W97, S97, W98, S98, W99, S99	IES – AAU SPRU, Sussex University, UK, January 98-May 98.	Kand. stip. Min. of Ind
Laursen, Keld Ph.D.-defence took place November 6, 1998.	February 95 - August 97*	A Neo-Schumpeterian Perspective on the Determinants and Effects of International Trade Specialisation (PhD Thesis title)	DRUID-conference W95, S96, W97, S97, W98 & S98, S99	IES – AAU Sussex University	Ph.D.-stip. FFL.
López, Mario	January 1998-May 2000	Innovation systems in the agro-forestry industry in Nicaragua	DRUID-conference S98	IES - AAU	DANIDA

	Period	Dissertation theme	Participation in training	Affiliation – Stay abroad	Finance
Lorenzen, Mark Ph.D. Defence took place in April 1999	September 95 - September 98	Localised learning and community capabilities:	DRUID-conference W95, W97, S97, W98, S98,S99	IVS - CBS	Ph.D.-stip. FFL
Mahnke, V.	October 97 – August 98 Ph.D.-Defence will take place in October 1999	Towards a new strategic theory of the firm: the economies of intellectual production.	DRUID-conference S97, S98, W99	IVS - CBS	Ph.D.-stip. CBS/DRUID
Nymark, Søren Ph.D.-defence took place September 02 1999.	February 96 – January 99.	Organizational storytelling; value based management	Druid conference S96, W97 Course: Philosophy and Theory of Management, Århus Business School.	IES – AAU University of Cambridge; visiting scholar August 1997 – April 1998	Ph.D.-stip. FFL.
Præst, Mette Ph.D.-defence took place January 15 1999.	April 95 – October 98*	Patterns of Technological Competence Accumulation and Performance: Experiences from Telecommunications.	DRUID-conference W95, S96, S97, W98 & S98, S99 Course: Structural equations, Aalborg University.	IES – AAU	Ph.D.-stip. FFL.
Segura, Bonilla Olman	June 96 – May 1999 Ph.D.-defence will take place in December 1999.	Competitiveness and Sustainable Development in the Forest Sector in Central America.	DRUID conference W97, S97, S98, S99. Ph.D.-course: International Knowledge Transfer and Learning Processes: Third World and East European Experiences, Aalborg University	IES – AAU Universidad Nacional de Costa Rica (UNA), Nacional Autónoma de Nicaragua (UNAN), de El Salvador (UES) y el Centro Agronómico Tropical de Investigación y Enseñanza (CATIE) in Costa Rica.	DANIDA
Schmidt, Anders McIlquham	May 97 - Maj 2000	Strategy, strategic management and performance.	DRUID- conference S97, W98 & S98	IVS – CBS Stanford University July 1999 - December 1999	Ph.D.-stip, FFL
Sornn-Friese, Henrik	September 96 - August 99	Industrial Dynamics and Business Strategy in the Road Haulage Sector in Denmark	DRUID- conference W97, S97, S98, W99, S99.	IVS - CBS Scancar, Stanford University, Californien, USA, July 1997 - March 1998.	Ph.D.-stip, FFL
Tolsby, June	August 99 – August 2002	IT and organisational learning within SMEs	ETIC:	IES-AAU	Ph.D.-stip, FFL
Valente, M.	Marts 97 – August 99	Evolutionary modelling of market processes	DRUID-conference S97, W98	IES – AAU University of Milan	Kand. stip. FFL.
Vinding, Anker Lund	October 98-October 2001	Network collaboration at the interfirm level	Druid conference W99, S99 ETIC	IES - AAU	DRUID

ABBREV: IES = Department for Business Studies, IVS = Department of Industrial Economics and Strategy, SJI = Statens Jordbrugsøkonomiske Institut, FFL= Financing: Ordinary budget

*Includes period of leave from the grant.

b. Dissertations

1999:

DREJER, I. (1999), "Technological Change and Interindustrial Linkages: Introducing Knowledge Flows in Input-Output Studies", Ph.D. dissertation, Aalborg: Department of Business Studies, Aalborg University, Presentation of dissertation will take place October 14, 1999.

NYMARK, S. R. (1999), "A discourse on organizational storytelling: Creating enduring values in a high-tech company by storytelling", Ph.D. dissertation, Aalborg: Department of Business Studies, Aalborg University, Presentation of dissertation took place September 2, 1999.

1998:

HUSTED, K., "Industriell forskning: styring og autonomi", Presentation of dissertation October 21, 1998.

LAURSEN, K., "A Neo-Schumpeterian Perspective on the Determinants and Effects of International Trade Specialisation", Presentation of dissertation November 6, 1998.

PRAEST, M., "Patterns of Technological Competence Accumulation and Performance: Experiences from Telecommunications", Presentation of dissertation January 15, 1999.

c. Ph.D.-training activities organised by DRUID and DRUIDS

There are two types of activities that are directly and exclusively aiming at Ph.D.-training to be reported here. One is the ETIC Ph.D.-training programme that goes on at a regular basis with senior DRUIDs as co-organisers and the other is individual contributions to other initiatives in the field of Ph.D.-training. The most important aspect of the Ph.D.-training offered by DRUID is the active participation of students in the participation in the bi-annual DRUID-conferences. The last summer conference was attended by 13 of the Ph.D.-students listed above and, of these, 8 presented a paper. Most of the others had tasks as discussants on papers presented by senior scholars.

The Winter conference gives even more room for local students to get response on their work by international senior scholars. Already at the first conference in December 1995 a major theme was how to get your work published in international journals and editors of some of the leading journals in the field of industrial dynamics were invited to the conference. It is encouraging to note that this has resulted in several of the Ph.D.-students publishing in refereed journals and books. Of the total stock of students thus 9 have published refereed articles while they were still Ph.D.-students. Out of 40 refereed contributions from DRUIDs in 1999 to journals, 13 had Ph.D.-students as authors or co-authors. This is a strong indication of the early maturity fostered by the DRUID framework.

The ETIC PhD programme

The PhD programme on the *Economics of Industrial, Technological and Institutional Change*, ETIC, consists of a European network, which started to organise PhD seminars in 1993-94 (in Aalborg and Alsace respectively), Since 1995 an annual programme of 4 weeks of courses and seminar has been running on a permanent basis.

The core universities of ETIC are Bureau d'Economie Théorique et Appliquée (BETA), University of Strasbourg; Maastricht Economic Research Institute on Innovation and Technology (MERIT), University of Maastricht, and IKE, Department of Business Studies, Aalborg University and Science Policy Research Unit, University of Sussex. The European Union (DG XII) has supported ETIC in 1996-98 (420.000 ECU) and currently for 1999-2001 (200.000 ECU), DRUID has encouraged PhD students to participate. Nearly all of the IKE PhD students and some of the IVS/CBS PhD students have participated in the 4-week ETIC programme.

The ETIC course/seminar programme consists of four modules of one week each:

1. Microeconomics of innovation, technology management and the theory of the firm.
2. Evolutionary modelling of technical change and economic dynamics.
3. Macro dynamics of growth and trade in open economies.
4. Systems of innovation and technology policy.

Module 2 and 3 has been coordinated by IKE (Esben Sloth Andersen and Bent Dalum), The steering committee has a participant from each of the four founding core institutes; Bent Dalum is the IKE member. 120 PhD students has participated in the ETIC activities 1993-98. A major conference was organised in Strasbourg in October 1998 with a selection of contributions from the 120 students.

From a DRUID point of view the detailed plans of the DRUID Academy contains a (i) merger of existing PhD courses/seminars at CBS, (ii) the ETIC activities and (iii) several new courses/seminars. In parallel the ETIC members has applied the EU for funding of a "Marie Curie Training Site" to cover some of the costs for the PhD students staying abroad for longer periods. The DRUID Academy/ETIC plans are given high priority in the design of the future of the IVS/IKE collaboration.

Activities in the ETIC Programme 1998

1. The ETIC Spring Session in Maastricht, March 30th - April 10th, 1998

'Macrodynamics of Growth and Trade in Open Economies' (first week)

Teaching staff:

Bent DALUM, IKE/DRUID, Department of Business Studies, Aalborg, Denmark (coord.)

Bart VERSPAGEN, MERIT, University of Maastricht, The Netherlands

Katy WAKELIN, MERIT, University of Maastricht, The Netherlands

Thomas ZIESEMER, MERIT, University of Maastricht, The Netherlands

'Systems of Innovation and Technology Policy' (second week)

Teaching Staff:

Aldo GEUNA, BETA, University of Strasbourg, France
Laurent BACH, BETA, University of Strasbourg, France
Dominique FORAY, IRIS, University of Paris IX, France
Patrick LLERENA, BETA, University of Strasbourg, France (coord.)
Frieder MEYER-KRAHMER, ISI, Karlsruhe, Germany
Luc SOETE, MERIT, University of Maastricht, The Netherlands
Ed. STEINMULLER, SPRU, Brighton, UK

2. The ETIC Autumn Session in Strasbourg, October 5th - 15th, 1998

'Micro-Economics of Innovation and Theory of the Firm' (third week)

Teaching staff:

Kristine BRULAND, Oslo, Norway
Carsten DREHER, ISI-FhG, Karlsruhe, Germany
Gilles LAMBERT, BETA, Strasbourg, France
Patrick LLERENA, BETA, Strasbourg, France (coord)
Stéphane ROBIN, Grenoble, France
Bernard RUFFIEUX, IREPD, Grenoble, France
Marc WILLINGER, BETA, Strasbourg, France
Anthony ZIEGELMEYER, BETA, Strasbourg, France

'Evolutionary Modelling of Technical Change and Economic Dynamics' (fourth week)

Teaching Staff:

Esben Sloth ANDERSEN, IKE, Aalborg, Denmark (coord)
Giovanni DOSI, University of Rome, Italy
Patrick LLERENA, BETA, Strasbourg, France
Gerald SILVERBERG, MERIT, Maastricht, The Netherlands
Murat YILDIZOGLU, BETA, Strasbourg, France

Research training collaboration with Central American universities – the Sudesca Project

The SUDESCA project is a joint research project between Centro Internacional de Política Económica para el Desarrollo Sostenible (CINPE), Universidad Nacional, Costa Rica and the IKE group & Centre for Environment and Development, Aalborg University. The project includes research collaboration with Escuela de Economía de la Universidad de El Salvador, Fundación Nacional para el Desarrollo (FUNDE), de El Salvador and Escuela de Economía Agrícola (ESECA) de la Universidad Autónoma de Nicaragua (UNAN).

The project is mainly financed by the ENRECA programme (Enhancement of Research Capacity in Developing Countries) of Danida.

The research topic of the project is formulated against the background of Central American countries risking to be locked into an environmentally and socially unsustainable development path partly as a result of increasing exposure to international competition. The long term goal of the project is to contribute to the formulation and implementation of a sustainable development strategy for Central America. The short term aim is to enhance the Central American research capacity within industrial dynamics, specifically the application of a systems of an innovation approach to sustainable development in the South.

The project includes the building of a Central America research network and “learning by joint researching” within the area mentioned above. In the first 3-year phase of the project several sector reports and case studies have been produced.

The project also includes a PhD programme. So far three Central American Ph.d students (Alfaro, Lopez and Segura) have started at the PhD programme on the Economics of Industrial, Technological and Institutional Change and the first defence is planned to take place in December 1999. The PhD-students of the SUDESCA project have participated actively in the DRUID seminar program and in the DRUID summer and winter conferences.

The SUDESCA project has recently been funded for another 3-year period by DANIDA with a budget of approximately 5 mill. dkr. Björn Johnson co-ordinates the project.

The DRUID Academy

The DRUID Academy for doctoral training and education has been jointly established by the Department of Industrial Economics and Strategy, Copenhagen Business School, the Department of Business Studies, Aalborg University, and will start its operations by January 2000, planning to have around 20 Ph.D. students enrolled by the year 2003. The mission of the Academy is to establish itself as a leading European centre for doctoral education on the dynamics of technical, structural and institutional change based on theories of economic organisation, organisational competencies, competitive advantages, economic evolution and growth. The objective of the Academy is to develop scholars for careers in research at business schools or universities as well as in industry or government. The Academy supports doctoral conceptual and applied research within industrial dynamics and offers courses founded on the research agenda of the faculty. Attention is given to fundamental trends such as the growing importance of knowledge for competitiveness, the information technology revolution, the ecological issue and the internationalisation of the economy. The Academy will utilise the fact that DRUID is one of the founders of ETIC - the European Doctoral Programme on the Economics of Technology and Institutional Change, recognised and economically supported by the DG XXII as a Research Training Network 1999-2001.

The Academy's conceptual and empirical work is organised around three scientific themes with a distinct focus on:

Theory of the firm: Connections between new institutional theories of the firm (such as transaction cost economics), the field of strategy (such as the capabilities and knowledge-based views of the firm) and market dynamics.

Inter-firm interaction: The circumstances where the dynamic changes in competitive patterns of firms is associated with changes in their specialisation and position in the production

systems. Included are analysis of co-ordination of R&D and of other activities bearing on the technological development of firms, their connection to competitive strategies and performance and inter-firm organisational arrangements. Of special concern is the evolution of the vertical division of labour between firms, and the way in which a deepening of the interaction between firms gives rise to innovative activity.

Innovation systems: The formation of geographically distinct systems of innovation and their effect on economic growth and development. The theme also explores and develops the theoretical and methodological base for the application of new concepts such as "the learning economy".

On the applied level, the Academy supports the development of policy implications while interacting with policy makers in government and managers in the business community.

Peter Maskell, IVS-CBS, co-ordinates the DRUID-academy.

d. Individual contributions to Ph.D.-training

Most senior DRUID-scholars are tutoring Ph.D.-students and the DRUID-seminars in Copenhagen and Aalborg are important elements in the continuous training of Ph.D.s. Participation of students in specialised research groups such as RESPECT and the Evolutionary Modelling group also give important support for their work. Finally their temporary participation in applied research projects such as DISKO and the TSER-projects co-ordinated by Dalum have proven to be an excellent supplement to the other forms for research training. What follows is thus a very selected list of all the activities pursued by individual DRUID-scholars with relevance for Ph.D.-training.

1999:

GELSING, L. (1999), Participation in a Ph.D.-evaluation committee at Aarhus School of Business, Department of international Business. Helle Neergaard: "Networks as Vehicles of Internationalization", Date of defence: 1999-05-18.

LINDEGAARD, K. (1999). Project Coordinator: SUDESCA Project on enhancement of Central American research capacity, funded by Danida, Danish Ministry of Foreign Affairs.

1998:

CHRISTENSEN, P.R.

"Theories on the internationalization of SMEs and their environment", Contribution to European Doctoral Programme, Växjö, April, 1998.

FOSS, N.J.

Opponent at Ph.d.-defence (Frederic Sautet) at Université Paris I- Dauphine, June 2.

Member "Scientific Board" for "Ecole d'été de Sophia Antipolis sur la Firme et l'Industrie" organised by IDEFI-LATAPSES, Nice.

LUNDVALL, B.-Å.

Commented papers by Ph.D.s, chaired sessions and gave a talk on research strategy in the field Economics of technical and institutional change, at the ETIC-conference, Strasbourg, October 15-17, 1998.

Chaired the evaluation committee for Annemarie Munk Riis's Ph.D.-dissertation, October 5, 1998,

Gave five lectures for Ph.D. –students on "Economics of innovation and learning", CEFI, Aix en Provence, October 19-23, 1998.

MASKELL, P.

Contributions to Ph.D. training at Uppsala University 03-04 April, 1998, Göteborg University Oktober 19, 1998 and at Karlstad University December 02, 1998.

1997:

ANDERSEN, E.S.

"On Evolutionary Perspectives in Economics". Lecture for the PhD Course on Business Economics with Special Reference to Recent Research Traditions. Copenhagen Business School, Gilleleje, 6 November 1996.

CHRISTENSEN, J.F.

Lecture at Ph.D. course in Methodology (The Ph.D. network "Technology and Society), Holbæk, August, 1997

Lecture at Ph.D.-course on "Learning to write", Copenhagen Business School, October, 1997

CHRISTENSEN, P.R. : Contribution to the ECSB-Ph.D.- course in Växjö, April, 1997.

DALUM, B.: Member of the organising committee for ETIC, which is chaired by Prof. Patrick Llerena, BETA, University of Strasbourg.

LUNDVALL, B.-Å.:

Participated in Ph.D.-jury for Ms Laurence Tasson, Aix en Provence, November 27, 1996.

Lecture at Ph.D.-seminar of CORE (Copenhagen Research Project on European Integration), February 10, 1997, Department for Political Science University of Copenhagen.

Lectures at Ph.D.-course 'New Perspectives on innovation and technology' February 26-27, 1997 at Roskilde University.

Section III. Interaction with and communication to users

Individual and shared networks with users

The DRUID group is characterised by the fact that several of the individual participants have developed a continuous and close interaction with specific user groups and categories. Below we have made a selective presentation of the profiles of some of these. The CVs gathered in Appendix 8 gives a much more full picture than what can be given here.

CHRISTENSEN, J.F. has through his project, Corporate Coherence and Management of Technology, developed extensive case studies of some of the leading companies: Danfoss, Grundfos, Bang and Olufsen, MD Foods, Reson and Danfysik. These case studies have all involved substantial communication with managers at the respective companies. In several cases this has led to ongoing dialogue and exchange of information and views on strategic issues. Christensen has established a strong connection especially to R&D-managers in these big firms.

CHRISTENSEN, J.L. has established a strong expertise in innovation surveys and in the finance of innovation. He is used extensively as lecturer outside academic circles (see below under individual interaction with users). He has good contacts internationally as well. He has contributed to a number of international project involving EC and OECD. He is one of the scholars involved in developing the Nordjysk Konjunkturbarometer (se below under Dalum).

CHRISTENSEN, P.R., is a leading Danish expert on supplier relationship and he has recently established and is now the director of a new unit of research on small business studies that has a close interaction with users in the private and public sector. As part of the DRUID research agenda, several studies on the dynamics of Danish subcontracting and supply systems have been undertaken. In one set of studies, the internationalization of Danish subcontractors has been analysed (see Andersen and Christensen, 1998 and 1999). Another set of studies has focused on a cluster of interrelated subcontractors in a regional setting (See Christensen and Philipsen, 1997 Christensen, Cornett and Philipsen, 1999). Based on results and experiences from these studies, researchers from 'Centre for Small Business Studies' (CESFO) have initiated collaborative experiments under the heading of 'Supplier Association'. The initiative is taken together with the Industrial Development Agency and the Triangle Region. 'Erhvervsfremme Styrelsen' provides the financial means to undertake the pilot studies.

DALUM, B. has developed his user interaction in connection with electronics industry as well as with regional firms in Northern Jutland. He is one of the entrepreneurs behind NorCOM- The Regional Cluster of Telecommunications in North Jutland. NorCOM is a club of approximately 25 firms and 2 knowledge institutions in the field of radiocommunications. He is also, together with J.L. Christensen and Lars Gelsing, a key person in establishing the Business Cycles Forecasting in North Jutland. It is a three year project on running a business cycle forecasting procedure for North Jutland. A representative sample of 1.000 firms (a permanent panel) is asked every quarter about their expectations of future employment, production, change of new orders, national and international competitiveness, etc.. The results

have been widely published and discussed in the local media. The project (Nordjysk Konjunkturbarometer) has been financed by the regional Labour Market Council, The County Council and Spar Nord (a local bank). The four researchers act as an “group of analysts”, who draft all the published material after discussions with a panel representing the sponsors.

LUNDEVALL, B.-Å. has a background in OECD as deputy director 1992-95 and from that period he has close connections with international organisations such as OECD, UNCTAD and the European Commission. He is also used as consultant by foreign governments and international organisations in the field of innovation policy. In the context of the DISKO-project he has developed contacts in all the ministries related to this policy area.

MASKELL, P. has a broad network of connections to user groups abroad and in Denmark. He is a leading expert in regional development issues. This is reflected in his participation in a number of committees etc:

- Member of Danmarks Statistiks Forskningsudvalg.
- Member of Københavns Erhvervsråd.
- Member of The Advisory board for Copenhagen Capacity.
- Member of bestyrelsen for Københavns Havn.
- Member of Byggeriets Udviklingsråd.
- Member of Erhvervsfremme Styrelsens ekspertgruppe for ressourceområdeanalyser.

DRUID (as represented by Maskell who wrote the background paper for the conference and by Lundvall as speaker) played a major role in the significant and highly successful OECD 1999 conference on ‘*Building a Cross-Border Learning Region*’ where members of the Swedish and Danish government, members of parliament, leaders from industry, trade and the professions were brought together to discuss the development in the Øresund Region. The conference white paper was written jointly by Professor Peter Maskell, DRUID and Professor Gunnar Törnqvist, Lund University, and contained a preface by the Danish and Swedish Ministers of Education. It highlighted the ways in which the region might utilise its unique position to head the transformation from the traditional engineering industries of yesterday into a cohesive learning economy in the 21st Century.

The conceptual work carried out by DRUID has mainly taken its empirical evidence and illustrations from manufacturing industries and to some extent also from the service sector of the economy. However, it has increasingly been felt that many of the analytical models developed in DRUID might contribute significantly to the understanding of market processes in industries traditionally less studied in industrial dynamics. Headway has been made in the transport sector where a Ph.D. project is close to completion, but a larger effort is now to be made in relation to the *construction industry*. DRUID is now engaged in helping the Ministry of Housing to build a new theoretical framework for understanding the sectors governance structure, inter-firm relationships, and innovation system. It is expected that the Government will back the conceptual work with four Ph.D. scholarships to the DRUID Academy for doctoral training and education.

The role of DRUID as a framework for interaction with users

One important role of DRUID has been to enrich the competence of individual experts making it possible for them to see sectoral problems in a broader perspective. Another fundamental role has been to work as quality control on analyses to be presented for different user groups. The bi-annual conferences (see appendix 2) have given scholars a forum where they can present results from applied research and, also, to confront it with work taking place in other countries. The importance of bringing together different data sets and expertise on different data sets should neither be underestimated (see appendix 5). The very amount of activities taking place simultaneously in the field of academic research and in the context of user interaction could not have been realised without having DRUID as a host and supporting infrastructure.

It is now considered to establish a user panel for DRUID (DRUID-Panel) – possibly with a certain entrance fee that could help to support the Unit financially. The idea would be to involve policy makers in all sectors related to industrial dynamics, citizen organisations and private firms at a rather high level and to organise a systematic information exchange with the members of the Panel. The plans are still at a preliminary stage and will be tested in the next year in discussions with different users.

a. Publications aiming at users

((p) indicates Ph.D.-student)

1999:

CHRISTENSEN, J.L. (1999), "SME Financing in Denmark", in *IAPMEI* book on SME-financing in international comparison.

CHRISTENSEN, J.L. (1999), "Lånegarantier i Danmark?", *The Danish Ministry of Industry*, 35pp.

CHRISTENSEN, J.L. (1999), "Risikovillig kapital til vækstorienterede innovative iværksættere", i *Århus Amts Erhvervsrededørelse*.

CHRISTENSEN, J.L., GREGERSEN, B., ROGACZEWSKA, A. (1999), *Vidensinstitutioner og innovation*, DISKO-rapport nr.8, Erhvervsfremme Styrelsen, august, 128 pp.

CHRISTENSEN, J.L. (ed.), JACKSON, S., RIDING, A., MENSAH, S. (1999), *Loan Guarantee Schemes in six countries*, Danish Ministry of Industry, 87 pp.

CHRISTENSEN, P.R., PHILIPSEN, K. & CORNETT, A. (1999), "Innovations & Innovation Support for SMEs - The Triangle Region of Denmark", SMEPOL Report no. 2. Funded by the European Community (DGXII) under the Targeted Socio-Economic Research Programme. Danish Country Report from the programme: SME Policy and the Regional Dimension of Innovation, Southern Denmark University, Kolding, 1999, University of Southern Denmark.

DALUM, B. (1999), "Erhvervsstruktur og erhvervspolitik". Kapitel 10 i Andersen, T. et al. *Beskrivende Økonomi*, 6. udg. København: Jurist- og Økonomforbundets Forlag.

DALUM, B. & SMITH, V. (1999), "Fremstillingsvirksomhed". Kapitel 12 i Andersen, T. et al. *Beskrivende Økonomi*, 6. udg. København: Jurist- og Økonomforbundets Forlag.

GJERDING, A.N., (1999), "Flexibility in Denmark: Pressures for Renewal and Change in the Danish Private Business Sector", in NUTEK (1999), *Flexibility Matters*, Stockholm: NUTEK Förlag.

GJERDING, A.N. & RASK, M. (eds.) (1999), *Internationalisering og eksport – billeder af den nordjyske eksportprofil* (Internationalisation and export – images of the North Jutland export profile), Aalborg: Center for Internationale Studier, Aalborg Universitet. Forthcoming.

LAURSEN, K., & CHRISTENSEN J.L. (1999), *The Creation, Distribution and Use of Knowledge: A Pilot Study on the Danish Innovation System*, Copenhagen, Danish Agency for Trade and Industry, Ministry of Business and Industry.

LINDEGAARD, K., & ABRAHAMSEN, B. (1999). *Miljø, produktinnovation og samarbejde* (Environment, Product innovation and Collaboration).

LUNDEVALL, B.-Å. (1999), *Det danske innovationssystem: et forskningsbaseret debatoplæg om innovationspolitiske udfordringer og handlemuligheder*, slutrapport fra DISKO-projektet, Erhvervsfremmestyrelsen.

LUNDEVALL, B.-Å. & BARRAS, S. (1999), *The Globalising Learning Economy: Implications for Innovation Policy*, Brussels, DG XII, 1999.

LOTZ, P. (1999), "Brancheanalyse. Begreber og dansk empiri", 2. udgave. Samfundslitteratur, 1999.

MADSEN, P.T. (1999), *Den samarbejdende virksomhed. Mønstre i produktudviklingen for danske fremstillingsvirksomheder* [The Collaborating firm. Patterns of product development of Danish Firms]. DISKO-projektet: Rapport nr. 6. Erhvervsfremmestyrelsen.

MADSEN, P.T. (1999), "Hvad vil de europæiske socialdemokrater med Europas økonomi?", kronik i *Politiken*, 11. januar, 1999 (i samarbejde med Henrik Plaschke).

MASKELL, P. & TÖRNQVIST, G. (1999), *Building a Cross-Border Learning Region. The Emergence of the Northern European Øresund Region*, Copenhagen: Copenhagen Business School Press.

MASKELL, P. (Forthcoming) (1999), "Verdenshandel og kapitalbevægelser", in Dolin, J., (Ed.) *Grundbog i Geografi for Gymnasiet og HF* København: Gyldendal.

NIELSEN, P. (1999), *Personale og fornyelse*, DISKO-projektet: Rapport nr. 7. Erhvervsfremmestyrelsen.

NIELSEN P. (1999), "Fornyelsesevne og kompetenceudvikling", i *Kompetence i organisatorisk perspektiv*, red. Arne Prahl m. fl., efteråret 1999.

NYMARK, S. R. (1999), "Billeder af strategi i forandringsrige organisatoriske omgivelser: 3 cases fra DISKO studierne", afs. 5.16, pp. 1-20, i S. Hildebrandt (red.), *Virksomhedens Strategi og Ledelse*, København: Børsens Forlag.

PHILIPSEN K. , CHRISTENSEN, P.R. & CORNETT, A. (University of Southern Denmark) (1999), *Innovation in SMEs and the regional innovation support system - the Triangle Region of Denmark*, A research project on innovation and innovation support in a regional perspective, funded by the European Community (DG XII) under the Targeted Socio-economic Research Programme (TSER), Kolding, 1999, 138 pages + appendixes.

PHILIPSEN K & TOFTILD, L. (1999), "Butik Lone". In P.R.Christensen, H.D. Jensen, P. Blenker, and A.Larsen,(eds.) *Godt begyndt - Casesamling om danske iværksættere og deres erfaringer*. Systime.

1998:

ANDERSEN, P.H. & CHRISTENSEN, P.R. (1998), *Den Globale Udfordring*, Eksportfremmerådet, ErhvervsFremme Styrelsen, 191 p.

CHRISTENSEN, J.L. (1998), *Den danske venturebranches seed-finansiering*, Aalborg, 26 p.

CHRISTENSEN, J.L. & ROGACZEWSKA, A.P. (1998), *The NSI Project: Synthesis Report of the Focus Group on Innovative Firm Networks*, OECD, 20 p.

CHRISTENSEN, J.L., DYHRBERG, L., LIVONI, P. & RYGAARD J.(1998), *Private investorers bidrag til innovation*, (Private investors' contribution to innovation), Erhvervsfremme Styrelsen, DISKO Report no. 5, October, 143 p.

DREJER, I. (p) (1998), *Den vidensbaserede økonomi - en analyse af vidensintensitet og vidensstrømme i det danske innovationssystem*, (The knowledge based economy - an analysis of knowledge intensity and knowledge flows in the Danish system of innovation), Erhvervsfremme Styrelsen, DISKO Report no. 4, May, 83 p.

GJERDING, A.N. (1998), "Teknologisk og organisatorisk innovation i nordjyske virksomheder", (Technical and organisational innovation in North Jutland firms), NEP Publikationer No.6, Aalborg: Aalborg Universitet, 34 p.

GJERDING, A.N. (1998), "Fleksibilitet og teknologisk fornyelse. Et socioøkonomisk perspektiv" (Flexibility and technological innovation. A socio-economic perspective), mimeo, Department of Development and Planning, Aalborg University, presented at the conference on *Fleksibilitet i Norden* (Flexibility in the Nordic Countries), organised by Institutt for samfunnsforskning (the Norwegian institute for social research), Oslo, October 29-30, 17 p.

JOHNSON, B., EDQUIST, C., HOMMEN, L., LEMOLA, T., MALERBA, F., REISS, T. & SMITH, K. (1998), *The ISE Policy Statement - The Innovation Policy Implications of the 'Innovation Systems and European Integration' (ISE) Research Project*, Linköping, 76 p.

JØRGENSEN, K. (P), KRISTENSEN, F.S. (P), LUND, R. & NYMARK, S. (P) (1998), "Organisatorisk fornyelse - erfaringer fra 24 danske virksomheder", (Organisational Change), Erhvervsfremme Styrelsen, DISKO Report no. 2, March, 101 p.

MADSEN, P.T. & Plaschke, H. (1998), *Den forbudte debat om ØMU'en*, Systeme.

VOXTED, S. (1998), "Efteruddannelsessystemets rolle og muligheder i det danske innovationssystem" (The role and possibilities of the system for continuing vocational training in the Danish system of innovation), Erhvervsfremme Styrelsen, DISKO Report no. 3, March, 71 p.

VALENTIN, F. (1998), "The Relationship between Research and Development in EC Projects", Vol III i forfatterens rapportserie: *The Impact of EC-Programmes on R&D decision making: Survey of a sample of industrial participants, I-III*. Commission of the European Communities, MONITOR/SPEAR.

1997:

CHRISTENSEN, J.L, TUNZELMAN, N. von & RAMA, R., "Innovation in the European Food Products and Beverages Industry", European Commission", report for the European Commission, 1996, 146 p.

CHRISTENSEN, J.L., "Borrower-Lender interactions - Financial systems and innovation", report for the European Commission, ISE, TSER, 1997, 166 p.

CHRISTENSEN, J.L. & KRISTENSEN, A., "Et historisk og internationalt perspektiv på innovation i dansk industri", København, Erhvervsfremme Styrelsen, 1997, 76 p.

DREJER, I. (p) LAURSEN, K., (p) & KRISTENSEN, F.S. (p), "Studies of Clusters as a basis for industrial and technological policy in the Danish economy", DRUID Working Paper 97-14.

GJERDING, A.N., ed., "Den fleksible virksomhed. Omstillingspres og fornyelse i dansk erhvervsliv" (The flexible firm. Pressures for renewal and innovation in the Danish business sector), København: Erhvervsudviklingsrådet, 1997, 179 p.

GJERDING, A.N., "Udviklingen i nordjyske virksomheders konkurrenceevne" (The development of competitiveness in the North Jutland private business sector), NEP Publikationer No.3, Aalborg: Center for Internationale Studier, Aalborg Universitet, 1997, 32 p.

KRISTENSEN, F.S., (p) LAURSEN, K. (p) & DREJER, I. (p), "Studies of Clusters as a basis for industrial and technological policy in the Danish economy", DRUID Working Paper 97-14.

b. Events and individual interaction with users

1999:

ANDERSEN, P. H. (1999), Presentations at the Aarhus School of Business business manager seminar in relationships and marketing

Christensen, J.L. (1999)

7. January – Productivity: measurement and development. Seminar at CBS, Copenhagen

7. January – Ministry of Industry – meeting on development of financial products in Denmark

13. January – Arranged seminar with external experts in Copenhagen on Technological Services

20. January – meeting German Ministry of Industry on financial products and financing of SME's

22. January - meeting Dutch Ministry of Industry on financial products and financing of SME's

25. January, 24.March and 21.June – Steering Committee Meeting in Danish Ministry of Industry on potential implementation of Business Angels Network. Copenhagen.

4. february – Speech at seminar Institutrådet, "Technological Service in Denmark".

22 february – Speech for Council of Viborg Amt, "Finansiering af udviklingsorienterede virksomheder".

3. March - meeting French Ministry of Industry on financial products and financing of SME's

4. March – DISKO steering committee meeting, Copenhagen.

10.march and 8.june - Meeting in editorial board of Nordjysk Konjunktur Barometer, Hotel Rebild Park, Skørping.

8. April – Seminar, Financing SME's, Prof. Allan Riding/Jesper Lindgaard Christensen, Ministry of Industri, Copenhagen.

22. April - Annual meeting VækstFonden, Copenhagen

3. May – Speech at NOVI on "Business Angels". Meeting in syndicate of business angels

4. May – Speech at Hotel Hedegaarden, Vejle on "Financing SME's in Denmark" , Dansk Industri.

18. May – Meeting in OECD/NIS-project, Paris.

20.May – Speech at Industriens Hus, Copenhagen on "Financing innovations in Denmark", Dansk Industri (Danish Association of Industries),

1.-2. June – Meeting in editorial board of Scandinavian Venture Capital Journal, Stockholm, Sweden.

19. August - Meeting in Danish Ministry of Industry and VækstFonden on the development of the Danish Venture Capital Market. Copenhagen.

CHRISTENSEN, J.F. (1999) Apart from academic articles my project, Corporate Coherence and Management of Technology, has implied the development of extensive case studies of the following companies: Danfoss, Grundfos, Bang and Olufsen, MD Foods, Reson and Danfysik. These case studies which will be published as working papers in 1999 have all involved substantial communication with managers at the respective companies. In several cases this has moreover led to ongoing dialogue and exchange of information and views on strategic issues.

GJERDING, A.N. (1999), "Det danske innovationssystem i komparativ belysning" (The Danish system of innovation – a comparative perspective), lecture to industrial consultants and policy makers, organised by Ringkjøbing County, Ringkjøbing 25.08.99.

LINDEGAARD, K. (1999) International Seminar: "Innovation, Competitiveness and Environment in Central America: Systems of Innovation Approach.", February 22 and 23, 1999, San Jose, Costa Rica.

LUNDEVALL, B.-Å.

January 7: Organised seminar on Danish Productivity problems in Copenhagen with representatives for Ministry of Industry, Danish Statistical Office and OECD.

Participated in several meetings with working group behind the establishment of regional center for human resource development.

March 8: Participated in meeting with the Technology Council

March 11: Commented proposal for establishing Danish Technology Foresight at Jystry seminar.

Contributed to OECD-project on knowledge at meetings March 15 (Paris), May 17-18 (Washington), June 17-18 (Copenhagen),

April 14: Presented results from the DISKO-project to Erhvervsudviklingsrådet, Copenhagen.

April 28-30: Organised workshop on innovation policy for DG XII-EU, Bruxelles.

May 27: Presented results from the DISKO-project at international workshop on the construction industry in Copenhagen.

June 3: Presented results from the DISKO-project at Amtsrådsforeningens erhvervsudvalg, Copenhagen.

June 21-22: Presented results from the EU-project on innovation policy at workshop organised by the Renner Institute, Vienna.

1998:

ANDERSEN, P.H.

Internet and the international marketing and sourcing of subcontracted goods. (DTI), August 27, 1998.

CHRISTENSEN, J.F.

Commentator at the minister of Ministry of Business and Industry's presentation of, *Erhvervsredegørelse 1998*, Christiansborg October 1, 1998.

Contribution to, *Oxford Research's evaluating af Centerkontraktordningen*

CHRISTENSEN, P.R.

Lecture to the Danish Council for Industrial Development, Ministry of Industry on the subject *Perspectives for Danish Subcontractors Development*, Copenhagen, December, 1998.

DALUM, B.

The Fairy-Tale of North Jutland: The History of the North Jutland Radiocommunications Industry. Talk at The Danish Telecom Society (part of the Danish Association of Engineers) Conference on the Danish Electronics Industry October 8, 1998.

Member of the Board of NOVI A/S, the Aalborg University science park.

GJERDING, A.N.

Flexible organisations in the Nordic Countries, NORDFLEX workshop, organised by the Norwegian institute of social research, Oslo, February 19-20, 1998.

Flexible organisations in the Nordic Countries, NORDFLEX workshop, organised by the Finnish labour ministry, Helsinki, June 15-16, 1998.

The flexible firm, presentation at the conference on "The Changing Nature of the Firm", organised by NUTEK, Borgarnes (Iceland), June 25-27, 1998.

Den fleksible virksomhed (The flexible firm), presentation at the conference on "Selvstyrende grupper - hvorfor?" (Self-governing work teams - why?), organised by the Vocational Training and Education Centre of Aarhus, Aarhus (Denmark), August 25, 1998.

Fleksibilitet og integration - tidens trend? (Flexibility and integration - the contemporary pattern?), presentation at the executive briefing on "Implementering af integrerede rammesystemer" (Implementation of integrated mainframe systems), organised by Deloitte & Touche Consulting Group, Copenhagen, September 2, 1998

Flexible organisations in the Nordic Countries, NORDFLEX workshop, organised by the Norwegian institute of social research, Oslo, October 28 & 31, 1998.

Fleksibilitet og teknologisk fornyelse. Et socioøkonomisk perspektiv (Flexibility and technological innovation. A socio-economic perspective), presentation at the conference on “Fleksibilitet i Norden” (Flexibility in the Nordic Countries), organised by the Norwegian institute for social research, Oslo, October 29-30, 1998.

Nye kompetencer - nyt uddannelsesbegreb (New competences - new educational concepts), presentation at the regular meeting for the Danish vocational training and education centres, organised by the Danish labour market directorate, Kolding (Denmark), November 5, 1998.

Lærende organisationer og fleksible virksomheder (Learning organisations and flexible firms), workshop organiser at the conference on “Mennesker i udvikling - virksomheder i forandring” (Humans in progress - changing firms), organised by the Danish labour market directorate, Vejle (Denmark), November 18-19, 1998.

Innovation i Nordjylland (Innovation in North Jutland), presentation at the conference on “Nordjylland i et globalt perspektiv” (North Jutland in a global perspective), organised by the North Jutland export club, Aalborg (Denmark), November 23, 1998.

Fleksibilitet og konkurrenceevne (Flexibility and competitiveness), presentation at the seminar on “Nordjysk Eksportprofil 1998” (North Jutland export profile 1998), organised by the NEP project at Aalborg University, Aalborg (Denmark), December 14, 1998.

LUNDEVALL, B.-Å.

The learning economy – implications for the knowledge base of health and education systems, presentation of paper at the, 2nd High level Forum on Knowledge Production in Learning economies and Societies, CERI/OECD, Paris, May 14, 1998.

Participated in working group to prepare the establishment of, *Human resource management center*, in Northern Jutland. Meetings 31/8, 5/10 and 11/12 1998.

Participated in *the Industry Ministry think-tank on innovation policy* 19/8, 18/11 and 16/12 1998.

Den økologiske udfordring i den lærende økonomi, ØKO-net seminar, Snoghøj Folkehøjskole, January 25, 1998.

Danske virksomheders håndtering af globaliseringen, Europa-konference, Aalborg University, February 2, 1998.

Den fleksible virksomhed – resultater fra DISKO-projektet, Aalborg Industri og Handelskammer, Aalborg, February 4, 1998.

Innovation policy in the learning economy, INSEAD, Fontainebleu, May 13, 1998.

Den vidensbaserede økonomi – myter og realiteter, Erhvervspolitisk Forum, Ingeniørhuset, København June 17, 1998.

The learning economy, 3rd high level Forum on Knowledge Production in Learning economies and Societies, CERI/OECD, Stanford University, Stanford, September 10, 1998.

Den lærende økonomi – nye udfordringer for virksomheder og for samfundet, PLS-workshop on Balanceret rapportering, Hotel d'Angleterre, September 17, 1998.

MASKELL, P.

Erhvervspolitisk Forum, *Boligpolitisk strategi - virker virkemidlerne?* May 5, 1998.

Erhvervspolitisk Forums presentation of *Erhvervsministeriets Erhvervsredegørelse 1998*, October 1, 1998.

Dansk Industri conference on, *Mindre og mellemstore virksomheders rolle i velfærdssamfundet*, December 3, 1998.

OECD conference in Modena on, *Learning and Regional Competitiveness*, May 28-29, 1998.

OECD conference on, *Economic and Cultural Transition Toward a Learning City*, Friedrich Schiller University of Jena, June 25-26, 1998.

EU commissions conference in Manchester on, *Learning Regions and Economic Development*, September 16-18, 1998.

VEJRUP-HANSEN, P.

Speech at Dansk Management Forum. Seminar on senior policy. *Hvorfor er tilbagetrækningsalderen blevet lavere?* November 1998.

Consultant for Arbejdsmarkedsstyrelsen on data use in AF-regions.

1997:

CHRISTENSEN, J.F.

Two lectures/talks at the Association of Engineers in Denmark, October and November, 1997

CHRISTENSEN, J.L.

Gave presentation on The Role of Technological Service in Danish Manufacturing at a meeting arranged by "Institutrådet" and the Danish Association of engineers "IDA", House of Ing., Copenhagen, november 20th.

DALUM, B.

Member of the Working Group that initiated and organise the Danish Business Policy Forum (“Erhvervspolitisk Forum”), Two meetings have been organised in this period of this report. At October 10, 1996 the annual Business Policy Report from the Ministry of Business was discussed. Main speaker Finn Lauritzen, Ministry of Business. BD was one of two the ‘reviewers’ of the report.

With two directors of the Aalborg University Science Park (NOVI) founder and organiser of a club, NorCOM, of firms (around 20), university departments in electronics and NOVI, which is host and in charge of the current organisation activities of the club. NorCOM, which is focused at the technology system of radiocommunications (mobile, cordless and satellite communications), has organised three meetings during 1997 with speakers from Ericsson, Nokia and Nera. During the meetings BD has delivered short briefings on e.g. “dual-band versus dual-mode phones”.

Besides various newspaper articles the journal of the Danish Association of Engineers (IDA) “Engineering Weekly” (“Ingenioeren”) has published a series of articles under the theme of “Mobilicom Valley” (about the electronics industry in North Jutland) during the autumn 1997.

Co-organiser of a seminar on “Business Policy” with focus of the Business Policy Report 1997 and the relation between high tech firms and the Danish venture capital market, November 27-28, 1997 in Hornbaek. The seminar was held by DJOEF-Efteruddannelse.

Member of an ad hoc group in Invest-in-Denmark that commented drafts for chapter 11 on foreign direct investments in Danish industry in the 1997 version of the Business Policy Report from the Danish Ministry of Business.

FOSS, N.J.

Participated in the committee about the importance of the work of KonkurrenceRådet

JØRGENSEN, K.M.

Ph.D-student connected to the Ministry of Business November 1 1996 - July 1, 1997.

Involved in the design of the LOK-project and participated in LOK-conference in Copenhagen October 6, 1997.

LAURSEN, K.(p)

Workshop on Innovation Systems, OECD, Paris October 3, 1996,.

TSER-Policy Conference on Technology, Economic Integration and Social Cohesion, University of Maastricht, the Netherlands, April 18-19, 1997.

Seoul OECD-Workshop on National Innovation Systems in Catching up Economies, Hotel Shilla, Seoul, South Korea, October 15, 1997.

LUNDVALL, B.-Å.

Has produced a major report and a summary policy document for EC-DG XII, aiming specifically at communicating results from TSER-research and other socio-economic research to policy makers in Europe (Innovation policy in the globalising learning economy). There have been two major meetings on the subject of Innovation Policy in Bruxelles in that context: April 25 and October 29-30, 1997. Both meetings had as exclusive purpose to discuss the design of the Lundvall-Barras report.

Presentation on 'Innovation and organisational change' at the annual 'Institutmøde' for the Danish Technological Institutes, Schæffergården, Gentofte, September 18.

MASKELL, P.

Presentation at Ministry of Environment Conference "Omdannelse af ældre erhvervs- og havneområder", March 1997, Eigtveds Pakhus, Copenhagen.

Participated in Scandinavian Academies for Management Studies' Round Table on the Øresund region, April 1997

Presentation on 'Competitiveness and industrial policy' at DJØF training course November 1997, Trouville, Hornbæk

Presentation on 'The international positioning of the Øresund region' Dansk Byplanlaboratoriums Danish Swedish Conference, Hotel Marienlyst, December 1997, Elsinore.

VILLUMSEN, G.

Organizer (together with Bent Dalum and Jørgen Basballe, managing director of NIVU) of a club, NorCOM, of firms (around 20), university departments in electronics and NOVI, which is host and in charge of the current organisation activities of the club. NorCom, which is focused at the technology system of radio communications (mobile, cordless, and satellite communications), has organised three meetings during 1997 with speakers from Ericsson, Nokia and Nera.

c. Events and collective interaction with users

1999:

JOHNSON, B.

International Seminar on Innovation, Competitiveness and Environment in Central America, San José, Costa Rica, February 22-23, 1999: The seminar was organised by The IKE group and Center for Environment and Development (AAU) and CINPE at the Universidad Nacional, Heredia Costa Rica. The intention was to communicate results from the SUDESCA (Sustainable Development in Central America) project to the Central American research community and to political decision-makers. Several officials from the Ministry of Industry

including the minister of industry and agriculture participated in the conference. The rector and other officials of the Universidad Nacional also participated.

1998:

DALUM, B.

The Norcom-club, Denmark May 6th. 1998 with Mette Præst and Gert Villumsen:

The Patent Behaviour of the Electronics Cluster 'Norcom' in Northern Jutland.

Member of the NOVI team organising the NorCOM club of telecommunications firms and knowledge institutions. Among the activities are 4 annual meetings, current update of the NorCOM homepage (based on detailed scanning of a variety of information sources and a broad spectrum of outside information tasks).

LUNDVALL, B.-Å.

Participated in meetings in advisory committee for the DISKO-project, January 26, May 12, September 18, October 30 and December 7, 1998.

Organised, *Innovation systems and Innovation Policy*, High Level Workshop on Innovation systems and Innovations policy, Novi, Aalborg, May 11, 1998.

1997:

In co-operation with the Board of Center for Industrial Economics and the Centre for Industrial Economics, DRUID organised the User Oriented Conference on Industrial Economics, Eigtveds Pakhus, October 31, 1996.

In connection with the DISKO-project DRUID has organised a number of user-oriented activities in collaboration with Erhvervsfremme Styrelsen and ErhvervsUdviklingsRådet: Meetings with a steering committee November 29 1996, August 27 and November 15 1997.

Specific meetings with users to discuss preliminary results from reports for sub-projects: June 18, 1997 on Organisational Change and Change in Qualifications, Schæffergården, Gentofte. November 27, 1997 on Knowledge-intensity and knowledge flows in the Danish Economy, Erhvervsfremme Styrelsen

In connection with OECD-activities in the field of innovation systems DRUID-projects have played a major role in representing Denmark and co-ordinating certain activities. DISKO/DRUID organised in collaboration with OECD a meeting in Aalborg 3.-4. April 1997. There have been a number of meetings in Paris: 19.-20. March 1997, 25 June 1997, 27.-28.th October 1997 & 11th December 1997.