PROJECT DESCRIPTION for CAGIS-II:
Cooperating Agents in the Global Information Space -- II
(Extension for Computer-Assisted Education)

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1 Summary

The information and knowledge society, with its demand for life-long learning and constant knowledge acquisition, requires university to play a new role, becoming more active and flexible. This calls for the dynamic combination of different educational approaches that optimize learning, keeping into account the requirements posed both by the subject and by the learning actors. More emphasis must be put on cooperation among both students and teachers. Technology can play an essential role in supporting this cooperation, fostering existing teaching styles and enabling new ones. In the last decade many tools have been developed for supporting different forms of cooperation, but there is still a lack of tools supporting the whole range of needs that are required in teaching/learning settings.

Objectives: The project will provide teachers and students, especially at IDI/NTNU, with parts of an integrated and flexible support for teaching and learning. It aims at:

(O1) Developing an overall framework (methods, models and components) that allows teachers to apply the best educational approach in relation to the context;

(O2) Enabling teachers and students to create an interactive and cooperative ‘‘learning community”, by constructing and applying suitable computer-assisted support;

(O3) Adopting and evaluating basic research, models and demonstrators resulted from CAGIS project.

Partners: CAGIS-II will work in cooperation with the CAGIS project at IDI, building on the infrastructure created during this project and involving both professors and doctoral students. Regular IDI courses will be used for case studies. In addition, we seek a loose cooperation with the national NITOL program for remote education, and the national NAWUS project for teacher cooperation in software engineering.

Approach: The project will be driven by the needs for better cooperation in educational settings. The requirements will be based on a theoretical analysis of different educational and learning theories, as well as on case studies at NTNU. These studies will seek to understand the cooperation needs in different settings (e.g., traditional vs. virtual classrooms) and the role that technology can play in them. The goal is to use technology not only for enhancing existing forms of learning, but also to allow a more flexible and adaptable approach to education. A demonstrator satisfying the determined requirements will be developed. Its use in some courses at NTNU is envisaged. The work will be developed using the results of CAGIS. Two main evaluations are envisaged, after 2 and 4 years.

Budget: CAGIS-II is to be staffed with one doctoral student for four years, where the last is financed by IDI. In addition it comes involvement of teachers, the existing CAGIS team and the surrounding university environment.

Reults and their exploitation: The results will be methods, models, and partially a demonstrator for the cooperation within and between students and teachers as explained later. These results will be disseminated in external courses and workshops, by other collaborative projects with Norwegian services and industry, by teaching 150 master candidates in informatics per year, and at international conferences and in journal papers.

Keywords: Education, Teaching, Collaborative learning, Groupware (CSCW), Evaluation of CAGIS, emonstrator, Case studies at IDI, transfer to use at IDI.

2 Motivation

Traditional education can be labeled as ‘‘teacher centered”: an instructor in a (real or virtual) classroom transfers her knowledge to students that are expected to acquire and memorize it. Learning is seen as an individual activity. Lately, these approaches to education has being questioned. More flexibility is required, and educational theories have started to recognize the importance not only to memorize, but also to interpret the knowledge and use it as a basis for creating new knowledge. This is one of the main assumption underlying **Problem-Based Learning (PBL)**. This approach to schooling does not start with a content to master, but rather with a problem to be solved. Though PBL has its origin in medicine, it is now starting to be applied in other disciplines although with varying degree of satisfaction. Further, more and more educational approaches recognize the importance of group work in learning. Different cases, both in school and in organizations, seem to support the idea that group work provides the best results when the focus is on developing new knowledge. This is confirmed also from the experience at NTNU, where many courses are (fully or partly) based on projects to be performed in small groups of students under the supervision of a professor (Andersen et al., 1994). Thus for engineering **project-based education** (not problem-oriented), as a supplement to a preplanned curriculum, seems the most appropriate, cf. experiences both at Univ. of Linköping and at NTNU.

In this perspective the responsibility of teachers is dramatically changing and their major challenge has become to combine different educational approaches. In fact, no one of the approaches mentioned above can be considered as optimal under every condition. It is therefore important to select what best fits to the topic under discussion and to the actual teaching settings (e.g., the level and composition of the classroom, the degree of geographical distribution, etc.). In relation to the selected approach (or combination of approaches) the role of teachers varies as well as the tasks that have to be performed.

Independently by the chosen educational approach, cooperation plays an essential role, though it assumes different characteristics. In general it is possible to identify three patterns of interactions and cooperation:

1. **Among teachers:** Cooperation among teachers allows to develop better curriculum and better teaching material, possibly reusing past experiences. This cooperation is becoming more and more relevant, as witnessed by many efforts in this area. This need mainly arises from the new challenges that teachers are facing due to highly dynamic subjects and life-long learning.
2. **Among students:** Interaction and cooperation among students is central in universities, even when is not planned ahead. Cooperation among students can moreover become a central part of education in accordance to various theories on collaborative learning. As mentioned, many courses at NTNU are already based on projects to be performed in small groups. Cooperation in this context is essential and it allows developing new knowledge and new mental models. In addition, this approach helps students to increase their capability to work in teams.
3. **Among teachers and students (and vice versa):** Cooperation among teachers and students is essential in optimizing the learning experience, in a continuous process that allows the adaptation of the teaching to the actual students' needs and level. Feedback from students is central in this adaptation process and for the learning process of teachers.

In all the above patterns, there is need to describe and distribute shared **documents**, to set up suitable **information flows** (process models, newsgroups), to configure partly common **workspaces**, and to apply special **tools/agents** with appropriate competences onto such workspaces. All of this is to some degree covered by CAGIS, see Sec. 3.3.

Teachers and students can be identified as a community of learning (Lave & Wenger, 1990) where the cooperation among each and every member is essential for the evolution of the community and the fulfillment of its goals. It is important to note that this community can be constituted by geographically distributed individuals belonging to different organizations and institutions.

The importance of technology in education is widely recognized and the last decades have seen the development of numerous dedicated computer based tools. In addition, Internet and the WWW have opened a new space of possibilities, connecting people and easing information exchange. Many courses made widespread use of Internet technology in order to improve the communication between teachers and students and among students. For example, mailing lists and newsgroups are used for communicating up-to-date information and for sharing feedback. FAQs on many topics are available and they constitute an essential way to share experience in distributed community. The WWW is used for providing general information and distributing course material. Virtual libraries give access to a wide variety of articles and books. Advances in multimedia technology makes it possible to prepare and distribute material where the adopted media is chosen depending on the content. Teachers, through the WWW, can easily share their teaching material and experience databases can be developed.

This project is motivated by the conviction that technology can and should be used in a multi-faced way, allowing to fully benefit of the high connectivity within and among universities. Internet and the WWW are in this perspective not the final stage, but the basis on which to build to transform a university into a community of learning, where teachers and students cooperate to progress. In order to fulfill this goal it is necessary to develop a framework that integrates different educational approaches and tools, recognizing the central role of cooperation in education. In this perspective, students and teachers constitute an instantiation of the cooperating agents in the global information space that are the subject of CAGIS research. The experience and the tools developed in CAGIS are therefore constituting the starting point for CAGIS-II.

The IDI context:

At IDI we can at least identify four kinds of cooperation in many courses:

1. Cooperation inside project groups of 4-6 students;
2. Cooperation between students (or groups) and their teachers and teaching assistants, either about curriculum (cf. newsgroups, FAQs) or about assignments (demanding concrete advice);
3. Dialogues between teachers and teaching assistants (to assess and adjust the course);
4. General exchange and questions between individual students to the outer world, e.g., to retrieve supplementary information.

These kinds of cooperation is indicated in the figure below. CAGIS-II mainly intends to give support to the three first.

FIGUR!!!

3 State of the art

3.1 Theoretical background

Different theories on learning and cognition have determined radical changes in educational approaches, moving the focus from knowledge transfer to knowledge creation. Of particular note is the work by the Russian socio-cultural psychologist Vygotsky (Vygotsky, 1978) that deeply influenced most of the later understanding of learning and cognition. The key concept in the work of Vygotsky is the idea of the ‘‘zone of proximal development”. This has been described as ‘‘the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers”. (pag.86)

Among the theories that are going to impact on CAGIS-II it is important to mention distributed cognition (Flor & Hutchins, 1991; Hutchins, 1995) as well as situated cognition (Lave & Wenger, 1990), that allow to see individuals as active agents that are purposefully seeking and constructing knowledge within a meaningful context.

Among the various educational approaches it is important to recall Problem-Based Learning (PBL) and Anchored Instruction (Bransford et al., 1990), that provide a student-centered contextualized approach to education.

3.2 Technical background

CAGIS-II is focused on supporting cooperation in education. Computer Supported Cooperative Work (CSCW) and Computer Supported Cooperative Learning (CSCL) constitute therefore the two main reference disciplines. It is here important to note that CSCW and CSCL are concerned not only with the development of tools, but also with their social, psychological, organizational, and learning impact. The systems developed in the area of CSCW and CSCL provide interesting tools for supporting different aspects of cooperation. GroupSystem (Nunamaker et al., 1995), BSCW (Bentley et al., 1997) and Lotus Notes (Orlikowski, 1992; Ginsburg & Duliba, 1997) are just a few examples of systems that can and have been used in different educational settings for supporting knowledge creation and sharing, also within the context of existing NTNU courses.

Workflow and process modeling are two other relevant research areas, as mentioned below. The direct applicability of the related existing tools in educational settings is however problematic because they have been designed mainly for organizational settings and their complexity make them inadequate for the intended purpose.

Additional input to the project will come from the research in knowledge management, digital libraries, and agent technology.

3.3 NTNU and CAGIS expertise

NTNU is the next largest educational institution in Norway, with 18,000 students and 900 teachers. It is leading in information technology. IDI educates over 100 master graduates in informatics per year, and a doubling is foreseen in the next 3--4 years. IDI is also giving courses for over 5000 non-informatics students per year.

The courses taught at IDI are adopting a variety of educational approaches and make use of different supporting technologies. IDI constitutes therefore an optimal environment for this project, providing a high number of relevant case studies as well as access to different experiences; cf. (Andersen et al., 1994) and (Jaccheri and Lago, 1997). This will be essential both during the requirement definition and the evaluation of the result. Note also the IDI courses: IT131 Datastøttet læring and IT232 Pedagogisk programvare.

IDI is participating in the NITOL program (NITOL, 1998) to provide regular courses over the Internet for remote learning, in cooperation with three other colleges in Norway. In 1998, NITOL has 4000 remote students, even students outside Norway. Four EU projects have or are been carried out ``around" NITOL: EONT, MECPOL, DoODL and AQUARIUS.

IDI/NTNU, Ifi/Univ.Oslo and six other educational institutions are furthermore starting up a ‘‘Norgesnett” around System Engineering education, where teachers cooperate and share educational material through WWW.

The experience developed at IDI during CAGIS will provide the basis for CAGIS-II. CAGIS aims at giving cooperating human problem-solvers (designers, engineers) a better support for concurrent and distributed team work, providing a framework for the corresponding IT support, with distributed software agents and data stores, and with domain-specific formalisms and tools. In particular, it is important to stress the experience and the results gained in document, workspace and process modeling as well as on software agents. These results are relevant for CAGIS-II for the following reasons:

- **Modeling of documents:** Documents play in fact an essential role in education. The capability to model heterogeneous documents and their use is central for fulfilling the goal of information sharing, at the technical level but also and foremost at the semantic one. Sharing of documents is important for supporting the cooperation within the single project groups, but even more for supporting the interaction among heterogeneous groups (as, for example, when a student belongs to more than one group).
- **Modeling of workspaces:** Cooperation among students and teachers is based on the sharing of common workspaces providing access to documents and shared tools, as well as awareness on the cooperative effort taking place. Shared workspace are, also according to our previous experience at NTNU, central when students are geographically or timely distributed. In this case the access to the common infrastruscture (e.g., meeting rooms) is not possible and the access to a virtual common workspace becomes crucial for creating the group.
- **Modeling of processes:** Process models can help teachers and students to have a better overview of the group progress. Especially in distributed groups process models can be the basis for an active support to coordination.
- **Software agents and multi-agent architectures:** Multi-agent architectures provide a new paradigm for the development of distributed systems whose flexibility is particularly suited for supporting adaptable education. Software agents can be used to provide active support to teachers and students by, for example, keeping models of students and groups updated and defining teaching patterns tailored in relation to these models.

In addition, one of the four scenarios used in CAGIS for eliciting requirements is considering collaborative learning in the context of a university course. In CAGIS-II this will provide a starting point for the research.

4 Scope and Approach

The proposed project mainly aims at developing a high-level and tailorable framework (T2) for supporting different communities of learning. This overall framework will provide a set of generic methods, models and even tools. The framework may have many alternative implementations, but we will make a demonstrator partly relying on CAGIS technology (see T3).

In order to maximize overlap with CAGIS and to provide fast feedback from empirical evaluations at IDI courses, the work will be done in two phases of two years each. The work consists four consecutive and partly overlapping tasks, T1-T4, where each task is performed twice:

- **T1. Analyze educational requirements.**

  We will here analyze how different teaching/learning approaches relate to different educational needs, and how they can be integrated. It is common to use, within the same course, different educational

approaches. At NTNU many courses, for example, support traditional classroom teaching with short group projects that allow students to deepen their understanding of the subject.

This task will combine a theoretical analysis of the state-of-the-art with a more empirical approach, taking advantage of sociological and anthropological methods of analysis developed in the field of CSCW. This analysis will consider different case studies based on courses at NTNU as well as courses provided by NITOL (remote learning). The selection of the cases will be performed so that we can consider both courses that make no (or low) use of technology and courses that adopt existing groupware technology. For the case studies we count on the support of the teaching staff involved in CAGIS, as well as on the possible participation of other professors at NTNU.

We also analyze the role that cooperation plays in education in relation to the specific setting. The patterns of interaction in fact vary in relation, for example, to the chosen educational approach (e.g., traditional classrooms vs. project based education), to the degree of geographical distribution (co-located students versus remote learning).

- **T2. Make an overall framework that support communities of learning in a flexible way.**

  This is a set of more operational guidelines (methods) and general (reusable) cooperation models to perform cooperative education for different situations.

  We will also identify the appropriate support by computer-based tools, with a focus on the enabling role of technology. This will require:

  - An evaluation (and possible adaptation/specialization) of the models developed in CAGIS for documents, processes and workspaces. Thus, there will be general evaluations back to the main CAGIS project from phase 1 this task.
  - The development of new specialized models for students, teachers and courses.

  The final framework will consider not only the results of Task 1, but will be integrated with the continuous development and analysis of possible scenarios of use and support. This integration aims at developing a framework that is not only able to support the actual state of affairs in education, but to stimulate the development and adoption of new practices.

- **T3. Make demonstrator, using CAGIS and other tools.**

  Select relevant concepts in the framework and develop demonstrators, using both the CAGIS prototype and existing groupware and educational tools.

  There will be concrete, suggestive inputs back to the main CAGIS project from phase 1 this task.

  We emphasize the risk here: On the one hand, this effort has to be very moderate, due to the available resources. On the other hand, we cannot expect students and teachers to meaningfully apply and experiment with unreliable ‘‘toy’’ tools for their regular course work. Thus, very pragmatical decisions and solutions must be applied.

- **T4. Experiment and validate.**

  This means running ‘‘live’’ experiments with the demonstrator(s) among teachers and students. The IDI course scenarios must be elaborated (done in T1), and operational hypotheses and evaluation criteria made, using theory from both T1 and T2.

  This evaluation will take into consideration the functionality and usability of the demonstrator and the underlying framework, as well as its impact on the learning process.

  To gather relevant data, we will use techniques from social sciences (observation, interviews, questionnaires), as well as (semi-)automatic data monitoring from instrumented cooperation tools.

The evaluation from phase 1 of T4 will give inputs to the main CAGIS project and to the second phase of CAGIS-II.

5 Objectives and Results

CAGIS-II aims at developing a framework that can be used by both teachers and students for improving learning, with a focus on cooperation.

We can display the role of CAGIS-II in the follow figure:

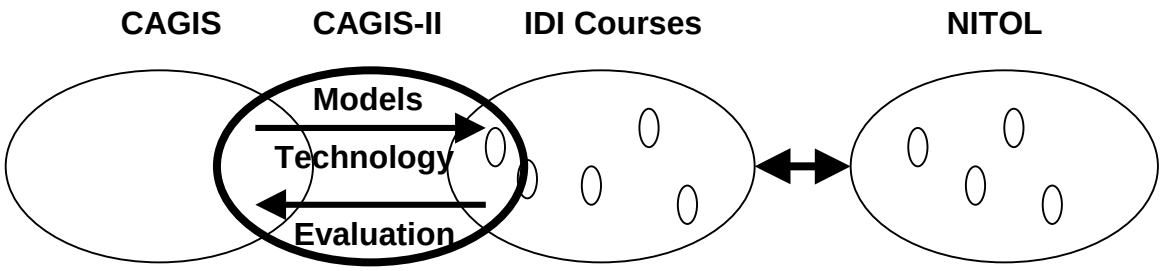

Figure 2: CAGIS-II Relationships

5.1 Overall objectives

G1. Increased effectiveness of Norwegian education, especially at IDI/NTNU, both for regular and life-long learning.
G2. Build-up of local and national competence by Ph.D. education.

5.2 Project objectives

O1. Developing an overall framework (methods, models and components) that allows teachers to apply the best educational approach in relation to the context;
O2. Enabling teachers and students to create an interactive and cooperative ‘‘learning community”, by constructing and applying suitable computer-assisted support.
O3. Adopting and evaluating basic research, models and demonstrators resulted from CAGIS project.

5.3 Technical objectives

TO1. Analysis of:
- The application of various learning theories to different educational environments and their integration;

- The technological support that can be provided for supporting flexibility and cooperation in education.

TO2. Evaluation and adaptation of the models developed in CAGIS for documents, processes, workspaces, and agents, especially describing students, teachers and course settings.
TO3. Making a demonstrator, utilizing the above technologies.
TO4. Application and validation of the demonstrator to NTNU courses.

5.4 Results

Deliverables will be from each of the tasks T1-T4, in two phases:

D1. Social and technological observation and analysis: Method and Results.
D2. A framework that allows supporting communities of learning in a flexible way.
D3. A demonstrator in group-oriented and distributed education.
D4. Experimentation and Evaluation of models and demonstrator.

The deliverables will be provided as internal notes and reports, and as external articles.

5.5 Exploitation of results

Internal exploitation: revised teaching methods, use of the demonstrators for relevant courses, build-up of strategic competences, synergies with other research (CAGIS, NITOL).

External exploitation: Papers to international workshops and conferences, plus internal and external reports available on the WWW. The work will be sought applied to both ordinary and continuing courses running during the project, with a special emphasis against NITOL. Cooperation with groups working in the same area or in related ones.

6 Workplan

6.1 Workplan Table

A total of 4.5 personyears is planned over 4 years. NFR is asked to finance 3 out of 4 years for one PhD student. IDI will finance the last year of this PhD student, plus 0.5 year of research guidance by førsteamanuensis Monica Divitini (starting at IDI from spring 1999).

There will be major milestones after 2 years (first phase), and after 4 years (second phase). The last half-year is mostly designated final thesis writing.

The work will have four tasks, each repeated in two two-yearly phases -- see below xxx'es.

Project and task phasing:

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Task                          97  98  99  00  01  02  03
T1 Analyze educational rqmts          xxx     xxx
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T2 Make framework w/ computer support   xxx     xxx
T3 Make demonstrator, using CAGIS         xxx     xxx
T4 Experiment and validate                  xxx     xxx

CAGIS project: 4.5 years     ***!***!***!***!**
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As mentioned, task deliverables will be phased according to the barcharts above. A more detailed workplan is not feasible in a basic research project, manned basically with one Ph.D. student.

6.2 Budget and Resources

The proposed budget is as follows, in respectively personyears and MNOK:

Category	1999 half	2000	2001	2002	2003 half	Sum
Dr.ing.-student	0,5	1	1	1	0,5	4,0 Man Year
Advisor	0,05	0,12	0,13	0,13	0,07	0,5 Man Year
SUM PERSONS	0,55	1,12	1,13	1,13	0,57	4,5 Man Yeat
Ph.D.-stud.	176	353	353	353	177	1412 KNOK
Advisor	20	50	50	50	30	200 KNOK
Ph.D.s abroad	-	-	90	-	-	90 KNOK
Travels	6	26	6	26	20	84 KNOK
Equipment	50	20	20	15	5	110 KNOK
SUM COSTS	252	449	519	444	210	1896 KNOK
whereof NFR	232	399	469	197	0	1297 KNOK
whereof IDI	20	50	50	247	232	599 KNOK

The Ph.D. student is planned to spend ca. 8 months abroad in the course of her study, at an extra cost of 90 KNOK.

IDI will finance an extra **fourth year** devoted to teaching, plus 1/8 (25% of the research time of one advisor). Other expenses will cover computer equipment and travels.

Ex. Travel with three int'l conferences each of 20 KNOK and two annual nat'l meetings each of 3 KNOK for four years, i.e. 8*3 + 3*20 = 84 KNOK.

7 Internationalization

The CAGIS partners at IDI have an extensive international network (details in Sec. 1), and plan to use this actively both ways during the project. The CAGIS-II Ph.D. student will, as mentioned, have one year abroad in the course of her study, cf. list of universities below.

The involved groups have had many foreign guest researchers the last 10 years, many of them initiated by the ESPRIT projects where we have participated. Especially relevant for CAGIS-II are the projects: PROMOTER2, RENOIR, EONT, MECPOL, DoODL and AQUARIUS.

IDI is participating in several student exchange programs (ERASMUS, SOCRATES).

Some of the most important international contacts are the universities in Manchester, Grenoble, Kaiserslautern, Lancaster, Pisa, Milano, Torino, Aarhus, Berlin, Glasgow, Maryland, Carnegie-Mellon/SEI, and companies like ESI, Q-Labs, Cap Gemini and Intecs.

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9 Appendix 1: CV for Monica Divitini

Postdoc Monica Divitini, born 1964 in Italy.

Educational qualifications and memberships of professional bodies:

1991 : M.S. in Computer Science, University of Milano, Italy.

1993 – :

- Member of program committees for the 3rd IFCIS conference on Cooperative Information Systems (CoopIS'98) and for international workshop on Coordination Technologies for Information Systems (98 & 99).
- Member of the organizational committee of the third European conference on CSCW (ECSCW'93).
- Co-organizer of the workshop Internet based GROupware for user participation in product development (IGROUP), to be held in conjunction with the ACM International Conference on Computer Supported Cooperative Work (CSCW'98), Seattle, WA, November 1998.
- Co-organizer of First International Workshop on Innovative Internet Information Systems (IIIS-98), held in conjunction with the 10th Conference on Advanced Information Systems Engineering (CAiSE98), Pisa, Italy, June 1998.

Summary of positions held:

1991–1995: Research scientist at the Cooperation Technologies Laboratory, University of Milano, Italy.
1995–1996: Visiting researcher at Risø National Laboratory, Denmark.
1996–1997: Research scientist at the University of Torino, Italy.
1997–1999: Postdoc at CAGIS project, IDI, NTNU.

Some Relevant Publications by Monica Divitini

- Monica Divitini, Babak A. Farshchian, and Tuomo Tuikka (eds.) :
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  Workshop on "Adaptive Workflows", PAKM'96, Basel, Switzerland, October 1996.

- Carla Simone, Monica Divitini, and Kjeld Schmidt :
  "A notation for malleable and interoperable mechanisms of interaction for CSCW systems",
  in Proceeding of COOCS'95. Milpitas, CA, 13-16 August 1995, ACM Press,44-54, 1995.

- Monica Divitini and Carla Simone :
  "A Prototype for Providing Users with the Contexts of Cooperation",
  in Proceedings of the seventh European Conference on Cognitive Ergonomics, Bonn, Germany, September 1994, GMD-Studien nr.233, 253-270.

- Monica Divitini and Carla Simone :
  "Adaptivity in a system supporting cooperation",
  In Proceedings of the Fourth International Conference on User Modeling, Hyannis, MA, August, 1994, User Modeling Inc., 59-64

- Monica Divitini, G. Omodei Sale', A. Pozzoli and C. Simone :
  "Supporting the Dynamics of Knowledge Sharing within Organizations",
  In Proceedings of the Conference on Organizational Computing Systems, Milpitas, CA, USA,
  November 1993, 178-183.

10 Appendix 2: CV for Reidar Conradi

Professor Reidar Conradi, born 1946 in Oslo.

Educational qualifications and memberships of professional bodies:

1970, 1976:	siv.ing., Ph.D.: Both from NTH, Trondheim.
1976– :	Member of IFIP WG2.4 on Systems Programming Languages.
1989–1999:	Member of program committees for ICSE'89, ESEC'89, SCM-2, EWSPM'91, SCM-3, EWSPT'92, SIGSOFT'92, ESEC'93, SCM-4, EWSPT'94, SCM-5, EWSPT'95, ESEC'95, SSR'95, SCM-6, EWSPT'96, SCM-6, SCM8, SEKE'99, ... Organiser: Int'l Workshop on Advanced Programming Environments, Trondheim, June 1986. Co-arranger of EWSPM'91, Milan, 30--31 May, 1991. Organizing chair for SCM-3, Trondheim, June 1991. Organizing chair for EWSPT'92, Trondheim, 7--8 Sept. 1992. Program chair for SCM'7, Boston, 19-20 May 1997. Program chair for EWSPT'2000, April 2000, Pisa, Italy. Reviewer for many journals.

Summary of positions held:

1972–1975:	Research scientist at SINTEF, Trondheim.
1975–:	Professor at NTH, Trondheim; full prof. from 1985.
1980–81:	Visiting scientist at CMU, Pittsburgh.
1985–87:	Head of Division of Computer Science, NTH.
1990:	Guest researcher at Univ. of Pisa and at ENSIMAG, May-June 1990.
1991–94:	Program leader of REBOOT National Strategic Technology Program in Norway.
1990–95:	Participation in ESPRIT projects REBOOT, PROTEUS, PROMOTER BRA and ASSET.
1996–98:	Participation in ESPRIT projects PROMOTER2, CMEX, AMEX, RENAISSANCE.
1996–98:	Participation in national SPIQ pre-project on software process improvement, subcontractor.
1997–98:	Coordinator for CAGIS NFR-project at IDI.
1998:	Starting NAWUS Norgesnett for Syst.dev., with Dag Sjøberg, UiO.

Some Relevant Publications by Reidar Conradi

Only work since 1993 is listed:

- M. Letizia Jaccheri, Reidar Conradi :
  ``Techniques for Process Model Evolution in EPOS",
  In special issue of IEEE TSE on Software Process Model Evolution, Dec. 1993, p. 1145-1156.
  Politecnico di Torino and NTH in Trondheim, 5 May 1993, 18 p.

- Minh Ngoc Nguyen, Reidar Conradi :
  ``Workspace Management: Supporting Cooperative Work ",
  Proc. International Conference for Young Computer Scientists (ICYCS-93), 15--17 July 1993, Beijing (forthcoming), 4 p.

- Reidar Conradi et al. :
  ‘‘Object-Oriented and Cooperative Process Modelling in EPOS ”,
  In PROMOTER book: Anthony Finkelstein, Jeff Kramer and Bashar A. Nuseibeh (Eds.): ‘‘Software Process Modelling and Technology”, 1994, p. 33--70. Advanced Software Development Series, Research Studies Press Ltd. (John Wiley), ISBN 0-86380-169-2, 362 p.

- Noureddine Belkhatir, Reidar Conradi :
  ‘‘The Relationship between Software Processes and CSCW ”,
  Forthcoming in Workshop on Links between CSCW and Software Process October 22, 1994 (held before CSCW'94), Chapel Hill, North Carolina, USA, 2 p. (position paper).

- Reidar Conradi, Marianne Hagaseth, Chunnian Liu :
  ‘‘Planning Support for Cooperating Transactions in EPOS ”,
  Special Issue of *Information Systems*, Vol. 20, No. 4 (June 1995), p. 317-336.

- Minh N. Nguyen, Alf Inge Wang, Reidar Conradi :
  ‘‘Total Software Process Model Evolution in EPOS ”,
  In Proc. ICSE'97, 21--23 May 1997, Boston, USA, p. 390-399. ACM/IEEE-CS Press.

- Reidar Conradi (Ed.) :
  ‘‘Software Configuration Management: Proceedings from SCM7 workshop ”,
  18--19 May, 1997, Boston, USA. As Springer LNCS 1235, 234 p. ISBN 3-540-63014-7.

- Vincenzo Ambriola, Reidar Conradi, Alfonso Fuggetta :
  ‘‘Assessing Process-centered Software Engineering Environments (OIKOS, EPOS and SPADE) ”,
  ACM Trans. Software Engineering Methodology (TOSEM), July 1997, Vol. 6, No. 3, p. 282-328.

- Reidar Conradi, Minh Ngoc Nguyen, Alf Inge Wang, Chunnian Liu :
  ‘‘Planning Support to Software Process Evolution ”,
  Proc. Eight International Conference on Software Engineering and Knowledge Engineering (SEKE), San Francisco, USA, 18--20 June 1998, 16 p.

- Reidar Conradi, Bernhard Westfechtel :
  ‘‘Version Models for Software Configuration Management ”,
  ACM Computing Surveys, Vol. 30, Number 2, July 1998, p. 232--282.

- Alf Inge Wang, Jens-Otto Larsen, Reidar Conradi, Bjørn Munch :
  ``Improving Cooperation Support in the EPOS CM System ",
  In Volker Gruhn (Ed.): ``Software Process Technology, 6th European Workshop, EWSPT'98, Weybridge, UK, 16-18. Sept. 1998", Springer Verlag LNCS 1487, p. 75--91.