



```
int levelups = gridu.getLevelups( elemNo ) - griduold.getLevelups( elemNo );
```

```
fe.fill( fep.es() );
```

```
int nfe = fe.nfe();
```

```
const int nels = gridu.getLevelups( elemNo );
```

```
real egp_error = 0.0;
```

```
int abs_int = 0;
```

```
for ( int k = 0; k < nels; k++ )
```

01010101101

0010110110110

0110110101010100010

```
// compute the derivative of the function u ( fe );
```

```
// gradient(x0, y0, z0, flux, rhs, diffusion);
```

```
residual = rhs;
```

```
ElmDef ed = (ElmDef) fep.getElmDef();
```

```
if ( ed.findLocalNode( x0, y0, z0, error, fep.geomtNode( i ) ) )
```

```
errorFP = i; // find point in element");
```

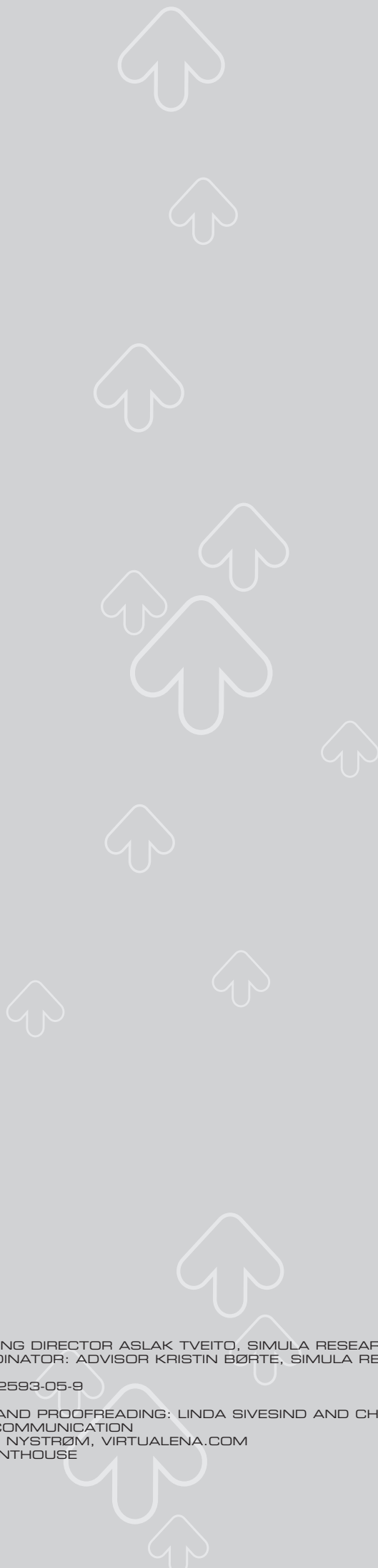
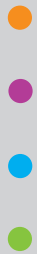
```
fep.setLocalEval( i );
```

```
u0 = ucoarse.value( i ); // f p);
```

```
// ucoarse.derivative( i ); // grad uold, fep);
```

```
egp_error += abs( u0 - u ); // fe.getJxW();
```

```
abs_int += abs( u0 - u ); // fe.getJxW();
```



EDITOR: MANAGING DIRECTOR ASLAK TVEITO, SIMULA RESEARCH LABORATORY
PROJECT COORDINATOR: ADVISOR KRISTIN BØRTE, SIMULA RESEARCH LABORATORY

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CONTENTS

MANAGING DIRECTOR	4
DIRECTORS REPORT	5
FINANCIAL STATEMENT	8
NOTES	10
AUDIT REPORT	12

RESEARCH

THE NETWORKS AND DISTRIBUTED SYSTEMS DEPARTMENT	14
THE SCIENTIFIC COMPUTING DEPARTMENT	16
THE SOFTWARE ENGINEERING DEPARTMENT	18

INNOVATION

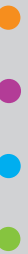
SIMULA INNOVATION AS	20
KALKULO AS	22
INDUSTRIAL COLLABORATION	24

EDUCATION

SIMULA SCHOOL OF RESEARCH AND INNOVATION	25
DOCTORATES AND MASTERS DEGREES	26

LIST OF PUBLICATIONS

28



New challenges in the wake of our best year

2006 was undoubtedly our best year so far. We produced more journal papers than ever; more PhD students have graduated; we received a considerable new grant from the Ministry of Transport and Communication to fund our research on communication infrastructures; we established and received funding for a partnership with companies and organizations in order to establish Simula School of Research and Innovation (see page 25); and we received a huge ten-year grant to establish a Centre of Excellence¹ (CoE) that will focus on software components for biomedical flows (see page 17). In addition, Hydro increased their cooperation with Simula, and we established Kalkulo, which is already attracting other large projects. All these events will lead to considerable growth at Simula during the next couple of years. And *growth* means substantial challenges for all employees at Simula.

We have argued strongly that there is a need to build a new type of school at the PhD level in Informatics. Many companies, organizations and Bærum municipality have joined us in our campaign. We have received unusually strong support from many politicians and, most importantly, we have convinced the Minister of Education and Research, Øystein Djupedal, to provide substantial financial support for this school. In 2007, the establishment of the school will be a major challenge for Simula. Our ambition is to set up a school that is very efficient, where the students have real and strong interaction with industry, and where all the PhD students and postdoctoral researchers really feel that they are able to focus entirely on their most demanding assignments. The result, we hope, will be that candidates will be produced who have in-depth knowledge of fields that are deemed to be of importance both in the industry and academia. A particular challenge is to include innovation in the PhD curriculum.

As an independent research institution, Simula participated this year in the national competition among the leading research groups in Norway for a Centre of Excellence. Professor Hans Petter Langtangen applied for such a centre to focus on Software Components for Biomedical Flows. Initially, the Research Council received 98 applications, and after a thorough selection process, eight centres were chosen and Langtangen was one of the winners. It is, of course, a great honour for Simula to host such a centre; but it is also a major challenge. The CoE will broach a completely new field; addressing the complexities of simulating flows in the human body. Moreover, the organizational model will be different from the rest of Simula, in that a much larger part of the

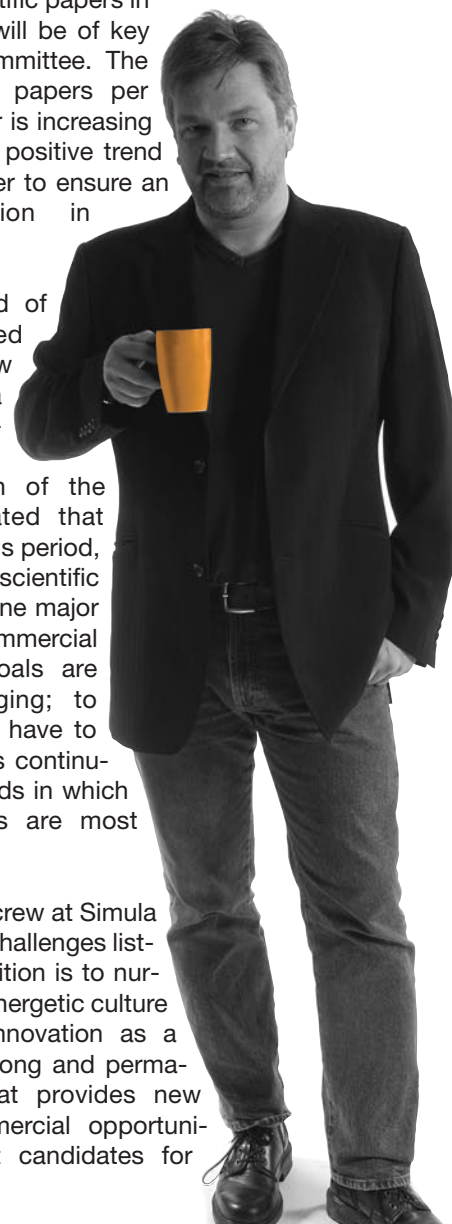
research will be carried out by international researchers visiting Simula. Our ambition is to involve international researchers in all parts of the CoE, and in particular, we would like their participation in supervising graduate students and postdoctoral researchers. It is a major challenge to organize this smoothly and also make sure that the research presents a cohesive whole and aggregates to provide further insights.

In 2009, an international committee will again evaluate Simula. Based on our experience with the former evaluation, and based on the mid-term evaluations² of the CoEs, it is evident that the number of scientific papers in reputable journals will be of key interest for the committee. The number of journal papers per senior staff member is increasing at Simula, and this positive trend is necessary in order to ensure an excellent evaluation in 2009.

In 2006, the Board of Directors completed their work with a new strategy for Simula for the period 2007-2015.

In the Foundation of the Strategy, it is stated that Simula should, in this period, create at least one scientific breakthrough and one major research-based commercial success. These goals are extremely challenging; to meet them, we will have to focus our resources continually towards the fields in which such achievements are most likely.

A highly motivated crew at Simula will address all the challenges listed above. Our ambition is to nurture a healthy and energetic culture of research and innovation as a foundation for a strong and permanent institution that provides new insight, new commercial opportunities, and excellent candidates for Norwegian industry.



Professor Aslak Tveito, Managing Director

1. A Centre of Excellence is funded by a ten-year grant provided by the Research Council of Norway; see www.forskningsradet.no.
2. The mid-term evaluation is available at www.forskningsradet.no

A successful year for Simula

Simula Research Laboratory (Simula) reached new heights regarding the number of scientific articles and books published, and doctorates awarded, in the anniversary year of 2006. It also became clear that Simula will be setting up a School of Research and Innovation, a Centre of Excellence, and a large-scale basic research project on resilient networks.

Strategy for 2007-2015

In October 2006, Simula's Board adopted a new strategy for 2007 to 2015. The strategy rests on a platform of basic research in three departments: Networks and Distributed Systems, Scientific Computing and Software Engineering. Simula will promote the application of research in these fields in the public and private sectors alike, and will educate students in collaboration with Norwegian universities. More specifically, by 2010 Simula aims to be among the world leaders in its research fields, and by 2015 the aim is to create at least one scientific breakthrough and one major research-based commercial success. The Board considers this to be a sound strategy for the years ahead

Meeting expectations

Simula's employees and invited guests celebrated Simula's 5th anniversary on 14 December 2006, when Minister of Education and Research Øystein Djupedal stated in his keynote speech that the institution has largely met all expectations already. The Board sincerely appreciates the signals provided by the minister in his speech, including his remark about how the dedicated efforts lavished on Simula are a good example of how it is possible to cultivate outstanding research groups in certain fields.

Simula School of Research and Innovation

In October, Simula's management handed over a proposal to the Ministry of Education and Research regarding the establishment of a research school within ICT: The Simula School of Research and Innovation. The Ministry of Education and Research announced in December that they would initially allocate MNOK 5 for such a school of research. Although further funding was promised, the level was not specified.

The Board of Directors hereby expresses its gratitude to the Norwegian government for its demonstration of confidence and the opportunity to set up a School of Research and Innovation in the field of ICT to address timely issues facing business and industry. The objectives, inter alia, are to strengthen PhD programmes in ICT, educate a larger number of commercially attractive PhD candidates, increase the turnover of postgraduate fellows, and enhance cooperation with international players. Simula's goal is for the school to be in full operation from January 2008.

Outstanding research

In December, the Research Council of Norway (RCN) announced that Simula was assigned status as a Centre of Excellence. The new Centre of Excellence: Software Components for Bio-medical Flows, will be rooted in Simula's Scientific Computing Department. The CoE allocation of a total of MNOK 75 over a 10-year period will be used to perform world-class research in computing and simulating fluid flows, focusing especially on blood flow through the aorta.

The Board observes that the allocation is associated with considerable prestige. The Board extends its gratitude to the CoE Director Professor Hans Petter Langtangen and his co-workers for their tremendous efforts in connection with the CoE application and wishes them the very best of luck in a vital new field of research.

Resilient networks

The Ministry of Transport and Communications allocated a total of MNOK 27 for the period 2006-2010 to the basic research project entitled 'Resilient Networks'. The project's primary scientific goal is to develop and demonstrate protocols and methods that can make communications infrastructure resilient against faulty components, wrong configurations, sabotage and other factors that can cause aberrations or collapse.

Scientific advances

The establishment of a CoE, a School for Research and Innovation, and the Resilient Networks project are clear signs that Simula has made formidable scientific advances that have been recognised by independent experts. In 2006, Simula also reached new heights with seven completed PhDs, as well as a larger number of published scientific articles and books than in previous years. The joint project Computational Geosciences (CG), in collaboration with industrial giant Hydro ASA, picked up momentum during the year. The project began in 2005. Its objective is to develop a better understanding of the geological and geophysical processes that contribute to the development of hydrocarbon deposits. These efforts have already resulted in new contributions to Hydro's technology for the design of complex geomodels, the development of the first version of a four-dimensional global model of the lithosphere, and the development of a prototype of a network-oriented software community for a new, integrated process for oil and gas exploration.

The establishment of Kalkulo AS

In April 2006, Simula set up a separate subsidiary, Kalkulo AS, to develop technical software based on mathematics, geometry and visualisation. The technology-oriented development segment of the CG project forms the backbone of this company's activities.

Simula in the run-up to 2015

Norway's government budget for 2006 includes signals that the contract with Simula will be extended to 2015, pending a new international evaluation to be performed by the end of 2009. The signals were repeated and reinforced in the State's Ownership Report for 2005 and the Ministry of Trade and Industry's White Paper No. 13 2006 on State ownership. The Board is grateful to be relieved of the pressures associated with finding long-term funding for the Simula's operations.

Ethics

Scientific fraud was a high-profile topic in 2006, both in Norway and abroad. Accordingly, Simula has paved the way for the introduction of new publishing regulations as of 1 January 2007. The regulations are based on the Vancouver Convention's ethical guidelines for the publication of scientific articles. They contain provisions on topics such as authorship, authenticity and confidentiality.

Finances

Simula's aggregate operating revenues totalled MNOK 64.2 in 2006. External project financing was MNOK 15.2 in 2006. The net profit for the year came to MNOK 2.77, which was transferred to equity in its entirety. The Simula group aggregate operating revenues totalled MNOK 69.7, and the net profit for the year came to MNOK 3.6.

SI AS' turnover in 2006 was of NOK 11 244 424 and an EBIT of NOK 555 291. At 31 December 2006, equity came to NOK 1 376 084. Further, Simula Research Laboratory has pledged the company an operating subsidy of MNOK 2.7 for 2007. The company has increased its public subsidies by 158 per cent compared with last year.

Kalkulo AS was founded in March 2006. Sales totalled NOK 4 184 334 and the profit after tax was NOK 430 164 in 2006. The company's prospects for 2007 are considered good.

The Board is of the opinion that accounts of the parent company and the consolidated annual accounts give an accurate impression of operations in 2006 and the status at 31 December 2006. The going concern assumption applies

and is the basis for the annual accounts. The company has developed a satisfactory operating structure. No situation has arisen since year end that has had a material impact on the accounts as presented.

Working conditions

It is the Board's impressions that there is a good working environment at Simula, and that this is an instrumental factor for the good results achieved in 2006.

Absence due to illness is very low at Simula and no work-related illnesses or accidents were reported during the year.

Gender parity

At the end of 2006, Simula had 61 full-time employees, of which six were PhD-students or post doctoral fellows with affiliation at Norwegian Universities but use Simula as their primary workplace. Simula also had 15 part-time employees. Of the 61, 47 were men and 14 women, while 50 were Norwegian and 11 foreign nationals.

Simula considers gender equality when hiring and strives continuously to increase the percentage of women until such time as they achieve a position of parity with men. However, it is a challenge to recruit more female scientists in disciplines that have traditionally been largely male-dominated. Simula and the company's subsidiaries focus on complying with political signals that there should be at least 40 per cent of both sexes on the Board.

Environmental issues

Simula's activities do not pollute the outdoor environment.

The Board of Directors and the staff

Simula's Board had four meetings and dealt with a total of 37 items of business in 2006. The Board of Directors appreciates that the anniversary year 2006 was characterised by scientific advances and many items of good news that have strengthened the platform for Simula's future development. So saying, the Board of Directors thanks all employees for their sterling efforts in the past year.



Simula's Board of Directors and Administration: Back row from the left: Kristin Vinje, Eivind Hiis Hauge, Anne-Brit Kolstø, Dagfin Brodtkorb, Aslak Tveito and Bjørn Fredrik Nielsen. Front row from the left: Harald Holm Simonsen, Berit Svendsen, Ingvild Myhre and Hans Christian Benestad.

Fornebu, 8. Mars 2007.
The Board of Directors, Simula Research Laboratory AS

Berit Svendsen
Berit Svendsen
Chair of the Board

Hans Chr. Benestad
Hans Christian Benestad

Dagfin Brodtkorb
Dagfin Brodtkorb

Eivind Hiis Hauge
Eivind Hiis Hauge

Anne-Brit Kolstø
Anne-Brit Kolstø

Ingvild Myhre
Ingvild Myhre

Bjørn Fredrik Nielsen
Bjørn Fredrik Nielsen

Aslak Tveito
Aslak Tveito
Managing Director

GROUP

PARENT COMPANY

2005	2006	INCOME STATEMENT	Note	2006	2005
66 813 085	69 778 726	OPERATING REVENUES	6	64 205 455	64 101 023
		OPERATING EXPENSES			
43 968 593	42 832 648	Cost of labour	5	38 162 571	40 641 644
2 327 702	1 871 405	Ordinary depreciation	3	1 859 946	2 324 661
22 399 229	21 538 852	Other operating expenses	5	21 723 039	20 201 328
68 695 524	66 242 905	TOTAL OPERATING EXPENSES		61 754 556	63 167 633
-1 882 439	3 535 821	OPERATING PROFIT		2 459 899	933 390
		FINANCIAL ITEMS			
209 744	313 359	Other interest income		319 197	207 392
239 346	1 587	Other financial income		671	239 346
29 995	11 299	Other interest expenses		6 442	23 374
180 980	1 981	Other financial expenses		1 608	180 980
238 115	301 666	RESULT OF FINANCIAL ITEMS		311 818	242 384
-1 644 324	3 837 487	PROFIT/ LOSS BEFORE TAXES		2 771 717	1 175 774
-	164 953	TAXES FOR THE YEAR		-	-
-1 644 324	3 672 534	NET PROFIT/ LOSS		2 771 717	1 175 774
		TRANSFERS			
		Transferred to equity		2 771 717	1 175 774
				2 771 717	1 175 774

GROUP

PARENT COMPANY

2005	2006	BALANCE SHEET	Note	2006	2005
		TANGIBLE FIXED ASSETS			
		FIXED ASSETS			
3 369 190	2 890 701	Furniture, equipment, etc.	3	2 861 591	3 351 190
3 369 190	2 890 701	Total fixed assets		2 861 591	3 351 190
		Financial fixed assets			
261 818	1 396 968	Investments in shares	12	-	-
-	-	Intra-Group loans	11	600 000	-
-	-	Investments in subsidiaries	10	4 762 300	4 356 300
261 818	1 396 968	Total financial fixed assets		5 362 300	4 356 300
3 631 008	4 287 669	TOTAL FIXED ASSETS		8 223 891	7 707 490
		CURRENT ASSETS			
		Receiveables			
1 468 640	3 733 453	Customer receivable		2 404 818	1 426 504
3 481 110	4 214 670	Other receiveables		4 420 239	2 630 079
4 949 750	7 948 123	Total receiveables		6 825 057	4 056 583
5 149 863	6 513 720	Bank deposits	9	4 162 598	3 261 919
10 099 613	14 461 843	TOTAL CURRENT ASSETS		10 987 655	7 318 502
13 730 621	18 749 512	TOTAL ASSETS		19 211 546	15 025 992

GROUP

PARENT COMPANY

2005	2006	EQUITY AND LIABILITIES	Note	2006	2005
		EQUITY			
		Paid-in equity			
1 500 000	1 500 000	Share capital	7,8	1 500 000	1 500 000
1 500 000	1 500 000	Total paid-in capital		1 500 000	1 500 000
		Earned equity			
504 692	4 177 227	Other equity	8	6 256 626	3 484 909
504 692	4 177 227	Total earned equity		6 256 626	3 484 909
2 004 692	5 677 227	TOTAL EQUITY		7 756 626	4 984 909
		LIABILITIES			
		Short-term liabilities			
2 911 381	4 692 421	Accounts payable		4 242 996	2 629 629
397 646	0	Liabilities to credit institutions		-	397 646
0	164 953	Tax payable	13	0	0
4 469 360	3 466 089	Duties payable		2 999 132	3 575 131
3 947 542	4 748 822	Other short-term liabilities		4 212 792	3 438 677
11 725 929	13 072 285	Total short-term liabilities		11 454 920	10 041 083
11 725 929	13 072 285	TOTAL LIABILITIES		11 454 920	10 041 083
13 730 621	18 749 512	TOTAL EQUITY AND LIABILITIES		19 211 546	15 025 992

Note 1 – Accounting principles

The financial statements have been prepared pursuant to the regulations in the Norwegian Accounting Act of 1998. The statements are drawn up in accordance with Norwegian accounting standards.

The main rule for the valuation and classification of assets and liabilities

Assets intended for permanent ownership or use are classified as tangible fixed assets. Other assets are classified as current assets. Receivables to be paid back within one year are always classified as current assets. The same criteria are applied to the classification of short- and long-term liabilities.

Fixed assets are valued at acquisition cost, but written down to their fair value if the reduction in value is believed to be of a permanent nature. Fixed assets are depreciated systematically over the useful life of the asset. Long-term liabilities are recognised at their nominal values on the date the debt was incurred. Long-term liabilities are not revalued to fair value in response to interest rate fluctuations.

Current assets are valued at cost or fair value, whichever is lower. Current liabilities are recognised at their nominal values on the date the debts were incurred. Current liabilities are not revalued to fair values in response to interest rate fluctuations.

Certain items are valued according to other rules, as explained below.

Note 3 - Fixed Assets

Simula Research Laboratory AS

	Computer equipment	Furniture/fitings, equipment, etc.	Total
Acquisition cost at 1 Jan.	4 410 837	5 330 135	9 740 972
Acquired 2006	1 223 033	147 142	1 370 175
Disposals 2006	754 997	42 353	797 350
Acquisition cost at 31 Dec.	4 878 873	5 434 924	10 313 797
Acc. depreciation	3 552 003	3 900 203	7 452 206
Book value at 31 Dec.	1 326 870	1 534 721	2 861 591
Ordinary depreciation	832 644	1 027 302	1 859 946
Depreciation in %	20 - 50%	20 - 33%	

Simula Research Laboratory AS – Group

	Computer equipment	Furniture/fitings, equipment, etc.	Total
Acquisition cost at 1 Jan.	4 410 837	5 351 175	9 762 012
Acquired 2006	1 245 602	147 142	1 392 744
Disposals 2006	754 997	42 353	797 350
Acquisition cost at 31 Dec.	4 901 442	5 455 964	10 357 406
Acc. depreciation	3 552 942	3 913 763	7 466 705
Book value at 31 Dec.	1 348 500	1 542 201	2 890 701
Ordinary depreciation	833 583	1 037 822	1 871 405
Depreciation in %	20 - 50%	20 - 33%	

Note 4 – Pension costs

The Group has a pension plan that covers a total of 55 individuals in the parent company and 63 individuals in the Group. The pension plan provides defined future benefits. Pension benefits depend on the individual employee's number of years of service, salary level upon retirement age, and social security benefits. The collective pension agreement is funded by building up pension funds under the auspices of the Norwegian Public Service Pension Fund.

Note 5 – Cost of labour, number of employees, remuneration, etc.

Cost of labour	Simula Research Laboratory AS		Simula Research Laboratory AS - Group	
	2006	2005	2006	2005
Wages	30 404 601	31 396 325	34 256 693	34 126 578
National insurance payment	4 594 499	4 963 263	5 168 333	5 363 676
Pension expenses	2 046 525	2 714 502	2 277 820	2 903 821
Other benefits	1 116 946	1 567 554	1 129 802	1 574 518
Total	38 162 571	40 641 644	42 832 648	43 968 593
Average man-years of labour	60	63	66	66

Foreign currencies

Assets and liabilities in foreign currencies are translated into Norwegian kroner at the mid-rates quoted by Norges Bank on the day of balance sheet recognition.

Tangible fixed assets

Tangible fixed assets are generally depreciated over the expected useful life of the asset. Depreciation is generally distributed on a straight line basis over the expected useful life of the asset.

Receivables

Accounts receivable and other receivables are recorded at nominal amounts less provisions for anticipated losses on bad debts. Provisions for losses are based on individual assessments of the recoverability of each receivable. In addition, if necessary, a general provision is made for anticipated bad debts on other receivables.

Pensions

A straight line earning profile is used to account for pensions and assumptions are made regarding expected salary upon retirement.

Taxes

The company has no tax expenses since its activities are not considered taxable.

Note 2 – Financial market risk

The company has little exposure to financial market risk.

Benefits to top management

	Simula Research Laboratory AS	Simula Research Laboratory AS - Group
Managing Director	1 051 470	
Other remuneration	149 007	
Pension expenses, director	57 213	
The Board of Directors	170 000	295 850
Auditor	47 400	73 000
Other auditing services	17 900	36 300

Note 6 – Operating revenue

	Simula Research Laboratory AS	Simula Research Laboratory AS - Group
Research funding	49 000 000	49 000 000
Subsidies from the RCN and the EU	9 659 158	11 129 856
Services for the subsidiary	4 081 140	-
Subsidies for research fellows	864 277	864 227
Other income	600 880	8 784 643

Note 7 – Share capital and ownership structure

The company's share capital consists of 1 000 shares with a nominal value of NOK 1 500 per share.

The shares are owned by:

The Norwegian state /repr. by the Ministry of Education and Research	80%
The Norwegian Computing Centre	10%
Sinvent AS	10%

Note 8 – Equity

Simula Research Laboratory AS				Simula Research Laboratory AS - Group			
	Share capital	Other equity	Total equity		Share capital	Other equity	Total equity
Equity at 1 Jan.	1 500 000	3 484 909	4 984 909	Equity at 1 Jan.	1 500 000	504 695	2.004.695
Net profit for the year	-	2 771 717	2 771 717	Net profit for the year	-	3 672 534	3 672 534
Equity at 31 Dec.	1 500 000	6 256 626	7 756 626	Equity at 31 Dec.	1 500 000	4 177 229	5 677 229

Note 9 - Bank deposits

The company had locked-in bank deposits of NOK 1 418 500 in connection with signed leases and NOK 1 520 710 in restricted deposits relating to withholding taxes. The Group's tied-up withholding tax aggregated NOK 1 748 836.

Note 10 - Subsidiaries

	Main office	Stake at 31. Des.	The company's equity 31. Des.	The company's profit/loss 2006
Simula Innovation AS	Fornebu	100 %	1 852 737	476 653
Kalkulo AS	Fornebu	100 %	830 164	430 164

Note 11 – Outstanding accounts/intra-Group transactions

	2006	2005
Claims against Simula Innovation AS	2 108 005	1 110 934
Long-term claims against Kalkulo AS	600 000	-
Short-term claims against Kalkulo AS	181 268	-
Debt to Kalkulo AS	197 348	-
Subsidies to Simula Innovation AS	2 300 000	-
Sale of services etc. to Simula Innovation AS	4 537 460	4 686 717
Sale of services etc. to Kalkulo AS	515 822	-
Purchase of services from Kalkulo AS	541 475	-

Note 12 – Shares

	Number	Nominal value per share	Book value
Silent Wings AS	3 250	10,00	34 548
Project Economics AS	600	33,34	21 270
vPos AS	1 030	100,00	206 000
World Besides AS	40 000	1,00	40 000
Symphonical AS	545 528	0,10	1 095 150
			1 396 968

Note 13 – Tax

Simula Research Laboratory AS does not engage in taxable activities. The subsidiaries Simula Innovation AS and Kalkulo AS are liable to taxation. Simula Innovation AS carried forward a deficit of NOK 2 588 291.

Taxation for the year consists of:

Tax payable	164 953
Net total taxes	164 953

Tax payable for the year is calculated as follows:

Earnings before tax (EBT) – Kalkulo AS	595 117
Permanent differences	- 6 000
Base tax payable	589 117
Tax payable on the profit for the year	164 953



Til generalforsamlingen i
Simula Research Laboratory AS
Fornebu

REVISJONSBERETNING FOR 2006

Vi har revidert årsregnskapet for Simula Research Laboratory AS for regnskapsåret 2006, som viser et overskudd på kr. 2.771.717,- for morselskapet og et overskudd på kr. 3.672.534,- for konsernet. Vi har også revidert opplysningene i årsberetningen om årsregnskapet, forutsetningen om fortsatt drift og forslaget til anvendelse av overskuddet. Årsregnskapet består av selskapsregnskap og konsernregnskap. Selskapsregnskapet består av resultatregnskap, balanse, kontantstrømsoppstilling og noteopplysninger. Konsernregnskapet består av resultatregnskap, balanse, kontantstrømsoppstilling og noteopplysninger. Regnskapslovens regler og god regnskapsskikk i Norge er anvendt ved utarbeidelsen av regnskapet. Årsregnskapet og årsberetningen er avgitt av selskapets styre og daglig leder. Vår oppgave er å uttale oss om årsregnskapet og øvrige forhold i henhold til revisorlovens krav.

Vi har utført revisjonen i samsvar med lov, forskrift og god revisjonsskikk i Norge, herunder revisjonsstandarder vedtatt av Den norske Revisorforening. Revisjonsstandardene krever at vi planlegger og utfører revisjonen for å oppnå betryggende sikkerhet for at årsregnskapet ikke inneholder vesentlig feilinformasjon. Revisjon omfatter kontroll av utvalgte deler av materialet som underbygger informasjonen i årsregnskapet, vurdering av de benyttede regnskapsprinsipper og vesentlige regnskapsestimater, samt vurdering av innholdet i og presentasjonen av årsregnskapet. I den grad det følger av god revisjonsskikk, omfatter revisjonen også en gjennomgåelse av selskapets formuesforvaltning og regnskaps- og intern kontroll-systemer. Vi mener at vår revisjon gir et forsvarlig grunnlag for vår uttalelse.

Vi mener at

- årsregnskapet er avgitt i samsvar med lov og forskrifter og gir et rettviseende bilde av selskapets og konsernets økonomiske stilling 31. desember 2006 og for resultatet og kontantstrømmene i regnskapsåret i overensstemmelse med god regnskapsskikk i Norge
- ledelsen har oppfylt sin plikt til å sørge for ordentlig og oversiktlig registrering og dokumentasjon av regnskapsopplysninger i samsvar med lov og god bokføringsskikk i Norge
- opplysningene i årsberetningen om årsregnskapet, forutsetningen om fortsatt drift og forslaget til anvendelse av overskuddet er konsistente med årsregnskapet og er i samsvar med lov og forskrifter.

Oslo, den 8. mars 2007

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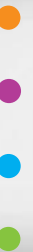
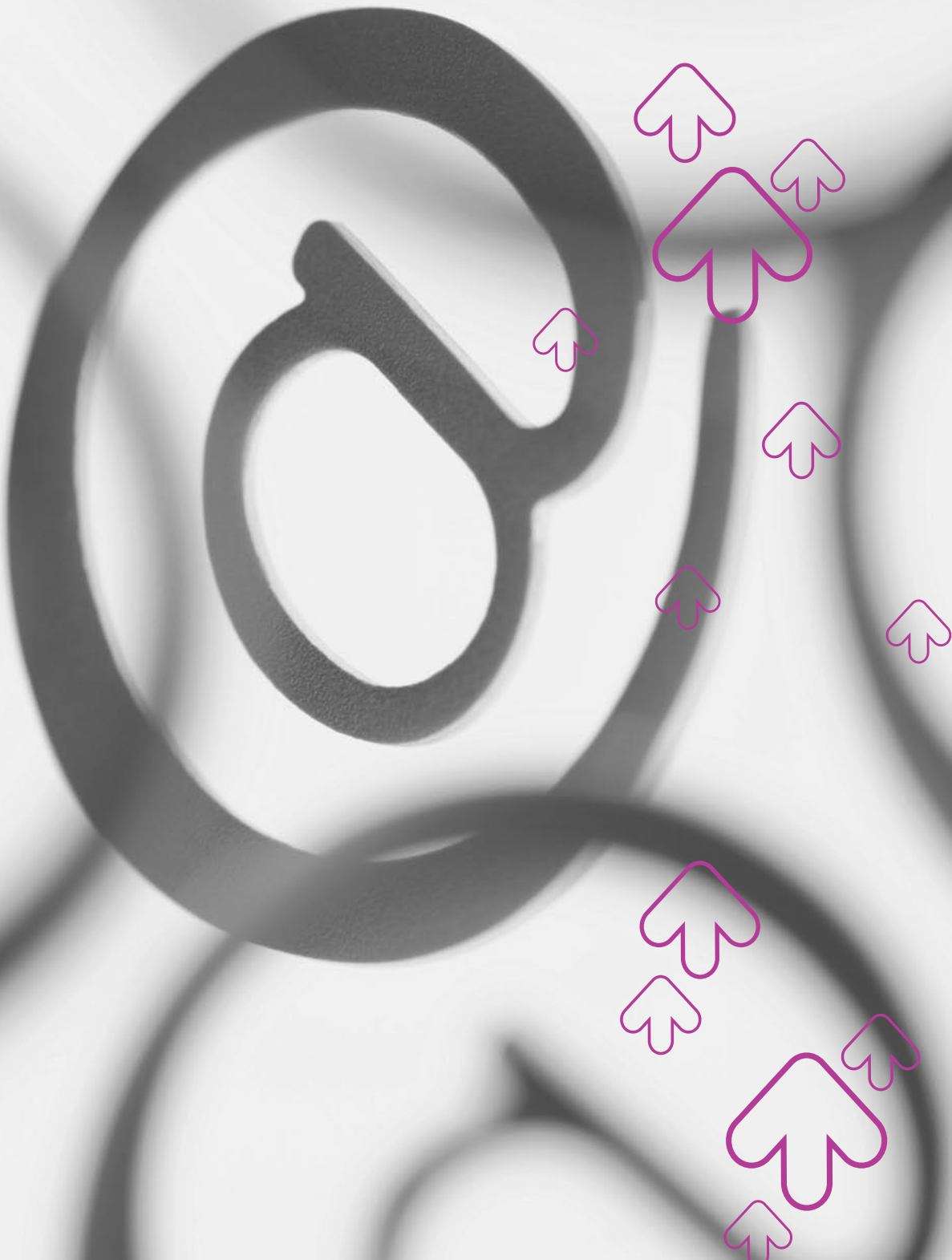
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Simula Research Laboratory AS (Simula) conducts basic research in the fields of networks and distributed systems, scientific computing and software engineering, and promotes the application of the research in both the private and public sectors. The education of graduate students is undertaken in partnership with Norwegian universities.

RESEARCH

THE NETWORKS AND DISTRIBUTED SYSTEMS DEPARTMENT	14
THE SCIENTIFIC COMPUTING DEPARTMENT	16
THE SOFTWARE ENGINEERING DEPARTMENT	18



A Productive Year

In the Networks and Distributed Systems Department, 2006 will be remembered for four important things. The first is that a research project focusing on resource utilization in time-dependent large-scale distributed systems moved to Simula. The project is called Relay, the main goal of which is to develop, integrate and combine mechanisms to derive more scalable, less resource-demanding, high-performance large-scale distributed multimedia systems. This project is described separately below.

The second main new event is that we received funding for a new project on Resilient Networks from the Norwegian Ministry of Transport and Communication. This is a five-year project with a total funding of 27 MNOK. In 2006 we secured the funding, and started and staffed the project. Currently, six people are engaged in Resilient Networks, and we expect this number to increase to eight during 2007.

```
int levelups = gridu.getGridLevelNo() - griduold.getGridLevelNo();
fe.refill(1,rules());

int e;
const int nel = gridu.getNoElms();
real egy_error = 0.0;
real abs_int = 0.0;
for (e=1; e<=nel; e++)
{
    fe.refill(e);
    int elm_parent = gridu.getParent_eff(e);
    int elm_parent = gridu.getParent(levelups,e);
    fep.refill(elm_parent);
    fe.initNumItg();
    while (fe.moreItgPoints())
    {
        fe.update4nextItgPt();
    }
    fe.getGlobalEvalPt(x);
    u1 = ufine.valueFEM(fe);
    ufine.derivativeFEM (grad_u, fe);
    real rhs;
    // problem(x,uu,grad_u,fe,flux,rhs,diffusion);
    residual = rhs;
}
//
//
//
```

2006 was also a year in which we reached a new level of scientific output. The department has steadily increased its number of publications in scientific conferences for several years, but we have now improved our status further by increasing the number of papers published in high-ranking scientific journals. As Head of Department, I am proud to say that this is not a temporary peak in our output, but rather an expression of an enhanced quality of research.

Finally, in 2006 we significantly extended our contacts with Norwegian and international industry. All projects collaborate with industrial contacts that are interested in the research they do, and in the results they achieve. In 2007, I expect these contacts to be exploited further, together with Simula Innovation. SI has nominated the ND department as its main area of interest for 2007, and I have high expectations for what ND and SI can achieve together in 2007.



Professor Olav Lysne, Research Director

```

ElmDef& ed = (ElmDef& fep-getElmDef());
if(!ted.findLocPt(x,xloc,niter,error,fep-geomNorm
errorFP("Did not find point in element"));
}
fep.setLocalEvalPt(xloc);
u0 = fep.parseValueFEM (F p);
u = fep.derivativeFEM (grad_uold, fep);
//
//
// += abs(u1-u0)*fe.detJxW();
// += abs(u1)*fe.detJxW();

```



Reduced latency in interactive applications

Researchers in the area of network and operating system support for multimedia have, for years, focused on increasing the performance of one kind of application. These applications require high bandwidth for the transfer of data in one direction with little interaction among users. However, there is now a growing number of other applications, such as Internet telephony, audio conferencing, remote surgery, sensor networks, and massive multiplayer computer games (MMOG). The users of these applications interact intensely with each other and have a low tolerance for delay.

The Networks and Distributed Systems Department's project "resource utilization in time-dependent large-scale distributed systems" (RELAY) examines latency (i.e. time lag in data transfer), taking MMOGs as an example. Of all the applications noted above, MMOGs are a huge commercial success; they have the largest numbers of users and the largest groups of interacting users. These users complain frequently about latency. We investigate solutions that provide latency reduction in the Internet.

In 2006, RELAY addressed four issues with respect to the potential for reducing latency, improvement potential that can be found in (i) network-level reservation, (ii) group management, (iii) the use of application-layer prediction, and (iv) the improvement of the Transmission Control Protocol (TCP). Network-level reserva-

tion provides dedicated bandwidth between networked computers by reserving resources on all routers between them. Our examination showed that it is currently not feasible. In group management, we have investigated a large number of algorithms for managing group membership and for maintaining routes for efficient communication among groups of users. The work provides generally applicable results for trading speed in updating group memberships and routes against the quality of the results. Application-layer prediction is a highly application-specific approach to hide the latency that remains after applying the other techniques. An interesting finding was that the best-known method for prediction fails in game worlds without inertia.

However, our most visible results this year were our modifications to TCP. TCP is the main transport protocol of the Internet, and underlies nearly all bulk data transfer over long distances over the Internet. It is used for email, file transfer and accessing web pages, and is used in peer-to-peer applications. Due to firewalls, even half of all video streaming and Internet telephony uses TCP nowadays. Researchers are investing heavily in improving TCP to achieve the highest throughput while remaining fair to other Internet users. The highly interactive traffic with which we are concerned is different: it requires very low bandwidth but also very low delay. Our findings are that new TCP improvements are of no help for this kind of traffic. The results of our investigation were welcomed by the community and we received the best paper award for our paper on this topic at ACM's NOSSDAV workshop. At IEEE's LCN conference, we received the best paper award for our evaluation of improvements to the more modern Stream Control Transport Protocol (SCTP).

In the coming months, we will extend this work by combining the modifications to TCP with our "late data choice" extension to the Linux kernel API to achieve even lower latencies. We will test this with Kalkulo's Silent Wings flight simulator to demonstrate the applicability and value of these changes for real-world applications.



Collaboration and Increased Funding

The Scientific Computing Department studies numerical methods and software for performing computer simulations of physical processes. Last year's report described an increased focus on applications of the computer simulations, and this trend has continued through 2006.

The Cardiac Computations (CC) project has continued and increased the collaboration with medical experts at national hospitals, particularly with Ullevål University Hospital and Haukeland University Hospital. During 2006, these collaborations led to both joint publications and a joint project proposal submitted to the Research Council of Norway. On the international arena, the biggest event for CC was the organization of a summer school on the modelling of the heart, which was held in May in Longyearbyen, Svalbard. The event was sponsored by the European Mathematical Society, and featured four top international experts as lecturers and participants from all over the world.

The other branch of heart research in SC, the Inverse Problems project, has continued their quest to construct new medical imaging devices based on ECG recordings, mathematics and laptop computers. In 2006, the project group demonstrated the effectiveness of their approach for synthetically generated data, and are now ready to apply their techniques to real medical cases. They have set up the necessary collaborations to perform this task, and are about to make the necessary investments in both medical devices and software that will facilitate the clinical trials.



The third application-oriented project in SC, Computational Geosciences, is continuing its close collaboration with Norsk Hydro. The results obtained by 2006 includes important contributions to Hydro's geo-modelling technology, the first version of a 4D global lithosphere model, the prototype of a collaborative software environment workflow management in oil and gas exploration, as well as simulation software for geological deformation and sediment deposition. The project has recently established research collaborations with leading groups at the University of Sydney, Caltech, and Institut Français du Pétrol.

The Software for PDEs (SP) project has continued to work on general-purpose software tools for numerical computations, but has also been involved in several application-orientated efforts. In close collaboration with the CC project, the group has launched a development version of PyCC (Python Computing Components), which contains both a platform-independent framework for solving partial differential equations (PDEs) and a new simulator for the electrical activity in the heart. PyCC has already been used in internal research projects, and will be distributed as a part of the FEniCS' suite. Simula's role in the FEniCS project will be strengthened even further in the future, through the launch of the new Centre of Excellence "Software Components for Biomedical Flows".

This centre represents a huge increase in the software-orientated SC activity, and is aiming to be a substantial contributor of high-quality scientific software.



Software Components for Biomedical Flows

By far the largest event for the SC department occurred in mid-December, with the announcement of the new Centres of Excellence funded by the Research Council of Norway. Competition for these grants was fierce, with 98 proposals submitted for the first call in October 2005. In May 2006, 26 proposals were selected for the final evaluation round, and the eight new centres were announced in December. The centre “Software components for biomedical flows” represents an entirely new direction for SC, but one that is based firmly on the activity in the SP project and also the more biologically orientated projects. The centre generates more than a 50% increase of the annual SC budget, and will enable Simula to make a real impact on a new and growing area of research.

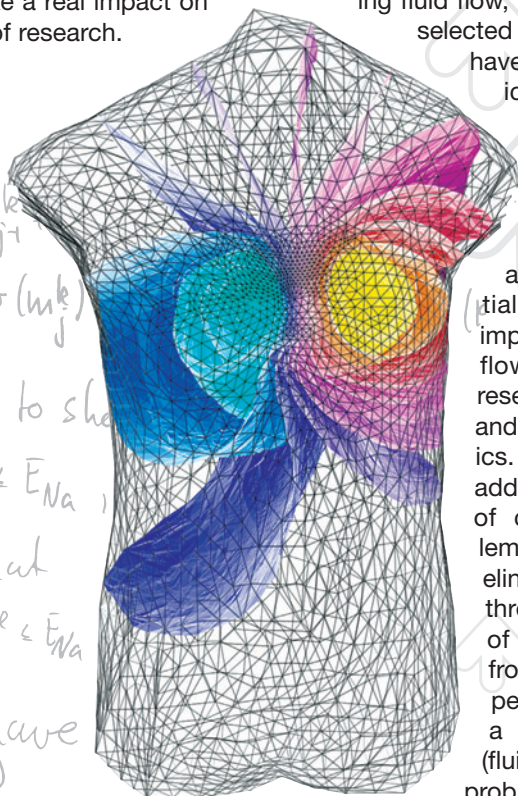
The work in the centre will be divided into three projects: Computational Middleware, Robust Flow Solvers, and Biomedical Applications. In the first years of operation, the main focus will be on Computational Middleware, which aims to produce general-purpose software components for solving PDEs to allow computational scientists to solve complicated PDE problems with a Matlab-like approach. The focus will shift gradually towards the development of robust and efficient solvers for fluid flow problems, based on and extending the software tools developed in the Computational Middleware project. After building a solid base of software tools for solving multi-physics problems involving fluid flow, we will address a number of

selected biomedical applications that have a potential impact for medical research and practice.

This composition of three main themes ensures results of different flavor.

First, the computational middleware will be generally useful and has the potential of achieving substantial impact in science. Second, the flow solver part continues research of outstanding quality and usefulness in fluid dynamics. Finally, the application part addresses a new and vital class of challenging physical problems where mathematical modeling is in its initial stages. The three parts also span the range of natural science research, from generic application-independent tools via methods for a wide class of applications (fluid flow) to specific physical problems.

Taking on a focused research project of this size and duration will be a new experience for the department, involving a number of substantial challenges as well as the potential for interesting and important research. A key element of the project strategy is to invite very promising young researchers from outstanding groups for long-term stays in the centre. This will help to increase the scientific quality of the department, which already has an excellent track record in computational middleware and biomedical computing.



$$(1 + \Delta t A_j^k) u_j^{k+1} = \gamma u_j^k + \Delta t (b(u_j^k))$$

 Our aim is now to show

$$u_j^{k+1} \leq E_{Na}$$

 and we know that

$$u_j^k \leq E_{Na}$$

 From (19), we have

$$(1 + \Delta t A_j^k) u_j^{k+1} \leq \gamma E_{Na} + (1 - \alpha \gamma) E_{Na} + \Delta t \gamma E_{Na} [b(u_j^k)^3 h_j + c(u_j^k)^4]$$

$$\stackrel{(12)}{=} E_{Na} + \Delta t E_{Na} A_j^k$$

$$= (1 + \Delta t A_j^k) E_{Na}$$

 so

$$u_j^{k+1} \leq E_{Na}$$

(22)

1. See www.fenics.org

Empirical Studies of Software Development

The main objective of the research conducted by the Software Engineering (SE) Department is to provide empirically-based evidence of how different processes, methods, techniques and tools can be applied in a cost-effective way to develop complex software systems.

The research is organized into three projects:

BEST – Better Estimation of Software Tasks

The BEST project focuses on how to improve expert judgment-based software cost estimates and cost uncertainty assessments through better processes, process support and better learning/training processes. The results from the BEST project are intended to contribute to better control of software projects and, consequently, more efficient use of IT resources and investments.

OOAD – Object-Oriented Analysis and Design

The goal of this project is to evaluate and improve the cost-effectiveness of technologies for object-oriented analysis and design in an industrial context. Empirical evaluations are required to understand when, how and why proposed technologies might be beneficial. In turn, such a body of knowledge can serve as a basis for improving the proposed technologies.

SERM – Software Engineering Research Methods

The goal of this project is to advance the state of the art of empirical SE research. The research problem to be addressed is how to develop methods, infrastructures and apparatus that will significantly improve the conducting of empirical studies in SE and the interpretation of their results. A particular emphasis is currently being placed on laying a foundation for using and building empirically based theories that are useful for software engineering research and practice.

Building Empirically Based Theories for Software Engineering

Empirically based theories are generally perceived as foundational to science and the scientific method. Theories embody our scientific understanding of phenomena and the underlying causal mechanisms by which such phenomena are produced, thus providing the means for predicting future events. In SE, theories may help to identify, explain and predict the effects of various factors that influence systems development, which in turn puts us in a better position to produce, improve and tailor software development technologies. However, our investigations into the use of theory in SE experiments have revealed that the use of theory in our field is the exception rather than the rule. It is among the SE department's main priorities to improve on this situation and to facilitate the use of empirically based theories in SE.

Professor Dag Sjøberg, Research Director

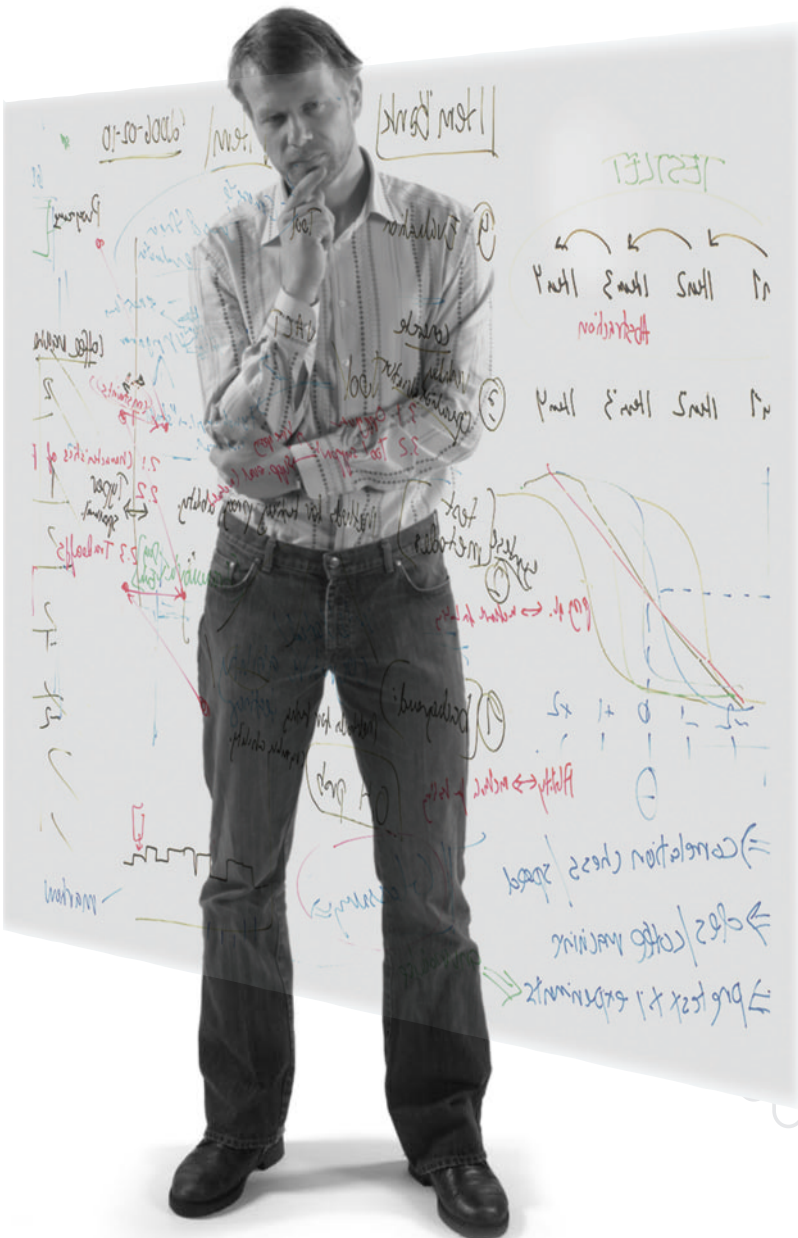
SE is a multidisciplinary field centred on problem solving, where the problems are of a technological and organizational nature. This means that theoretical knowledge from disciplines such as cognitive psychology, management, social/behavioural science, and information systems are relevant for providing theoretical foundations for our studies. However, theories may also arise purely within the field of SE, based on empirical work done there. The SERM project is currently developing conceptual frameworks for both of these approaches; that is, frameworks for integrating theories from other disciplines and for building theories from scratch within SE. A community webpage for registering, describing and sharing theories within these frameworks is hosted by the project.

Besides investigating and developing general frameworks for integrating and building theory, research within the department involves integrating and building actual theories in conjunction with the empirical studies conducted in the BEST and OOAD projects. In the BEST project, theories from management and cognitive psychology are adapted in order to explain and predict processes of making judgments in software effort estimation, and theories from organizational learning and educational science form the basis for a training model for developing specialized skills so that software practitioners will provide more accurate effort estimates with less over-confidence. In the OOAD project, theories from group dynamics form the basis for developing an explanatory and predictive model of pair programming, and based on case studies at ABB, a theory is under development that seeks to explain why using UML is beneficial for developing large systems.

Through the abstraction of theory, researchers may get a grasp on a complex world by postulating useful theoretical concepts (expertise, intelligence, programming skill, perceived risk, etc.), and they may communicate within frameworks of common terminology. Abstraction does not entail inapplicability; theoretical abstraction for software engineering pertains to describing and explaining, in a manageable way, the human and technological processes that occur in everyday software development.

The industry is our lab!

Through collaboration between industry and research, we help to build a body of knowledge and expertise that is essential for developing higher quality software systems, within shorter timelines, and in a more predictable way. As an engineering discipline, our goal must be to find realistic solutions to problems faced by our industrial partners. Given the growing role of software technology in all areas of the economy, our impact on innovations in private and public industry and commerce is bound to grow in importance.



Transforming research into commercial value

Simula Innovation AS is the innovation- and commercialization company owned by Simula Research Laboratory AS.

The vision of Simula Innovation is to be recognized as one of the most efficient commercialization groups within comparable research environments. The operational goal is to improve the commercial success rate, volume and quality of the outcomes of publicly funded research and technology at Simula.

2006 was a productive and active year for Simula Innovation. With 2.5 man-years, Simula Innovation had seven running projects in the portfolio, evaluated 12 new ideas, spun off two new companies, initiated new funding activities and established two new industry alliances. Simula Innovation also focused on further developing the infrastructure activities at Simula by integrating the commercial perspective and activities in a highly scientific oriented environment.

Two major infrastructure goals were achieved:

- the establishment of the T2M Team Innovation and
- the arrangement of a Simula Innovation Day.

The Simula Innovation Day was the first activity in which Simula Innovations strategy, cases and ideas were presented to a multitude of internal and external stakeholders. 2006 was also the first year in which an Innovation Award was presented to a Simula entrepreneur. Furthermore, Simula Innovation continued to develop the T2M Network. The T2M Network now consists of 12 senior profiles from industry and academia. Simula Innovation utilizes this network when evaluating ideas, discussing strategy, door-opening activities, and mentorship for different projects and entrepreneurs.

Financially, Simula Innovation increased the amount of grants received from public funding by 158 % over 2005, which will give Simula Innovation an opportunity to strengthen the organization in 2007. The positive result from the agreement with Hydro gave Simula Innovation an opportunity to further invest in the spin-off company Symphonical AS.

Simula Innovation reported quarterly to the Executive Board on the following four areas of focus:

1. Establish commercialization vision, strategy and goals

For Simula Innovation, it was important to attain commitment to the commercial aspect and further investments in commercialization activities in Simula's future goals. This was achieved through the Simula strategy process for 2006-2015, in which one of two major goals listed for Simula is to produce a commercial breakthrough by 2015.

2. Develop and capitalize on the commercial project Resilient Routing

The Resilient Routing project, which is run by Simula's research department for Networks and Distributed Systems (ND), has achieved promising results in the configuration of robust networks (resilient routing). In close cooperation with ND, Simula Innovation has focused on presenting the results to the industry and developed strategies for market entry to try to capitalize on the research result. This is a long-term process and in 2006 Simula Innovation established new industry contacts with Cisco, Tandberg and Telenor .

Resilient Routing also received "Verification grants" ("Verifiseringsmidler") through Simula Innovation from The Norwegian Research Council/FORNY programme to a total amount of 1.350 MNOK, to further facilitate the demonstration to industry of the viable commercial application of the results.



Anita Krohn Traaseth
Managing Director



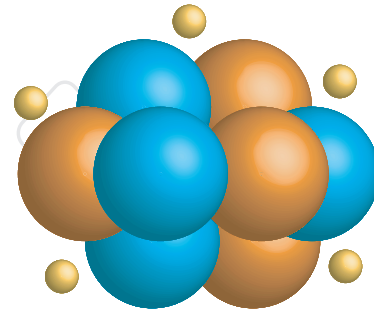
3. Develop a new industry alliance

Close collaboration with industry and other environments for commercialization and innovation is an important part of the Simula Innovation commercialization strategy. Simula Innovation signed a new industry alliance with Telenor R&I in December 2006. The new common research & innovation project is named SimTel Innovation and will focus on developing TIM ideas (Telecom, Internet, Media). The Project Manager will be Audun Fosselie Hansen from April 2007 to April 2009. An end result of the project is envisioned to be a new start-up company in cooperation with Telenor R&I.

4. Implement T2M precubator tool

Simula Innovation has developed and implemented a new process for research-based innovation, T2M. T2M is an operational, "how-to-do-it" precubator tool that consists of three elements. The tool:

- identifies the market relevance of the field of research (T2M Matrix)
- ensures interaction with business and industry at an early stage (T2M network)
- accelerates and evaluates research ideas (T2M IdeAccelerator)



T2M[®]

T2M Team Innovation

A T2M Manual, written for and in cooperation with the Simula researchers, was launched on Simula's Innovation Day. In 2006, T2M became an established tool at Simula. In addition T2M is gaining national and international attention in both academic and industry environments.

"T2M, or variations on this model, will probably be the answer to many problems currently bothering corporate innovation units in enterprises as well as universities that are trying to commercialise their research results."

Professor Tomas Hellström, Director of the Centre for Entrepreneurship, Faculty of Mathematics and Natural Science, University of Oslo.



The first Innovation Award at Simula was presented to Hans Gallis for his spin-off company Symphonical AS at Simula's celebration of five years at Fornebu on 14 December.



Many researchers at Simula are interested in possible applications of their work.



Kalkulo AS is a 100 % owned commercial subsidiary of Simula Research Laboratory that delivers consulting services regarding technical and scientific software. The company started operations on April 1st 2006 and has seven employees as of December 31st 2006. Kalkulo has, during its first operating year (nine months), met its budget goals and is positioned for significant growth in 2007.

Kalkulo's total consulting revenue in 2006 was NOK 3.9 million, split with 2.3 million from Norsk Hydro, 0.8 million from Simula, and 0.8 million from four smaller customers within the area of PC games and real-time simulation. It is expected that these three areas will all grow in 2007, with a particularly strong growth in the area of PC games, in which the company is in the final rounds of closing a contract worth about NOK 3 million for 2007.



Position, goals and strategy

Technical and scientific software is a segment of the software market that requires combined excellence in computer science and applied mathematics. As a part of the Simula Group, Kalkulo benefits from a well-developed network and is in a unique position to consult up-to-date expertise and recruit skilled personnel in this field. These factors, combined with a head start provided by a research and development contract with Norsk Hydro, give Kalkulo the best possible platform to develop successfully in the technical and scientific software market.

In the initial three-year period, the goal of Kalkulo is to secure commercial success. This means that Kalkulo should operate with a healthy profit margin and expand staff to between 10 – 20 employees. A secondary goal is to provide industrial feedback to Simula that will have a positive impact on the relevance of the research undertaken at Simula and the supporting innovation in SI.

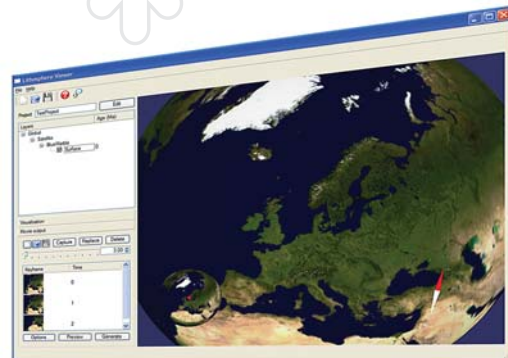
Erlend Arge
Managing Director



The initial focus of Kalkulo is on developing software for PC games, medical and geophysical modelling that has a common competence platform within mathematics, numerical methods and visualisation. In order to be successful with respect to its primary goal of commercial success, Kalkulo concentrates its efforts on expansion within key areas that are based on present projects and personnel competence. After reaching its primary goal, the company will develop a longer-term strategy for further growth.

Geological modelling

Kalkulo is collaborating with Simula to develop a software system to help Hydro's oil and gas geoscientists to better understand the Earth's geology. With this software, geoscientists are able to study geological features at different levels of detail and at any point in geological time. Kalkulo, Simula and Hydro work with world-leading research groups in USA and Australia on these issues and Kalkulo collaborates closely with the users at Norsk Hydro to ensure that the software is designed and developed to create the best possible user value.



The geological modelling software developed by Kalkulo for Norsk Hydro helps geoscientists to understand the development of large-scale geological structures in space and time.

Medical Modelling

Electrical signals emitted by a beating heart can be measured on the surface of the body by ECG equipment. Currently, it is not known how these measurements vary according to individual body types. Kalkulo is developing a software application for Simula

Research Laboratory to emulate a wide variety of body types as a step towards solving this research problem. This is of critical importance for current research at Simula that involves computer simulations of ECGs.

Flight Simulation

The PC game vendor Silent Wings AS has outsourced most of the development of its flight simulation and animation products to Kalkulo. These products are used by soaring enthusiasts for training, online competition and real-time animation. In contrast to the users of many other flight simulators, a majority of the users of Silent Wings AS products are real pilots with deep insight into aerodynamics and atmospheric conditions. In this area, Kalkulo and Silent Wings AS collaborate with external test pilots and aerodynamic experts to achieve accurate simulations.



Turning Rocks into Knowledge

The oil and gas industry is a major part of the Norwegian economy. Today, most of the major offshore fields on the Norwegian Shelf have been explored, and we know that these hydrocarbon reserves will last only for a quite limited time. Therefore, the industry must identify new, profitable reserves on a global scale. This requires evaluation of prospects that are structurally different from the fields on the Norwegian Shelf, and that may vary considerably from one case to the next. As a result, the exploration work requires a stronger methodology and better software tools, based on tight links between different areas of expertise.



A Boguer anomaly map computed and visualized by the Lithosphere Model Viewer

Since the beginning of 2005, Simula and Norsk Hydro have collaborated closely in order to form a better understanding of the geological and geophysical processes that are important for the formation of hydrocarbon deposits. This calls for several specific activities, all of which are pursued as part of Simula's Computational Geosciences (CG) project.

So far, the CG project has made novel contributions to Hydro's technology for the construction of complicated geo-models, realized the first version of a 4D global lithosphere model, and developed a prototype of a collaborative software environment for new, integrated work

processes for oil and gas exploration. In addition, the project addresses the numerical simulation of 2D/3D deformation and heat flow in sedimentary basins, and of deposits from subaqueous sediment gravity flows.

From Data Observations to Complicated Geomodels

Hydro has, over several years, developed a powerful methodology for constructing advanced geomodels. Due to an extreme level of parameterization, such models can easily be edited to reflect an improved understanding of the prospect. While Hydro's work was originally limited to 2D, Simula has introduced advanced numerical methods that make the methodology suitable for 3D models as well. The resulting software can represent realistic models of sedimentary basins, in which all available data, from local to global scales, are integrated fully. In combination with a new software strategy for efficient workflow management, this approach to modelling looks particularly promising.

A Dynamic Model of the Lithosphere

When evaluating a prospect, the combining of global data sets and local information can provide valuable geological insights. For this purpose, Hydro and Simula have designed and implemented an innovative 4D global lithosphere model, which extends state-of-the-art algorithms for the storage, presentation and manipulation of large-scale data sets. It offers multiresolution, multiscale and multilayer modelling possibilities, supports surface-based geocalculations, and allows dynamic views of the paleotopography. The latter viewpoint is obtained by stepping millions of years back in time and taking into account the corresponding movement of the tectonic plates. According to Hydro, this is the first 4D global lithosphere model in the industry.

Other activities

As part of our collaboration, Hydro finances two PhD positions at Simula. These PhD projects concern the simulation of 2D/3D deformation and heat flow in sedimentary basins, and particle-based simulations of the physics that governs turbidity currents.

Simula has established itself as a close research partner for Hydro. There is a strong mutual interest in continuing this relation on a long-term basis, and it is expected that the key activities will be continued and extended with new topics.

SIMULA SCHOOL OF RESEARCH AND INNOVATION AT THE UNIVERSITY OF OSLO

In its report in late 2004, the Evaluation Committee identified one particular point where Simula had room for improvement; The Committee recommended that Simula raise its postgraduate student targets and, to make this possible, seek additional resources from the Research Council or elsewhere. Since that time, Simula has worked to increase the number of PhD students. In 2005, Simula concluded an agreement with the University of Oslo that states, among other things, that the parties would work together to found a school of research in the field of informatics.

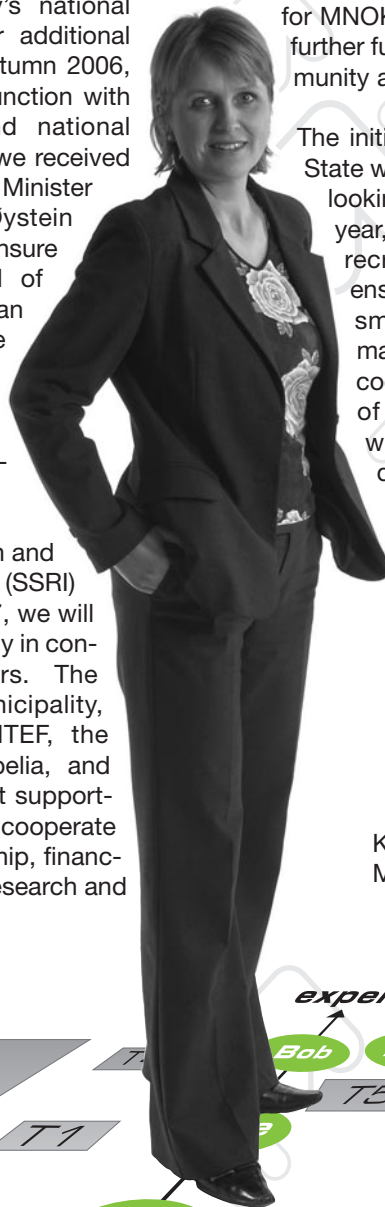
The main challenge for Simula in this context has been to secure funding for fellowships. In autumn 2005, we made Norway's national authorities aware of our need for additional funding for this. In summer and autumn 2006, we stepped up our efforts in conjunction with industrial players, and local and national authorities. At the end of the year, we received a very gratifying response from the Minister of Education and Research, Øystein Djupedal. The Ministry will help to ensure that Simula can found a school of research and innovation, granting an initial allocation of MNOK 5. The Minister was unable to comment on the level of further financing, but was at least able to assure us that further financing would be forthcoming.

Now, the Simula School of Research and Innovation at the University of Oslo (SSRI) will soon be a reality! In spring 2007, we will set up the SSRI as a private company in conjunction with other stakeholders. The University of Oslo, Bærum municipality, Telenor, Norsk Hydro, DNV, SINTEF, the Norwegian Computing Centre, Abelia, and ICT-Norway have all been important supporters, and they will be invited to cooperate closely on the organization, ownership, financing and operation of the school of research and innovation.

SSRI will enable Simula to educate PhD students who are interested in doing research of considerable relevance to industry. The school will help to forge stronger bonds between enterprises and research institutions, thus reinforcing the interaction between industry and the world of academia in the field of ICT. SSRI will cooperate closely with Norwegian and international industry, educating graduates who are attractive to these communities. The PhD degrees will be awarded by the University of Oslo, and the university's regulations will apply in full.

Once in full-scale operation, we envisage that SSRI should have 15 trainees, 45 PhD students, 10 post-doctoral research fellows, five supervisors and three administrative staff. The need for funding is estimated at MNOK 50. Some of that amount will be supplied by Simula itself, which will transfer its own education-related funding to SSRI. Simula has applied to the State for MNOK 30 in 2008, and we will seek further funding from the business community and other actors.

The initial grant of MNOK 5 from the State will allow us to begin, and we're looking forward to it! During the first year, we will set up the school, recruit the first students and ensure the programme is running smoothly. Our ambition is to make this an important arena for cooperation between the worlds of academia and industry in which we educate PhD candidates. SSRI is scheduled to be in full operation as from January 2008.



Kristin Vinje
Managing Director



Doctorates	Supervisors	Thesis
Grimstad, Stein	Jørgensen, M.	Software Effort Estimation Error
Hanslien, Monica	Sundnes, J. Lines G.T. Tveito, A.	Analysis of numerical methods for mathematical models of cardiac electrical activity
MacLachlan, Mary Catherine	Sundnes, J. Lines G.T. Tveito, A. Nielsen, B. F.	Computer simulations of myocardial ischemia
Rafaelsen, Hans Ole	Eliassen, F.	Towards a framework for autonomic support of heterogeneous multimedia applications
Staff, Gunnar Andreas	Langtangen, H.P. Mardal, K-A.	Numerical computation of Initial Value Problems originated from Partial Differential Equations
Thorvaldsen, Tom	Sundnes, J. Osnes, H.	An Electro-Mechanics Solver of the Heart
Ødegård, Åsmund	Langtangen, H.P. Tveito, A.	Applications of high level software for parallel solution of Partial Differential Equations
Masters	Supervisors	Thesis
Almqvist, Johan Per Fredrik	Karahasanović, A. Fries, G.	Replication of Controlled Experiments in Empirical Software Engineering – A Survey
Alnæs, Martin Sandve	Mardal, K-A.	Finite Element Simulations of blood flow in the circle of Willis
Apeland, Ole Kristoffer	Čičić, T.	IP redundant trees for preplanned recovery in connectionless networks
Bai, Aleksander	Skeie, T. Engelstad, P.E.	Interoperation between 802.11e EDCA and Differentiated Services with Admission Control
Birkeland, Erlend	Halvorsen, P. Griwodz, C.	Late data choice with the Linux TCP/IP stack
Bredesen, Kim	Eliassen, F. Amundsen, S. L.	QoS-aware Remote Bindings in IP based Mobility Management
Buzungu, Valery	Arisholm, E. Briand, L.	Predicting Fault-prone Components in a Java Legacy System
Dybvik, Bjørn Arne	Solheim, Å. Čičić, T.	Ytelsesanalyse av Froots og Dimension-Order
Haga, Joachim Berdal	Langtangen, H.P. Hjorth-Jensen, M.	Numerical Simulation of Bose-Einstein Condensates
Holt, Nina Elisabeth	Sjøberg, D. Hannay, J.E.	A Systematic Review of Case Studies in Software Engineering
Karper, Trygve Klowning	Mardal, K-A. Winther, R.	Mixed Finite Element Methods for Coupled Darcy-Stokes Flow
Kværn, Kaja	Karahasanović, A.	Effects of Expertise and Strategies on Program Comprehension in Maintenance of Object-Oriented systems: A Controlled Experiment with Professional Developers
Lilja, Didrik	Mardal, K-A. Langtangen, H.P.	On testing the optimum principles of Murray's law
Nøtnes, Kristian	Lysne, O.	Overvåkning av et 802.11g 54 Mbps trådløst nettverk utendørs

* Candidates supervised throughout their PhD/MSc by researchers at Simula Research Laboratory.

Masters	Supervisors	Thesis
Paaby, Espen Søgard	Halvorsen, P. Griwodz, C.	Evaluation of TCP retransmission delays
Pedersen, Jon	Halvorsen, P. Griwodz, C.	Evaluation of SCTP retransmission delays
Ruud, Bjørn Olav	Boudko, S. Griwodz, C.	Video quality measurement of scalable video streams
Sand, Gunhild	Anda, B.	Evaluering av UML-basert utviklingsmetodikk i et stort prosjekt
Setek, Martin Tostrup	Eliassen, F.	CPU management for Multimedia Applications: A case Study
Stensland, Håkon Kvale	Lysne, O.	Fault-tolerant routing in SCI
Sunde, Øystein Yri	Halvorsen, P. Griwodz, C.	Fordelen ved å implementere applikasjonsspesifikk shaping og køing på et IXP2400
Tømmerberg, Gøril	Karahasanović, A.	Comprehension-Related Activities during Maintenance of Object-Oriented Systems: An In-Depth Study
Vikskjold, Espen A.	Karahasanović, A.	Measuring Time – A Systematic Survey of Controlled Experiments in Software Engineering
Voss, Markus	Leister, W. Griwodz, C.	Hikernet



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S. Grimstad. *Software Effort Estimation Error*, PhD thesis, University of Oslo, 2006.

M. Hanslien. *Analysis of numerical methods for mathematical models of cardiac electrical activity*, PhD thesis, Dep. of Informatics, University of Oslo, 2006.

M. C. MacLachlan. *Computer simulations of myocardial ischemia*, PhD thesis, Department of Informatics, University of Oslo, 2006.

H. O. Rafaelsen. *Towards a framework for autonomic support of heterogeneous multimedia applications*, PhD thesis, Faculty of Science, University of Tromsø, Norway, 2006.

G. A. Staff. *Numerical Computation of Initial Value Problems originating from Partial Differential Equations*, PhD thesis, University of Oslo, 2006.

T. Thorvaldsen. *An Electro-Mechanics Solver for the Heart*, PhD thesis, Department of Informatics, University of Oslo, 2006.

Å. Ødegård. *Applications of high level software for parallel solution of Partial Differential Equations*, PhD thesis, Informatics department, University of Oslo, 2006.

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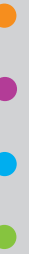
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SIMULA CONDUCTS BASIC RESEARCH IN THE FIELDS OF NETWORKS AND DISTRIBUTED SYSTEMS, SCIENTIFIC COMPUTING AND SOFTWARE ENGINEERING. THE AIM IS TO UNDERTAKE RESEARCH OF THE HIGHEST QUALITY, COMMERCIALISE RESEARCH RESULTS AND EDUCATE M.SC. AND PH.D. CANDIDATES IN COOPERATION WITH NORWEGIAN UNIVERSITIES.

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