[**simula** . research laboratory]
- *by thinking constantly about it*

[**simula** . research laboratory]
- *by thinking constantly about it*

[annual report . 2005]

```
t levelups = gridu.getGridLevelNo() - griduold.getGridLevelNo();

.reFill(1,rules());

t e;
nst int nel = gridu.getNoElms();
al egy_error = 0.0;
al abs_int = 0.0;
r (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;

      ElmDef& ed = (ElmDef&) fep.getElmDef();
      if(!ed.findLocPt(x,xloc,niter,error,fep.geomNodeCoor())){
          errorFP("Did not find point in element");
        }

      fep.setLocalEvalPt(xloc);

      u0 = ucoarse.valueFEM (F p);
      ucoarse.derivativeFEM (grad_uold, fep);


      egy_error += abs(u1-u0)*fe.detJxW();
      abs_int += abs(u1)*fe.detJxW();
    }
}
```

[Contents Annual Report]

[Direktøren har ordet]

**Professor
Aslak Tveito
Managing Director**

Simulamodellen

Styringsmodell og grunnbevilgning er avgjørende for hvordan et forskningsmiljø fungerer. I Norge har vi i hovedsak to organisasjonsmodeller; universitetene – med en stor grunnbevilgning og en styringsmodell som gir forskerne meget stor individuell frihet og, på den annen side – forskningsinstituttene som har en beskjeden grunnbevilgning og en styringsmodell som er langt nærmere det vi finner i arbeidslivet forøvrig.

Nylig var Arvid Hallén, adm. dir. i Norges forskningsråd, på besøk i Simulasenteret. Han lyttet til våre presentasjoner og oppsummerte ganske presist at Simulasenteret kombinerer universitetenes fokus på grunnleggende forskning basert på en stor grunnbevilgning med forskningsinstituttenes styringsmodell. I Simulasenteret driver vi styrt grunnforskning[1]; vi definerer noen få grunnleggende problemstillinger og arbeider med disse over lang tid. Dette reduserer den individuelle friheten vi kjenner fra universitetene, men det øker muligheten til å konsentrere ressursene på et lite antall krevende problemstillinger.

Et annet sentralt trekk ved simulakulturen er at vi arbeider seriøst for å dyrke fram heldagsforskere. Det er et kjent problem at mange dyktige forskere opplever at de mister fokus på forskningen fordi tiden blir spist opp av søknader, rapporteringer og arbeid i råd og utvalg. I tillegg til dette må universitetsforskere også undervise, og ansatte ved forskningsinstitutter må arbeide aktivt for å selge prosjekter til næringslivet. Ingen mener at dette er uvesentlig arbeid, men

tiden til å trenge inn i de kompliserte sammenhengene blir likevel skadelidende. Ønsket om sterkest mulig konsentrasjon om forskningen står i fokus for alle strategiske diskusjoner vi har i Simulasenteret.

Simulasenteret ble etablert i 2001, og denne modellen er nå testet ut i fem år. Virker den? Det er det for tidlig å gi noe definitivt svar på, men Simula har nylig vært gjennom en omfattende evaluering og i innledningen til denne står det blant annet:

> *The Evaluation Committee is impressed with the progress and level of activity achieved at the Simula Research Laboratory in the comparatively short time since its foundation. The organization has succeeded in generating a vibrant research culture and is now operating as a highly effective research unit with growing international recognition[2].*

Selv om universitetene i Norge er tilbakeholdne med å støtte etableringen av nye forskningsinstitusjoner utenfor universitetene, er de fornøyd med den faglige utviklingen av Simulasenteret:

> *De fire universitetene har merket seg den meget positive evalueringen av Simulasenterets virksomhet. Både ledelsen og medarbeiderne fortjener honnør for det arbeid som er lagt ned og de resultater som er oppnådd. Vi tror denne positive evalueringen også indikerer en viktig og oppmuntrende generell lærdom: Når vilkårene legges godt til rette og det satses systematisk på kvalitet, er det fullt mulig å bygge opp vitenskapelige kraftsentre på høyt internasjonalt nivå i Norge![3]*

Og noen virkelig fremragende resultater kan Simulasenteret vise til. I en rangering foretatt av Journal of Systems and Software[4] kommer vår Software Engineering avdeling på 14. plass i verden og 3. plass i Europa[5]. I en kommentar til dette skriver Norges forskningsråd på sine hjemmesider[6] at

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Software engineering-miljøet ved Simula Research Laboratory har hatt en fantastisk utvikling siden opprettelsen i 2001, og denne rangeringen er en bekreftelse på det.

Videre registrerer vi at interessen for Simula øker i norsk næringsliv. Dette har resultert i et omfattende forskningssamarbeid mellom Hydro og Simula.

Våren 2005 la Regjeringen fram St.meld. 20 Vilje til forskning (2004-2005). Meldingen bar bud om en kraftig opptrapping av Norges satsning på forskning. En spesiell utfordring er knyttet til å øke næringslivets forskningsinnsats. I den sammenhengen kan det være fornuftig å vurdere om Norges forskningsråd bør utvide verktøykassen sin. Kanskje simulamodellen også bør implementeres innenfor andre fagområder?

Ledergruppen
Bak fra venstre: Anita Krohn Thrane, Erlend Arge, Dag Sjøberg, Kjetil Moløkken-Østvold og Kristin Vinje. Foran fra venstre: Olav Lysne, Aslak Tveito og Joakim Sundnes.

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1 Dette omtales som målrettet eller strategisk grunnforskning i Frascati-manualen.
   Frascati Manual 2002: Proposed Standard Practice for Surveys on Research and Experimental Development

2 Evaluation of the Simula Research Laboratory. Report of the Evaluation Committee Investigation.
   The Norwegian Research Council of Norway 2004.

3 Brev fra de fire norske universitetene til Utdannings- og forskningsdepartementet, datert 12. juli 2005.

4 Tse, T. H., Chen, T. Y., Glass, R. L.: An assessment of systems and software engineering scholars and institutions (2000–2004). The Journal of Systems and Software 2005;. http://www.elsevier.com

5 Undersøkelsen rangerer også enkeltforskere. I denne kommer Magne Jørgensen på tredjeplass i verden og på førsteplass i Europa.

6 http://www.forskningsradet.no

[Managing Director]

The Simula Model

Management models and basic funding have an impact on how well a research community functions. In Norway, there are generally two organisational models: on the one hand, there are the universities, based on large basic grants and a management model that gives the researchers considerable individual freedom and, on the other hand, there are the research institutions that have modest basic grants and a management model that is far closer to that found in industry.

Arvid Hallén, Director General of the Research Council of Norway, recently paid a visit to Simula. After listening to our presentations, he pointed out very succinctly the fact that Simula combines the universities' focus on basic research featuring a large basic subsidy with the research institutions' management model. Simula engages in directed basic research[1]. We identify a few fundamental issues and then work on them over a long period of time. This places constraints on the individual freedom we know from the universities, but it increases opportunities to concentrate resources on a small number of demanding issues.

Another key feature of the Simula culture is that we make serious efforts to cultivate full-time researchers. It is no secret that many talented scientists find themselves losing their focus on research since they are submerged in writing applications and reports in addition to serving on boards and committees. University researchers are also required to teach, while employees of research institutions have to make active efforts to promote projects to business and industry. While no one would contend that this work is less than essential, it takes a great deal of time, and can reduce the time researchers can devote to delving into the complexities of their research. The desire to concentrate on research to the greatest possible extent lies at the heart of all the strategic discussions conducted at Simula.

Established in 2001, the Simula model has now been tested for five years. Does it work? It is it still too early to give any definite answer to that, but Simula recently underwent an extensive evaluation. The introduction reads as follows:

The Evaluation Committee is impressed with the progress and level of activity achieved at the Simula Research Laboratory in the comparatively short time since its foundation. The organization has succeeded in generating a vibrant research culture and is now operating as a highly effective research unit with growing international recognition.[2]

Although the universities in Norway are hesitant to support the establishment of new research institutions outside the universities themselves, they are pleased with the professional development of Simula:

"The four universities have taken note of the highly positive evaluation of Simula's activities. Management and co-workers all deserve recognition for the efforts they have invested and the results they have obtained. We believe this positive evaluation also teaches us an important, encouraging lesson: When the stage is properly set and systematic efforts are made to achieve high quality, it is definitely possible to build up bastions of scientific excellence of a high international calibre in Norway!"[3]

Simula can boast of some truly outstanding results. In a ranking undertaken by the Journal of Systems and Software[4], Simula's Software Engineering Division is ranked 14th in the world and 3rd in Europe[5]. The Research Council of Norway comments on this on its website[6]:

"The Software Engineering Group at the Simula Research Laboratory has made tremendous progress since its establishment in 2001, and this ranking confirms that".

Furthermore, we have noticed that Simula is attracting more attention from Norwegian business and industry. This has resulted in extensive research collaboration between Hydro and Simula.

In spring 2005, the Norwegian Government presented White Paper No. 20: The Will and the Way: Research in Norway. The report predicted a powerful escalation of Norway's investments in research. One special challenge involves boosting industrial research. In that context, it might be wise to evaluate whether the Research Council of Norway should enlarge its toolbox. Perhaps the Simula Model might serve as a good role model for other disciplines as well?

1   This is referred to as goal-oriented or strategic basic research in the Frascati manual. Frascati Manual 2002: Proposed Standard Practice for Surveys on Research and Experimental Development

2   Evaluation of the Simula Research Laboratory. Report of the Evaluation Committee Investigation. The Norwegian Research Council of Norway 2004.

3   Letter from Norway's four universities to the Royal Norwegian Ministry of Education and Research, dated 12 July 2005 (authorised translation)

4   Tse, T. H., Chen, T. Y., Glass, R. L.: An assessment of systems and software engineering scholars and institutions (2000–2004). The Journal of Systems and Software 2005. http://www.elsevier.com

5   The survey also ranks individual researchers. It ranks Magne Jørgensen in third place world-wide and first place in Europe.

6   http://www.forskningsradet.no

[Annual report 2005]

The Simula Research Laboratory (Simula) took further steps towards becoming a permanent research institution in 2005, now that international recognition is gaining momentum. The year was characterised by advances in basic research as well as in cooperation with business and industry. Determined efforts were made to follow up the evaluation from 2004.

When Simula was established in 2001, the Research Council of Norway pledged funding for 10 years, on the condition a successful international evaluation was made during the period. In 2004, such an evaluation was highly favourable to Simula's scientific merits and operations. Thus the evaluation established a sound platform for discussions about Simula's future, leading to important political and organisational clarifications in 2005. Simula is located at IT-Fornebu in the muncipality of Bærum.

Since 2004, Simula Innovation has established a major research project in collaboration with Hydro ASA to develop new oil exploration technologies and methods based on Simula's simulation expertise.

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

Strategic efforts and the follow up of the evaluation

Simula's strategy from 2003 to 2005 attached considerable importance to research of a high international calibre, the education of graduate and post-graduate students, and the establishment of enterprises based on the research performed at the centre. The Evaluation Committee ascertained that Simula has come far in the short time since it was established, but also pointed out areas for potential improvement. Accordingly, several follow-up initiatives were introduced in 2005, and further initiatives will be instituted in 2006.

One of the main initiatives in 2005 was to reorganise into fewer, larger projects in the research departments. The three departments are now concentrating their efforts on a handful of larger-scale projects with their own managers and budgets.

The Evaluation Committee also mentioned that the number of graduate and post-graduate fellows was low compared with the number of academic staff. This is primarily a financial problem. In future, Simula will be more active in terms of applying for external funding for fellowships.

Simula's Board of Directors and administration have also started to draw up a new strategy for 2006 to 2015. The strategy is intended to respond to the challenges pointed out in the evaluation.

Research and cooperation

In 2005, Simula focused on joint projects with institutions in Norway and abroad. Among other things, a comprehensive collaboration agreement was signed with the University of Oslo

(UiO), based on common acknowledgement that the two institutions have concurrent interests in research, teaching and innovation. The agreement formalises their cooperation, describing the responsibility that UiO has in respect of Simula and that the research groups at Simula have in respect of UiO.

Simula organised several major seminars and conferences during the year. In June 2005, the centre organised the International Conference on Parallel Processing (ICPP), one of the main conferences in its field. ICPP has been organised annually since 1972, and Simula is the second European institution to host it. This year's conference attracted 180 delegates from all over the industrialised world.

Simula also organised a large-scale seminar for Norwegian network researchers in October, and a seminar in December that attracted 100 software developers from cooperating institutions.

Simula aspires to attract outstanding foreign researchers. In 2005, the centre hosted exceptionally competent scientists from Canada in visiting researcher Lionel Claude L. Briand, an international capacity in his field, and PhD students James Dzidek and Mary MacLachlan.

The Board was pleased to see the research programme eVITA (eScience - Infrastructure, theory and applications) established as from 1 January 2006. eVITA began as a Simula initiative. The programme is intended to help Norway develop a modern, internationally competitive infrastructure and to promote the use of computational science as the third path of science, i.e., in addition to experimentation and theory.

Favourable feedback

The Board was pleased that Simula received favourable mention from important players during the year. The universities in Oslo, Trondheim, Tromsø and Bergen took note of the highly positive evaluation of Simula's activities, according to a letter from the university rectors to the Ministry of Education and Research in July. The university presidents pointed out that when the stage is properly set and systematic efforts are made to achieve high quality, it is definitely possible to build up bastions of international-quality scientific excellence in Norway.

Arvid Hallén, Director General of the Research Council of Norway, remarked that Simula combines the universities' focus on basic research, based on a single large basic grant, with the management model used by the research institutes. The Research Council also confirmed that Simula's long-term, generous financial support has worked according to the intention, that the framework conditions have made it possible to take advantage of entirely new methods in its research, and that the employees can do research on full-time basis without other obligations.

Abelia, the Association for Knowledge and Technology Enterprises under the auspices of the Confederation of Norwegian Business and Industry (NHO), praised the SE Department for optimising the conditions for focused, long-term research. According to Abelia, SE provides important, highly relevant industrial research that should be further upgraded and is highly significant for revitalisation in the public sector as well as for the IT industry's competitiveness.

International Ranking

In 2005, the prestigious "Journal of Systems and Software" ranked Professor Magne Jørgensen of Software Engineering (SE) as the best researcher in Europe, and number three in the world, in his field. Jørgensen competed against 3987 other researchers. At the same time, Simula was ranked number three in Europe and number 14 in the world. Jørgensen, one of the researchers on the Abelia project SPIKE, has published ground-breaking work on software cost estimation.

It is also gratifying to note that the Association of International Professional Business Women (AIPBW) named Amela Karahasanović one of Norway's ten most influential female immigrants. Karahasanović, originally from Bosnia Herzegovina, is a post-doctoral research fellow at Simula's SE Department and an associate professor at UiO's Department of Informatics.

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Long-term funding

In the light of the evaluation, the Research Council of Norway decided to extend its contract with Simula until 2010. The Simula Centre's Board has also asked the administration to work towards a 10-year contract with the Research Council, given that a new five-year contract could be perceived as short-term and engender a risk of researchers leaving as 2010 approaches.

The Evaluation Committee proposed that Simula secure a rolling contract based on evaluations every fifth year and new 10-year contracts contingent upon favourable evaluations. This was the basis for the administration's work on a new long-term research contract with the Research Council and the efforts to secure more long-term funding. The Board notes with satisfaction that the Storting's Standing Committee for Finance and Economic Affairs has given a positive signal across party lines regarding a contract up to 2015, and that this will be followed up in the central government budget for 2006. This is contingent inter alia on a new international evaluation of Simula being made by the end of 2010. If that is also favourable, the Ministry of Education and Research will agree to further extend the contract with Simula until 2015. The question of future location and organisation should be considered eventually, for example, in connection with such an evaluation.

Industrial cooperation

The discussion about Simula's involvement in industrial cooperation was clarified at the AGM in June. The State, represented by the Ministry of Education and Research, owns 80 per cent of Simula, and the Ministry's representative at the AGM made it clear that the Ministry takes a favourable view to Simula increasing its income from services rendered. The Ministry's representative also stated that more collaboration with business and industry, e.g. research cooperation with Hydro, is compatible with the social responsibility ascribed to Simula in its articles of association.

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In the form of an addendum to the minutes of the AGM, the Ministry's representative also stated that: "The company should also strive to take part in comparable binding joint projects that can contribute to innovation and revitalisation in industry and society. By the same token, the company's Board should be aware that the company represents a very important basic research environment in Norway, so that any new joint projects must be assessed in the light of this and relative to the Articles of Association, which state that the company shall engage in long-term basic research. As owner, the Ministry of Education and Research is of the opinion that it is important that the company not develop in a direction entailing that external earnings would place pressure on the company's basic research profile." The Ministry's representative also pointed out that the company has substantial public funding, so there should not be any State cross-subsidisation of assignments for other principals. The administration and the Board now feel that the principle that applies to this aspect of industrial cooperation has been clarified. In future, Simula will seek to cooperate with business and industry to develop solutions, enhance the relevance of the research, and boost the funding available for basic research. Simula's policy is to avoid short-term projects. Technology and consultancy projects should preferably be organised as independent companies or be conducted in collaboration with external partners. The Board has followed through on this by deciding that the technology-oriented development segment of the Hydro project should be organised under the company Kalkulo AS, which will be established in 2006.

Administrative conditions

In February 2005, Simula announced plans to expand its activities by augmenting the administration and adding several new researcher positions. Many applications were received. After careful consideration, three very well-qualified managers were hired. With Kristin Vinje as the new assistant director general with responsibility for administration, Kjetil Moløkken-Østvold as the new assistant director general with responsibility for research and Anita Krohn Thrane as the new managing director of Simula Innovation, Managing Director Aslak Tveito has a strong management team that is well equipped to further develop the research centre.

Simula's corporate culture

In 2005, Simula produced a special memorandum describing the corporate culture intended to distinguish the work being done there. The Centre is to attach considerable importance to actively restoring the concept of full-time researcher and reducing the administrative burdens placed on researchers. The memo also stresses that the centre focuses on directed basic research where individual researchers' freedom to pursue their own ideas is less than at the universities, but where they nonetheless have considerable freedom to take decisions about their own work within defined directions and projects. Simula's corporate culture shall otherwise be characterised by quality, honesty, credibility and efficiency; and Simula should be a place where all employees are aware that their jobs are important.

Finances

Simula's aggregate operating revenues totalled MNOK 64,1 in 2005. Project revenues increased from MNOK 10,2 in 2004 to MNOK 15,1 in 2005. The net result for the year was MNOK 1,17 which was transferred to equity capital. 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 impacts the accounts as presented.

Employees and equal opportunity

At year end, Simula had 67 full-time and 13 part-time co-workers. Of the 67, 52 were men and 15 women, while 59 were Norwegian and eight were foreign nationals. Simula takes a pro-active position on equal opportunity and one of its goals is to hire more women. The Board appreciates that two women were recruited to management during the year, and that the boards of Simula and all subsidiaries consist of at least 40 per cent women. The boards of directors of Simula Innovation AS and Kalkulo AS will have 50 per cent women. No work-related illnesses or accidents were reported during the year. Simula's activities do not pollute the outdoor environment.

Conclusion

The Board of Directors considers that the important clarifications and other initiatives implemented during the year constitute a very strong platform for Simula's further development. So saying, the Board of Directors thanks all employees for their dedicated efforts in the past year. The current Board also takes this opportunity to thank the directors who completed their terms at the AGM in June. Some of them had been involved in the development of Simula ever since the start in 2001.

Fornebu March 9, 2006
The Board of Directors

Berit Svendsen
Chair of the Board

Hans Christian Benestad   Dagfin Brodtkorb   Eivind Hiis Hauge

Anne-Brit Kolstø   Ingvild Myhre   Bjørn Fredrik Nielsen

Aslak Tveito
Managing Director

[Financial statement 2005]

Income statement/ Resultatregnskap

	Note	2005	2004
OPERATING REVENUES *Driftsinntekter*	6	**64 101 023**	**58 259 166**
OPERATING EXPENSES *Driftskostnader*			
Personnel costs *Lønnskostnad*	4,5	40 641 644	37 417 549
Depreciation of fixed assets *Avskrivning varige driftsmidler*	3	2 324 661	2 397 411
Other operating expenses *Annen driftskostnad*		20 201 328	20 923 004
TOTAL OPERATING EXPENSES *Sum Driftskostnader*		**63 167 634**	**60 737 964**
OPERATING PROFIT/ LOSS *Driftsresultat*		**933 389**	**-2 478 798**
FINANCIAL ITEMS *Finansposter*			
Other interest income *Annen renteinntekt*		207 392	210 535
Other financial income *Annen finansinntekt*		239 346	2 140
Other interest expenses *Annen rentekostnad*		23 374	5 513
Other financial expenses *Annen finanskostnad*		180 980	83 232
TOTAL FINANCIAL ITEMS *Sum finansposter*		**242 384**	**123 930**
NET PROFIT/ LOSS *Årsresultat*		**1 175 774**	**-2 354 868**
ALLOCATION OF PROFIT *Disponering av årsresultat*			
Transferred to equity *Overført annen egenkapital*		1 175 774	-2 354 868
TOTAL ALLOCATED *Sum disponert*		**1 175 774**	**-2 354 868**

Balance Sheet/ Balanse

	Note	2005	2004
FIXED ASSETS *Eiendeler*			
Fixed assets *Varige driftsmidler*			
Furniture, equipment, etc *Driftsløsøre, inventar o.l.*	3	3 351 190	5 350 047
Total fixed assets *Sum varige driftsmidler*		**3 351 190**	**5 350 047**
Financial fixed assets *Finansielle anleggsmidler*			
Investments in subsidiaries *Investeringer i datterselskap*	10	4 356 300	1 356 300
Total financial fixed assets *Sum finansielle anleggsmidler*		**4 356 300**	**1 356 300**
TOTAL FIXED ASSETS *Sum anleggsmidler*		**7 707 490**	**6 706 347**
CURRENT ASSETS *Omløpsmidler*			
Receivables *Fordringer*			
Customer receivables *Kundefordringer*		1 426 504	573 608
Other receivables *Andre fordringer*		2 630 078	4 230 955
Total receivables *Sum fordringer*		**4 056 583**	**4 804 563**
Bank deposits *Bankinnskudd*		**3 261 919**	**3 080 848**
TOTAL CURRENT ASSETS *Sum omløpsmidler*		**7 318 502**	**7 885 411**
TOTAL ASSETS *Sum eiendeler*		**15 025 992**	**14 591 757**

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[Financial statement 2005]

Balance Sheet/Balanse

	Note	2005	2004
EQUITY AND LIABILITIES *Egenkapital og gjeld*			
EQUITY *Egenkapital*			
Payd-in capital *Innskutt egenkapital*			
Share capital *Selskapskapital*	7,8	1 500 000	1 500 000
Total paid-in capital *Sum innskutt egenkapital*		**1 500 000**	**1 500 000**
Earned equity *Opptjent egenkapital*			
Other equity *Annen egenkapital*	8	3 484 909	2 309 135
Total earned equity *Sum opptjent egenkapital*		**3 484 909**	**2 309 135**
TOTAL EQUITY *Sum egenkapital*		**4 984 909**	**3 809 135**
LIABILITIES *Gjeld*			
Short-term liabilities *Kortsiktig gjeld*			
Liabilities to credit institutions *Gjeld til kredittinstitusjoner*		397 646	136 816
Accounts payable *Leverandørgjeld*		2 629 629	2 960 074
Duties payable *Skyldige offentlige avgifter*		3 575 131	3 029 054
Other short-term liabilities *Annen kortsiktig gjeld*		3 438 677	4 656 677
Total short-term liabilities *Sum kortsiktig gjeld*		**10 041 083**	**10 782 622**
TOTAL LIABILITIES *Sum gjeld*		**10 041 083**	**10 782 622**
TOTAL EQUITY AND LIABILITIES *Sum egenkapital og gjeld*		**15 025 992**	**14 591 757**

Note 1 – Accounting principles

The financial statements have been prepared pursuant to the regulations in the Norwegian Accounting Act of 1998 and Norwegian accounting standards.

Main rule for the valuation and classification of assets and liabilities
Assets intended for permanent ownership or use are classified as 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 acquisition cost or fair value, whichever is lower. Short-term liabilities are recognised at their nominal values on the date the debts were incurred. Short-term liabilities are not revalued to fair values in response to interest rate fluctuations.

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

Foreign currency
Assets and liabilities in foreign currencies are translated to Norwegian kroner at the mid-rates quoted by Norges Bank on 31 December.

Tangible fixed assets
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 collectability 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.

Note 3 - Fixed assets

	Computer equipment	Furniture, equipment, etc.	Total
Acquisition cost at 1 January	4 180 775	5 234 561	9 415 336
Acquisitions 2005	290 388	95 647	386 035
Disposals 2005	60 326	-	60 326
Acquisition cost at 31 December	4 410 837	5 330 135	9 740 972
Acc. depreciation	3 574 455	2 915 327	6 489 782
Book value 31 December	936 382	2 414 808	3 351 190
Ordinary depreciation	1 288 266	1 036 395	2 324 661
Depreciation in %	20 - 50%	20 - 33%	

[Notes]

Note 4 – Pension expenses

The company has a pension plan that covers a total of 62 people. 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 financed by building up pension funds under the auspices of the Norwegian Public Service Pension Fund.

Note 5 – Payroll expenses, number of employees, remuneration, etc.

Payroll expenses	2005	2004
Salaries	31 396 325	29 665 178
National insurance contributions	4 539 115	4 435 116
Pension expenses	2 714 502	2 036 615
Other benefits	1 991 702	1 280 640
Total	**40 641 644**	**37 417 549**
Average man-years of labour	63	58

Salaries and benefits to top management	Managing director
Salaries	960 218
Pension contributions	67 170
Other benefits	88 941

Board of Directors

The Board of Directors was paid total fees of NOK 174 000.

Auditor

The auditor was paid NOK 38 700, and NOK 21 600 in fees for other services.

Note 6 – Operating income

The company's operating income was as follows:

Research funding	NOK	49 000 000
Subsidies from the RCN and the EU	NOK	10 561 474
Services for the subsidiary	NOK	3 571 878
Remuneration for research fellows	NOK	821 398
Other income	NOK	146 273
	NOK	64 101 023

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

	Share capital	Other equity	Total equity
Equity at 1 Jan	1 500 000	2 309 135	3 809 135
Profit/loss for the year	-	1 175 774	1 175 774
Equity at 31 December	1 500 000	3 484 909	4 984 909

Note 9 - Bank deposits

The company had locked-in bank deposits of NOK 1 446 876 in connection with the lease and NOK 1 791 265 in restricted deposits relating to withholding taxes.

Note 10 – Shares
The company owns all the shares in the subsidiary Simula Innovation AS. The subsidiary earned a loss of - NOK 2 820 099. At 31 December 2005, the company's equity totalled NOK 1 376 084.
With reference to §3-2 of the Accounting Act, no consolidated accounts have been drawn up.

In connection with a project headed by the subsidiary, the company provided services aggregating NOK 3 571 878. The subsidiary was also charged for a share of the rent and infrastructure amounting to NOK 778 993.

At 31 December 2005, claims on the subsidiary totalled NOK 1 157 418.95.

Note 1 – Regnskapsprinsipper
Årsregnskapet er satt opp i samsvar med regnskapsloven 1998. Det er utarbeidet etter norske regnskapsstandarder.

Hovedregel for vurdering og klassifisering av eiendeler og gjeld
Eiendeler bestemt til varig eie eller bruk er klassifisert som anleggsmidler. Andre eiendeler er klassifisert som omløpsmidler. Fordringer som skal tilbakebetales innen et år er uansett klassifisert som omløpsmidler. Ved klassifisering av kortsiktig og langsiktig gjeld er analoge kriterier lagt til grunn.

Anleggsmidler vurderes til anskaffelseskost, men nedskrives til virkelig verdi når verdifallet forventes ikke å være forbigående. Anleggsmidler med begrenset økonomisk levetid avskrives planmessig. Langsiktig gjeld balanseføres til nominelt mottatt beløp på etableringstidspunktet. Langsiktig gjeld oppskrives ikke til virkelig verdi som følge av renteendring.

Omløpsmidler vurderes til laveste av anskaffelseskost og virkelig verdi. Kortsiktig gjeld balanseføres til nominelt mottatt beløp på etableringstidspunktet. Kortsiktig gjeld oppskrives ikke til virkelig verdi som følge av renteendring.

Enkelte poster er vurdert etter andre regler, og redegjøres for nedenfor.

Valuta
Pengeposter i utenlandsk valuta omregnes til balansedagens kurs.

Varige driftsmidler
Varige driftsmidler avskrives over forventet økonomisk levetid. Avskrivningene er som hovedregel fordelt lineært over antatt økonomisk levetid.

Fordringer
Kundefordringer og andre fordringer oppføres til pålydende etter fradrag for avsetning til forventet tap. Avsetning til tap gjøres på grunnlag av en individuell vurdering av de enkelte fordringene. I tillegg gjøres det for øvrige kundefordringer, om nødvendig, en uspesifisert avsetning for å dekke antatt tap.

Pensjoner
Ved regnskapsføring av pensjon er lineær opptjeningsprofil og forventet sluttlønn som opptjeningsgrunnlag lagt til grunn.

Skatter
Selskapet har ikke innarbeidet skattekostnader da virksomheten ikke er vurdert å være skattepliktig.

Note 2 – Finansiell markedsrisiko
Selskapet er i liten grad eksponert for finansiell markedsrisiko.

Note 3 - Anleggsmidler

	Datautstyr	Inventar, utstyr m.v.	Sum
Anskaffelseskost 1/1	4.180.775	5.234.561	9.415.336
Anskaffet 2005	290.388	95.647	386.035
Avgang 2005	60.326	-	60.326
Anskaffelseskost 31/12	4.410.837	5.330.135	9.740.972
Akk.avskrivninger	3.574.455	2.915.327	6.489.782
Bokf˜ rt verdi 31/12	936.382	2.414.808	3.351.190
Ordinære avskrivninger	1.288.266	1.036.395	2.324.661
Avskrivning i %	20 - 50%	20 - 33%	

Note 4 – Pensjonskostnader
Selskapet har pensjonsordning som omfatter i alt 62 personer. Ordningen gir rett til definerte fremtidige ytelser. Disse er i hovedsak avhengig av antall opptjeningsår, lønnsnivå ved oppnådd pensjonsalder og størrelsen på ytelsene fra folketrygden. Den kollektive pensjonsavtalen er finansiert ved fondsoppbygning organisert i Statens pensjonskasse.

Note 5 – Lønnskostnader, antall ansatte, godtgjørelser m.m.

Lønnskostnader	2005	2004
Lønninger	31.396.325	29.665.178
Folketrygdavgift	4.539.115	4.435.116
Pensjonskostnader	2.714.502	2.036.615
Andre ytelser	1.991.702	1.280.640
Sum	**40.641.644**	**37.417.549**
Gjennomsnittlig antall årsverk	63	58

Ytelser til ledende personer	Daglig leder
Lønn	960.218
Kostnader til pensjonsordning	67.170
Annen godtgjørelse	88.941

Styret
Til styret er utbetalt et honorar på totalt kr. 174.000,-.

Revisor
Til revisor er utbetalt kr. 38.700,- for revisjon og kr. 21.600,- for annen bistand.

Note 6 – Driftsinntekter
Selskapets driftsinntekter fordeler seg som følger:

Tilskudd til forskning	kr.	49.000.000
Tilskudd fra NFR og EU	kr.	10.561.474
Tjenester levert datterselskapet	kr.	3.571.878
Refusjon for stipendiater	kr.	821.398
Øvrige inntekter	kr.	146.273
	kr.	64.101.023

Note 7 – Aksjekapital og eierstruktur
Selskapets aksjekapital består av 1.000 aksjer à kr. 1.500,-.

Aksjene er eiet av:
Den norske stat v/Utdannings- og forskningsdepartementet	80%
Stiftelsen Norsk Regnesentral	10%
Sinvent AS	10%

Note 8 - Egenkapital

	Aksjekapital	Annen egenkapital	Sum egenkapital
Egenkapital 1/1	1.500.000	2.309.135	3.809.135
Årets resultat	-	1.175.774	1.175.774
Egenkapital 31/12	1.500.000	3.484.909	4.984.909

Note 9 - Bankinnskudd
Av innskudd i bank er kr. 1.446.876,- bundne midler i forbindelse med inngåtte leiekontrakter og kr. 1.791.265,- er bundne midler vedrørende ansattes skattetrekksmidler.

Note 10 - Aksjer
Selskapet eier alle aksjer i datterselskapet Simula Innovation AS. Resultatet i datterselskapet ble negativt med kr. 2.820.099,-. Selskapets egenkapital pr. 31/12-05 var kr.1.376.084,-. Under henvisning til regnskapslovens § 3-2 er konsernregnskap ikke utarbeidet.

Selskapet har i forbindelse med et prosjekt ledet av datterselskapet levert tjenester for totalt kr. 3.571.878,-. I tillegg er datterselskapet belastet for andel av leie og infrastruktur for totalt kr. 778.993,-.

Fordring på datterselskap pr. 31/12-05 utgjorde kr. 1.157.418,95.
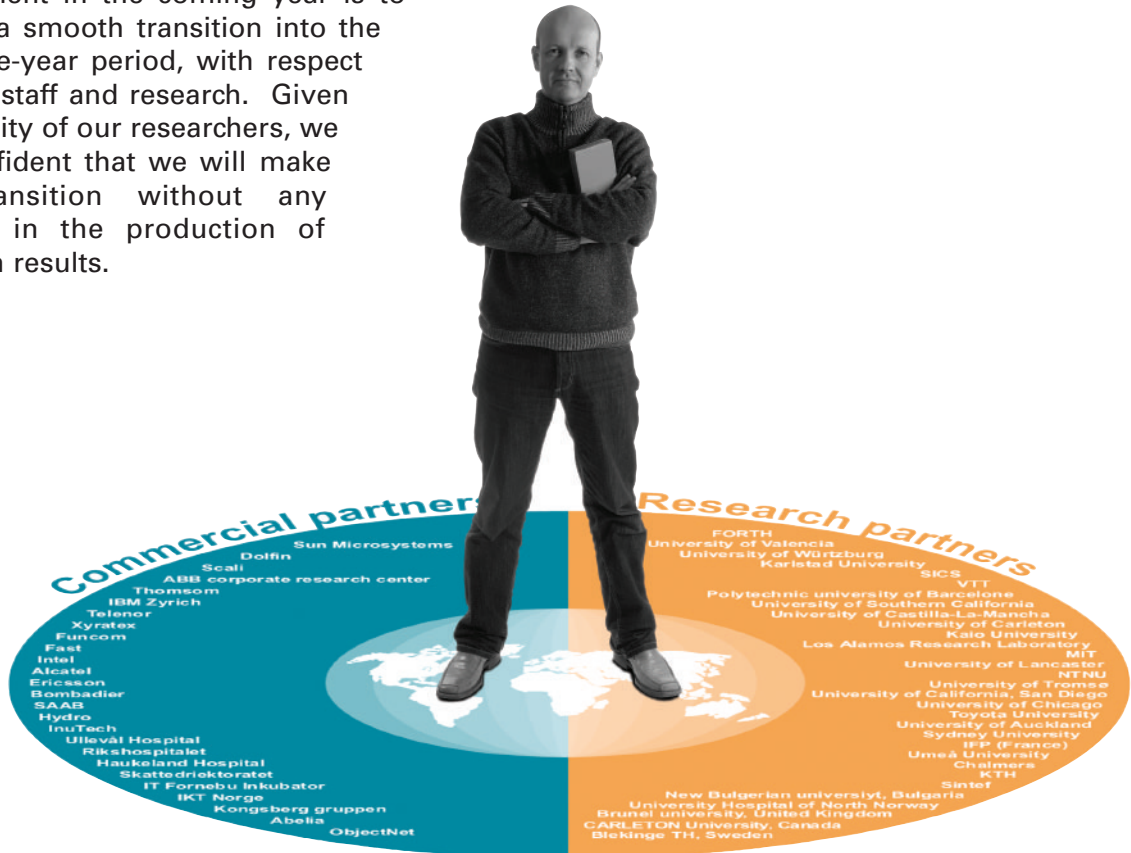
A year of change

2005 was the final year of the first five-year period at Simula. These have been years of hard and dedicated work, during which every member of the staff has shown a determination to deliver research results of top quality. At the end of such a period, it is natural for individuals to reflect on the past as well as to wonder what the future may bring. After due consideration, two of ND's senior researchers have decided that one period is sufficient, and have chosen to return to the Department of Informatics at the University of Oslo, taking one research project with them. Fortunately, the tight cooperation between Simula and the University makes us confident that cooperation will not suffer.

As some people leave, others will join and research will continue in an uninterrupted progression. In the coming year, we will begin a new and exciting research project at Simula. This project, named "Relay", will focus on resource utilization in time-dependent large-scale distributed systems. One of the main goals of the project is to develop, integrate and combine mechanisms to derive more scalable, less resource demanding, high performance large-scale distributed multimedia systems. The senior researchers in this project have a strong publication record, and we have high expectations for its further development.

The Icon project, which focuses on interconnection networks, and the Vinner project, which works on resilience in backbone and access networks, have progressed remarkably well in 2005. Icon is now firmly established as a continuous contributor to the most prestigious journals in the area, and Vinner has received considerable attention from international industry. Vinner is described in more detail in a separate article.

One of the main challenges of the Department in the coming year is to ensure a smooth transition into the next five-year period, with respect to both staff and research. Given the quality of our researchers, we are confident that we will make the transition without any decline in the production of research results.

Commercial partners

Sun Microsystems
Dolfin
Scali
ABB corporate research center
Thomsom
IBM Zyrich
Telenor
Xyratex
Funcom
Fast
Intel
Alcatel
Ericsson
Bombardier
SAAB
Hydro
InuTech
Ulleval Hospital
Rikshospitalet
Haukeland Hospital
Skattedriektoratet
IT Fornebu Inkubator
IKT Norge
Kongsberg gruppen
Abelia
ObjectNet

Research partners

FORTH
University of Valencia
University of Würtzburg
Karlstad University
SICS
VTT
Polytechnic university of Barcelone
University of Southern California
University of Castilla-La-Mancha
University of Carleton
Kalo University
Los Alamos Research Laboratory
MIT
University of Lancaster
NTNU
University of Tromse
University of California, San Diego
University of Chicago
Toyota University
University of Auckland
Sydney University
IFP (France)
Umeå University
Chalmers
KTH
Sintef
New Bulgerian universiyt, Bulgaria
University Hospital of North Norway
Brunel university, United Kingdom
CARLETON University, Canada
Blekinge TH, Sweden

Professor Olav Lysne, Research Director

[The Networks and Distributed Systems Department]

Increasing Internet Resilience

Many of us have cancelled our old analogue and ISDN telephones in favor of IP-based solutions. Experiences are largely positive, the most serious complaint being the long communication delay. The human brain is sensitive to this delay; if the time for our peer to respond is more than approximately 150 milliseconds longer than in face-to-face conversations, we believe a misunderstanding has occurred.

In the Internet, speech has to traverse the network in two directions: first to our peer and then back to us. Speech is transported as data packets that, for reasons of efficiency, contain at least 20 ms of audio data. A typical network delay in Europe is 20 ms, and for transatlantic communications 50 ms. Even in a perfect world, we are touching the boundary of what is experienced as acceptable delay. In reality, users often experience additional delay caused by traffic congestion, which causes the packets to be stored in network routers as they wait for their turn to be transmitted over the lines. Even worse, a router failure in the central parts of the network can interrupt hundreds of thousands of telephone conversations for seconds or longer.

The cornerstones of the present Internet architecture were laid more than 30 years ago, with the exchange of static data between trustworthy parties in mind. Today, we witness the convergence of audio, video and data communications on the Internet, as well as its ever-increasing importance in all spheres of life. For these new services, the Internet has been slow to both planned and unexpected changes in the network infrastructure and traffic patterns.

Resilience is the ability of a system to adapt to changes that restrict its availability and performance. The fundamental changes in the requirements on the Internet infrastructure have resulted in network resilience becoming a research topic of high importance, on both the theoretical and applied levels.

In 2005, the Networks and Distributed Systems Department at the Simula Research Laboratory started a new project, named Vertical and Horizontal Internet Resilience (VINNER). The main project objective is to understand and improve the resilience mechanisms of the Internet. Network resilience covers factors that pertain to network control, transport and management. VINNER aims to address all of these aspects, in different wired and wireless network technologies, and across protocol layers.

VINNER has developed a novel method for network protection in the Internet, called "Resilient Routing Configurations" (RRC). RRC is based on the intelligent creation of alternative routing data, which can be used to bypass failed or congested portions of the network as soon as the problem is noticed. RRC has performed very well in laboratory tests and has drawn considerable attention from the research community. Furthermore, with strong support from Simula Innovation AS, our solution is drawing significant attention from the industry, including a world-leading manufacturer of communication equipment.

Increased application focus

The Scientific Computing Department studies development of reliable and efficient software for solving partial differential equations (PDEs). The work in the department is a blend of generic methods and tools and activities geared towards specific applications. In 2005 the focus on applications has been increased, as the project portfolio was increased from two to four projects, adding two projects focusing on very specific scientific applications.

One of these, named Inverse problems, investigates the possibility of using ECG recordings, mathematical modelling and computers to diagnose heart infarctions. Starting out as part of the Cardiac Computations project, this activity showed great promise and was organized as a separate project from January 2005. Good progress on the activity has been made through the year, and the project team has started on the major task of applying the methodology to real-world cases, employing geometrical data and ECG recordings from heart patients in hospitals.

In spite of the organization of the inverse problems activity as a separate project, the Cardiac Computations project saw an increase in collaborative, application-oriented research projects in 2005. The collaboration with Ullevål University Hospital, which is focused on studying cellular mechanisms during heart failure, showed good results and an increase in activity through the year. Collaboration with Haukeland University Hospital in Bergen is also emerging, with the aim of studying atrial arrhythmias and their treatment by radiofrequency ablation.

**Dr. Joakim Sundnes,
Research Director**

One of the roles of the Software for PDEs project is to be a supplier of methods and software tools for the other projects. For instance, in 2005, members of this group have been strongly involved in developing a new simulator for the electrical activity in the heart. Simultaneously, the project continues its focus on generic numerical methods and software tools for PDEs, and recently joined as a partner in the exciting FEniCS project[1]. FEniCS is a collaborative effort to automate computational mathematical modelling, a goal that fits in well with the Department's other activities. Other partners in FEniCS include Chalmers University of Technology, the Royal Institute of Technology (KTH), the University of Chicago and Argonne National Laboratory.

The focus of this year's report is on the second new project of the department, the Computational Geosciences project. This project was initiated in 2004 and involves strong industrial cooperation with Hydro.

1 See www.fenics.org

Computational Geosciences project

Simula is involved in several research activities within the field of computational geosciences, working closely with its industrial partner, Hydro ASA (www.hydro.com). Some of these activities focus on the numerical simulation of geological processes, while others concentrate on new ways of representing and visualizing large-scale geological datasets.

Based on geoscientists' need to access, and identify the relations between, large datasets on different scales, Simula is currently conducting research on data structures and advanced visualization techniques suited for interactive presentation that allows seamless transition between datasets. The aim is to provide the technology needed for multi-layer, multi-resolution data browsing that can support industrial decision-making.
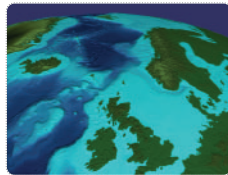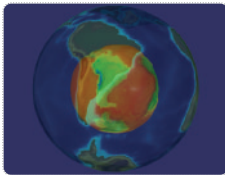
With respect to the simulation of processes, we are addressing the complicated interplay between heat transfer, single-phase fluid flow and deformation that take place in sedimentary basins. Such basins are often associated with magmatic activity, where intrusions with high temperature can change the basin properties significantly and influence the maturation and migration of hydrocarbons.

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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 object-oriented analysis and design technologies 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 software engineering research. The research problem to be addressed is how to develop methods, infrastructures and apparatus that will significantly improve the conducting of experiments and other empirical studies in software engineering.

**Professor Dag Sjøberg,
Research Director**

Why Industry Research Collaborations Matter!

The SE Department is a pioneer in carrying out realistic, controlled SE experiments by having professional software developers perform development tasks in a controlled, but still industrially relevant, environment. Conducting controlled experiments is the main scientific method for revealing relationships between software development deliverables, practices and technologies, and as such can offer important new insights to the software industry.

In addition to experiments in controlled settings, it is also of paramount importance to conduct case studies on actual development projects to better understand the practical requirements for the successful application of new technologies and to assess the actual costs and benefits of deploying them in the field. In other words, we need to determine how technologies with high potential scale up to complex but typical settings and project conditions. Conducting such case studies is time-consuming and has substantial costs for both the research and industrial partners. However, we believe that these drawbacks are outweighed by the highly significant advantages for both industry and research:

- Case study research can have a positive impact on the cost-effectiveness of the processes, methods, techniques and tools used in a specific company, thus increasing its competitiveness.
- From the research perspective, case studies provide invaluable insights into the prerequisites for the successful deployment and tailoring of new technologies.

Thus, controlled experiments and case studies together constitute a comprehensive body of evidence by providing complementary information on the advantages and challenges of new software technologies. In the following, the importance of industry collaborations and case studies is illustrated by our current research collaborations with ABB and Telenor.

The ABB project

Model-driven development with the Unified Modeling Language (UML) has become a de facto standard in industry, and there are many claims for the positive effects of modelling object-oriented systems using methods based on UML. However, there are still few reported experiences of UML-based development in large, industrial projects. Consequently, a case study was initiated in collaboration with ABB, a global company with 120 000 employees. The results of our study showed several improvements due to the introduction of UML in ABB; in particular, with respect to traceability from requirements to code, design quality, testability, communication and documentation. However, the results also showed that the positive effects of UML-based development were reduced due to such factors as 1) legacy code that it was not feasible to reverse engineer into UML, 2) training that was not particularly well adapted to this project, and 3) modelling tools that had insufficient functionality. The results have been used to improve ABB's development methodology.

The Telenor project

Telenor is among the largest mobile operators in the world, with over 67 million subscribers. The OOAD project has an on-going collaboration with a large development project in Telenor. Researchers in the SE Department work with the project to improve their release management and quality assurance processes, which in turn is expected to result in a better product with fewer faults in the production system. Such faults can result in expensive failures and must be avoided to the greatest possible extent. On the basis of historical project data and measures of structural properties of the software, we have developed fault prediction models that can help the developers to discover a large portion of the faults after changes have been performed and before the system becomes operational.

The industry is our lab!

Through industry-research collaboration, 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.

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[Doctorates and Masters Degrees 2005]

Doctorates (Dr.Scient)	Supervisors	Thesis
Davik, Bjørn Fredrik	Gjessing	Fairness Aspects of Buffer-Insertion Rings in General and Resilient Packet Rings in Particular
Eide, Viktor S. Wold	Eliassen/ Lysne	Exploiting Event-Based Communication for Real-Time Distributed and Parallel Video Content Analysis
Halvorsen, Frode	Langtangen/ Aukrust	Mathematical Modeling of Shape Variations on Extruded Aluminium Sections
Ingebrigtsen, Linda	Grøttum/Tveito	On the local error in operator splitting schemes applied to diffusion-convection-reaction equations
Vokác, Marek	Sjøberg/Arisholm	On the practical use of design patterns

Masters (Cand.Scient)	Supervisors	Thesis
Angell, Lise	Cai/ Langtangen	High Quality Visualization with RenderMan
Amundsen, Ole Morten	Langtangen/Huseby	Stochastic Event Simulation of Oil Recovery Projects
Anh, Nguyen Bao	Mardal/Torkildsen/ Wang	Visualisering av sammenhengen mellom krefter på et skrog og skrogets bevegelse i sjø
Bommen, Håkon Torjus	Eide/Eliassen	Compression Methods for Video Streaming over an Event Notification Service
Bredesen, Rolv E.	Hakim / Langtangen	PvPython: Pythonizing Two Weather Models
Engvik, Tore	Eliassen	Separating the QoS Concern in QuA using Aspect Oriented Programming
Enerstvedt, Knut-Erik	Langtangen	Finite Volume Methods in Diffpack
Hinkel, Unni Nyhamar	Karahasanović/ Sjøberg	Evaluating Methods for Data Collection during Software Engineering Experiments
Jahr, Arthur	Krogstie /Sjøberg	Development and maintenance of IT-systems in Norwegian organizations
Jensen, Frank Norman	Eide/Eliassen	Adaptive Video Streaming over an Event Notification Service
Johansen, Morten Lied	Langtangen	Building a Better Make - Implementing PyMek

[Doctorates and Masters Degrees 2005]

Levine, Annette Kristin	Karahasanović/ Sjøberg	Study of Comprehension Strategies and Difficulties by Novice Programmers Performing Maintenance Tasks on Object-Oriented Systems
Ligner, Erica Madeleine	Mardal/ Staff	Solving the Equations steady Stokes using the Parareal Algorithm
Magistad, Astrid Elise	Eliassen	Monitoreringsrammerverk for QuA-arkitekturen
Martinsen, Jan Kasper	Cai/ Bouhmala	A study of different matching heuristics
Mork, Eivind	Eliassen/Staehli	Building real-time audio applications with component technology
Nystad, Øyvind	Langtangen	High-Level Software for Solving Shallow Water Equations
Solstad, Tuva Marie	Bruaset	The Collection Engine
Stenbro, Richard Magnor	Mardal	Python- Realizer – Rapid application development with Python rewritten in C++ and Qt
Sæhlie, Kristine	Anda	Estimering av webutviklingsprosjekter-Use case poeng sammenliknet med eksperters estimater, funksjonspoeng, COCOMO ll og WEBMO
Taij, Junisilver	Thomas/ Karahasanović	Controlled Experiment to Investigate the Correlation between Keystroke Latency and Programming Performance
Tanilkan, Sinan S.	Jørgensen	Estimering i IT-prosjekter: Hvor gode er vi og hvordan kan vi bli bedre?
Thorsen, Asbjørn Reglund	Mardal	Ruby-grensesnitt til Diffpack og analyse av kompilator-opsjoner ved bruk av modifisert ACOVEA
Vassdokken, Rolf	Karahasanović	The bacground information on subjects in program comprehension studies
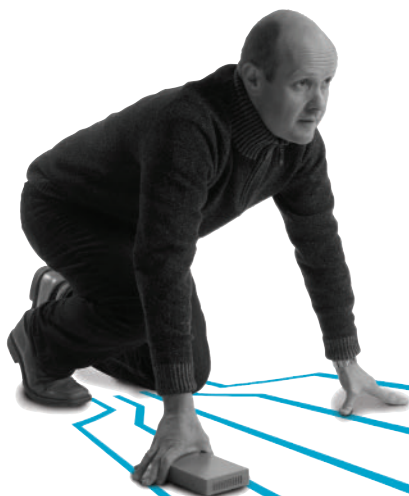
[2005 Publication list]

Books

H. P. Langtangen. *Python Scripting for Computational Science*, Springer (second edition), 2005.

Edited Books

T. Skeie and Chu-S. Yang. *Proceedings of the 2005 International Conference on Parallel Processing Workshops*, IEEE Computer Society Conference Publishing Services (ISBN: 0-7695-2381-1), 2005.

PhD Theses

B. F. Davik. *Fairness Aspects of Buffer-Insertion Rings in General and Resilient Packet Rings in Particular*, PhD thesis, Faculty of Mathematics and Natural Sciences at the University of Oslo August, 2005.

V. S. W. Eide. *Exploiting Event-Based Communication for Real-Time Distributed and Parallel Video Content Analysis, PhD thesis*, Faculty of Mathematics and Natural Sciences, University of Oslo, Norway, 2005.

L. I. Ingebrigtsen. *On the local error in operator splitting schemes applied to diffusion-convection-reaction equations*, PhD thesis, University of Oslo, 2005.

M. Vokác. *On the practical use of design patterns*, PhD thesis, University of Oslo, 2005.

Articles in International Journals

B. C. D. Anda and D. Sjøberg. Investigating the Role of Use Cases in the Construction of Class Diagrams, *Empirical Software Engineering* 10(3):285-309, 2005.

X. Cai, P. Jeberg and H. P. Langtangen. A numerical method for computing the profile of weld pool surfaces, *International Journal for Computational Methods in Engineering Science and Mechanics* 6(2):115-125, 2005.

X. Cai, H. P. Langtangen and H. Moe. On the performance of the Python programming language for serial and parallel scientific computations, *Scientific Programming* 13(1):31-56, 2005.

X. Cai, G. K. Pedersen and H. P. Langtangen. A parallel multi-subdomain strategy for solving Boussinesq water wave equations, *Advances in Water Resources* 28(3):215-233, 2005.

J. Duato, O. Lysne, R. Pang and T. M. Pinkston. A Theory for Deadlock-Free Dynamic Network Reconfiguration, *IEEE Transactions on Parallel and Distributed Systems* 16(5):412-427, 2005.

T. Dybå, B. Kitchenham and M. Jørgensen. Evidence-based Software Engineering for Practitioners, *IEEE Software* 22(1):58-65, 2005.

M. Hanslien, K. H. Karlsen and A. Tveito. A maximum principle for an explicit finite difference scheme approximating the Hodgkin-Huxley model, *BIT* 45(4):725 - 741, 2005.

Ø. Hjelle and M. Dæhlen. Multilevel Least Squares Approximation of Scattered Data over Binary Triangulations, *Computing and Visualization in Science* 8(2):81-92, 2005.

M. Jørgensen. Practical guidelines for better support of expert judgment-based software effort estimation, *IEEE Software* 23(3):57-63, 2005.

M. Jørgensen. Evidence-Based Guidelines for Assessment of Software Development Cost Uncertainty, *IEEE Transactions on Software Engineering* 31(11):942-954, 2005.

A. Karahasanović, B. C. D. Anda, E. Arisholm, S. E. Hove, M. Jørgensen, D. Sjøberg and R. Welland. Collecting Feedback during Soft-ware Engineering Experiments, *Empirical Software Engineering* 10(2):113-147, 2005.

S. Linge, G. T. Lines and J. Sundnes. Solving the heart mechanics equations with Newton and quasi Newton methods - a comparison, *Computer Methods in Biomechanics and Biomedical Engineering* 8(1):1—8, 2005.

O. Lysne, T. M. Pinkston and J. Duato. A Methodology for Developing Deadlock-Free Dynamic Network Reconfiguration Processes, *IEEE Transactions on Parallel and Distributed Systems* 16(5):428-443, 2005.

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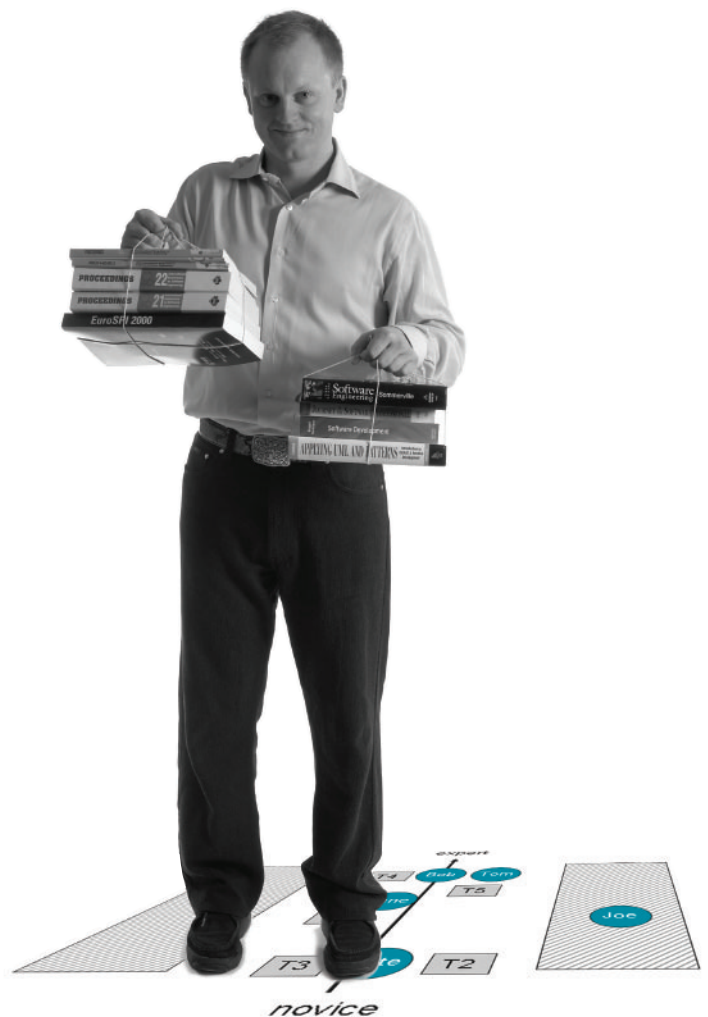
[Annual Report 2005]

[**simula** . innovation]

[Simula Innovation AS]

Transforming research into commercial value

"Innovation is the process that transforms ideas into commercial value."

Simula Innovation AS (SI) was established as a fully owned subsidiary of Simula Research Laboratory AS (SRL) in May 2004 to safeguard the commercial aspects of SRL research activities.

According to the Articles of Association, SI's object is to supply commercial services and engage in innovation efforts based on research done by Simula Research Laboratory AS. Further, SI shall take decisions regarding the acquisition, ownership and management of stakes in companies, as well as manage SRL's other commercial interests.

SI is organized into three areas: idea generation, idea management and idea funding. The business idea is to convert research results and ideas into commercial value. SI works closely with researchers and managers at Simula and has built up a comprehensive network of contacts with the industrial and business communities, investors and key resource people. The combination of proximity to research and market-oriented network development constitutes an important key to success. The network of business and industrial communities are the "innovation catalysts".

The transformation of research ideas into commercial value is built on SI's operative commercialization model: Simula Innovation Technology2Market©. This process is intended to result in the establishment of new companies, patents and licenses, strategic commercial collaboration, external funding of fundamental research projects or profiling outside the world of purely academic publication.

Anita Krohn Thrane
Managing Director

Simula Innovation Technology2Market©
SI's goal is to create national and international demand for ideas and research collaboration with Simula, and to demonstrate that the national commitment to the Simula model is innovative and creates value.

Simula Innovation Technology 2 Market©

Results 2005
In 2005, SI performed about 1.6 man-years of labour centrally, while a considerably broader scope of work referred directly to the projects. SI's focus in 2005 was on further developing existing projects, as well as on structuring its results and rendering them visible. SI has also developed and implemented a new model for research-based innovation and built up networks in business and industry, in addition to initiating a donor programme aimed at raising funding for research based on the gift funding scheme administered by the Research Council of Norway. SI hired a new general manager as of 1 September 2005.

In 2005, SI had a portfolio of eight projects, including four companies, that were in different phases of the commercialisation process. The portfolio includes a cooperation contract under which Hydro ASA is fully financing a new Simula research group in computational geoscience. This research aims at a long-term strategic goal for Hydro, while giving SI the right to participate in the commercialisation of partial results. The Networks and Distributed Systems department at Simula has also achieved ground-breaking results in the configuration of robust networks (resilient routing), which is now in the process of being patented. SI is in dialogue with a major international player as regards the commercial exploitation of the results, which could conceivably lead to tremendous savings in the development and maintenance of the Internet, among other things. One of the most comprehensive research projects at Simula is related to the calculation of cardio-electrical activity. It is now possible to envisage developing software that could automatically diagnose heart problems based on EKG readings. However, considerable research will be required before these results can be transformed into commercial products. Efforts are being made to secure funding for this research through a donor strategy that allows SI to raise private capital under a gift funding scheme.

In May 2004, a group of scientists introduced SI to a prototype web tool designed for project management. The general idea was analogous to 'post-it notes' combined with 'symphonic' interaction among project participants. During the autumn of 2004, the project gained momentum, receiving total funding of approx. MNOK 1.2 from SI, Birkeland Innovasjon AS (the Technology Transfer Office at the University of Oslo) and Innovation Norway (IN). In addition to technical development, the project's focus was on the development of the business concept in 2005. This was accomplished with the assistance of a number of resource persons from business and industry. The concept underwent major changes in the process. From being one of many project management tools for enterprises, a 'blue ocean' concept was defined that has a huge scaling potential. As regards its current status, Symphonical AS was established in December 2005 and, as of January 2006, is on the threshold of its first share issue directed at private investors. The ambition is to launch the product in the latter half of 2006.

Symphonical AS was established in December 2005 and, as of January 2006, is on the threshold of its first share issue. The product is an Internet-based system analogous to virtual 'post-it notes' that can prove useful to everyone that needs easy-to-use Internet-based management routines.
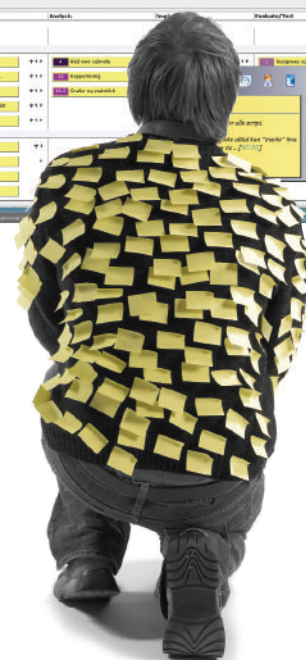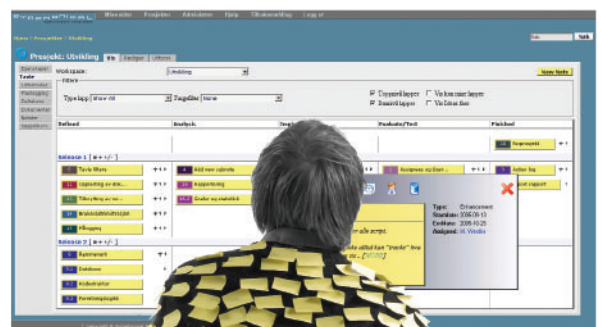
[Annual report]

Simula Innovation AS is a wholly-owned subsidiary of Simula Research Laboratory AS. The company's object is to supply commercial services and engage in innovation efforts based on research done by the Simula Research Laboratory. The company's offices are located at Fornebu.

During the 2005 operating year, Simula Innovation has focused on further developing existing projects, restructuring, rendering results visible, and value creation. The company has developed and implemented a new tool for research-based innovation, built up networks in business and industry, and instituted a donor programme based on the gift funding scheme proposed in the White Paper on Research.

The company reported sales of NOK 7 114 325 and an operating loss of NOK - 2 815 828 in 2005. Equity totalled NOK 1 376 084 at 31 December 2005. The Simula Research Laboratory has pledged the company an operating subsidy of NOK 2 300 000 for 2006.

Simula Innovation hired a new managing director on 1 September 2005. At year end, the company had three employees. The Board is of the opinion that the company has a good working environment and absence due to illness was low in 2005. Simula Innovation aspires to be an equal opportunity employer.

The company does not engage in activities that pollute the outdoor environment, and has therefore not implemented initiatives in this area.

It is confirmed that Simula Innovation fulfils the assumptions for being a going concern. The Board of Directors is not aware of any factors of significance that would affect the company's position that did not appear on the annotated income statement and balance sheet. Nor have any incidents come to light after the close of the fiscal year that would, in the Board's opinion, have a significant impact on an assessment of the company.

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Snarøya, 31 Dec. 2005/13 March 2006
The Board of Directors of Simula Innovation AS

Ottar Hovind
Chair of the Board

Martha Kold Bakkevig

Per Kristian Jacobsen

Bjørn Fredrik Nielsen

Anita Krohn Thrane
Managing Director

Income Statement Resultatregnskap

	Note	2005	2004
OPERATING REVENUES *Driftsinntekter*			
Sales revenues *Salgsinntekter*		7 114 325	2 122 562
TOTAL OPERATING REVENUES *Sum driftsinntekter*		**7 114 325**	**2 122 562**
OPERATING EXPENSES *Driftskostnader*			
Personnel costs *Lønnskostnad*	2,3	3 326 949	906 673
Depreciation of fixed assets *Avskrivning varige driftsmidler*		3 041	0
Other operating expenses *Annen driftskostnad*		6 600 164	1 370 048
TOTAL OPERATING EXPENSES *Sum driftskostnader*		**9 930 153**	**2 276 721**
OPERATING PROFIT /LOSS *Driftsresultat*		**-2 815 828**	**-154 159**
FINANCIAL ITEMS *Finansposter*			
Other interest income *Annen renteinntekt*		2 352	100
Other interest expenses *Annen rentekostnad*		6 622	59
TOTAL FINANCIAL ITEMS *Sum finansposter*		**-4 270**	**41**
NET PROFIT/LOSS *Årsresultat*		**-2 820 099**	**-154 118**
ALLOCATION OF PROFIT *Disponering av årsresultat*			
Transferred to uncovered losses *Overført til udekket tap*		-2 820 099	-154 118
TOTAL ALLOCATED *Sum disponert*		**-2 820 099**	**-154 118**

[Financial statement 2005]

Balance Sheet/ Balanse

	Note	2005	2004
ASSETS *Eiendeler*			
FIXED ASSETS *Anleggsmidler*			
Furniture, equipment, etc *Driftsløsøre, inventar o.l.*		18 000	0
Total fixed assets *Sum varige driftsmidler*		**18 000**	**0**
Financial fixed assets *Finansielle anleggsmidler*			
Investments in shares *Investeringer i aksjer*	4	261 818	240 548
Total financial fixed assets *Sum finansielle anleggsmidler*		**261 818**	**240 548**
TOTAL FIXED ASSETS *Sum anleggsmidler*		**279 818**	**240 548**
CURRENT ASSETS *Omløpsmidler*			
Receivables *Fordringer*			
Customer receivables *Kundefordringer*		1 192 869	1 465 878
Other receivables *Andre fordringer*		911 215	124 795
Total receivables *Sum fordringer*		**2 104 083**	**1 590 673**
Bank deposits *Bankinnskudd*	7	**1 887 944**	**538 492**
TOTAL CURRENT ASSETS *Sum omløpsmidler*		**3 992 027**	**2 129 165**
TOTAL ASSETS *Sum eiendeler*		**4 271 845**	**2 369 712**

Balance Sheet/ Balanse

	Note	2005	2004
EQUITY AND LIABILITIES *Egenkapital og gjeld*			
EQUITY *Egenkapital*			
Paid-in equity *Innskutt egenkapital*			
Share capital *Selskapskapital*	5,6	400 000	200 000
Share premium reserve *Overkursfond*	6	3 950 300	1 150 300
Total paid-in equity *Sum innskutt egenkapital*		**4 350 300**	**1 350 300**
Earned equity *Opptjent egenkapital*			
Other equity *Annen egenkapital*	6	-2 974 216	-154 118
Total earned equity *Sum opptjent egenkapital*		**-2 974 216**	**-154 118**
TOTAL EQUITY *Sum egenkapital*		**1 376 084**	**1 196 182**
LIABILITIES *Gjeld*			
Short-term liabilities *Kortsiktig gjeld*			
Accounts payable *Leverandørgjeld*		1 492 669	460 035
Duties payable *Skyldige offentlige avgifter*		894 230	237 981
Other short-term liabilities *Annen kortsiktig gjeld*		508 863	475 514
Total short-term liabilities *Sum kortsiktig gjeld*		**2 895 761**	**1 173 530**
TOTAL LIABILITIES *Sum gjeld*		**2 895 761**	**1 173 530**
TOTAL EQUITY AND LIABILITIES *Sum egenkapital og gjeld*		**4 271 845**	**2 369 712**

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[simula . innovation]

[Notes]

Note 1 – Accounting principles
The annual accounts have been prepared in accordance with the Norwegian Accounting Act of 1998 and generally accepted accounting principles for small businesses.
The company was founded on 4 May 2004.

Note 2 – Payroll expenses, number of employees, benefits, etc.

Payroll expenses	2005	2004
Salaries	2 730 253	755 092
National insurance contributions	400 413	113 446
Pension expenses	189 319	34 045
Other benefits	6 964	4 090
Total	**3 326 949**	**906 673**

Average number of employees	3	3

Benefits to top management	Managing Director
Salary	791 000
Pension plan expenses	73 721
Other remuneration	35 873

The Board of Directors
The Board of Directors was paid total fees of NOK 110 000.

Auditor
The auditor was paid NOK 9 500 for auditing and NOK 11 800 in fees for other services.

Note 3 - Pension expenses
The company's pension plan covers three employees. The scheme is covered through membership in the Norwegian Public Service Pension Fund.

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 4 – Shares

	Total	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
			261 818

Note 5 – Share capital and ownership structure
The company's share capital consists of 400 shares with a nominal value of NOK 1 000 per share.
The company is wholly-owned by Simula Research Laboratory AS.

Note 6 - Equity

	Share capital	Share premium reserve	Other equity	Total equity
Equity at 1 January	200 000	1 150 300	- 154 117	1 196 183
Capital increase	200 000	2 800 000	-	3 000 000
Net profit/loss for the year	-	-	-2 820 099	-2 820 099
Equity at 31 December	400 000	3 950 300	-2 974 216	1 376 084

Note 7 - Bank deposits
The company has NOK 221 385 in restricted bank deposits relating to employees' withholding tax.

Note 8 - Fixed assets

	Fixed assets
Acquisitions 2005	21 040
Accumulated depreciation	3 040
Balance sheet value at 31 December	18 000
Depreciation for the year	3 040

Note 9 – Transactions with the parent company
The company purchased services valued at NOK 3 571 878 from the parent company in connection with a project.
Moreover, the subsidiary paid NOK 778 993 in rent for premises and infrastructure.
Debt to the parent company aggregated NOK 1 157 418.95 at 31 December 2005.

Note 10 – Tax
The company carried forward a loss of NOK 3 067 673. The deferred tax asset was not incorporated into the balance sheet.

[Noter til regnskapet]

Note 1 – Regnskapsprinsipper
Årsregnskapet er satt opp i samsvar med regnskapsloven og god regnskapsskikk for små foretak.
Selskapet ble stiftet 4. mai 2004.

Note 2 – Lønnskostnader, antall ansatte, godtgjørelser m.m.

Lønnskostnader	2005	2004
Lønninger	2.730.253	755.092
Folketrygdavgift	400.413	113.446
Pensjonskostnader	189.319	34.045
Andre ytelser	6.964	4.090
Sum	**3.326.949**	**906.673**
Gjennomsnittlig antall ansatte	3	3

Ytelser til ledende personer	Daglig leder
Lønn	791.000
Kostnader til pensjonsordning	73.721
Annen godtgjørelse	35.873

Styret
Honorar til styret er utbetalt med kr. 110.000,-.

Revisor
Honorar til revisor er utbetalt med kr. 9.500,- for revisjon og kr. 11.800,- for andre tjenester.

Note 3 – Pensjonskostnader
Selskapet har pensjonsordning som dekker tre ansatte. Ordningen er dekket gjennom medlemskap i Statens Pensjonskasse.

Ordningen gir rett til definerte fremtidige ytelser. Disse er i hovedsak avhengig av antall opptjeningsår, lønnsnivå ved oppnådd pensjonsalder og størrelsen på ytelsene fra folketrygden. Den kollektive pensjonsavtalen er finansiert ved fondsoppbygning organisert i Statens pensjonskasse.

Note 4 – Aksjer

	Antall	Pålydende pr. aksje	Bokført verdi
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
			261.818

Note 5 – Aksjekapital og eierstruktur
Selskapets aksjekapital består av 400 aksjer à kr. 1.000,-.
Aksjene er i sin helhet eiet av Simula Research Laboratory AS.

Note 6 - Egenkapital

	Aksje kapital	Overkurs fond	Annen egenkapital	Sum egenkapital
Egenkapital 1/1	200.000	1.150.300	- 154.117	1.196.183
Kapitalutvidelse	200.000	2.800.000	-	3.000.000
Årets resultat	-	-	-2 .820.099	-2.820.099
Egenkapital 31/12	400.000	3.950.300	-2.974.216	1.376.084

Note 7 - Bankinnskudd
Av innskudd i bank er kr. 221.385,- bundne midler vedrørende ansattes skattetrekksmidler.

Note 8 - Driftsmidler

	Driftsmidler
Anskaffet 2005	21.040
Akkumulerte avskrivninger	3.040
Balanseført verdi pr. 31/12	18.000
Årets avskrivninger	3.040

Note 9 – Transaksjoner med morselskap
Selskapet har kjøpt tjenester fra morselskapet i forbindelse med et prosjekt for kr. 3.571.878,-.
I tillegg er det betalt kr. 778.993,- for leie av lokaler og infrastruktur.
Gjeld til morselskapet pr. 31/12-05 utgjorde kr. 1.157.418,95.

Note 10 – Skatt
Selskapet har et fremførbart underskudd på kr. 3.067.673,-. Utsatt skattefordel
er ikke innarbeidet i balansen.

Simula Research Laboratory conducts basic research in selected areas within information and communication technology. The main objectives of Simula are to conduct high quality research, educate graduate students and support the establishment of business based on the research it conducts. All research projects are designed with the potential for application.