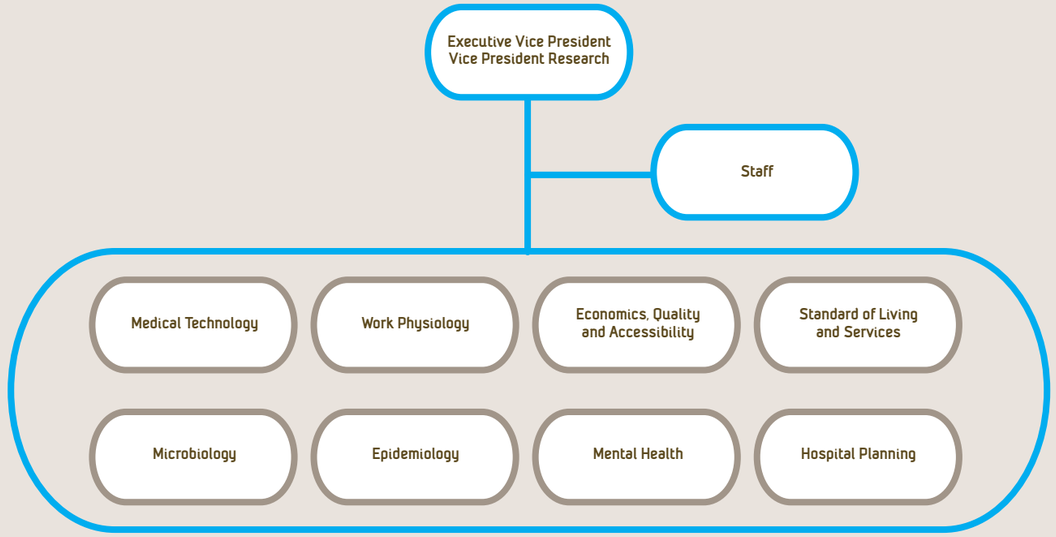
SINTEF Health Research

Annual Report 2006

SINTEF

SINTEF Health Research: Departments



Medical Technology
Develops new technology which offers patients more certain diagnoses and better treatment. On the basis of health sector requirements, we also help to create new industry. Our strength is our knowledge of user-oriented product development and close contact with both the health sector and industry.

Work Physiology
Develops technology and solutions which improve health, safety and performance. We contribute to innovation in the health sector and industry via multidisciplinary approaches, user-focused product development and professional project management. All of our activity is based on research, and relies on our competence in physiology, medical technology, design and product development. Our top-level expertise on the effects of heat and cold on the human body is internationally recognised.

Economics, Quality and Accessibility
We utilise research and surveys to evaluate the health services in the fields of organisation, resource utilisation, quality and the public's use of these services. The department is multidisciplinary, and can point to competence in economics, sociology and political science

Standard of Living and Services
Disability and rehabilitation are our most important fields of activity, in which user involvement is a central element. We also carry out research and development projects in Africa in this area in the form of national standard of living studies, rehabilitation projects and evaluations of other institutions' development aid projects. Another area of activity is hospital organisation and management

Microbiology
Infections of environmental origin are a significant problem for society. Our most important task is to develop knowledge and diagnostic tools for monitoring and preventing such infections.

Epidemiology
We manage and carry out large-scale patient-based research projects aimed at mapping the extent and causes of disease. We also evaluate new diagnostic and treatment measures. The department acts as a builder of bridges between different national registers of illness in various clinical environments. We also run a clinical research centre

Mental Health
This is the largest research group in Norway dedicated to mental health. Our multidisciplinary research group does research on acute psychiatry, rural psychiatric centres, local government health services and health services for drug abusers.

Hospital Planning
We offer a wide range of consulting activities in hospital planning, with special expertise in the early phase of planning activities.

http://www.sintef.com/health

This is SINTEF Health Research

With its 137 employees, SINTEF Health Research is one of the largest centres of health research in Norway. Our strength lies in our broadly based and solid understanding of health sciences and research methods, and in our ability to analyse and solve problems in an integrated manner. With this as our basis, our efforts are dedicated to improving everyone's health and quality of life.

SINTEF Health Research has four strategic areas of concentration: medical technology, health services research, preventive health care and international activity.

Medical technology
SINTEF is an international leading-edge research centre in the field of ultrasound-guided surgery. We collaborate closely in this field with the Department of Surgery at St. Olav's Hospital in Trondheim and the Faculty of Medicine at NTNU. We are heavily involved in the development of "the operating theatre of the future", where we are also concerned with the development of remote communication between the operating surgeon and external experts.

Our innovative milieu acts as a consultant and driving force for industrial development in the health sector, where we function as coordinator between research, industry and public-sector stimulation measures.

SINTEF administers the clinical evaluation of pharmaceutical products and medical technology in several Norwegian hospitals..

Health services research
For several years, SINTEF has been an important consultant to the national health services authorities. We supply research-based knowledge that ranges from analyses of health economics and the distribution and use of health services to the development and analysis of indicators of medical practice and quality, not to mention models for planning and operating health institutions.

SINTEF participates actively in national and international research and development cooperation that will make society more capable of meeting the health and care needs of a rapidly growing proportion of older people in the population. We have developed unique methods of analysing future needs for health and hospital services.

The Mental Health Upgrading Plan has increased the need for research-based knowledge that can be used as a basis for political and administrative decision-making. SINTEF is Norway's largest centre of research in this field.

We operate the secretariat of the Competence Network for Hospital Planning and help to develop and evaluate new hospital projects.

SINTEF publishes the annual SAMDATA reports, which present steering data, comparative statistics and analyses of the specialist health service in general and psychiatric health care. The reports illustrate how well our health institutions are functioning with respect to the main objectives of national health policy, and provide a basis for improvements in governance, planning, evaluation and research.

Preventive health care
SINTEF wishes to help to realise the important social benefits of preventive health care. Our contract research projects and competence building in microbiology and HPV infections have given us a central place in Norwegian research on infectious diseases. We intend to increase the utilisation of data from the Norwegian Patient Register in network-based research for clinical groups in this country, HUNT and general practice.

SINTEF participates in international research cooperation on the use of nanotechnology in the development of "SmartWear"; i.e. "intelligent" textiles and "smart" clothing. We are developing clothing that is capable of monitoring patients' physiological and medical condition, as well as work clothing for surgeons and protective suits for firemen.

International activity
SINTEF Health Research is involved in a wide range of international cooperative programmes, both through the EU's Framework Programmes and other scientific networks in Europe, the USA and Africa.

Through its long-term strategic cooperative programme with organisations for the disabled, SINTEF carries of studies of the standard of living in a number of southern African countries. These studies have provided us with important data which local authorities can use to develop measures on behalf of disabled persons in their own countries. In collaboration with national universities, SINTEF is also helping to build up local competence in the field of standards of living research. We are currently broadening our range of cooperation between SINTEF and health research groups in the region.

http://www.sintef.com/health

Tonje Hamar | Group Director | SINTEF Health Research

Better health from multidisciplinary research

Cooperation makes us stronger, so we have set ourselves the goal of winning more projects from industrial partners, and of making the best use of the multidisciplinary approach of the research that we carry out.

2006 was a demanding year for SINTEF Health Research, but it was also a year in which we managed to realise many of our long-term aims. And we managed this by working together, as can be seen, for example, by taking a glance at our list of projects.

Never before have we had so many exciting research topics which have so clearly illustrated the strength of our multidisciplinary approach. One example is our research on chronic obstructive pulmonary disease (COPD). In a few years, this disease of the lungs will be the third most important cause of death in the world. Taking three different approaches to one and the same disease, our scientists aim to find out more about this group of patients.

In 2006, we also achieved our ambition of becoming an attractive research partner for the medical technology industry, as navigation within the body became an export product. In this way, we profile our vision and operate at the limits of the possible.

SINTEF Health Research has had the responsibility for developing and leading a network dedicated to research on and evaluation of acute psychiatric treatment. This multi-centre study shows that patients who receive acute psychiatric treatment experience a distinct improvement in their health in the course of treatment.

These examples help to illustrate the breadth of our research and underline the importance of our role as an objective supplier of knowledge. In 2006, we also strengthened our position as an international research centre. We are cooperating in projects with partners in Asia, America, Africa and Europe, while we have also mobilised considerable resources vis-à-vis the EU's 7th Framework Programme.

Two of our departments; the Norwegian Patient Register and Patient Classification and Financing, left SINTEF Health Research in 2006 to become part of the Directorate for Health and Social Affairs via a transfer of activities. This was a demanding process from which we emerged stronger than ever. However, we have also had the pleasure of welcoming new members of staff, a process that brings not only growth but also new ways of thinking.

We are also very proud of our senior staff. We have several productive researchers who reached the age of retirement long ago. It is also a great privilege to be able to recruit a manager who has the experience that only a 60-year-old can possess.

Diversity and restructuring have been the hallmarks of SINTEF Health Research in 2006, and we are a robust and well-integrated research unit. In my eyes, mutual respect is the most prominent characteristic of our milieu.

SINTEF Health Research promotes research and development for the health sector, and its users' perceptions of their own positions and of the health services will continue to guide our choice of important topics for research.

http://www.sintef.com/lapsurg

Thomas Langø	Senior Scientist	Medical Technology
Ronald Mårvik	Senior Medical Officer	St. Olav's Hospital

Comrades in innovation

One of them is a doctor, the other a technologist. Between them, they have given medicine a new window to the inside of the body – and the Norwegian health-products sector a new export product.

Two experts; two disciplines. Senior Medical Officer Ronald Mårvik (58) leads the National Centre for Advanced Laparoscopic Surgery, a technique better known as "keyhole surgery". SINTEF researcher Thomas Langø (36) is a physicist, with a doctorate in medical technology.

The two have been collaborating for ten years with the support of their respective research groups at St. Olav's Hospital in Trondheim and in SINTEF/NTNU. The result is a technology which the Trondheim scientists are the first in the world to put on the market. It makes patients "transparent" on the computer screen when Dr. Mårvik and his colleagues insert their surgical instruments through small openings in the abdominal wall.

The system converts x-ray and magnetic resonance (MR) images into 3D maps that the surgeon can use to guide his scalpel. An extra keyhole that supplements the mini-camera in the abdominal cavity!

Just as in the shipping and air transport industries, the type of navigation has been developed in order to raise safety levels. The system provides information that helps to prevent the surgeon from damaging blood vessels or other organs that the camera cannot see; for example when cancer tumours are being removed.

Thanks to this, Mårvik and his colleagues can now make use of less invasive keyhole techniques in operations that would otherwise have required large open interventions. This is good both for the patient and for society, because, in comparison with open operations, keyhole surgery is much less stressful for the patient and thus requires a shorter stay in hospital and a shorter period of convalescence.

Use of the navigation system is still regarded as an experimental treatment, but a hospital in the Netherlands has recently purchased the SINTEF software needed to utilise the system, and experts from Trondheim and Utrecht will collaborate in documenting the benefits of the technique.

On a parallel track, Thomas Langø and his colleagues at SINTEF Health Research are baking ultrasonic instruments into this advanced pathfinder. In the highly innovative "operating theatre of the future" in Trondheim, the results of their efforts will be tested in safe, controlled surroundings.

"With a few more refinements, our navigation technology will also open up the prospect of widespread use of keyhole surgery to remove cancerous liver tumours. When we get so far, we will have an aid that keyhole surgeons all over the world have been wanting for years," says Dr. Mårvik.

In the course of his hunt for improved technology, Thomas Langø is often to be seen taking a ringside seat during surgery.

"The system is a result of our closeness to SINTEF/NTNU," says Mårvik without hesitation. Langø is just as full of praise for the experienced surgeon:

"Ronald is a prime example of the creative medic who wants to try out new things, and he utilises technology to improve clinical procedures."

In his time, Langø himself applied for medical training, while Mårvik admits to a strong interest in technology. In his younger days, he applied to study aircraft and motor engineering.

So it is not so strange that the two have found a joint interest that cuts across disciplinary boundaries.

http://www.shdir.no/norsk_pasientregister/

Unn Huse | Departmental Director | Ministry of Health and Care Services

Leader of vital register

She is the head of the Norwegian Patient Register (NPR), and used to people thinking that it sounds dreaaadfully boring.

"A little pool of silence often develops around me at parties when someone asks me what I do, and I tell them that I am the leader of a team that collects hospital activity data."

Unn Huse (42) smiles – as she often does – and admits that it can sound as though she has a really dull job.

She herself knows that one aspect of her work is to reveal differences in practice among hospitals, something that she believes to be important and exciting. For example, NPR has documented that the length of time spent in hospital before hip operations varies; this period affects patients' prognoses, so the authorities are following up the finding.

Any table companion who follows up his opening question will also be told that NPR was also recently authorised to place individually identifiable material in the register. This does not mean that Norwegians' identity numbers will be floating around freely among researchers and health service bureaucrats. Personal numbers will be encrypted and thereafter erased from the records. Meanwhile, this authority offers completely new possibilities for quality assurance of our health services – a benefit that may well save lives, according to Huse.

Until now, it has been possible, for example, to count how many people have been treated for heart attacks at St. Olav's Hospital in Trondheim. But it has been impossible to draw up statistics that can tell us how many of them subsequently died of another cardiac infarct.

This limitation has disappeared with the new authority, which enables the patient register to be cross-indexed with the register of causes of death. The Swedes, who took this step long ago, found large regional differences in mortality among patients treated for infarcts. They also saw that young women in this group died more often than men in the same category of patients.

"This realisation led to changes in treatment in several Swedish hospitals, which are said to have saved 3000 lives a year for ten years," says Unn Huse.

NPR was set up in 1997. What is now the Norwegian Ministry of Health and Care Services contracted SINTEF Health Research to establish and run the register, giving it responsibility for collecting and filing all patient data used in hospital research and in the steering of resources within the hospital sector. On January 1, 2007, NPR was quite undramatically transferred from SINTEF to the Norwegian Directorate for Health and Social Affairs.

Unn Huse has been with the register almost since it was set up, and is full of praise for her colleagues Ola Kindseth and Turid Bugge Strøm, whom she calls the "father and mother" of the patient register. She is also proud of the level of cooperation with SINTEF's health services researchers, which she says has meant a great deal for quality assuring the register's data.

Unn's training is in computing, complemented with economics and management, and she enjoys working with information that could improve the treatment given by hospitals and the rest of the specialist health services.

"It makes me shiver a bit when I think that our data could actually save lives … "

The courage to change. The knowledge needed to do so.

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http://www.sintef.com/workphysiology

Ingunn Holmen Geving	Senior Scientist	Work Physiology
Stian Furøy	Fisherman	Sørøya, Finnmark

Life-saving design

A big white carton made fisherman Stian Furøy curious. It may well have saved his life.

A June afternoon last year in Sørvær, Finnmark's gateway to the Lopp Sea. Stian Furøy (27) and a companion are going out to catch saithe for their dinner. Going down to the boat, Stian sees a parcel in the family's boathouse. He has no idea what it might be, and rips off the paper.

At the same moment, Ingunn Holmen Geving (38) is working in her garden in Trondheim. She is enjoying the sun, and has no idea that the fisherman's work clothing that she has helped to develop is about to be "baptised" about 1000 kilometres further north.

On the island of Sørøya, Stian Furøy pulls a set of oilskins out of the package. The two-piece survival suit is safety equipment that Gjensidige, his insurance company, sends to clients who are professional small boat fishermen. The cover letter mentions buoyancy elements in the oilskin trousers. The suit is intended to save lives, while still being comfortable to wear.

Stian puts on the suit. Eight months later he is sitting right opposite Research Scientist Ingunn in a boathouse, explaining what happened later that summer's day that could have been his last.

Over strong hot coffee – "works best as a paint remover" – as Steinar Furøy, Stian's father and colleague says, he talks about their 14-foot fibre-glass boat, and about the gillnet caught in the propeller. A breaking wave completely fills the boat, and the two fishermen suddenly find themselves in the ice-cold sea.

"Wearing the suit meant that I was standing in the sea, with my head well above the water. If not for the suit, I might well have panicked, and I don't know what might have happened then," says Furøy.

The fisherman remembers that his companion caught his foot in the net. Stian Furøy was calm enough to pull his boot off and work him free.

The two men caught hold of the boat's stern-post, which was sticking out of the water. Stian Furøy's mobile telephone was a little damp in his trouser pocket, but dry enough to allow him to send an alarm. The lifeboat soon turned up, and everything ended well.

While Furøy is telling his story, Ingunn Geving has noted that the survival suit did what it was supposed to do. "This story is enough to make you feel humble," she says quietly.

Development of the survival suit began with a survey of what fishermen wanted and needed from their work clothing. As project manager, Ingunn Geving led this phase of the project, while Product Developer Jarl Reitan, a colleague at SINTEF, was the principal architect in the design phase. In order to provide wearers with sufficient mobility, he incorporated ideas that have been used in snowboarding suits and lifejackets for canoeists.

Even before the new clothing was launched, fishermen had already reported to Regatta, the manufacturer, that they liked the design. But not only the fishermen approved it: in March 2007, the design was awarded the "Good Design Award" by the Norwegian Design Council.

However, Stian's story is probably what most warms the hearts of the prize winners.

Combating chronic obstructive pulmonary disease (COPD)

Today, 200,000 people in Norway have chronic obstructive lung disease (COLD), but very many of them do not know that they are sufferers. In a few years, the disease will probably become one of the most frequent causes of death anywhere in the world.

SINTEF aims to make life somewhat better for these patients by studying the disease across disciplinary boundaries, in a team that includes doctors, social scientists, product developers and designers. Working together, they intend to identify the most suitable treatment for individual patients and for society as a whole, to survey standards of living, and to develop new aids that will make everyday life easier for this growing group of patients.

http://www.sintef.no/kolsforsk

From the left:
Product Developer Jarl Reitan, Merete Rørvik from project sponsor Innomed, SINTEF consultant, Professor Rolf A. Walstad, and researchers Gerhard Hem and Tommy Haugan.

http://www.sintef.com/womenmalawi

Marit Hoem Kvam | Senior Scientist | Living Conditions and Service Delivery

Fighting sexual abuse

Last year, she travelled to Malawi to carry out a pilot study of sexual abuse of disabled women. Now, this 1935-model researcher is trying to finance a major study in South Africa.

"I am just a young researcher; only seventeen years old. I took my doctorate in 1990, so there are a lot of researchers around here who are much older than me," laughs Marit Hoem Kvam, who will be 72 years old this year.

She could have been enjoying life as a pensioner, using all her time and energy to write song lyrics and crime stories and look after her garden, all of which she loves doing. But Marit also enjoys having a job to go to.

"I feel that what I am doing is important. We need more knowledge about violence and the molestation of disabled women in order to lower the risk and prevent these things from happening. I believe that I have helped to open the eyes of society to sexual abuse of this sort, and that we now have more measures available that can help to prevent thing like this from happening."

Marit has nearly always worked with people, both children and adults, who have functional problems. When she came across an American article that pointed out that people with disabilities are often the victims of abuse, at first she couldn't bear to read it. But nor was she able to let go of the idea.

"People with disabilities are more vulnerable to molestation because they often have many carers, and in many cases it is the carers themselves who abuse them. And then they tend to be poorer communicators. On top of that, there is a tendency to regard disabled persons as being less important than others."

Once Marit had identified these points in common, there was no going back. She was financed by the Save the Children Fund to survey the literature in this area, and started the first studies of deaf persons, in which she obtained remarkable, but depressing, results. Then she went on to do the same thing with blind people.

"I get so angry! To think that people can do such things to someone! Especially if they are disabled! Some of this would not have emerged without our documentation. For people who are working in the clinical sector, it is important to have a theoretical basis for their activities. And for the disabled themselves, it is important for them to know that there are many others in the same position, so that they dare to speak out and to discuss these issues."

Marit Hoem started her investigations here in Norway, but then this highly committed researcher suddenly decided to go abroad. Sexual abuse of disabled women was likely to be at least as relevant a problem in Africa, she thought. So she ended up in Malawi last summer, together with her colleague Stine Hellum Braathen, who is almost 45 years younger.

"Stine is the ideal companion. People take us for mother and daughter," she laughs.

But perhaps the most important thing about the relationship is that she knows that someone else will carry on this important field when she herself no longer wishes to do research.

http://www.sintef.com/mentalhealth

Torleif Ruud | Senior Scientist | Mental Health

Mapping acute psychiatry

Torleif Ruud (58) is not an easy man to miss, either physically or professionally. Recently, he conceived the idea behind what is probably the biggest research effort ever made in acute psychiatry in Norway.

Acute psychiatry is one of the fields of health care that demand most resources and manpower. This is where we find most discussions about the use of enforced treatment regimes, and where patients' sufferings are most intense. At the same time, however, it is one of the areas on which least research has been done.

What sorts of treatment are offered by acute wards, and how do the patients get on? How can we find answers to these problems? These were questions to which the Norwegian Directorate of Health and Social Affairs asked for input at a meeting with SINTEF Health Research in autumn 2002. We could create a network in which we can bring together information and experience, and carry out a structured investigation, suggested health services researcher Torleif Ruud, and his ideas brought him funding from the Directorate.

The concept may seem simple enough, but such ideas are not necessarily easy to put into practice. Everyday life in an acute psychiatry ward is hectic. Collecting data for a research project is not a high-priority matter when people in deep crisis walk through the door.

However, Ruud and his colleagues managed to persuade acute wards, teams and other units to collaborate. In the course of three years, the network, which consists of key personnel in such units, has gathered detailed information about the course of more than 4900 cases at 33 locations all over Norway.

"There is a great deal of knowledge here about enough patients to enable the study to draw an actual map of the acute psychiatry situation in this country. This gives the MAP acronym, which actually stands for Multi-centre Acute Psychiatry study, a double meaning," smiles Ruud.

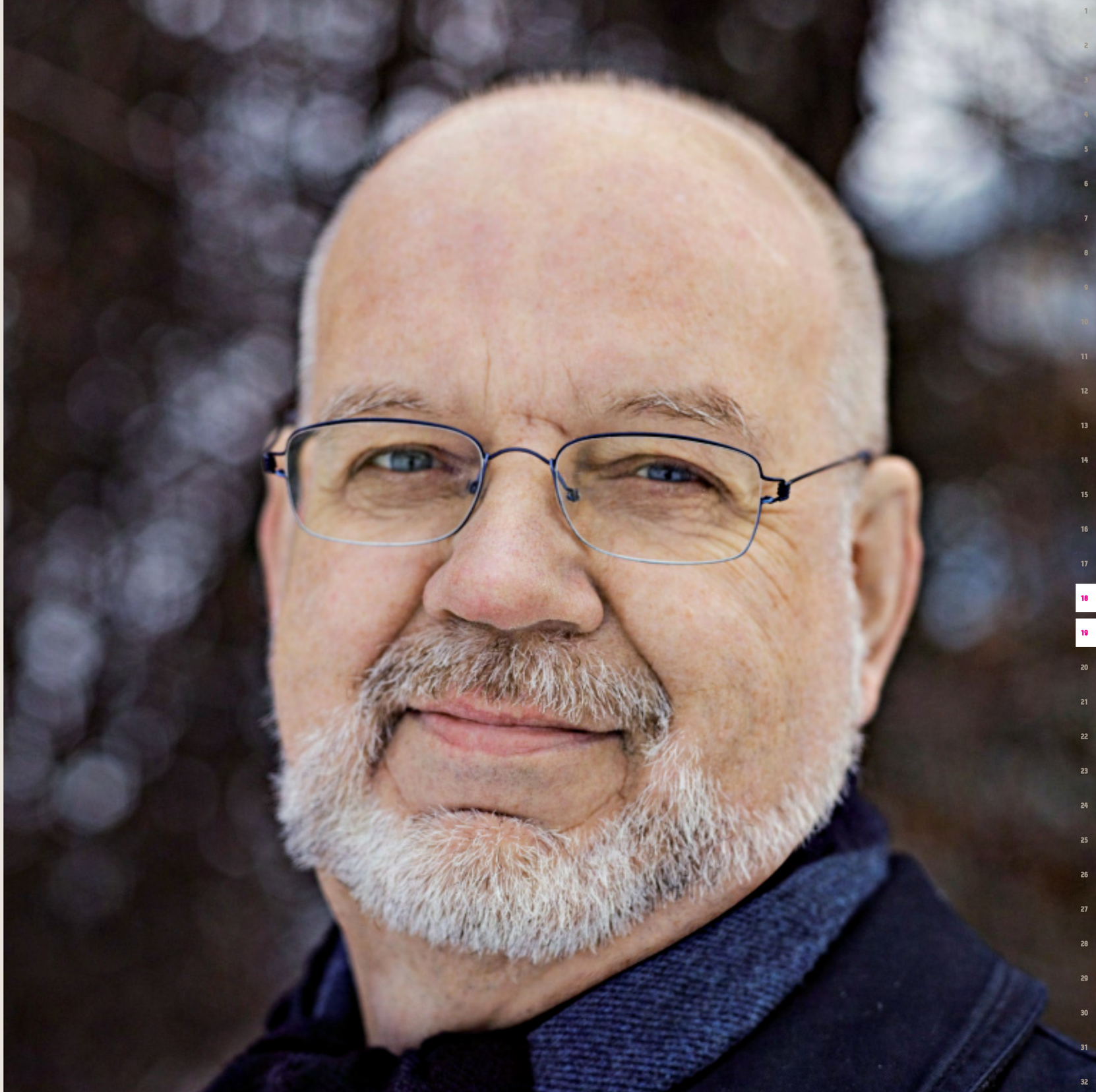
In the course of the next two or three years, the information gathered will provide raw material for several academic articles. The study has already aroused a great deal of interest as a result of one of its findings; that half of the patients who arrived in acute wards had already been hospitalised in the course of the previous year.

The Norwegian Directorate of Health and Social Affairs regards the MAP study as so valuable that the lifetime of the network will be extended through 2008.

"The meetings of the network have given its participants an opportunity to think critically about their own activities. We are now going to start a series of smaller studies in which the units can test out new methods of treatment or other ways of running departments and teams. An extremely positive downstream effect of the network is precisely the fact that it has stimulated and contributed to processes leading to top professional development in these units," emphasises Ruud.

Besides his part-time position with SINTEF Health Research, Torleif Ruud now works as a psychiatrist and professor at Akershus University Hospital in Norway. One day a week he works in a team that treats young people who have become ill for the first time.

"I wanted to get closer to patients and the clinical environment again. I also believe that this sort of contact can help me as a researcher to see what sort of research can help provide a better range of treatments."



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SINTEF Health Research 2006

Research for health and quality of life
The objective of SINTEF Health Research is to encourage research and development for the health sector in close collaboration with health-service users, the health sector, industry and relevant university and college research groups. We will strengthen research and development, provide services to the authorities, and improve the competitiveness of industry by contributing to industrial activity and innovation.

Technology for a better society
In the course of ten years, SINTEF has developed a unique activity based on the Norwegian Patient Register (NPR) which has become a national steering tool and an important basis of Norwegian health research. On January 1, 2007, NPR and the Department of Patient Classification and Financing were transferred to the Norwegian Directorate for Health and Social Affairs. SINTEF Health Research wishes to continue to collaborate with these unique expert groups with a view to strengthening patient data research.

Our SAMDATA reports on somatic and psychological health are important documents for the guidance of health institutions and national health authorities. We have reached agreement with the Norwegian Directorate for Health and Social Affairs to supply SAMDATA for two more years, with the possibility of further prolongation.

The hospital reform has been evaluated on behalf of the Research Council of Norway, with important contributions from us. We have also undertaken a series of evaluations and assessments of the organisation and management of a number of health-service institutions.

The effects of the Upgrading Plan for Psychological Health Care are beginning to be noticeable. In 2006, we carried out several projects related to these efforts. These included reports on competence and training requirements, the use of enforced treatment regimes, acute psychiatry, local psychiatric centres, treatment for drug and alcohol abusers, and on children and adolescents with psychological problems.

The national and international textile industry is displaying a high level of interest in our studies of SmartWear. The Nordic Innovation Centre is funding the operating costs, for a further three years, of a network of which we are a member. SmartWear technology results in clothing with completely new properties. Key concepts include temperature regulation and buoyancy in clothing for offshore transport and the fishing industry. The results of our research improve user safety and comfort.

Via InnoMed we are developing new products and services for the health sector. SINTEF Health Research is responsible for the "Future Homes for Elderly People" project. We have also contributed to the development of tools for need-driven innovation, a process that has reinforced efforts to develop better medical equipment.

Unimed Management has initiated, and now manages, an international multi-centre study of the development of a new method of treatment for obesity. The method helps pathologically overweight persons – without the need for major surgical interventions.

Our epidemiology groups continue to work in the field of women's health and sexually transmitted diseases. A study of chlamydia in male students has been presented at an international conference on chlamydia, and an article has been accepted for publication.

Our evaluation of consultancies for pregnant women was used as the basis for the Norwegian National Budget's discussion of such a service.

Our scientists are important sources of knowledge for the authorities, the health services and society in general. SINTEF Health Research was referred to as a source 24 times in the 2007 National Budget. We were mentioned in 230 different articles in the Norwegian media in 2006. Our Internet website receives more than 250 visitors a day. Every day, some 700 of our reports are downloaded.

The Norwegian Broadcasting Corporation uses us regularly as a source of knowledge. We have contributed to items in such programmes as the National TV News, popular science programmes on national TV, as well as several news programmes and local transmissions.

International growth
We are working actively to position ourselves vis-à-vis the EU's 7th Framework Programme. We are also implementing a development programme for research management, which will strengthen our competence in international research. Several of our departments are members of European research networks in their own particular fields; these include mental health, disabilities, image-guided surgery, smart textiles and safety at sea.

The Group Director participated in the SINTEF management's visit to the EU Commission in March. The visit was followed up by a separate delegation from SINTEF Health Research in May. In October, one of our staff was appointed by the EU Commission as an expert on health services research.

The EU's "UniAccess" project on access to public transport has come to an end, but we are aiming for a prolongation in the 7th Framework Programme, this time as project coordinator.

The accreditation of our Work Physiology Laboratory means that we are an important partner for international development groups. Among other successes, we have been awarded the fourth development study by the German company Dräger AG to verify equipment developed by that company for monitoring body temperature in fire-fighters and smoke-divers.

In collaboration with the MESO Medical Centre in Utrecht, we are carrying out a multi-centre study in the field of navigation-based laparoscopic surgery. We have been working at strategic level with groups in the USA to establish a technology platform in navigation-based surgery and visualisation. We have also laid the foundations of a new project with Northern Norway Regional Health Authority (Helse Nord RHF) and the University of Austin regarding a bloodstream model based on geometric data from CT examinations. The project is a candidate for financing by the 7th Framework Programme.

The international network in research on living conditions for disabled persons is growing and becoming stronger. In 2006, we performed projects whose target groups were disabled people in Namibia, Zimbabwe, Malawi, Zambia, Mozambique, South Africa, Kenya, Tanzania, Yemen, North Korea, Vietnam and Macedonia. The national living conditions study of disabled persons in Zambia has come to an end; this is the fourth country in which we have carried out studies of this type. The reports form a valuable knowledge base for health and social affairs decision-making in these countries. The interest aroused by these studies has triggered new projects, such as studies of the relationship between disability and poverty in Yemen and Kenya, sponsored by the World Bank. We have also been invited to join a group of WHO researchers who will contribute to the World Disability Report.

The Research Council of Norway has given us NOK 10.5 million over four years to study the use of health workers with basic training in vaccination programmes. This project is being carried out in collaboration with health research groups in Norway, the UK and Africa.

In collaboration with Stellenbosch University, we have organised a conference in Cape Town on the topic of health research collaboration between South Africa and SINTEF. In Malawi, we have performed a pilot study on the abuse of disabled women.

We have taken part as consultants in a workshop held in Beijing together with Chinese researchers, on the subject of the forthcoming reform of China's health sector.

National growth
Our expert group on image-guided surgery is a research partner in one of the newly appointed Centres for Research-based Innovation: "Medical Imaging Laboratory for Innovative Future Healthcare." The same department is a member of a user-guided innovation forum in which Laerdal Medical is the industry partner. In conjunction with the MISON development group, we are establishing new clinical applications for ultrasound in surgery, and are collaborating with the MR and ultrasound groups at NTNU and St. Olav's Hospital on breast and prostate examinations.

Through SINTEF's efforts on SmartWear, we are collaborating with Norwegian industry on the development of two types of smart wear; clothing that incorporates sensors and communication equipment, and clothes produced in functional materials. We have also signed an agreement with the Norwegian Defence Research Institute regarding research on SmartWear.

Both industry and the political sector are paying more attention to the importance of human factors in working life. A four-year industry project on work and health in the marine sector has enabled us to expand in this area. Our Work Physiology Laboratory has been accredited, and in October we moved into new laboratories in Teknobyen in Trondheim.

In the field of physical activity, we have developed a good project portfolio that includes projects from the Research Council of Norway, the Norwegian Health and Rehabilitation Foundation and an international industrial partner. One of the projects is "Out-door Life and Health in Immigrants in Groruddalen", which is providing immigrant women with opportunities to participate in physical activities.

COPD and asthma are among our most important widespread diseases, and we are involved in several research initiatives in this area. We are surveying how COPD patients are diagnosed and treated, studying the living conditions of this group and are looking at the possibility of developing new, improved treatment aids. We have been given funding by the Health and Rehabilitation Foundation to develop guidelines for physical exercise teachers who will draw up training schedules for pupils with asthma.

In the course of the SAMDATA project, we have developed unique competence in the field of health economics. The "Capacity in the Special Health Services" project will develop methods and indicators for following up and identifying over- and underuse of health institution capacity. Eastern Norway Regional Health Authority (Helse Øst RHF) has asked us to develop an income distribution model for financing the ambulance service. For Mid-Norway Regional Health Authority (Helse Midt-Norge RHF), St. Olav's Hospital and Trondheim City Council, we are developing a model of patient progress.

On behalf of Akershus University Hospital (AHUS), we will survey the significance of the management team for restructuring and change, and for Trondheim City Council, we are developing a predictive model for the nursing and care service.

Our competence in rehabilitation and orthopaedic aids for the disabled is in great demand. We are currently in the course of establishing a network for research collaboration with Norwegian rehabilitation institutions. The Disabled Documentation Centre has engaged us to study the range of health and social support services offered to persons with disabilities. On contract from the Work Environment Fund of the Confederation of Norwegian Enterprise, we are evaluating the adaptation guarantee scheme for employing disabled persons.

We have long been central contributors to the Upgrading Plan for Mental Health. Bærum City Council has engaged us to evaluate the range of services offered to persons with psychological problems and how these services are organised in comparison with other services. On behalf of NAV, the Norwegian Labour and Welfare Organisation, we are evaluating work coping measures for persons with psychological problems.

Our hospital planners have participated in a study of area planning and structure for Helse Øst, and a functional evaluation of the hospitals in Innlandet Hospital Trust. We have evaluated the organisation model of the hospitals in Helse Møre og Romsdal. Our work on the principal functions programme for Nordland County Hospital has led to further sales to the same organisation.

We have been awarded a Research Council project together with Multiconsult, SINTEF ICT and SINTEF Technology and Society, to examine models of patient progress and link these with concepts of strategic property development.

Our microbiology group has signed a five-year contract with the petroleum industry regarding long-term prevention of infections in the North Sea.

Scientific quality

The SINTEF/NTNU Gemini Centre for health services research is to continue for a further five years. Efforts to design Gemini Centres in health services research for SINTEF and the University of Oslo are continuing.

Our medical technology researchers occupy a leading position in national and international terms. In the EU's VECTOR project, we are collaborating with SINTEF ICT and European research organisations to develop a "pill-scale" navigable diagnostic tool.

We are at the leading edge in SmartWear and physical activity in the cold. Our results have been published in international journals and presented at conferences and in popular science magazines.

Our health services researchers have long had a solid reputation at national level, and we are currently strengthening our international position. For example, we had six presentations at the European Conference on Health and Medical Sociology (ESHMS) in Krakow in Poland.

Our living conditions group lies at the international leading edge in the fields of disability and poverty and disability statistics. The group was invited to a WHO expert meeting in July.

We have drawn up a national knowledge status report on sick leave, in the course of our competence development in the field of health and work. We are collaborating with key players in the field of innovation in the health sector. Together with selected user groups of patients, St. Olav's Hospital, Inno-Med and SINVENT, we are working on concepts such as seating for surgeons, patents for the Reptil thermometer, moisture-absorbing textiles for hospitals and new solutions for domestic aids for COPD patients.

We are one of Norway's largest mental health research groups, and are leading a network of groups working in acute psychiatry. In this sector, we have carried out a country-wide multi-centre study. We have drawn up a strategy for extending competence in addiction and mental health, in both the special health service and at local government level.

The Lottery and Foundations Inspectorate has engaged us to survey cash lottery dependence in Norway. We are collaborating in this project with NTNU and St. Olav's Hospital.

None of our academic staff submitted doctoral theses in 2006, but 12 of them are currently working on their doctorates.

Attractive workplace

Our values of honesty, generosity, courage and solidarity will be reinforced via consistency and openness in our strategic efforts, systematic follow-up of the HSE survey, the provision of good conditions for doctoral studies and the development of management capacity.

The work environment survey revealed that our work environment is generally good, but that we need to improve our internal communication. The development programme for international research management is under way. Most emphasis is being laid on the EU's research programmes and on Southern Africa and Central Europe.

Hospital planning has been an area of special effort for several years, and has recently been established as a separate department.

Tonje Hamar has been appointed Group Director for both SINTEF Health Research and SINTEF Technology and Society. Arne H. Eide has been appointed Research Director at SINTEF Health Research.

Ingunn Holmen Geving, Tekna trade union representative and researcher in the Department of Work Physiology, was awarded SINTEF's Work Environment Prize for 2006.

At the end of 2006, SINTEF Health Research had 137 employees. We have engaged 18 new staff in the course of the year, while 42 have left our employment, in most cases as a result of the transfer of two departments to the Directorate of Health and Social Affairs.

Financial freedom of action

In 2006, SINTEF Health Research made an operating profit of NOK 3 million on a gross turnover of NOK 112 million. Most of our departments made a profit, while a couple of groups did not win a sufficient volume of contracts. A reorganisation process is under way, and the prospects of winning research contracts in the coming year appear to be better for these groups.

A growing international involvement has meant that we are now paying more attention to the value of intellectual rights.

Ethics

Health research inevitably involves people. For this reason, SINTEF Health Research has always been aware of the ethical problems that can arise in our work.

In 2006, ethics became even more clearly etched into our consciousness, when SINTEF's Board adopted a new set of ethical guidelines. All parts of our organisation have studied these and discussed their impact on our research. This is not merely a matter of research ethics, compliance and openness regarding our methods. For health researchers, ethics are as much a matter of respect for sources in interview situations and of how to deal with sensitive data. Our many international projects demand a degree of humility in the face of other cultures' values.

Health, safety and the environment

HSE and ethics are the first item on the agenda of all departmental and managerial meetings. Ninety-five percent of our employees have had a staff conversation with management. Work safety rounds and risk assessments of laboratories have been conducted. All our offices have now been upgraded, and the open office landscapes in Teknobyen have been converted into individual offices at the request of our staff.

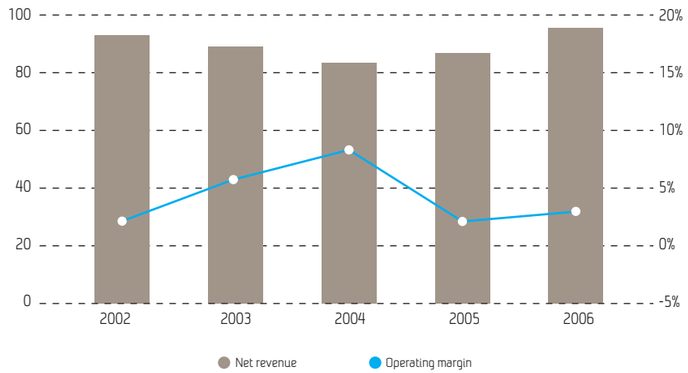
Our overseas projects make special demands as regards HSE. The departments involved in such projects have discussed awareness of personal safety, particularly when working in non-European countries, with our safety manager. In 2006, no serious events in connection with our overseas projects were reported.

Accounts

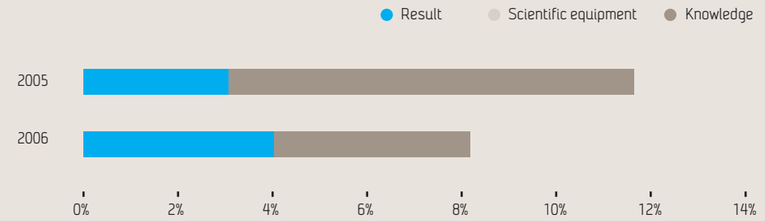
Key financial figures for SINTEF Health Research

Figures in NOK thousand	2002	2003	2004	2005	2006
Income statement					
Gross operating revenue	108 667	126 423	109 059	110 293	122 010
Net operating revenue	78 307	89 059	83 258	86 591	86 591
Operating result	**6 353**	**12 563**	**6 881**	**1 923**	**3 001**
Annual result	**6 261**	**4 973**	**7 466**	**2 674**	**3 754**
Operating margin	2.2%	5.6%	8.3%	2.2%	3.1%
Profit margin	2.9%	6.9%	9.0%	3.1%	3.9%

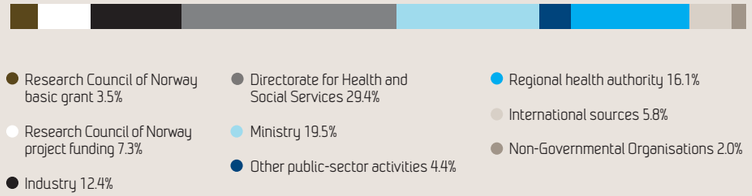
Trend in net operating revenue (MNOK) and net operating margin (%)



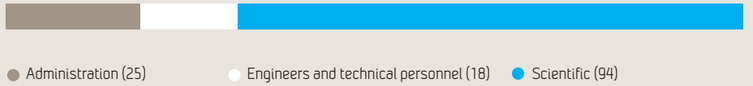
Investment in knowledge and scientific equipment, and result as percentage of net operating income



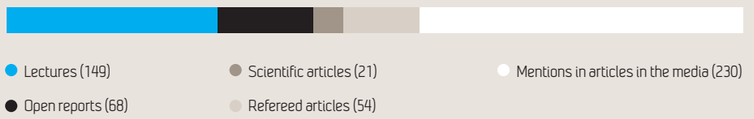
Sources of finance for SINTEF Health Research 2006



Employees in SINTEF Health Research



Publication and dissemination of our contributions to knowledge



Refereed publications 2006

http://www.sintef.com/publications

Title	Author	Journal
Chlamydia trachomatis infections increase the risk for ectopic pregnancy: a population-based nested case-control study	Bakken Inger Johanne, Nordbø SA, Skjeldestad Finn Egil	Gynekologen 19(3); 58 (abstr. A42), 2006
Chlamydia trachomatis testing patterns and prevalence of genital chlamydial infection among young men and women in central Norway 1990-2003: a population-based registry study	Bakken Inger Johanne, Nordbø SA, Skjeldestad Finn Egil	Sex Transm Dis, 33(1); 26-30, 2006
Time trends in etopic pregnancies in a Norwegian county 1970-2004 - a population-based study	Bakken Inger Johanne, Skjeldestad Finn Egil	Human Reproduction, 21(12); 3132-3136, 2006
EXTRA and chlamydia	Bakken Inger Johanne	Ønskebarn, 4; 32-33, 2006
Strain estimation in abdominal aortic aneurysms from 2D ultrasound	Brekken Reidar, Bang Jon, Hernes Toril A Nagelhus, Ødegård Asbjørn, Aasland Jenny, Myhre Hans Olav	Ultrasound in Medicine and Biology, 32(1); 33-42, 2006
Albinism in Malawi: Knowledge and beliefs from an African setting	Braathen Stine Hellum, Ingstad Benedicte	Disability & Society, 21(6); 599-611, 2006
Surgical treatment of carotid stenosis in Norway	Dahl T, Myhre HO, Johnsen HJ.	Tidsskrift for Den norske lægeforening, 126(11); 1466-9, 2006
Data quality of surgery for carotid artery stenosis. Are the national vascular registries reliable?	Dahl T, Rudjord K, Altreuther M, Myhre HO.	European journal of vascular and endovascular surgery, 31(4); 381-5, 2006
Data Quality of Surgery for Carotid Artery Stensosis. Are the National Vascular Registries Reliable?	Dahl T, Rudjord Ketil, Altreuther M, Myhre H O.	Eur J Vasc Endovasc Surg, 31(3); 381-385, 2006
Carotid endarterectomy: time-trends and results during a 20-year period	Dahl T, Aasland J, Romundstad P, Johnsen HJ, Myhre HO	International angiology, 25(3); 241-8, 2006
Change in height, weight and body mass index: Longitudinal data from the HUNT Study in Norway	Drøyvold Wenche Brenne, Nilsen TIL, Krüger Ø, Holmen TL, Krokstad S, Midthjell K, Holmen J.	Intern J of Obesity, 1-5, 2006
Reflections on disability data and statistics in developing countries, Bill Albert, In or out of The Mainstream?	Eide Arne Henning, Loeb Mitchell	Lessons from Research on Disability and Development Cooperation., Leeds, UK, 89-103, 2006
Impact of Community-Based Rehabilitation Programmes: The Case of Palestine	Eide Arne Henning	Scandinavian Journal of Disability Research, 8(4); 199-210, 2006
Registration completeness in the Norwegian Arthroplasty Register	Espehaug Birgitte, Furnes Ove, Havelin Leif I, Engesæther Lars B, Vollset Stein E, Kindseth Ola	Acta Orthopaedica, 77(1); 497-, 2006
The Psychiatric Out-Patient Experiences Questionnaire (POPEQ): Data quality, reliability and validity in patients attending 90 Norwegian clinics	Garratt A, Bjørngaard JH, Aanjesen Dahle K, Bjertnes ØA, Saunes IS, Ruud T.	Nordic Journal of Psychiatry, 60(2); 89-96, 2006
PasOpp – a method for measuring users' experiences of the mental health-care services	Garratt A, Danielsen K, Bjertnes ØA, Ruud Torleif	Tidsskrift for Den norske lægeforening, 126(11); 1478-80, 2006
Safer work clothing for fishermen.	Geving Ingunn Marie Holmen, Reitan Jarl Kåre, Sandsund Mariann, Færevik Hilde, Reinertsen Randi Eidsmo, Aasjord Halvard	Internat. Marit. Health, 57; 1-4, 2006
The general practitioner's encounter with refugees.	Grut Lisbet, Tingvold Laila, Hauff Edvard	Tidsskrift for Den norske lægeforening, 126(10); 1318-1320, 2006
Understanding and treating persons with serious mental health problems and alcohol or drug abuse	Gråwe Rolf Wilhelm	IA. Almvik & L. Borge, Psykisk helsearbeid i nye sko, Bergen, 138-158, 2006
Mental health care for persons with mental health problems and alcohol- or drug-abuse problems.	Gråwe Rolf Wilhelm	Tidsskrift for norsk psykologforening, 43(16); 561-562, 2006
Depression in schizophrenia – understanding and clinical implications.	Hagen Helge, Gråwe Rolf Wilhelm	Tidsskrift for norsk psykologforening, 43; 99-104, 2006
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Allocation of labour to somatic and psychiatric specialist care The effects of earmarked grants	Halsteinli Vidar, Ose Solveig Osborg, Torvik Liv Heidi Wiig, Hagen Terje P.	Health Policy, 78(2006); 115-127, 2006
Computer-assisted 3D ultrasound-guided neurosurgery: technological contributions, including multimodal registration and advanced display, demonstrating future perspectives	Hernes Toril A Nagelhus, Solberg Ole Vegard, Selbekk Tormod, Lindseth Frank, Wollf Arild, Harg Erik, Tangen Geir Arne, Rygh Ola M, Rasmussen Inge, Augdal Sigmund, Couweleers Fred, Unsgård Geirmund	Journal of Medical Robotics and Computer assisted Surgery, 2(1); 45-59, 2006
Traces of the War: life stories	Hjort Haldis, Wetlesen Tone Schou	Unipub. Oslo, 2006
The bereaved therapist	Hjort Haldis	Suicidologi, (2); 3-6, 2006.
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Human rights – for psychiatric patients in Norway too?	Husum Tonje Lossius, Thune Gro H.	Tidsskrift for Den norske lægeforening, 12(126); 1616-1618, 2006
Computer-aided Interventions	Kaspersen Jon Harald, Langø Thomas, Lindseth Frank	Zielinski, Duplaga, Ingram, Information Technology Solutions for Healthcare, London, 271-287, 2006
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Mental Health in Deaf Adults: Symptoms of Anxiety and Depression Among Hearing and Deaf Individuals	Kvam Marit Hoem, Loeb Mitchell, Tambs Kristian	Journal of Deaf Studies and Deaf Education, 12(1); 1-7, 2006
Severity of Illness and the Use of Paracetamol in Febrile Preschool Children: a Case Simulation Study of Parents' Assessments	Lagerløv P, Loeb Mitchell, Slettevoll J, Lingjærde O-C, Fetveit A.	Family Practice, 23(6); 618-623, 2006
The individual plan - a tool for coordination, relationships and predictability	Lidal Eli, Røhme Kjerstina	Almvik Arve, Borge Lisbet, Psykisk helsearbeid i nye sko, Bergen, 2006
Paradigms lost: the changing face of disability in research	Loeb Mitchell, Eide Arne Henning	Internat. views on disability measures, Elsevier, 2006
Development and evaluation of a new PCR assay for detection of Pseudomonas aeruginosa D genotype	Lødeng AGG, Ahlen Erika Catrine, Lysvand H, Mandal LH, Iversen Ole Jan	Clinical Microbiology & Infection, 12(8); 761-768, 2006
Risk factors for long term posttraumatic stress reactions in UN military observers - a four year follow-up study	Mehlum L, Koldsland Bo, Loeb Mitchell	Journal of Nervous and Mental Disease, 194(10); 800-804, 2006
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Squeezed or in balance? Work, stress and family life	Ruud Torleif	Roness A og Mathiesen SB, Misjonærfamilien, Bergen, 207-218, 2006
Endoscopy guided by an intraoperative 3D ultrasound-based neuronavigation system	Rygh Ola M, Selbekk Tormod, Lindseth Frank, Hernes Toril A Nagelhus, Cappelsen J, Unsgård Geirmund	Minimally Invasive Neurosurgery, 49(1); 1-9, 2006
Intraoperative navigated 3D ultrasound angiography in surgery	Rygh OM, Selbekk T, Lindseth F, Müller TB, Hernes TAN, Unsgaard G.	Surgical Neurology, 66; 581-592, 2006
The individual plan – ambitious goals, but insufficient means	Røhme Kjerstina, Hatling Trond, Lidal Eli	Tidsskrift for Velferdsforskning, 9(2006); 148-157, 2006
Exercise performance in cold weather; cardiorespiratory aspects, International Congress on Science and Nordic Skiing	Sandsund Mariann	Linnamo Vesa, Komi Paavo V, Müller Erich, Congress on Science and Nordic Skiing, Finland, 2006
Intra-operative 3D ultrasound in neurosurgery	Unsgård Geirmund, Selbekk Tormod, Lindseth Frank, Hernes Toril A Nagelhus, Rygh Ola M, Müller Tomm B, Kolstad Frode	Acta Neurochirurgica, 148(3); 235-153, 2006
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Are cold light sources really cold?	Yavuz Y, Skogås JG, Güllüoglu NG, Langø Thomas, Mårvik R.	Surgical laparoscopy endoscopy & percutaneous techniques, 16(5); 370-6, 2006
Little knowledge of human papilloma virus among young Norwegian women.	Øren Anita, Skjeldestad Finn Egil	Tidsskrift for Den norske lægeforening, 126; 2101-3, 2006

This is SINTEF

The SINTEF Group is the largest research organisation in Scandinavia. Our vision is "Technology for a better society", and our aim is to contribute to increased value creation, improved quality of life and sustainable development. SINTEF sells research-based knowledge and associated services based on deep insight into technology, the natural sciences, medicine and the social sciences.

Our basic values are honesty, generosity, courage and solidarity. SINTEF's aim is to become the most respected research institution in Europe.

The SINTEF Group comprises the SINTEF Foundation, plus four limited companies and SINTEF Holding. We are a competitive research group with a significant potential to make a positive contribution to the development of society at regional, national and international level.

We contribute to the development of existing knowledge-based employment and to the creation of new workplaces. Our business concept is that of promoting the closer interaction of business and research cultures.

Key figures

At the turn of the year, the SINTEF Group had 1901 employees, who generated new knowledge worth NOK 2 billion in 2006.

Contracts for industry and the private sector and project funding provided by the Research Council of Norway account for more than 90 percent of our income. Around seven percent takes the form of basic grants from the Research Council.

Partners in cooperation

SINTEF cooperates closely with the Norwegian University of Science and Technology (NTNU) and the University of Oslo. NTNU personnel work on SINTEF projects, while many SINTEF staff teach at NTNU. Our collaboration involves widespread common use of laboratories and equipment, and more than 500 people are jointly employed by NTNU and SINTEF.

International activity

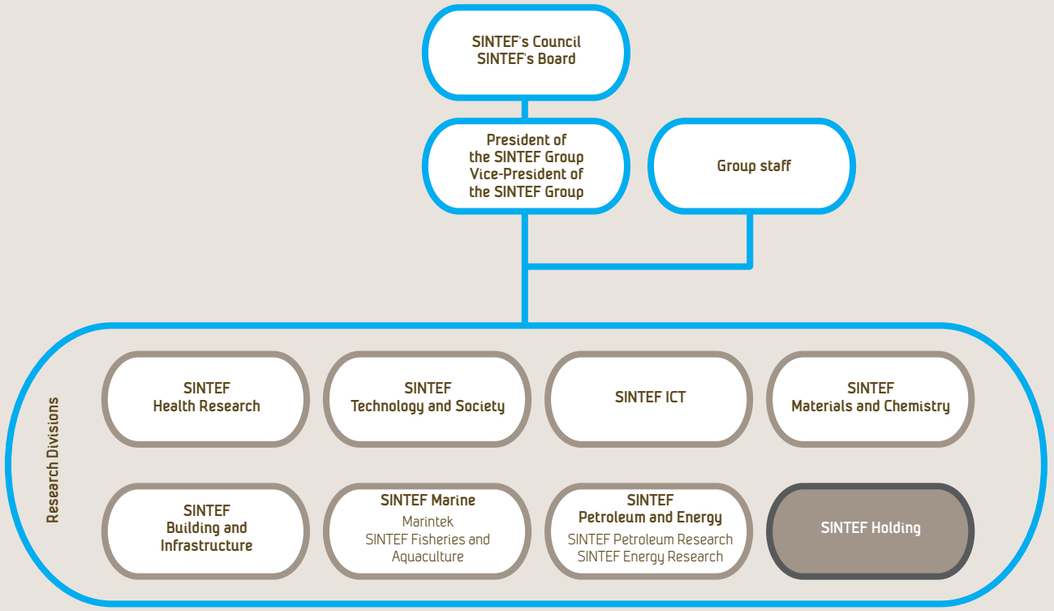
In 2006, 12 percent of our turnover derived from international contracts. About one third of our international turnover comes from the EU's research programmes. We give these high priority because we believe that it is important to participate in multinational knowledge-generation efforts, and because such projects give us access to interesting networks.

The rest of our international turnover comes from contract research projects performed on behalf of overseas clients. Our ambition is to grow in other countries, and for this reason we are investing in areas in which we are particularly strong: oil and gas, energy and the environment, materials technology and marine technology.

Commercial spin-offs

SINTEF also acts as an incubator for new industrial companies. In 2006, we were involved in the commercialisation of 12 SINTEF technologies, through licensing agreements and the establishment of new companies. We are active owners of our start-up companies, and we help them to continue to develop. Selling our shareholdings in successful spin-offs realises liquid assets that we subsequently invest in the generation of new knowledge. Nevertheless, the most important part of our work is the development of existing industrial companies. Every year, SINTEF supports the ongoing development of some 2000 Norwegian and foreign companies via its research and development activities.

Our organisation



SINTEF Health Research is one of the largest health research organisations in Norway. We have wide-ranging solidly-based knowledge of both medical subjects and methods, and are capable of analysing and solving problems in an integrated manner.

SINTEF Technology and Society offers R & D in the fields of technology management, working life and transport. The division also has a subsidiary company; SINTEF MRB AS.

SINTEF ICT offers integrated research-based knowledge via access to a broad platform of technology and competence in ICT.

SINTEF Materials and Chemistry possesses top-level expertise in the fields of materials science, applied chemistry and applied biology. We work closely with industry on the development of advanced materials, products, processes and tools. The division also has two subsidiary companies; SINTEF RTIM AS and Molab AS.

SINTEF Building and Infrastructure is the third largest building research institute in Europe. It was established in 2006 following the merger with the Norwegian Building Research Institute (NBI). The division also includes the subsidiary company SINTEF NBL AS.

SINTEF Marine consists of MARINTEK and SINTEF Fisheries and Aquaculture, and it deals with exploitation of the marine environment.

SINTEF Petroleum and Energy comprises SINTEF Petroleum Research and SINTEF Energy Research, and operates within the whole of the value chain for petroleum products and sustainable energy systems.

SINTEF Holding was established with the aim of separating out SINTEF's activities at the interface between commercial activitiy and research from our core activities. SINTEF Holding is a taxable entity, which comprises strategic ownership and newly established companies.

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