



UNIFOB ANNUAL REPORT 2008

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FROM PERIPHERAL ZONE COMPANY TO RESEARCH COMPANY

Unifob AS is developing from a peripheral zone company into a research company. What does this mean?

A «peripheral zone company» is a company affiliated to a parent organisation. For many years, this has been Unifob's role in relation to the University of Bergen. The company has been an administrative and academic tool for the university and contributed to the university's total research activities being much more extensive today than they would otherwise have been.

However, all peripheral zone companies carry the seeds of their own destruction within them, like time bombs. The reason for this is quite simply that the capable researchers who work there will gradually create their own research communities, their own expertise and their own academic agendas.

In other words, a peripheral zone company is a transitional stage on the road to becoming a research company, i.e. a company in which research is carried out independently or in cooperation with others, but this research is always rooted in the company's own strategy and own expertise. That is where we are today, and this is the basis from which we will continue to develop.

We have a good foundation for development. In 2008, we have, among other things, become a major partner in two so-called Centres for Environment-Friendly Energy Research (CEER), one on wind power and one on carbon storage. It is typical for both of these centres that they represent new applications of known expertise. In this case, this expertise has been developed in the centres of excellence in which we are a partner – climate research and petroleum research – and in our own milieu for mathematical modelling and environmental research. But that is not all, our social sciences researchers are also attached to a third CEER, which illustrates the strength of our broad academic base.

We have also established the Research Centre for Sick Leave and Rehabilitation based on a collaboration between health studies, social sciences and economics in our Unifob Health and Rokkan Centre departments. This is another example of the exciting combinations that are made possible by our academic breadth.

One of our capable researchers received a large grant from the Bergen Research Foundation, while Unifob AKSIS was awarded the Rosing's Language Prize for the department's work on dictionaries for immigrant languages.

The Bjerknes Centre for Climate Research, where our climate researchers participate, came second and beat a number of well-known research entities in the USA, Europe, Asia and Australia in a benchmarking of international climate centres.

These examples demonstrate that we maintain a high academic level and that our activities are academically diverse. It is precisely this combination of high quality and academic breadth that is our greatest strength and our hallmark.

However, in the final instance, it is our employees who are the basis for success. As shown by the examples above, their efforts in 2008 command respect, as they always do – both those who actually carry out the research and those who keep the wheels turning to make our research possible.

In order for us to become a research company, we need to know who we are, where we want to go and how to get there. In 2008, we therefore started a major project to develop an identity strategy and vision for the company, as well as considering a change of name. This project has the firm support of our employees, and we see that they are not only making great efforts in terms of their academic work, but also in further developing the company. At present, the project has entered its concluding phase and we can see that it has been a success and that we will soon have an identity strategy, a vision and a new name. Through this process, we have laid the foundations for the research company we wish to become.



Key Financial Figures

MNOK

Revenues and other income	452,6
Payroll and related costs	242,7
Depreciation and amortisation expense	0,7
(Total) operating costs and expenses	205,4

Operating income	3,8
Financial income, net	8,4

Profit for the year	12,2
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Non-current assets	29,8
Current assets	330,1
Total assets	359,9
Equity	74,8
Current liabilities	285,1
Total equity and liabilities	359,9

Profitability

Profit margin %	2,7
Operating margin %	0,8
Return on total assets %	3,4
Return on equity %	16,3

Liquidity

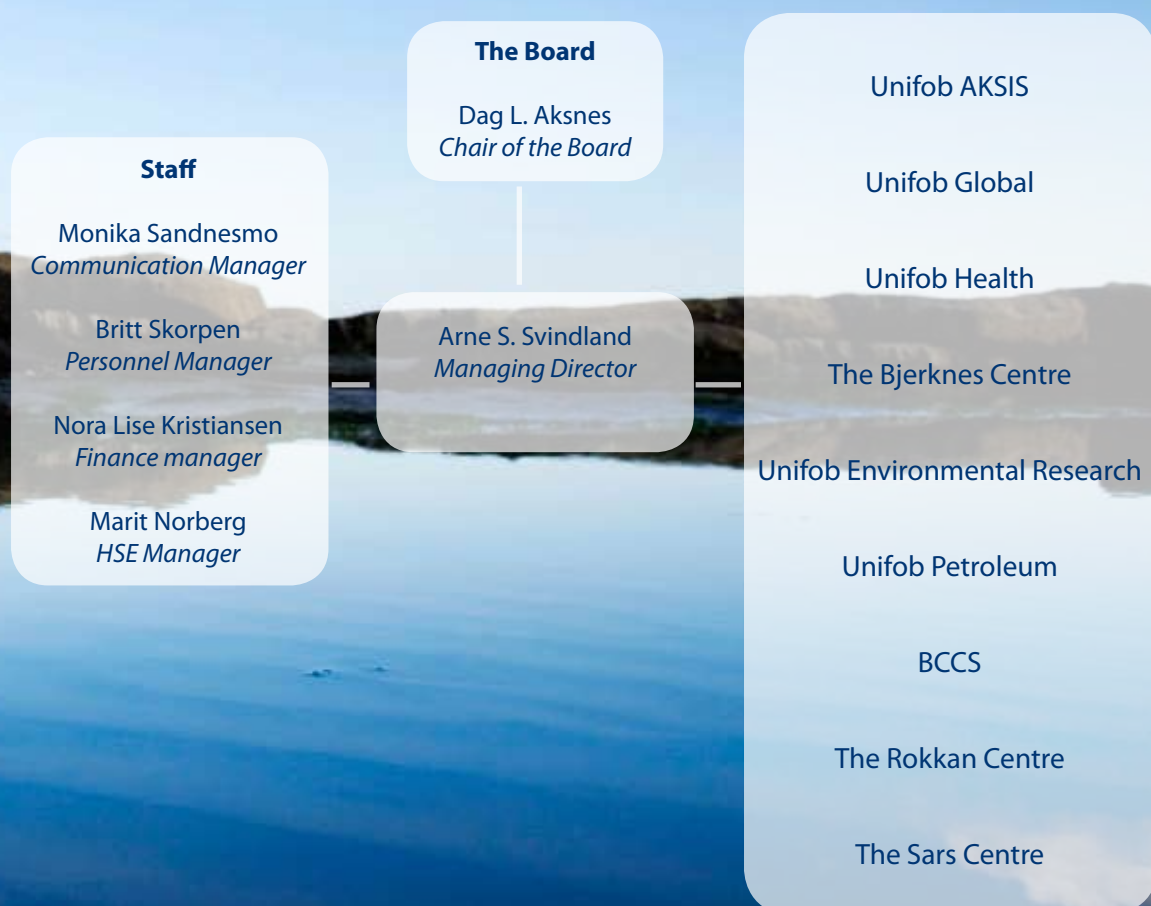
Working capital ratio %	1,2
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Financial strength

Equity to assets ratio %	20,8
Working capital	45,0



Our Organization



DICTIONARIES FOR EVERYBODY

Unifob AKSIS makes web-based dictionaries for immigrants. The LEXIN project secured Rosing's Language Prize.

The interactive image on the computer monitor shows a supermarket surrounded by various edible products. A click on the oblong food item with a crust tells you that what you call *rooti* in your Somali mother tongue is called *brød* in Norwegian.

«Many dictionaries are made available online without making full use of the opportunities offered by digital distribution,» says Sindre Sørensen, a developer with AKSIS. «The available space is limited in printed books, but pixels are free. Pictures and illustrations can therefore be used in a totally different way on the internet. And, not least, hyperlinks can be used to link the images to dictionary entries.»

Unifob's Centre for Culture, Language and Information Technology (AKSIS) has been making low-threshold dictionaries for immigrants on behalf of the Directorate for Education and Training for years. So far, web-based LEXIN dictionaries are available in Arabic, English, Kurmanji, Sorani, Persian, Somali, Tamil, Tigrinya and Turkish, using both the Bokmål and Nynorsk varieties of Norwegian as source languages. Four of these dictionaries are also available in printed versions.

«There are probably about 150 languages spoken in Norway, but many of them are used by so few people that it is impossible for commercial players to invest in them. That means that the Norwegian state must take responsibility,» says Tove Bjørneset, who is project manager for the LEXIN project. «Since we use a static source language, it is also relatively quick and cheap to make new dictionaries for other languages.»

At the moment, dictionaries for Thai and Urdu are being completed, while Russian and Polish are in the start-up stage. In addition, work is also underway on developing a search interface for mobile phones, among other things. Simplicity and user-friendliness are key concepts throughout the process, and in 2008 LEXIN was awarded the Rosing's Language Prize for these very characteristics. The jury for the prize, which is awarded by the Norwegian Computer Society and the Norwegian Language Council, praised LEXIN for its plain, fast and practical service of great value to its users.



Project Manager Tove Bjørneset and Software Developer Sindre Sørensen

«We maintain a continuous dialogue with our users and listen to their feedback,» says Ms Bjørneset. «Our launching of *Nynorsk* as a source language for all our dictionaries last year was not a result of guidelines from the authorities, but of the demand from immigrants living in areas where *Nynorsk* is used. This shows the value of the language, both in terms of our identity and as a common cultural denominator.»

Own tools

The idea of a state dictionary project for immigrants was originally Swedish, and is more than 30 years old. The Swedish solution became so popular that both Norway, Denmark and Iceland accepted the offer of borrowing the material to develop corresponding language resources. After a successful pilot project lasting from 1996 to 1999 in which Swedish source language materials and Swedish translations were imported and reused, the first online dictionaries were launched in 2002. The Norwegian-English and the two monolingual Norwegian online dictionaries consist of 36,000 entries, compounds and derivations, while the other dictionaries contain between 7,600 and 11,000.

«LEXIN is a resource that helps its users to achieve a level of language proficiency that enables them to understand and be understood better. In the long run, they will be able to use other, larger dictionaries, which are essential in developing a good mastery of the Norwegian language,» says Ms Bjørneset.

AKSIS has developed the editing tool themselves, and it allows the translators to edit the dictionary material via a special website. This means that the translators can work on LEXIN from anywhere in the world. The Ministry of Foreign Affairs also uses tools from AKSIS, for example in connection with their terminology database for EEA and EU terms, *EØS-EU-basen*.

«Multidisciplinary project groups give us philologists a good opportunity to provide input and communicate our wishes to the developers and programmers, and vice versa,» says Ms Bjørneset. «This continuous collaboration on developing and testing tailor-made tools and resources often results in ground-breaking solutions. It is also an important element in creating job satisfaction in our hectic day-to-day work. Our experience shows that there are many outside of our academic environment who have a great need for our multi-disciplinary expertise without realising it.»



FACTS

Unifob AKSIS does research and development in the following areas:

Language technology. Development of online dictionaries and solutions for language processing. We build language resources and infrastructure for research and development and we offer tools for term extraction, grammar development, annotation and corpus work.

Language testing. We develop and carry out language tests in foreign languages. We conduct research on assessment methods (assessment of, assessment as and assessment for learning), language testing and standard setting.

ePublishing. Research in semantic technology in order to facilitate efficient search in text collections. We develop infrastructure for the publishing of text collections and host digital versions of cultural resources including the works of Ludwig Wittgenstein.

Digital media and eLearning. Research on the pedagogical potential and limitations of digital media and eLearning systems. We analyze social and cultural aspects of new media and offer technology for development and assessment of eLearning systems.

Highlights

- Unifob AKSIS contributed to the publication of famous persons' writings: Henrik Ibsen's poems are part of the project Henrik Ibsen's writings (publishing 2009). On eMunch.no, the publishing of Edward Munch's writings began. 5000 pages of Ludwig Wittgenstein's original manuscripts are being published on wittgensteinsource.org.
- LFG-Parsebanker – tool creating databases of grammatically analyzed sentences was completed and licensed to several companies and universities.
- The LEXIN dictionaries for minority languages won Rosing's language award. These dictionaries have been developed by Unifob AKSIS since 1996.
- The government proposition about Norwegian language (Mål og mening) was received very positively by the research communities. Its focus on terminology and the creation of a Norwegian language bank is especially interesting for us.
- Eli Hagen took over as research director 1 October. She came to Unifob AKSIS from BMW's research and development centre in Munich where she developed speech applications and was program manager R&D in the interior division.

Important projects

The goal of the *Semi-SemAntic Models for cross-sector portals* (SeSAM4-project) is to simplify the usage of semantic web technology and make it more accessible for small and medium enterprises.

The EU-project *Common LAnguage Resources and technology Infrastructure* (CLARIN) shall develop a new electronic research infrastructure for language resources and make these accessible for the human and social sciences.

In the EU-project *Science Created by You* (SCY), we conduct research on how digital teaching aids can make science more interesting

In the project *Termportalen*, we establish a national infrastructure for Norwegian terminology.

Collaboratores

Unifob AKSIS cooperates with several universities – especially the human and social science departments at the University of Bergen. Other partners and customers include the national research council, EU, The Norwegian Language Council, businesses and government organizations.



NILE RESEARCH FOR THE COMMON GOOD



Guests to Bergen: From the left: Nada Babiker Hamza from Sudan; scientific leader Ole Reidar Vetaas, programme director Tore Sætersdal, Gaspard Ntakimazi from Burundi and Henry Ndangalasi from Tanzania.

Two groups of ten researchers from ten countries per year. Unifob Global's guest researcher programme gives academics from countries around the Nile the peace and time they need to carry out research and build democracy.

Ten researchers from the Democratic Republic of the Congo, Burundi, Egypt, Ethiopia, Kenya, Rwanda, Sudan, Tanzania and Uganda are in Bergen to study biodiversity. These researchers cooperate across and despite sometimes considerable barriers inherited from colonial times. Their common denominator is the Nile. The ten countries are all in the catchment area for the longest river in the world – a shared resource and, in a historical perspective, the root of many conflicts.

«The water in the Nile is a common good, and the ten countries are currently negotiating about how to share it. But this agreement is delayed by disagreement between Egypt and the other states about rights. Encouraging research cooperation is a considerable contribution to understanding fair distribution and common development,» says Tore Sætersdal.

He is the Director of the Nile Basin Research Programme (NBRP), Unifob Global's guest researcher programme

financed by the Ministry of Foreign Affairs. This programme has welcomed two groups of researcher from the countries around the Nile every year since 2007.

«These ten countries all have big flagship universities, but their quality and financial foundations vary,» says Mr Sætersdal. «In addition, the researchers are overburdened with teaching. Our programme gives them a six-month break in which they can focus on their research, build networks and work with colleagues who might otherwise not have been natural cooperation partners. The idea is *independent research in a faraway place*.»

Counteracts brain drain

The origins of the guest researcher programme can be traced back to 2002, when Norway became a donor in the Nile Basin Initiative – a programme of agreements between the countries around the Nile based on peaceful utilisation of common water resources. The early trainee programmes under this agreement were primarily aimed at engineers, but there was also a wish to get an academic result from the cooperation. The University of Bergen developed a programme proposal which quickly attracted the Ministry of Foreign Affairs' interest, and the guest researcher programme was officially launched in 2006.

«The Ministry of Foreign Affairs sees our programme not only as support for high-

level research, but also as a peace initiative. The objective is not only to produce academic publications, but to educate an enlightened public opinion and encourage new South-South cooperation,» says Ole Reidar Vetaas, scientific leader of the spring semester 2009 and the fifth group of Nile researchers.

Previous groups have studied subjects ranging from history to the humanities and natural sciences. The researchers who now visit Bergen prepare field studies to study, among other things, biodiversity in light of the use of land and the climate changes.

«Local cooperation within an academic field is common, but shared measures across the old colonial and language barriers are rare,» says Mr Vetaas. «In our programme, researchers get to know each other in a completely different way. Ethiopians and Eritreans work together to achieve a common goal. That is not an everyday occurrence.»

Unifob Global has also launched an initiative to stimulate regional cooperation between universities – the first such project among universities in the region.

«The Nile agreement hangs by some thin political threads, but strengthened academic environments will also strengthen democracy. Science is state-neutral, and such programmes counteract brain drain,» says Tore Sætersdal.

FACTS

Unifob Global was established in 2007 as an anchor for development-related research and global studies at the University of Bergen (UiB). The department manages a portfolio of fourteen projects and houses seven research units with researchers from a wide range of disciplines. Unifob Global employs a staff of 47 people, accommodates a dozen PhD candidates and frequently hosts international guest researchers.

This environment spurs innovative and multidisciplinary research proposals. Current activities span topics like international migration; environmental challenges; the dynamics of European politics and society; water studies; gender and development; and historical and contemporary explanations for regional development. Unifob Global applies a critical methodological lens to realise the potential of new and original research.

The activities are rooted in UiB's long history of collaboration in the Middle East, East and Southern Africa, the Pacific, South and Southeast Asia and Europe. The department established two new research units in 2008: one is concerned with conflicts in the Middle East and their impact on the civilian population; the other engages itself with global aspects of gender and development. In addition, the department aims to add cross-disciplinary research units focusing on climate and conflict, languages, and emerging issues in global politics.



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Highlights

Eritrea joins the Nile Basin Research Programme, completing the list of the ten Nile Basin countries taking part in the programme.

Closing conference for the multidisciplinary research programme, Global Moments in the Levant.

The Nile Basin Research Programme initiates a Nile Basin University

Forum for regional cooperation, bringing together more than twenty universities in all the ten Nile Basin countries.

The 4th Nordic Latin America Research Network Conference organized in Bergen.

The TV documentary «The Future of Water» by Terje Tvedt wins the prestigious «Gullruten» Prize in the category for best TV documentary.

Selected publications

Andersson, Mette. *Flerfarget idrett. Nasjonalitet, migrasjon og minoritet*, Bergen: Fagbokforlaget, 2008.

Bang, Anne K. Zanzibar-Olsen: *Norsk trelasthandel i Øst-Afrika 1895–1925*, Bergen: Fagbokforlaget, 2008.

Fahlander, Fredrik & Terje Oestigaard (eds). *The Materiality of Death: Bodies, Burials, Beliefs*, British Archaeological Reports, 2008.

Naguib, Nefissa & Inger Marie Okkenhaug (eds). *Interpreting Welfare and Relief in the Middle East*, Leiden: BRILL, 2008.

Sicakkan, Hakan G. *Do our Citizenship Requirements Impede the Protection of Political Asylum Seekers? A Comparative Analysis of European Practices*, Lewiston: Edwin Mellen Press, 2008.

Tvedt, Terje & Erik Hovden. *A Bibliography of the River Nile*, Vol I–III, Bergen: BRIC, 2008.

Tvedt, Terje, Erik Hannemann, Anders Taylor Larsen & Robert Stengård, *The Future of Water*, TV documentary (3x52 min.), Oslo: Panopticon, 2008.



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THE MUSIC OF LIFE

The need for good services in geriatric care is greater than ever. Music therapy is one of the services that are in a greater and greater demand. Expertise in the field is now being strengthened through a Nordic network.

He is well into his eighties and cannot remember his wife's name. In spite of dementia and a near-total loss of verbal language he still sings the songs he learnt in primary school. Such situations are seen every day in Norwegian nursing homes.

«In a time where the number of elderly people suffering from dementia is increasing, we see an increasing focus on the potential of music in work with the elderly. However, this academic field is not very well developed. Only about 20 music therapists work in Norwegian nursing homes. Still, it is only a few years since the number of music therapists in geriatric care could be counted on one hand. The demand is rising, and as researchers, we have a responsibility to encourage both practical and theoretical development,» says Brynjulf Stige, professor of music therapy at the University of Bergen and head of research at GAMUT, the Grieg Academy Music Therapy Centre, Unifob Health.

The centre was established in 2006, at the same time as music therapy training was moved from Sogn og Fjordane University College to the University of Bergen. A grant from the GC Rieber Foundations has now also given the centre the opportunity to form a Nordic network for research and the development of knowledge about music and the elderly. The network unites the two Norwegian music therapy environments at the University of Bergen and the Norwegian Academy of Music in Oslo, and it also draws on interdisciplinary expertise in various Norwegian and Danish research environments. The goal is both to unite a fragmented academic field and to develop the services offered in geriatric care.

Dependent on the expertise

«Music is a motivational factor and a basic communicative resource. We see no signs that people's interest in music decline with age, in fact the opposite seems to be the case,» says Brynjulf Stige.

In geriatric care, music can be used to create meaningful activities and a sense of community for elderly in good health who lack social networks. For people in nursing



The sound of health: «Music is health-promoting,» states Brynjulf Stige, professor of music therapy.

homes, who need more assistance, music is used to create meaning and relief and to ease communication, but it is not an automatic process.

«The nurses cannot simply turn on the radio and continue to the next task,» says Professor Stige. «You need sensitive personnel who know how to use music in a contextual manner. Music therapists are incredibly important, but sporadic visits are not sufficient to make full use of the potential inherent in music. There are situations in which music can be a useful resource around the clock, but this requires the staff to have basic competence. Unfortunately, music therapy has hardly been mentioned in nurses' training until now.»

However, trials are underway at Nord-Trøndelag University College. GAMUT also hopes to be able to enter into cooperation with the department of nursing at Bergen University College.

«Our goal is to encourage both practice-related research and improved practice in nursing homes and in the rest of society,» says Professor Stige.

The therapist needs to have an interdisciplinary perspective whether music is used in individual therapy for persons with dementia or as an environmental measure. Music has effect both through neurophysiological and psychosocial processes. The need for more research is still very much present.

«In order to understand the potential of music, we need to understand what is going on in the brain. But this is not enough, we also need research on music as a social and cultural resource. We have a lot left to do on the theoretical side, but one thing is indisputable: music makes people feel alive.»

For more information on the project, see: www.gamut.no or www.nmoe.no

FACTS

Unifob Health carries out research in academic fields with a bearing on health and quality of life for a large number of people. The activities are affiliated to the faculties of psychology, public health and dentistry at the University of Bergen, and they contribute to the development of expertise in these academic milieus. Several of the department's research groups have an interdisciplinary profile. Some of its activities are also linked to social science environments.

In 2008, the department consisted of the following core groups:

- Research Unit for General Practice in Bergen
- Occupational and environmental medicine
- Child Protection Research Unit, Western Norway (BUS-V)
- Dental biomaterials: Adverse Research Unit
- GAMUT (the Grieg Academy Music Therapy Centre)
- The HEMIL Centre, Research Centre for Health Promotion
- National Centre for Emergency Primary Health Care
- Centre for Child and Adolescent Mental Health, West (RBUP)
- Stress, Health and Rehabilitation (formerly the research entity of Nasjonalt ryggnettverk)

The research groups are strong in themselves, but they also collaborate closely.

New Research Centre

The establishment of the Research Centre for Sick Leave and Rehabilitation. The point of departure was the recognition that, even though the Norwegian population is in good health, Norway still has the highest level of sickness absence in Europe. This centre is a collaboration between Unifob Health and the Rokkan Centre. Researchers in the fields of health studies, economics and social sciences will work on topics such as disability, sickness absence, inclusion and occupational rehabilitation, with particular emphasis on developing methods for analysing and evaluating rehabilitation measures. The goal of the project is to shed new light on the factors that affect labour market participation and how people on benefits and employees on long-term sickness leave can return more quickly to work or active participation in society.

Focus on dissemination

Unifob Health's researchers publish a lot of research in internationally recognised journals, and some of them are therefore more well-known abroad than here in Norway. Much of the department's research is potentially important to individuals and it is of interest to and useful to the public. Unifob Health wishes to engage in more systematic research dissemination, and it therefore launched the newsletter «Aktuelt fra Unifob helse» in April 2008. Three issues were published in 2008. Their main topics included public health, music therapy and emergency primary health care.

Conferences and events

The research groups at Unifob Health have organised, either alone or in collaboration with other Unifob research groups and departments, several events aimed at the general public:

Folkehelsedagen (*Public Health Day*) is a annual regional one-day conference organised by the research communities at Unifob Health and the Rokkan Centre. The topic for the 2008 conference was marginalisation and public health.

The Centre for Child and Adolescent Mental Health West (RBUP Vest) marked the World Mental Health Day by holding open mini-lectures, which were attended by 120 persons. The title of the event was «How are children with mental health problems treated in the health services?»

Researchers from the Stress, Health and Rehabilitation research group gave a lecture titled «*Modern health problems; what is normal, and does mastery matter?*» for Galleri 3,14 in connection with an art exhibition.



ABSORBS LESS CO₂

The world's oceans absorb carbon dioxide corresponding to one fourth of the man-made emissions. But this system is also vulnerable to climate changes.

An increase in temperature of two degrees Celsius in relation to the pre-industrial level has long been climate researchers and the EU's limit for when climate changes go from being bad to becoming far, far worse. The UN Climate Panel describes an increase of 1.8 degrees as the most optimistic scenario we can hope for. It is still theoretically possible to limit global warming within this framework, but if we exceed the two-degree limit, certain self-reinforcing processes will take place in nature: systems that have so far bound greenhouse gases will start releasing them instead.

«If the current development continues, this will be an inevitable fact within 30-40 years,» says climate researcher Are Olsen at Unifob Environment.

The climate changes and increase in temperature depend on the concentration of carbon dioxide in the atmosphere. The pain threshold for a two-degree temperature increase is 450 CO₂ parts per million. The present level is 390 ppm, and it increases by 1.9 every year.

The concentration in the atmosphere does not, however, increase in proportion to the emissions. The oceans absorb carbon dioxide corresponding to one fourth of the man-made emissions.

«Without the ocean's ability to absorb some of the emissions, the greenhouse effect would have increased 25 per cent faster,» says Are Olsen.

The scenario is hypothetical, but several surveys show that the ocean's absorption of carbon dioxide is decreasing.

Not a prophecy of doom

The container vessel Nuka Arctica goes back and forth between Denmark and Greenland. Since 2004, researchers from the Bjerknes Centre for Climate Research have used measurements taken from this ship to register the concentration of carbon dioxide in the North Atlantic. Traditionally, it has been assumed that the ocean releases CO₂ at the equator and absorbs CO₂ at high latitudes. This mechanism is called the physical pump and indicates that the colder the water is, the more CO₂ will be absorbed. But the findings from Nuka Arctica surprised researchers.

«We expected the water in the North Atlantic to be undersaturated, but in fact it proved to be saturated,» says Are Olsen.

The researchers are uncertain about the reason for this. They do not rule out the possibility that this may actually be the normal situation for this area – but the findings may also be linked to the results of a previous survey. In 2002 and 2003, researchers from the Bjerknes Centre collected carbon data on voyages in the Iceland Sea, the Greenland Sea and the Norwegian Sea and compared them with data from an American voyage in 1981. Are Olsen and the other researchers demonstrated that the absorption of CO₂ from the air is decreasing in the eastern parts of the Nordic oceans. They also hinted that this had to do with man-made CO₂ being absorbed further south and transported north by the ocean currents.

«The feedback indicates that the ocean absorbs less CO₂ because of the climate changes,» says Are Olsen

Researchers are now working to determine the exact absorption figures, identify the variables and determine how sensitive the ocean is to the climate development. Improved knowledge about these factors can help to improve the models used by the UN Climate Panel, among others, to simulate the climate of the future. If the North Atlantic stops absorbing carbon CO₂ from the atmosphere, this will result in faster and more dramatic climate changes. But how great cause for concern is there?

«The North Atlantic is saturated in relation to today's atmosphere – not necessarily in relation to tomorrow's. Anyway, the ocean has not stopped absorbing carbon dioxide, it is simply keeping up with the atmospheric level,» says Are Olsen, who thinks that these findings should not be read as a prophecy of doom:

«What we should really be concerned about is the fact that the concentration of CO₂ in the atmosphere has increased much faster than anybody feared.»

*Climate Researcher Are Olsen
at the Bjerknes Centre
for Climate Research*



FACTS

Unifob runs its climate research through the Bjerknes Centre for Climate Research (BCCR), which is the largest climate research centre in the Nordic countries. The Centre has an international profile, with a main focus on northern Europe and the Polar regions, and is a key provider of first-rate knowledge on climate change to policy makers, industry, and the general public.

BCCR has a leading research position within climate understanding, climate modelling and scenarios for future climate changes and quantification of climate changes. The Bjerknes Centre is a Norwegian Centre of Excellence (CoE), which is a co-operation between Unifob, the University of Bergen, the Institute of Marine Research, and the Nansen Environmental and Remote Sensing Center.

Main research themes

- Past, present and future climate changes and distinguishing natural and man-made changes.
- Abrupt and regional climate changes in the context of the global climate system. The role of the oceans in the climate system, feedback mechanisms caused by the marine carbon cycle and other processes.

Highlights

- BCCR, with Unifob AS as the coordinating institution, leads the Norwegian activities for developing climate models/earth system models (NorESM) in advance of the next IPCC report. In 2008, the first runs with NorESM, including interactive carbon cycle, were performed.
- BCCR reached a record number of internationally published peer-reviewed papers in 2008, with 88 articles (includes BCCR as a whole).
- A 4-year partnership programme with the University of Washington, Seattle, and Massachusetts Institute of Technology was funded.
- BCCR strengthened its collaboration with the Nansen-Zhu Centre at Institute of Atmospheric Physics in Beijing, and new partnerships in South Africa and India are becoming established.
- A benchmarking of a number of international climate research centres in 2008 placed the BCCR as number 2, ranging ahead of well known climate research centres in the USA, Europe, Asia and Australia.

Important projects

- **NorClim** is the largest climate research project in Norway. The aim is to provide new climate scenarios for Norway and the northern region for the periods 2030 and 2100, as well as establishing a national Earth System Model (NorESM).
- **Marine carbon sources and sinks assessment** is a EU-project, consisting of 47 international partners. The aim is to determine the ocean's uptake of CO₂, which is essential knowledge to determine on the expected consequences of rising atmospheric CO₂ concentrations and to guide the management of CO₂ emission reductions.
- **Bipolar Atlantic Thermohaline Circulation** is one of the biggest national IPY-projects. The aim is to study all aspects related to bottom water formation on the bipolar Atlantic Ocean shelves and the impact on the thermohaline circulation in the past, present and future.
- **RETRO** is a European Science Foundation project with partners in Brazil and Europe. It aims to improve the understanding of the couplings between the tropics and the North Atlantic region, in particular how heat is transported through the Gulf Stream.



GETTING TO THE BOTTOM OF THE CHALLENGES OF THE FUTURE

From salmon in the Vosso river system to carbon storage: Unifob Environmental Research is not just a passive analysis institution. «We want to play a more active role in solving environmental problems,» says Research Director Svein Winther.

«Our research projects are selected on the basis of a set of values which do not influence research methodology or free research. We support an ecologically sustainable development and want to play an active role in achieving this,» says Research Director Svein Winther at Unifob Environmental Research.

This department, formerly known as Unifob Natural Sciences, changed its name in 2008. Environmental monitoring was and will continue to be an important focus for the department, but initiatives and projects aimed at solving environmental challenge makes up an increasing share of its activities.

«It is a significant change of course, but it is also more demanding,» says senior advisor Tor Solberg. «Solutions often involve cooperation between parties who are traditionally far apart, sometimes also 'at war' with each other. This can require considerable diplomatic skills, and we will also have to be accountable for the solutions which we prescribe. On the other hand, this makes our job more exciting, inspiring and future-oriented – and more satisfying when we succeed.»

Different needs, shared solution

Previous projects under the auspices of the research centre have demonstrated that very different interest groups benefit greatly from cooperation. The Vosso salmon project to survey the special and endangered population of large salmon in the Vosso river system was a significant driving force behind collaboration between the aquaculture industry and the wild fish interest groups.

«Basic research and the industry's needs meet in this way in many of our projects,» says Svein Winther.

In recent years, Unifob Environmental Research has been the driving force behind the establishment of a Norwegian centre for offshore wind power. Researchers are also currently working to initiate a project in

the NOON network. The Norwegian Ocean Observatory Network is a collaboration between seven research institutions, and it aims to develop a network of permanent observation laboratories on the seabed.

More and more of the offshore oil and gas activities take place in deep waters far from shore, and a significant proportion of future activities will also take place in Arctic areas, which will make even more stringent demands in relation to environmental considerations.

The researchers at Marineholmen are therefore working on projects to study the environmental impact of such investments in cooperation with, among others, the expertise and production environment NCE Subsea. The projects link world-leading private companies with research environments.

«The objective is to develop biotechnology-based monitoring which the oil and energy industry, among others, will be dependent on both for expansion northwards and for any future subsea storage of carbon dioxide,» says Mr Winther.

Time for action

When research environments unite, they provide a unique opportunity for the industry to benefit from the effects.

«We see that the aquacultural industry, which is often accused of insufficient environmental commitment and portrayed as environmental villains by the media, is becoming more and more involved in this field both to ensure their own operations and to find solutions to the conflicts between agriculture and the interest of wild fish. Unfortunately we also see that the petroleum industry, which has made considerable investments in the environment in the past, now shows more restraint due to the international recession,» says Mr Winther. His advice to the industry is to continue to focus on the long-term perspectives, also in times of crisis.

«We have a unique opportunity to develop new environmental technology which can be highly beneficial to the petroleum industry in the wake of the projects we are now initiating. We have our tool box ready,» says Tor Solberg.

Wants to play a more active role: Research Director Svein Winther and Senior Advisor Tor Solberg at Unifob Environmental Research are expanding their activities.





FACTS

In 2008, Unifob Natural Sciences changed its name to Unifob Environmental Research and expanded its activities. This department's vision is to supply «Research-based knowledge for ecologically responsible development». The department organises research activities in the following fields:

- Marine environmental research
- Freshwater ecology and inland fisheries
- Aquaculture
- Molecular biological biomarkers
- Molecular biology/ ecology
- Bioproteins
- Cultural landscapes

These areas of expertise are subdivided into research groups whose researchers have great expertise in their research fields and cooperate with other Norwegian and foreign research groups.

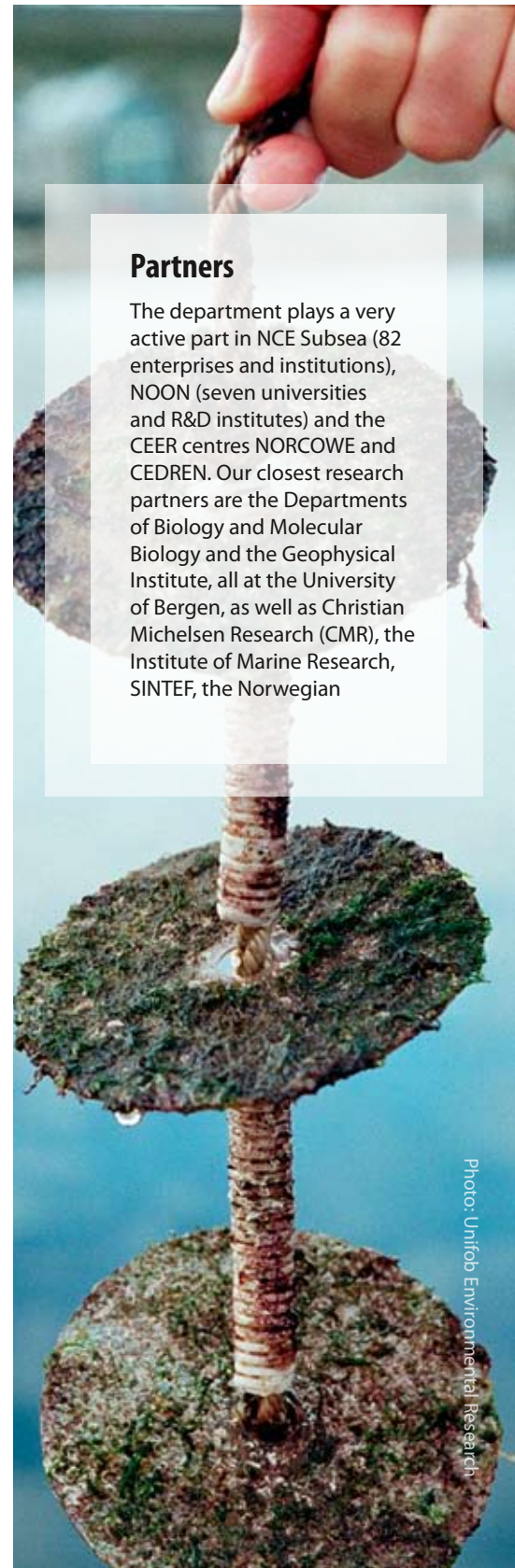
Highlights

- Active participation in the establishment of two Centres for Environment-friendly Energy Research (CEER): *NORCOWE – Norwegian Centre for Offshore Wind Energy* and *CEDREN – Centre for Environmental Design of Renewable Energy (hydroelectric power/ wind power)*
- The start of a rescue initiative for the salmon in the Vosso river system under the auspices of the Directorate for Nature Management primarily based on Unifob's research results over many years.
- The establishment of a molecular biology laboratory in collaboration with BioSense AS.
- Start-up of a large marine biology environmental survey on the Tampen area.
- Strengthening of international cooperation by bringing in more foreign guest lecturers.

Further endeavours

The department will continue to focus on establishing itself as one of Norway's main players in environmental monitoring, among other things through research on new methods based on genetics and the development of biomarkers and sensor systems. Research on diseases and parasites related to wild fish and aquaculture will be expanded. The environmental impact of the production of renewable energy and carbon dioxide management will be studied through new projects and participation in centres. Research on environmental factors that influence freshwater ecology, wild fish stocks and cultural landscapes are three other priority areas. The department will continue its

activities relating to the utilisation of natural gas in the production of bioprotein. One of our goals is to coordinate the establishment of a national seabed observatory through the *Norwegian Ocean Observatory Network (NOON)*.



Partners

The department plays a very active part in NCE Subsea (82 enterprises and institutions), NOON (seven universities and R&D institutes) and the CEER centres NORCOWE and CEDREN. Our closest research partners are the Departments of Biology and Molecular Biology and the Geophysical Institute, all at the University of Bergen, as well as Christian Michelsen Research (CMR), the Institute of Marine Research, SINTEF, the Norwegian

NEW KNOWLEDGE ABOUT OLD GROUND

New tools and methods enable researchers to draw up a clearer picture of underground faults. This knowledge is essential in the production of oil and gas.

Faults are fractures created by movements in the earth's crust. A majority of all oil and gas fields are influenced by this geological phenomenon to varying degrees. Faults have a significant impact on the way in which water, oil and gas flow underground, and they often represent significant risk factors during drilling operations.

«Fault studies is a key issue in the petroleum industry, but the concepts and methods used so far to model and calculate the properties of faults have not been able to depict them with a satisfactory degree of realism.»

This statement was made by Jan Tveranger, Senior Researcher of Unifob Petroleum and head of the projects Fault Facies I and II. These projects started with an interdisciplinary discussion over a cup of coffee four years ago. Their goal is to develop a new, improved and more realistic method for digital representation and calculation of fault properties. The projects are sponsored by the Research Council of Norway and industrial partners with academic participation from several national and international research institutions.

Over the last few years, researchers have worked on software development in parallel with empirical field studies of faults in the USA, Chile, England, France, Spain, Egypt, Oman – and on Svalbard.

«It has been a long uphill struggle, but it has really paid off. We have already produced results which must be described as no less than the beginning of a change of paradigm,» says Mr Tveranger.

A flagship project

During the first phase, thirty researchers, seven PhD candidates and eight Master's students representing different academic fields at Norwegian institutions concluded that it was technically possible to make more realistic models by applying an integrated multidisciplinary approach. The researchers still had problems selling the project to the oil and gas industry.

«The petroleum companies often prefer to focus on limited issues and invest in smaller packages,» says Jan Tveranger. «It is necessary to see the bigger picture in order to solve the geological, reservoir

technology and software-related problems related to fault modelling. With our team comprising everything from structure geologists to reservoir engineers and mathematicians, Unifob Petroleum possesses unique expertise and has the opportunity to carry out this type of interdisciplinary strategic research.»

Despite initial financial problems, Fault Facies I developed into a flagship project for the petroleum department and the associated Centre for Integrated Petroleum Research (CIPR). From being an unknown quantity, the centre now experiences a considerable response from research environments. Today, PhD candidates apply directly to the project.

«Today, modelling fault properties is an integrated part of the work on a petroleum field, but it is very much controlled by the software used rather than geological knowledge,» says Mr Tveranger. «While ideally reality should make requirements of the modelling tools, the situation has so far been much the opposite: that the software available has determined how reality is depicted. The tools we are now developing represent an attempt to correct this imbalance in a way which will be useful to research as well as to the industry.»

The second phase of the project, running from 2009 to 2012, will build on experience and the further development of methods and concepts developed during the first phase, and academic environments outside of Norway will be involved to a much greater extent. The collaborating partners include the Universities of Bergen, Stavanger, Glasgow, Strathclyde, East Anglia and Amsterdam, as well as the Norwegian Computing Centre, the University Centre in Svalbard and the Geological Survey of Norway (NGU).

The project has unfortunately also felt the effects of the current financial crisis, which has made work to secure financing very challenging. Jan Tveranger finds the situation frustrating, but still sees reasons to be optimistic: «We have a long-term perspective on our work on developing expertise, methods and software that may enable us to make better predictions about reservoir behaviour. This type of knowledge will always be in demand, whether the reservoir in question produces oil or groundwater or is used for carbon storage.»



Jan Tveranger is Senior Researcher in Unifob Petroleum and leader for the projects Fault Facies I and II

FACTS

Much of Unifob Petroleum's research takes place in CIPR – the Centre for Integrated Petroleum Research. CIPR is the only Norwegian Centre of Excellence in petroleum research. Unifob Petroleum/CIPR consists of an international research environment with approx. 110 researchers and research fellows (PhDs) from all over the world. Unifob Petroleum/CIPR's strong point is its ability to integrate traditional research disciplines into interdisciplinary collaboration. We also focus on combining theoretical and experimental research. Our goals are to:

- Achieve increased understanding of multiphase flow phenomena in porous media.
- Develop faster and more reliable reservoir models, with an emphasis on homogeneous reservoirs.
- Contribute to increased oil recovery by improving understanding of oil recovery mechanisms.
- Help develop improved carbon storage methods.

Selected activities

Carbon storage. The unique knowledge we have built up in research on reservoir models and reservoir interpretation will be developed further in order to help to improve carbon storage methods. Unifob Petroleum/CIPR was, in collaboration with other institutions, awarded the research centre SUCCESS – «Subsurface CO₂ storage – Critical Elements and Superior Strategy». This centre is one of eight Centres of Environment-friendly Energy Research (CEER).

History matching. A reservoir simulation is a simulation of how we believe that oil recovery from a reservoir takes place. We use history matching to make the simulation as realistic as possible. We have studied two history matching methods: the binary level set method and the piecewise constant level set method. The results are very promising, but many challenges remain before the methods are ready for use.



Helicopter-based laser scanning of terrain surfaces. We use terrain formations above sea level that are analogous to a reservoir below sea level in order to increase our understanding of the actual terrain formation in a reservoir. The mountain formations at Billefjorden on Spitsbergen, for example, are analogous to the formations under the Barents Sea. The terrain models are made using a Laser Detection and Range Finding Scanner (lidar), a 3D laser scanner. We mounted the lidar scanner and a camera on a helicopter. The helicopter enables us to scan larger areas and get closer to the surface of the terrain, and the angle is also more optimal than in other methods. This work has provided us with large, accurate 3D terrain models that we load into the CIPR VR-Lab. This lab is a visualisation room in which it is possible to study the terrain models in a 3D virtual reality.

Low-cost surfactant flooding. Surfactants are chemicals that reduce the surface tension between oil and water. Such chemicals can be injected into oil reservoirs in order to improve oil recovery from the reservoirs. We have carried out research on methods that combine the use of low-salinity water and surfactants in flooding. The combination of low-salinity water and surfactants improves oil recovery and is more economical than using low-salinity water alone. This method opens up new opportunities for improved oil recovery on the Norwegian continental shelf.

Unstable displacement. Unifob Petroleum/CIPR has developed a method by which a 2D X-ray scanner is used to scan 1 x 1 metre porous slabs of stone. The X-rays show how the injected substances displace the heavy oil in the slabs. The purpose of these experiments is to find a better way of handling unstable displacement (viscous fingers), and thereby help to improve our knowledge of how to improve recovery from heavy oil reservoirs.

Partners

The University of Bergen, the Research Council of Norway, PETROMAKS, StatoilHydro, Total, BP, ConocoPhillips, CGGVeritas, Eni Norge, Chevron, Shell, Wintershall, VISTA, Roxar, IRIS, SINTEF and several international universities.

Equipment

- 1 high pressure laboratory
- 3 large physical chemistry laboratories
- 4 small chemical laboratories
- 1 VR laboratory (Virtual 3D visualisation room)
- Lidar (Laser Detection and Range Finding Scanner)
- 2D X-ray scanner sanner)
- 2D röntgenskanner
- NMR maskin

FOURTEEN MILLION KRONER FOR OUTSTANDING RESEARCH

Nathalie Reuter's protein research could result in new medicines for lung and blood diseases. Last year, she got her reward in the form of a dream grant from Bergen Research Foundation.

Nathalie Reuter, theoretical chemist at the Bergen Centre for Computational Science, studies the proteins of the body without taking samples of blood or tissue. In 2008, she was designated a future research leader by Bergen Research Foundation and awarded a project grant of NOK 7.2 million. The University of Bergen, represented by the Department of Molecular Biology, will contribute a corresponding amount.

«Fourteen million kroner really makes a difference. It is an important recognition of our work and will make us less dependent on external partners.»

Ms Reuter, who took her PhD at the Henri Poincaré University and has been a postdoctoral fellow at the Max Planck Institut für Kohlenforschung, leads what started out as a small team consisting of two PhD candidates and one postdoctoral fellow. The group uses computer simulation to obtain information about the movement and three-dimensional shapes of proteins – knowledge which is crucial in order to develop new medication, among other things. Knowledge of both form and movement is necessary because different medicines have to attach themselves to different proteins.

The methods and algorithms used are well established, but require an enormous computational capacity. Ms Reuter and her group hire capacity at the largest computer in Norway, which is conveniently located in the same building.

«We are lucky to be located here – firstly in Norway, secondly at the Bergen Centre for Computational Science. We have access to plenty of computational resources, which is critical to the project,» says Ms Reuter.

From the laboratory to the body

Proteins are difficult to study because they are small and quick. Without data simulations, they can at best be studied indirectly. Ms Reuter's group is studying six different proteins. Three of these proteins are related to inflammatory processes in the human body. Among other things, they contribute to the digestion of pathogenic bacteria in the white blood cells and form an important part of the body's immune system. In conditions of chronic inflammation, however, these same proteins can become a problem. The immune system launches an attack, and the protein starts to attack the healthy components of the body. The proteins which Ms Reuter and her team study are related to, among other things, chronic obstructive pulmonary disease (COPD) and the blood vessel disease vasculitis.

«There is also speculation that those same proteins may be related to leukaemia, and this is one of the questions we hope to answer,» says Nathalie Reuter.

Thanks to the funding from Bergen Research Foundation and the University of Bergen, she can double the size of her team for the next four years and start the next phase of her research project in collaboration with the Department of Molecular Biology.

So far, the team has focused on molecules, whose movements and properties can be reproduced in the laboratory under controlled conditions – but which are not necessarily suitable for medical use.

«It is a huge leap from making something work in the laboratory to making it work in the body,» says Ms Reuter. «There are many more factors involved, and the simulations become a lot more complicated – and considerably more expensive. This phase could not have been carried out without this grant. The alternative would have been a considerably less ambitious project with a much lower profile.»



Future research leader: Nathalie Reuter uses the largest computer in Norway to simulate protein movements. In 2008, she was designated a future research leader by Bergen Research Foundation and awarded a project grant of NOK 7.2 million.

FACTS

Bergen Center for Computational Science (BCCS) has as its primary aim to conduct research with a basis in advanced computations and mathematical modelling. In addition, research where the use of information technology and computers for the interpretation and comparison of large different sets of data, is central.

The department consists of four research units:

The Computational Biology Unit (CBU) is the largest unit. Its primary aim is to conduct research within bioinformatics as well as to expand the interfaces between bioinformatics, experimental biological and biomedical research. CBU leads and coordinates the national bioinformatics technology platform of the Norwegian programme for functional genomics (FUGE).

The Computational Mathematics Unit (CMU) has its main focus on problems related to hydrodynamics (Computational Fluid Dynamics, CFD) and geophysics.

Parallab works within the fields of High Performance Computing, Grid related distributed High Performance Computing and computational science. The group is responsible for the running and maintenance of the high performance computing facilities at UiB and has 50 % of the national high performance computing infrastructure.

The Bergen Computational Physics Laboratory (BCPL) is engaged in projects directed towards theoretical physics and particle physics connected to CERN and the Large Hadron Collider experiments.

Highlights

- The Supercomputer Hexagon (Cray XT4) was installed in January. Throughout 2008 the machine has been ranked amongst the 50 fastest supercomputers in the world.
- Group leader Nathalie Reuter was awarded a recruitment stipend by the Bergen Research Foundation.
- BCCS will contribute in two research centres for environmentally friendly energy (FME). These centres will be established in Bergen.

Collaborators

UiB, Cray, Sigma, UiO, UiT, SINTEF ICT, Princeton University, University of Stuttgart, FUGE Bioinformatics platform nodes

Equipment

Cray XT4 supercomputer (daily running responsibility), various computational clusters and servers.

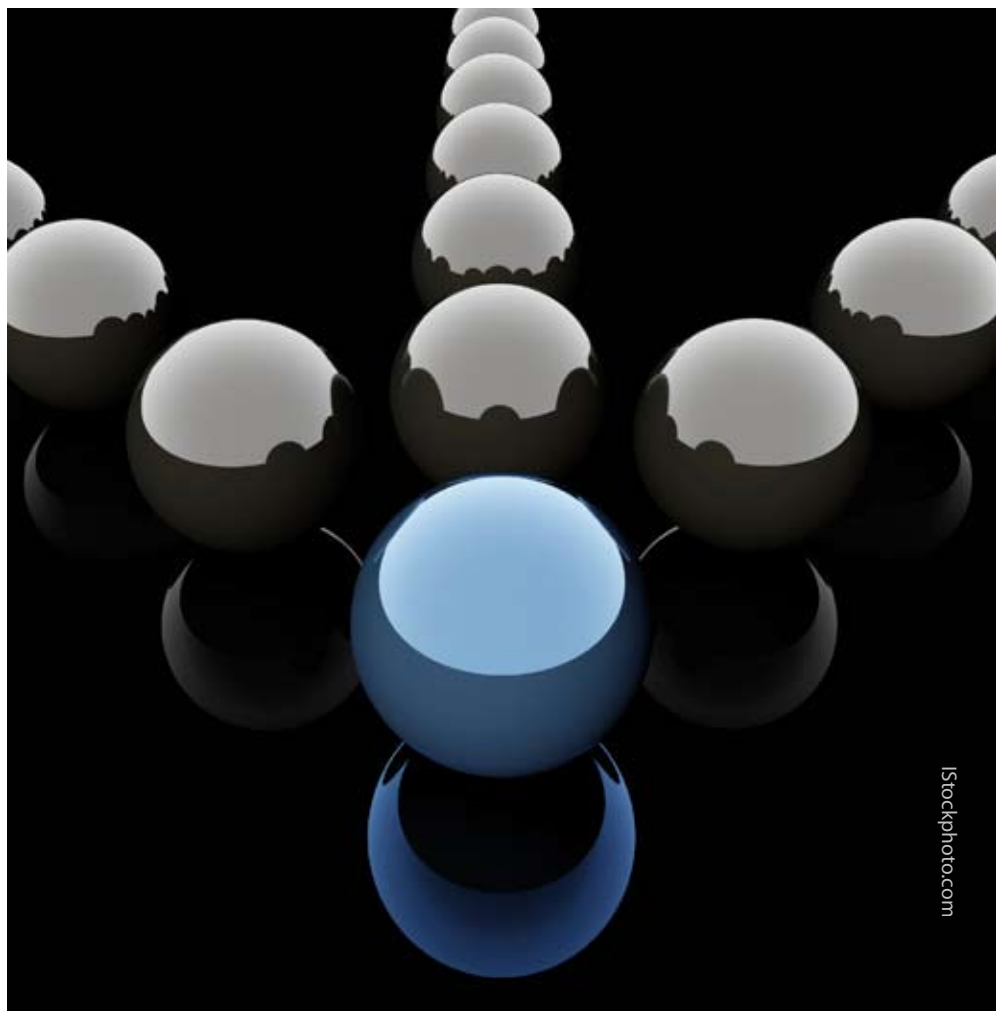
Important projects

A CO₂ Community Grid Infrastructure has been established together with the Nordic Data Grid Facility (NDGF), UNINETT/Sigma and computational centers in Oslo and Tromsø. The structure turned into a production Grid in the fall 2008.

The project «Geological Storage of CO₂: Mathematical Modelling and Risk Analysis» is a collaboration between BCCS, UiB, SINTEF ICT, Princeton University and University of Stuttgart. The project uses the Grid infrastructure mentioned in the above project.

GAFFA (Genome Annotation Framework for Flexible Analysis) is a framework for analysis, administration, integration, and storage of genome data. It has been developed at BCCS.

Bergen Ocean Model is a tool for oceanic and coastal process studies. In 2008 this tool has been further developed and the group now has several projects where local current and particle transport are studied.



MODERN VOLUNTARY WORK

Half of all Norwegians are involved in work for voluntary organisations, but there has been little research on this sector. A new research centre aims to make up for lost time.

There are more than 100,000 voluntary organisations in Norway, ranging from the Confederation of Sports and the Red Cross to the smallest women's institutes and local branches of missionary associations. Half of all Norwegians are somehow involved in voluntary organisation work.

«The voluntary sector plays an important role in our democracy. However, there has been far too little research done on this important field, particularly in relation to its importance to society,» says Kristin Strømsnes at the Rokkan Centre. She is one of the researchers currently working to make up for this. Last year, the Rokkan Centre and the Oslo-based Institute for Social Research established the Centre for Research on Civil Society & Voluntary Research on the instructions of the Ministry of Culture and Church Affairs. The website www.sivilsamfunn.no, which was officially opened in April 2009, is the centre's shop window and is intended to serve as a knowledge bank for everyone associated with the voluntary sector.

One of the centre's primary tasks is to update the data material. All local organisational life in Hordaland County and in a selection of municipalities around the country will be mapped. The Hordaland municipalities have been the subject of such surveys three times before.

«The surveys were carried out about ten years apart in the period from 1980 to 1999. This provides us with good time series for following the development and comparing Norway with other countries,» says Ms Strømsnes, who is research coordinator for the new centre.

Scandinavia on top

The Scandinavian countries lead the field in voluntary involvement. Unsurprisingly, this is often linked with the welfare state. But is it really social democracy that has provided the breeding ground for the rich organisational life?

«Many researchers today will probably claim that the opposite is the case; that social democracy developed as a result of the rich organisational culture,» says Ms Strømsnes.

The newest figures indicate that the scope of voluntary organisations remains

relatively stable, but that their composition is changing. Sports, culture and hobbies are growing, while political organisations are experiencing a decline. Another characteristic is that the involvement is of a more short-term nature. People participate less in meetings and similar formal activities.

«This type of voluntary work requires time and often a more long-term perspective. That is probably an important reason why this type of activity is losing ground.»

In addition to surveying the voluntary organisation activities in the municipalities, a questionnaire survey will provide data on, among other things, present attitudes to voluntary work. The researchers want to study everything from the motivation for participation, who participates and who does not, to changes in the population's voluntary involvement. Separate project will study the voluntary sector's standing among young people and immigrants.

«We see a particular reduction in involvement among young people,» says Ms Strømsnes. «We will therefore study both the causes and potential consequences. It will be particularly interesting to look into the role played by different network communities on the internet.»

Through history, organisational life has let people see how democracy works in practice and helped to prepare people for participation in politics. The question is how such trends as globalisation, individualisation and self-development influence our attitude to voluntary work.

«We will probably see major changes in the time ahead,» says Kristin Strømsnes.

Kristin Strømsnes is Research Coordinator at the Centre for Research on Civil Society & Voluntary



FACTS

Stein Rokkan Centre for Social Studies is engaged in research covering a wide range of topics within social sciences and cultural studies. The researchers at the Rokkan Centre are trained in public administration, political science, sociology, economics, social anthropology, history and cultural studies. The research has been organised in three research groups, reflecting the research profile of the centre:

- Democracy, Politics and Welfare
- Welfare and Health Care Studies
- Culture, Technology and Gender

The researchers connected to the centre delivered in total 46 man years of research, including 10,8 man years by PhD students and 4,7 full time equivalents by researchers in part time positions. Among 28 permanently employed researchers, 26 have a doctoral degree. The centre will continue to emphasize projects which provide basis for long term finance of pure research and policy relevant applications. This implies a continued reliance on projects from the Norwegian Research Council, the EU and public administration, but also from industry and private institutions when relevant for the research profile. Since the Rokkan Centre is one of very few research institutes that does not receive base finance from the government, which is considered important for building up and withholding a high level of research competence, great effort has been laid down also in 2008 in advocating the importance of receiving such base finance.

Partners

The Rokkan Centre is involved in cooperation with the University of Bergen and other research institutes in Norway and abroad. This takes place on a broad basis, involving common research projects, co-operation in the development of new research fields, and exchange of researchers. Researchers at the Rokkan Centre are also engaged in teaching at universities and colleges, and in tutoring of PhD- and master students.

Highlights

- Six doctoral degrees (PhDs) at the University of Bergen in 2008 were related to projects at the Rokkan Centre. Four of the dissertations were presented at the Faculty of Social Sciences, one at the Faculty of Humanities and one at the Faculty of Law.
- Research within the discipline of history in Norway has been evaluated by NFR through an international committee, and the research conducted at the Rokkan Centre received a very favourable assessment.
- The Rokkan Centre was in connection with «The University of Bergen Summer Research School: Global Development Challenges», responsible for the course «Disability, Illness, and Poverty: Identities on the margin and the effects of global forces.»
- The Rokkan Centre has through the Nordic welfare research project NordWel been the host of several PhD students and researchers from other Nordic countries.
- The Rokkan Centre has during 2008 hosted several workshops and conferences.

Publications

During 2008 a total of 32 articles were published in peer reviewed journals, 22 chapters appeared in anthologies, and the centre published 8 scientific monographs, including PhD dissertations.

The following books published in 2008 were based on projects at the Rokkan Centre:

- Hellesund, Tone. *Identitet på liv og død – marginalitet, homoseksualitet og selvmord*, Oslo: Scandinavian academic press, 2008,
- Elvbakken, Kari Tove; Stenvoll, Dag (red.). *Reisen til helseland*, Bergen: Fagbokforlaget, 2008.
- Helgøy, Ingrid; Aars Jacob (red.). *Flernivåstyring og demokrati*, Bergen: Fagbokforlaget, 2008.
- Tranvik, Tommy; Selle, Per. *Digital teknologi i sivilsamfunnet. Studier av fire frivillige organisasjoner*, Oslo: Unipub Forlag, 2008.
- Olivier, Marius; Kuhnle, Stein (ed.). *Norms and Institutional Design: Social Security in Norway and South Africa*, Stellenbosch: Sun Press, 2008.



PLANKTON WITH POTENTIAL

Basic research on the tiny creatures of the sea can teach us a lot about the human race. The microscopic larvacean may carry the key to a new treatment for cancer.

The *Oikopleura dioica* is a tiny larvacean that lives along the entire coast of Norway as well as in most other oceans. It feeds by filtering particles from seawater through an encapsulating house, has a lifetime of less than one week – and it carries a secret which may lead to new ways of treating cancer in humans.

This tiny zooplankton and its relatives keep several researchers at the Sars International Centre for Marine Molecular Biology busy, including professor and team leader Eric Thompson.

«The human being evolved from small microorganisms in the sea,» says Professor Thompson. «Today's larvaceans belong to the same group of animals which in the early stages of evolution became the origin of the vertebrates. By starting there, we hope to find answers to a number of unsolved questions.»

Small genome, great possibilities

Little *O. dioica* is an ideal guinea pig. Despite its relatively advanced biological functions, it has an extremely compact genome. This quality, in combination with a short life cycle and the fact that it is transparent, makes it easy to study the plankton's biological mechanisms.

Professor Thompson and his team have focused on various aspects of the animal, including its cell division – or, to be more precise, the lack of such. The surface tissue of the plankton is formed in a so-called *endocycle*, in which cells do not divide to make more cells, but increase in size.

«Many cancer cells are formed in exactly the same way,» says Professor Thompson. «A cancer patient's prognosis is generally good provided that the cancer can be removed surgically, but this type of cell cycle considerably increases the probability of mutations and new tumours.»

One of the special characteristics of *O. dioica* is its ability to control variants of the cell cycle.

«It has an almost incredible control of the different stages of the cycle. If we can understand the way in which this plankton controls the development of such cells, we could potentially learn new treatment methods for cancer in humans. We cannot ignore the fact that our studies will probably generate significant interest from cancer researchers in the long term,» says Professor Thompson.

His group has already made good headway when it comes to identifying the responsible genes. So far, they have mapped more than 100 so-called cell cycle regulators and developed antibodies for a number of the proteins.

«But unfortunately, this does not mean that we are much closer to a new treatment for cancer.»

Another interesting fact about the larvacean is that it is one of the most widespread species in the world and belongs to the only group of animals capable of making celluloses. This means that it also plays an important role in the ocean's absorption of carbon dioxide – and that it can therefore also give us new knowledge of, among other things, climate fluctuations.

Looking for the key

The Sars Centre is considered one of the world's foremost research environments in marine molecular biology. Almost 60 employees from many different countries prefer zebrafish, sea anemones and polyps to the more traditional experimental animals. What goes on in these genes, cells and proteins may nonetheless help to increase understanding of processes in our own bodies.

«This is basic research, but we hope that these studies will result in a set of keys which can help us to understand diseases in humans,» says Eric Thompson. «In time, this knowledge may result in new medicines and treatments.»



Studies larvaceans: Professor Eric Thompson of the Sars Centre studies the inner life of this zooplankton.



FACTS

The Sars International Centre for Marine Molecular Biology conducts research on basic biological processes by using functional and comparative molecular methods on marine model organisms.

The Centre employs some 55 researchers and other staff from 20 different nations, and continued growth is expected with the expansion of existing groups and recruitment of new ones. The Centre had a turnover at 44,4 MNOK; 35,8 MNOK from the core budget, 8,6 MNOK from other externally funded projects and income from the DNA sequencing facility.

The Sars Centre has been a partner with the European Molecular Biology Laboratory (EMBL) since 2003. Since 2006, the Centre has also been collaborating with the University of Bergen's Dept. for Molecular Biology, Dept for Informatics and Dept for Biomedicine and Unifob's Computational Bioinformatics Unit in the University's doctorate programme «Molecular and Computational Biology Researcher School.» The Centre also runs a DNA sequencing facility serving users and customers from research institutions in the Bergen region.

All research groups at Sars are non-meriting. The groups headed by Chourrout, Thompson and Becker are now in their second contract period after having been recommended by the Scientific Advisory Committee (SAC) for continuation. Jiang established his group 2006 whereas two new group leaders, Adamska and Rentzsch, were established in 2007. Together with the Lenhard group affiliated to Unifob's BCCS department, the Sars Centre has seven research groups, in addition to two associate groups headed by professors from UiO and UiB respectively.

The Sars Centre has contributed to establishing the zoo-plankton *Oikopleura dioica* internationally as a model organism for studies on more complex vertebrate organisms. The Centre's development of zebrafish as a model organism has also received international recognition. The Centre is working towards establishing new marine model organisms; *Nematostella vectensis*, *Hydra vulgaris*, *Ciona intestinalis*, and from 2007 in morphogenesis (Jiang) and signal development (Adamska) in marine evertebrates.

The Sars Centre shows significant publications in peer-reviewed, high-impact journals. Researchers at the Centre also contribute in the international research community, as collaborators, at conferences and symposia as speakers – as well as through co-authorships.

In addition to annual SAC evaluations, the Sars Centre was in 2007 comprehensively evaluated by the Research Council of Norway in a scientific mid-term evaluation as part of its 2003–2012 contract with NFR. The evaluation panel concluded that the Sars Centre had reached its main goal of establishing basic marine molecular research on an international level, and thus has profiled Bergen and Norway in the international research community. Based on the evaluation the Research Council and the UiB have now confirmed that funding contributions will be held at the current level until the end of 2012. The Centre has begun efforts to secure long-term, stable funding following 2012.

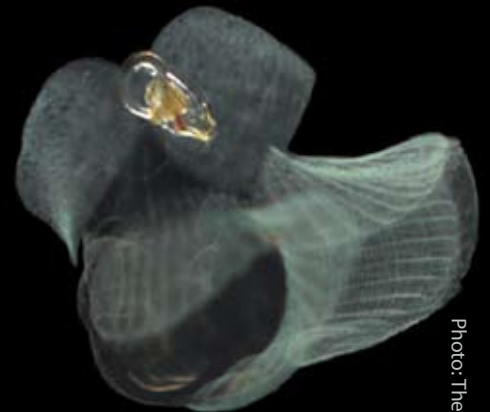


Photo: The Sars Centre



Report from the Board of Directors 2008

Pursuant to its objects, Unifob AS is a non-profit company in that its purpose is to carry out research and other activities that are naturally associated with research and which are of significant interest to the University of Bergen, but which the University chooses not to organise itself. Under this remit, the company shall promote innovation in collaboration with society and the business community. The company can establish and participate in other companies, foundations and collaborative initiatives with a view to fulfilling its objective.

Unifob AS was founded on 17 June 2003. The company is a subsidiary of the University of Bergen and is jointly owned by the University (85 %) and the Foundation for University Research in Bergen (Unifob – 15 %). The company is the research company of the University of Bergen.

In the period from 1 January to 31 December 2008, Unifob AS generated a net income of NOK 452,642,689. At the end of the year, the company employed about 550 persons, corresponding to approximately 420 full-time equivalents.

Strategic challenges

The ambition of the Board is to develop the company into an organisation which can, in a professional manner, procure new projects as well as develop its own projects that can be offered to clients, help to raise the visibility of and market Unifob AS's research, and participate in research collaboration with other organisations and institutions, particularly the University of Bergen.

Business activities

Unifob AS carries out and disseminates research in the fields of health, language and information technology, marine biology and the environment, climate, petroleum and social sciences.

The accounts have been prepared on the basis of the going concern assumption.

The accounts have been settled with a profit for the year of NOK 12,153,867. The operating profit amounted to NOK 3,790,974, and the net financial profit amounted to NOK 8,362,893.

In the Board's opinion, the annual accounts provide an accurate picture of the company's assets and liabilities, as well as of the company's financial position and performance. The Board is not aware of any events of significance to the company's position after the end of the financial year.

The working environment

In 2008, a welfare committee was set up for Unifob AS and a full-time HSE manager was appointed.

Four near-misses and two non-conformities have been reported in 2008. We have not experienced any serious accidents resulting in long-term sick leave.

In 2008, registered sickness absence (self-certificate/ doctor's note) accounted for 1.96 per cent of total working hours. The corresponding figure for 2007 was 2.07 per cent.

Environmental conditions

Unifob AS operates activities both in premises rented from the University of Bergen and in premises rented from other parties. Unifob AS has a coordination agreement with the University of Bergen's Health, Safety and Environment section. In addition to the company's own procedures, employees also comply with the procedures laid down in the university's *HSE handbook – Guidelines for the internal control of health, safety and the environment*.

Unifob AS's biology activities are located in modern buildings and laboratories, including the High Technology

Centre in Bergen, where conditions have been adapted to accommodate handling of potentially environmentally hazardous materials. The Sars International Centre is located here. All of the

Sars International Centre's procedures have been approved by the Norwegian Institute of Public Health.

SAM-marine at Unifob Environmental Research is accredited under accreditation no TEST 157 as a test laboratory and meets the requirements stipulated in NS-EN ISO/IEC 17025. The accreditation applies to P30 (taking samples), P21 (taxonomy) and P32 (expert assessments and interpretation).

Unifob's activities do not pollute the natural environment.

Gender equality

Unifob strives to achieve a balanced distribution of men and women in all job categories and to ensure that pay and working conditions are not biased in favour of one gender. Unifob's pay policy contains gender-neutral criteria for determination of salary and is practiced in a manner intended to promote equal opportunities for men and women. The company employs approximately the same number of men and women. Both genders are represented on the Unifob Board of Directors, which comprises four men and five women.

Outlook

In future, the Board will focus on improving the company's earnings.

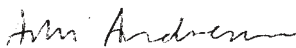
Bergen, 26. mars 2009



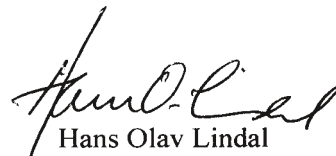
Dag L Aksnes
styreleder



Lise Øvreås



Astri Andresen



Hans Olav Lindal



Øystein Michelsen



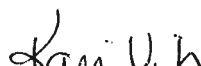
Signy Midtbø Risnes



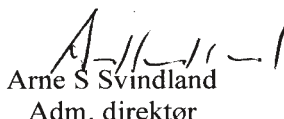
Helga Flesche Kleiven



Alois Pichler



Kari Vik



Arne S Svindland
Adm. direktør

THE BOARD OF THE PERIOD 16.06.2008 – 29.05.2009

Member:

Appointed of UiB

Professor Dag Aksnes, Leader
Professor Lise Øvreås
Professor Astri Andresen
Advocate Hans Olav Lindal

Appointed of Stiftelsen Unifob

Director Øystein Michelsen
Director Signy Midtbø Risne

Valgt av de ansatte

Researcher Helga Flesche Kleiven
Researcher Alois Pichler
Consultant Kari Vik

Deputy member:

Associate Professor Oddrun Samdal
Professor Olav Korsnes

Managing Director Bjørn Henrichsen

Personal Coordinator Tordis Lerøen
Researcher Ole Andreas Brekke
Senior Computing Officer Tove Bjørneset



Photo: Unifob Petroleum

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