

[Translation of the chapters 1 and 2 from the document "Report and plans 2011–2012 ("Rapport og planer 2011–2012") submitted from the Norwegian University of Science and Technology to the Norwegian Ministry of Education and Research, 1 March 2012.]

1. Introduction from the Board

"NTNU aims to create the basis for the development of knowledge and to create value – economic, cultural and social." This statement is an excerpt from NTNU's new strategy, which the Board adopted in the spring of 2011. The vision that will set our direction for the coming decade is "knowledge for a better world", which is also the title of the document. The university's national and global mission in society has thus been given a clearer role in NTNU's strategies, at all levels of the organization. According to survey findings, Norwegians believe that NTNU is a university with a strong sense of responsibility to society and that it contributes to the creation of value in the country. We are proud of this reputation, and we intend to make sure that we live up to it.

The Board is gratified that the extensive efforts to develop our strategy, which started in 2010, have reached completion. Not only has NTNU gained a new overarching document for governance, but the faculties have also renewed their strategies. Broad-based involvement and strong engagement have been features of the process, and the Board has attached great importance to this. Now, the demanding task of implementation has started. In autumn, the Board, among other matters, dealt with the budget and requirements for results with the aim of following up the ambitious goals we have set for ourselves. One of the most important challenges for NTNU is to concentrate our academic activities and create a greater number of robust academic groups with a leading position at the national and international level. Better conditions must be established for long-term basic research and for enabling technologies. This requires more effective use of the resources that we have, while we strive to extend the framework of our activities at the same time.

Cooperation and alliances with leading centres of expertise in and outside Norway will be an important element in the time ahead. Internationalization is a means to support our efforts to improve quality and achieve our goal of being an outstanding university. In 2011, we established an action plan for internationalization with specific objectives and initiatives. This will be an important tool for our leadership in the future.

The interdisciplinary profile and experience from collaboration with society and businesses provide NTNU with a competitive advantage in innovation. It is important to encourage increased innovation and creativity throughout the breadth of our subject areas. Effective innovation requires close, strong and professional cooperation with the private and public sectors. We want to strengthen commercialization of research results. The establishment of NTNU Discovery and the introduction of the Central Norway Regional Health Authority as a co-owner of NTNU Technology Transfer AS have been two strategically important initiatives in this area in 2011. The Board is also very gratified that we have become the main host for the Norwegian Research School in Innovation.

Applications to NTNU's programmes of study remain at a high level, with respect to both scope and quality. In the main admission round in the autumn of 2011, the number of applications increased by 8.1 % from 2010, and about 900 more students attended the start of studies compared with the previous year. The grade point average has increased by 0.3 points compared with last year, and NTNU is still at the forefront in Norway with regard to the quality of applicants. We also note that NTNU is the university with the highest number of exchange students: nearly 1500 in 2011. A survey from TNS Gallup in February 2011 shows that Trondheim has the most satisfied students in the country. The Board emphasizes that NTNU must strengthen its position as a leading academic centre in Norway. We will accomplish this through further development of our attractive student environment, but also by streamlining the academic portfolio and continuing to raise the quality of all programmes of study. This has been an area of focus in the past year and will be followed up

further in 2012.

On the research side, there has been a great deal to celebrate. In 2011, many of our research groups won national and international distinctions, including prestigious research awards. In its evaluation of biological, medical, and health research, the Research Council of Norway awarded the grade *excellent* to four academic groups, while five were rated as *very good/excellent*. A good 30 % of all the groups were awarded the top grades of 4 or 5. At the same time, an equally large proportion received the two lowest grades. The Board is not satisfied with the proportion of lower ratings, and wants more groups to achieve higher grades. For both the higher and the lower grades, the Board is concerned about follow-up of such evaluations in the academic groups, so that the quality of our research activities attains a high international level.

NTNU is active in EU research, and is the third largest player in Norway in the Seventh Framework Programme. At the end of last year, we were partners in more than 70 projects, which has provided about NOK 275 million for activities at NTNU in the period 2008–2011. We have done especially well in the energy programme, but have also won acceptance in the health and materials programmes. In line with the strategy and action plans, we will continue our commitment to international research cooperation, including working together with institutions outside Europe.

For a university such as NTNU, an effective and modern scientific infrastructure is particularly important. In 2011, we won approval for several major projects in the infrastructure programme of the Research Council of Norway, including NORBRAIN, which is headed by NTNU, and NORTEM, headed by Sintef. We are continuing with the construction of a laboratory and premises for CCS research related to the ECCSEL project, but still face major challenges with regard to the funding of modern buildings for the infrastructure. The Board will pay special attention to this and to other aspects of campus development in the time ahead. This includes the need for new premises at Dragvoll, where space is at a premium due to the growth in student numbers. Further growth in the core subjects of the humanities and social sciences requires expansion soon.

The focus on health, safety and the environment (HSE) was strengthened in 2011. A working environment that is safe and attractive for staff and students is an obvious requirement, but it is also an important success factor for a university that wants to be better in every way. It is therefore necessary to keep up the pressure with regard to HSE work, and areas where the Board is concerned with improvement will be monitored especially closely. In the light of the report from the Norwegian Labour Inspection Authority, a great effort has been made to follow up the instructions as quickly as possible, and the Board is satisfied with the commitment that has been made at all levels of the organization.

Nevertheless, all surveys consistently indicate that we have a good working environment and that students and staff are happy at NTNU. Staff members who are motivated and satisfied are the greatest asset a university can have – the starting point for achieving progress in research and education. Thanks to them, NTNU has achieved good results in 2011 and has taken important steps forward.

Trondheim, 1 March 2012



Marit Arnstad
Chair of the Board

2. Events and highlights in 2011

2.1 Knowledge for a better world

In the spring of 2011, the Board adopted an overarching strategy for the next ten years. The document "Knowledge for a better world" contains a clear vision that NTNU will take an active role in knowledge development and help to solve the great challenges faced by Norway and the world community. Our responsibility to society has become much clearer in our strategies, not only at the top level, but also in the plans of the faculties and academic groups. The strategy process has been a positive experience with strong commitment and broad-based involvement.

Quality in research, education and artistic activities are key aspects of the strategy. NTNU has high aspirations. In areas where we have special qualifications, we aim to be internationally outstanding. This requires greater concentration and more stringent priority setting, and we must develop academic environments that are more robust. We must also identify and cultivate talents that are capable of achieving the highest international level. Faculties and departments are well under way with this process, and in 2011 we have taken several steps forward to streamline the academic portfolio and improve the organization of our activities. This is a long-term endeavour, but we are on the right track.

International cooperation is an important prerequisite for success. The long-lasting effort that NTNU has invested in developing relations with China has yielded good results, and in 2011 we launched a new academic initiative in relation to India. The extent of research cooperation in the EU is increasing. The Board has adopted an ambitious action plan for internationalization that sets specific objectives and initiatives for the coming years.

NTNU's specialized main profile, our academic breadth and long experience in interdisciplinary collaboration means that we are well positioned to provide important contributions in research, education and innovation. Norwegians regard NTNU as a university with great social relevance and high quality in its programmes of study. They feel that we are an important element in the creation of value in Norway. The high level of applications to the programmes of study that we offer and to our scientific recruitment positions is evidence of our good reputation. If we are to be able to continue recruiting from the best specialists and students in the future, we must ensure that they have a good working environment and competitive conditions. Premises with adequate capacity and high quality as well as up-to-date equipment for research and education are vital. In 2011, we made important advances in upgrading of the infrastructure, and HSE initiatives have received increased attention.

Action plan for internationalization

In August 2011, the Board adopted the action plan for internationalization for NTNU for the period 2011–2013 within the framework of the strategic plan. This is the most ambitious plan for internationalization that NTNU has had up to now, with clear goals for our international commitment in research, education and innovation.

Quality and relevance in NTNU's activities are the objectives, and internationalization is a means to achieve them. Two key initiatives form the basis of the plan: development of strategic international partnerships, and systematic linking of education, research and innovation. The ambition of the action plan is that internationalization will be integrated in all academic activities and that all academic groups will form part of international development of knowledge and will participate in international academic relations.

Social relevance and creation of value

Several surveys in 2011 show that NTNU has high social relevance and that it makes a substantial contribution to value creation. The survey of top management showed that NTNU had educated 15.6 per cent of the senior executives in the 500 largest enterprises in Norway. Only the BI Norwegian

Business School and the Norwegian School of Economics have supplied more leaders to Norwegian business and industry. A survey conducted by Synovate last year indicates that most Norwegians regard NTNU as the university in the country that has the greatest sense of social responsibility, operates most effectively, shows the greatest transparency in its conduct and has the highest academic level.

NTNU has made a strong commitment in the area of innovation and entrepreneurship, with special attention to environmentally friendly solutions. In spring 2011, 600 students worked in the course "Experts in Teamwork" to come up with new ideas in relation to the challenges related to a "greener" Trøndelag county. Europe's first installation for industrial CO₂ capture using membrane technology was opened at a coal-fired power plant in Sines, Portugal, in October. The technology was developed by Professor May-Britt Hägg and her colleagues at the Department of Chemical Engineering as part of the EU project NanoGLOWA.

2.2 External prizes – an expression of high quality

Several coveted national and international awards and honours in 2011 show that we have experts and students who are in the forefront of their fields. These distinctions relate to research, artistic work and education. The prizes were awarded to staff in a variety of disciplines – medicine, technology, natural sciences, architecture, humanities and visual arts. They provide evidence of the academic breadth at NTNU, and reflect the high level of our activities. Examples include Anders Jahre's Award for Medical Research, the Alfred Wegener Award, the Statoil Award for Outstanding Research, Universitetsforlaget's prize for the year's best article and the IEEE Best Student Paper Award.

2.3 Research and artistic activity at a high level

Infrastructure

NTNU was granted the NORBRAIN project in cooperation with the University of Oslo (UiO) from the Research Council's allocation for large-scale infrastructure. Within a framework of NOK 80 million, we can now strengthen the neuroscience research environment. Together with Sintef and UiO, we were also granted NOK 58 million for NORTEM, the Norwegian Centre for Transmission Electron Microscopy, which makes it possible to obtain advanced new instruments for transmission electron microscopy. The grant for national cooperation in resources for high performance computing, NOTUR II (the Norwegian Metacentre for Computational Science), enables NTNU to complete the upgrade of Njord – a supercomputer that provides important services to both internal and external research groups. We are also pleased about the award of a grant for the Norwegian node in ELIXIR, the European cooperative programme in infrastructure for biological information.

NTNU was awarded a new environmental centre: CenSES

In 2011, NTNU received one of the three centres for environment-friendly energy research (FME) – the Centre for Sustainable Energy Studies (CenSES). CenSES will study the interaction between technology and society in relation to the global challenges in energy policy. The aim is to gather insights from an array of disciplines to provide an improved basis for making decisions on future investments in energy.

New SFI centre: SAMCoT – Sustainable Arctic Marine and Coastal Technology

NTNU hosts one of the seven new Centres for Research-based Innovation (SFI), which opened in 2011. SAMCoT's objective is to become a leading national and international centre that develops robust technology to explore and benefit from natural resources. SAMCoT will work in close cooperation with other players including Sintef and the University Centre in Svalbard, as well as industrial partners such as Statoil and Aker Solutions.

AUR Lab – Applied Underwater Robotics Laboratory

NTNU reinforced its leading position in marine research when we established the Applied Underwater Robotics Laboratory (AUR Lab) in the autumn of 2011. AUR Lab will focus on sustainable and environmentally robust solutions to challenges in the oceans. These include environmental monitoring, marine research, and offshore oil and gas applications.

Good evaluations

Four of the research groups in the Faculty of Natural Sciences and Technology (NT) were graded as excellent in the new evaluation of the biological disciplines. These were the Centre for Conservation Biology (CCB) and the environmental toxicology group at the Department of Biology as well as the groups in microbial biotechnology and in biopolymers at the Department of Biotechnology. At the Faculty of Medicine, the Centre for the Biology of Memory (CBM)/Kavli Institute for Systems Neuroscience received the assessment "undoubtedly excellent".

Norwegian research in the earth sciences was also evaluated in 2011. The applied geophysics group at the Department of Petroleum Engineering and Applied Geophysics was evaluated as very good/excellent.

At the same time, we will not hide the fact that some academic groups received weaker grades in the two evaluations. NTNU will address this and will follow up the groups concerned with the aim of raising the level of quality.

Coordinated projects in FP7

At January 2012, NTNU is participating in 79 projects in the EU Seventh Framework Programme, making it the third largest Norwegian player in FP7. In NTNU's international involvement, participation in the European Research Area (ERA) is a top priority, with the EU's Framework Programme as the key instrument. With clear goals and substantial commitment of resources, a systematic effort is being made throughout the organization to increase our participation. The action plan for EU-funded research in the period 2011–2013 has an annual budget of NOK 5 million. In addition, there are incentives in the form of funds and positions for approved projects.

New PhD booklet: "Quality for PhD Education"

The preparation of the PhD handbook is a follow-up initiative after the analysis project "Researcher Recruitment and PhD education" from June 2009. The objective of the handbook is to achieve better and more consistent quality in PhD education. It is aimed at anyone working with PhD education, but it is primarily intended for PhD candidates and their supervisors.

Art

Works by Professor Anne-Karin Furunes were exhibited at the Barry Friedman Ltd. Gallery in New York from November 2011 to February 2012. Furunes is famous for her distinctive technique, in which pictures from historical archives of photographs are enlarged and perforated.

In May, NTNU conferred an honorary doctorate on Kjetil Trædal Thorsen, co-founder and director of the architectural firm Snøhetta. He is the first architect to receive this honour since Alvar Aalto was awarded an honorary doctorate in 1960.

The musicians Carl Håkon Waadeland, Ståle Storløyken and the Trondheim Soloists participated in a music project that won the Spelemannprisen award in 2011. Other musicians from NTNU's Department of Music also took part in music projects that were nominated for the Spelemannprisen, which is the Norwegian equivalent to the Grammy Awards.

2.4 Highly qualified and satisfied students

Good applicants, good admissions and more women

In 2011, the number of applicants through the Norwegian Universities and Colleges Admission

Service increased by 8 % from 2010. This is 3 % higher than the average in the sector. It is especially gratifying that NTNU filled the study places in the international programmes. The quality of the new students is high. This is measured as the number of points from upper secondary school. The number of women admitted to programmes in technology increased by 18 % from 2010.

Teacher education in greater demand

NTNU has developed a sought-after 5-year master's programme for teacher education. We see that the number of applicants is increasing every year. From 2010 to 2011, the number of applicants increased by 7.2 %, which means that every year it becomes more difficult to get a place.

New programmes of study

In 2011, the first year of study began in the new 6-year psychology programme at NTNU with direct admission. At the Faculty of Architecture and Fine Art and at the Faculty of Medicine, new 2-year master's programmes have been created to reflect special expertise that society needs. Staff at the Faculty of Information Technology, Mathematics and Electrical Engineering have explored how the ICT programme of study should be developed in the future. At the Faculty of Natural Sciences and Technology, the first candidates in the 5-year master's programme in nanotechnology have graduated. This is one of the programmes in Norwegian higher education to which it is most difficult to gain admission.

Qualifications framework

The qualifications framework will be in place in all programmes of study at all levels when the autumn semester of 2012 begins. The work is based on experience from the pilot project in 2009/10 and the academic preparations at the faculties since then.

Internationalization: Erasmus Mundus (EM)

In 2011, NTNU was included in two EM initiatives, which will begin in 2012. They are at master's degree level in the subject areas of wind energy (where the partners are from the Netherlands, Germany and Denmark) and dance knowledge (with partners from France, the United Kingdom, Hungary and the Netherlands). In dance knowledge, the Faculty of Humanities is the EM coordinator.

Improved language training in Norwegian for international students

NTNU has developed its own Web-based course in the Norwegian language, which enables us to offer customized tuition in Norwegian to a higher number of international students than previously. The course includes interactive exercises. The first user tests were conducted in 2011, and the response has been very positive.

Satisfied students

A survey conducted by TNS Gallup in 2011 showed that NTNU has the most satisfied students in Norway.

2.5 An innovative university

NTNU Discovery

NTNU Discovery is intended to help to bridge the funding gap for good ideas and research results with commercialization potential. NTNU Discovery is well under way, and awarded NOK 8 million to 14 projects in 2011. This grant for development and verification of research findings makes it possible for the business sector to take over research results and introduce them to the market. For example, it may provide the oil and gas industry with an easier way to separate water and gas, or offer better ways for people with diabetes to monitor their blood glucose and improve their quality of life.

Cooperation between TTO and the Central Norway Regional Health Authority

The Central Norway Regional Health Authority has become a co-owner in NTNU Technology

Transfer AS. This provides better opportunities for innovation and business development in the health sector.

Research School

The Norwegian Research School in Innovation has been assigned to NTNU. The research school is being developed in close cooperation with BI Norwegian Business School. It will involve leading national and international communities of expertise in innovation research. The school also focuses on the regional perspective.

Start-up businesses for a better world

Several of the start-up businesses spun off from NTNU have produced new and better solutions to challenges in society. An example is 3d-Radar AS, which has developed an advanced system for ground penetrating radar. This creates 3-dimensional images of underground objects. It can be used to detect landmines and improvised explosive devices. This radar technology also makes it easier to survey pipelines or to inspect roads, railways, and airports. Another example is Kaliber Industrial Design, which has developed a "vacuum cleaner" for mechanical clean-up of oil spills.

2.6 Interaction with society and industry

India in Norway

NTNU moved a piece of India to Trondheim when 150 guests from India arrived to liven up the city with more than a hundred events during the first week of October. The opening concert featured the world-renowned Indian percussionist Trilok Gurtu, who played together with the NTNU Jazz Ensemble.

Improved contact with society

The Næringslivsringen collaboration between the construction industry and NTNU's programme of study in civil and environmental engineering received well-deserved praise during the Building and Environment Day 2011. NTNU is working to establish such partnerships in a number of subject areas. We are also making it easier for people from outside the university to find their way around. With a "Campus Guide" for browsers, NTNU in Trondheim is the first university in the world where you can navigate both inside and outside with a smartphone, tablet or PC.

Fruitful collaboration with cultural life

For several years, NTNU has worked together with the Trondheim Soloists, a chamber orchestra with present and former music students. National and international performances highlight our education in music, NTNU as an institution, and the orchestra itself. In 2011, the newly established NTNU Jazz Ensemble performed both during the India week and at the Trondheim Jazz Festival. As part of the teamwork with the Trondheim Jazz Festival, the PELbO trio, graduates from NTNU's programme in jazz, were designated as NTNU ambassadors in 2011. Another innovation was the collaboration with Trøndelagsutstillinga, the Trøndelag Exhibition, where the artist Per Formo was awarded the NTNU artist prize.

2.7 Better working environment and internal control

Greater emphasis on HSE

In 2011, NTNU has made a number of improvements in the area of HSE. Chemical health hazards have been reduced, the units have made good progress with local plans for emergency response, and NTNU has introduced a new system for handling of non-conformances. There has been a strong increase in training initiatives in HSE. The psychosocial work environment has received greater attention, and a variety of actions have been taken to improve it. New procedures in relation to sickness absence have been introduced. We have worked with the new action plan for more inclusive working life (IA), objectives, activity goals and specific initiatives. We place great emphasis on preventive measures and on integration of inclusive working life as a management responsibility and

as part of our HSE efforts.

Services offered to international staff

In 2011, the established mobility centre, NTNU International Researcher Support (NIRS) has offered international researchers a better encounter with NTNU. Through new web pages, courses, excursions and seminars, the centre provides advice on a variety of practical and cultural challenges. NIRS is working together with the City of Knowledge (Kunnskapsbyen) in a programme to introduce researchers to Trondheim as a centre of culture and learning.

Improved control of temporary appointments

NTNU has reduced the number of temporary employees. This has been achieved through the units' efforts in terms of strategic plans for human resources, conversion to permanent positions, and control over the engagement of temporary staff.

Internal control and more efficient services

NTNU has developed IT-based systems to improve internal control and make services more efficient from the users' perspective. Among other things, NTNU has made considerable progress in efforts to develop a dynamic tool that gathers key figures and will be available to leaders at all levels. Another example is a Web portal that provides support to researchers in medical and health-related research in project implementation. At the same time, it meets requirements for internal control and management of non-conformances.