

Annual Report 2013



NTNU
Bevegelsevitensk



NTNU – Trondheim
Norwegian University of
Science and Technology

Production: NTNU Communication Division

Photo, front page: NTNU SVT/Nils Heldal

Circulation: 100

Print: Skipnes Communication

CONTENTS

| | |
|--|-----------|
| Introduction | 4 |
| Knowledge for a better world | 6 |
| Research and artistic activities | 8 |
| Education | 14 |
| Innovation | 18 |
| Communication | 22 |
| Management, participation and resources | 26 |
| Key figures | 28 |

The Norwegian University of Science and Technology (NTNU) is Norway's primary institution for educating the nation's future engineers and scientists. The university also has strong programmes in the social sciences, the arts and humanities, medicine, teacher education, architecture and fine art.

- With more than 22,000 students, NTNU is the second largest university in Norway.
- NTNU employees work more than 5,000 person-years, more than 3,000 of which are in teaching, research and communication.
- NTNU is divided into seven faculties, 49 departments and the University Museum.
- NTNU works closely with the research foundation SINTEF and St. Olavs Hospital.
- NTNU has more than 100 laboratories and 600,000 m² of owned and rented space.
- NTNU has an annual budget of approximately NOK 5.6 billion, of which externally funded projects amount to NOK 1.5 billion.

INTRODUCTION



Rector Gunnar Bovim meets the rector of the future.

NTNU's strategy, "Knowledge for a Better World", sets ambitious goals for our university until 2020. A review of the year past and our plans for the future show that NTNU has had many successes and is headed in the right direction.

THE BOARD AND MANAGEMENT

Morten Loktu served as the acting Chair of the Board during the spring of 2013. He was succeeded by Per Kristian Foss in the summer of 2013. Several 2013 board members were also appointed that summer for a new fixed term. Foss led the Board during the autumn of 2013, but was appointed Auditor General from 2014.

Svein Richard Brandtzæg assumed the position as NTNU Chair of the Board beginning in January 2014.

In August 2013, Gunnar Bovim began as the university's new Rector.

The Board has handled several important matters in 2013. Their top priority was following up on NOKUT's evaluation with the development of a new QA system, which was discussed at all Board meetings. The Board has also given high priority to the hiring of new leadership. During the spring of 2013, the Board hired a new Rector, seven Deans and a new NTNU University Museum Director. NTNU has now implemented a management model with staff managers at all levels.

The Board has also closely followed the fact-finding process related to the campus development project. Other major matters were the further development of the

study programme portfolio, establishment of new strategic areas, guidelines on employees' second jobs and the percentage of temporary employees.

PLANS AND AMBITIONS FOR 2014

The plan for 2014 is the operationalization of NTNU's strategy, "Knowledge for a Better World", in our annual activity objectives and measures.

We want to be an important contributor to addressing social challenges, and have high international ambitions. Achieving this demands a solid foundation. Therefore, the recurrent theme in our 2014 priorities is "quality throughout the organization". We also want to highlight the university's distinctive aspects and further develop our strengths (innovation, close contact with the workplace, interdisciplinary efforts). Among the important measures designed to help the university address social challenges are developing the study programme portfolio, establishing strategic areas and strengthening cooperation with peripheral enterprises and the business and public sectors. We also need to be better at profiling our activities and participating in the public debate.



Photo: Thor Nielsen/NTNU Comm. Div.

Knowledge for a better world

NTNU wants to be an important contributor in solving the challenges that face the globe, and has high international ambitions.



Photo: Kristoffer Furberg, Universitetsavisen, NTNU

Mozart of the linguistic world

Terje Lohndal is a 28-year-old professor of linguistics at NTNU. He published his first paper at age 21. Terje Lohndal is also the youngest winner of the Nils Klim Prize - a prestigious research prize awarded to young Nordic researchers in the humanities, social sciences, law and theology. He was also recently awarded the Royal Norwegian Society of Science and Letters prize for young researchers. He is studying the very fundamentals of language, and trying to look differently at how language is constructed. His work has been widely recognized because it has a unique depth, originality and scope.

The 200th anniversary of Norway's constitution is in 2014, and the Government has said it wants to ready the country for the next 200 years. The Minister of Education and Research has presented a seven-point plan to increase the quality of research and higher education. The plan is generally in line with our own strategy under our vision, "Knowledge for a Better World".

NTNU RESEARCH EXCELLENCE - WORLD-CLASS ACADEMIC ENVIRONMENTS

NTNU Research Excellence was launched in 2013. Its objective is to produce the best possible researchers and research groups. We have prioritized developing the talents we already have, as well as recruiting new international talents. We also want to strengthen our research culture in a broader sense and build our employees' expertise. We have increased our emphasis on the quality and extent of our researchers' scientific publications. We have facilitated increased international mobility and participation in European research cooperative partnerships. Our explicit strategic objective is that all of NTNU's academic environments should be at a high international level.

INNOVATIVE EDUCATION

Society is changing rapidly, and education has to keep up. NTNU was the first university in Norway to start using MOOC - massive open online courses. Starting in 2014, four academic environments received support to develop innovative education projects, such as in the 5-year teacher training programmes. This is the beginning of a long-term process to develop new learning methods and revitalize NTNU's education programmes with alternative

forms of assessment and digital exams, among other efforts. Our goal is for several of our academic environments to qualify for the prestigious "Centre of Excellence in Higher Education" programme.

INCREASED EMPHASIS ON TEACHER EDUCATION

Predictability, long-term planning and innovative forms of study are key to increasing the quality of teacher education and, consequently, the nation's school system. In Trondheim, we have almost a hundred years of experience in educating teachers, and our activities are research-based. If we are given the opportunity, we will quintuple the number of available places in our continuing education programme for teachers. This will mean a thousand places next year. NTNU already has academic offerings for mathematics, natural science, language teachers, and for counselling. Starting in 2015, we will add more subjects in technology, social sciences and aesthetics.

DISTINCTIVE CHARACTER AND SOCIAL RESPONSIBILITY

NTNU plays a special role in the Norwegian research and education landscape. When the Government presents a long-term plan to prioritize research to create a competitive edge and solve the great challenges of our time, NTNU is in a strong position. The themes we have chosen for our four new strategic areas are a good example of this:

- Energy
- Ocean science and technology
- Health, welfare and technology
- Sustainable societal development

These are also topics that address global challenges while at the same time offer opportunities for the Norwegian business sector. NTNU's strategic areas should highlight the university's unique expertise, but should also contribute to structuring our research and educational efforts. Last but not least, they are important components in our efforts to realize our vision of Knowledge for a Better World.

NTNU 2060 – VISIONS FOR CAMPUS DEVELOPMENT

The Ministry of Education and Research initiated a concept study (KVU) in 2013 to address the space issues at the Dragvoll Campus. At the same time, the Rector initiated a vision project for campus development at NTNU from a 50-year perspective. The effort included a survey of national and international trends that affect the university now and in the future and a thorough discussion of the best strategies to develop the NTNU campus to meet future needs and requirements.

The vision project's report was delivered in January 2014, and the main conclusion was a clear recommendation to work to concentrate the different campuses and integrate them more closely with the urban community in Trondheim. More building projects, or reducing the number of campus locations are not objectives in and of themselves. Instead, what is important is to create an infrastructure for research and education that will enable NTNU to reach its objective of being an attractive, internationally outstanding university. Given this perspective, good campus solutions and better integration with the surrounding community are important to achieving these goals.

NTNU laid the foundation in 2013 to further develop its top international research environments and create a culture of quality across the entire range of our research and artistic activities. Four new strategic areas will also be initiated in 2014.

HIGHLIGHTS FROM 2013

- Four new research centres of excellence
- 370 new doctoral degrees
- Four grants for basic research to young research talents
- An increase in the number of level 2 publications
- Continued growth in externally funded research
- Top year for participation in FP7
- Two new national research infrastructures, NorBOL and Smart Grid
- NOK 150 million from the Government and the Research Council of Norway for CCS laboratories associated with ECCSEL, the European Carbon Capture and Storage Laboratory infrastructure.

RESEARCH AND ARTISTIC ACTIVITIES



WINTER RAIN ON SVALBARD AFFECTS ANIMAL COMMUNITIES

The entire wintering wildlife community on Svalbard is synchronously influenced by climate and extreme weather events. Norwegian researchers from NTNU's Centre for Biodiversity Dynamics were the lead scientists on the project. Heavy rain causes icing on the frozen ground and blocks the availability of food for reindeer, grouse and mice. This leads to a crash in the populations of these herbivorous species during winter and spring. The study was published in Science and widely written about in more than 100 national and international media.

RESEARCH, ART AND NTNU'S DISTINCTIVE CHARACTER

NTNU stands out in the Norwegian educational landscape. Our distinctive character as a university is a strength in national and international academic competition. Our main profile of technology and natural science, along with great academic depth and interdisciplinary expertise, puts us in a special position in this sector. This is reflected by the results of our research and artistic activities.

Our main profile is clearly reflected in our scientific publication numbers. Technology and natural science subjects represent more than half of all the university's published works, while the Faculty of Medicine, which conducts both medical and scientific research, produced about one-tenth of all publication points. Of the almost 1,100 doctoral degrees awarded by NTNU over the last three years, 63 per cent were taken at the three technology and natural science faculties (NT, IVT, IME), 19 per cent in the social sciences, humanities and architecture (SVT, HF, AB) and 18 per cent at the Faculty of Medicine (DMF). Over the last few years, NTNU has graduated nine out of ten technology-related PhDs in Norway.

The extent and percentage of externally funded research also says something about NTNU's distinctive character. In 2013, more than 60 per cent of the funding provided to NTNU by the Research Council and the EU went to the three technology- and natural science-related faculties. Medicine represented a little over 20 per cent. These figures clearly reflect our profile, but also the large expenses associated with experimental research.

For a university that emphasizes experimental research, access to good laboratories is critical. The Research Council's commitment to research infrastructure is important. In 2013, 16 research infrastructures were granted funding for which NTNU and SINTEF are either the host or partner institutions. Seven of the highest priority projects received approval, in addition to NOK 50 million in funding for ECCSEL (Carbon Capture and Storage) laboratory from the Research Council.

On 10 June, we opened the four new centres of excellence (CoE):

- AMOS – Centre for Autonomous Marine Operations and Systems
- CNC – Centre for Neural Computation
- CEMIR – Centre of Molecular Inflammation Research
- CBD – Centre for Biodiversity Dynamics

First and foremost, status as a CoE is an acknowledgement of quality. At the same time, the selection shows that NTNU possesses expert knowledge in its main research areas and medicine. A hallmark of the research at the four centres is that it is both interdisciplinary and experimentally based.

Humanities and social sciences are important at NTNU. In 2013, we saw a gratifying increase in the number of projects included in the Research Council's programmes. Artistic subjects with a performance aspect are also an important part of our distinctive character. Last year, our musicians received international acclaim with two Grammy nominations.

RESEARCH AND ART AT THE HIGHEST LEVEL

In 2013, we started work on a priority programme called NTNU Research Excellence. This is a collection of existing and new measures intended to increase our ability to succeed in the most challenging funding competitions. Among the measures is the quality assurance of applications to the EU and the Research Council. Identifying and supporting selected applicants for grants from the ERC (European Research Council) and large EU projects is going well.

Seven leading research groups have been selected for and received special assistance in writing project applications for Horizon 2020. The third round of applications to the Research Council of Norway for Centres for Research-based Innovation received a great deal of attention in 2013. NTNU worked closely with SINTEF to select the best candidates and ensure that the application drafts were of the highest quality. A total of 19 drafts hosted by NTNU were submitted.

NTNU Outstanding Academic Fellows is among the new measures approved for 2013. The purpose of this programme is to give young, world-class researchers the ability to further develop their academic expertise and qualifications. The programme gives participants the opportunity to qualify to compete for ERC grants from Horizon 2020 between 2014 and 2020. A total of 17 NTNU researchers have been invited to participate in the programme's first stage from 2014–2017.

We will also recruit up to 20 outstanding international researchers, and focus on younger research talents,

preferably with a few years of research experience after being awarded their PhDs. We would like to bring them to our best academic environments, to help these groups achieve or maintain top international standards.

NEW OVERARCHING STRATEGIC AREAS

In June 2013, the Board decided to establish four new strategic areas for 2014–2023:

- Energy
- Ocean science and technology
- Health, welfare and technology
- Sustainable societal development

These four areas were selected after a comprehensive process where social relevance, academic quality and potential for interdisciplinary cooperation were emphasized. The areas of strength and the academic groups that will constitute the nucleus of the efforts have been identified, and during the autumn of 2013, the university further developed the strategic foundation, organization, administration and management for the effort.

ENABLING TECHNOLOGIES

The national research infrastructure called NORFAB is an important effort for nanotechnology and materials research, of which NTNU NanoLab is a part. Operating and developing these facilities demand a great deal of resources, not least because Norway still does not have a mature industry that can insist on and fund research. Future investments in, and the operation of NORFAB will be challenging in the years ahead. At the same time, we

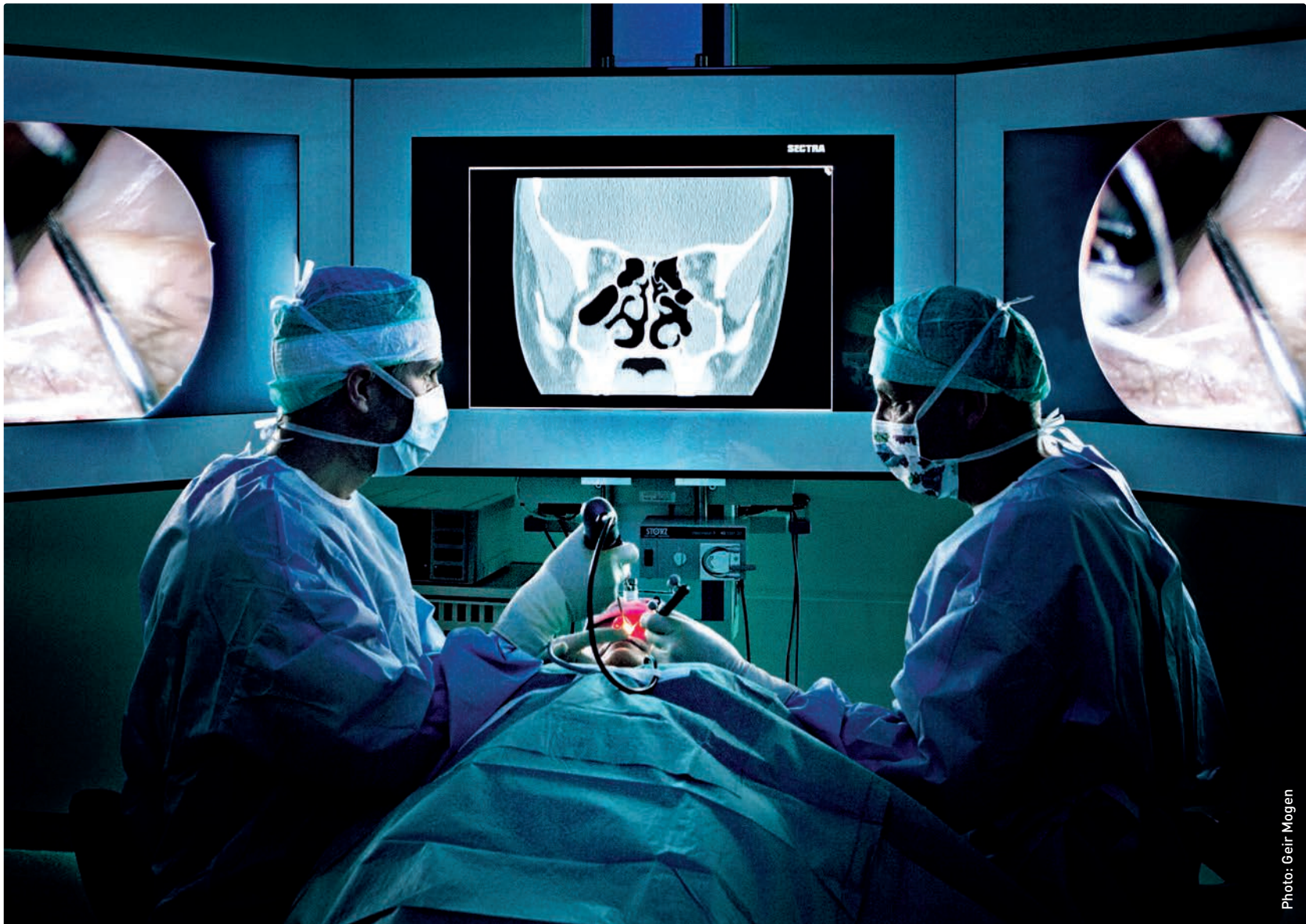


Photo: Geir Mogen

Medical technology researchers in Trondheim have developed methods and technologies that have changed the everyday workings of today's hospitals.

are excited to have opened the Centre for Transmission Electron Microscopy (TEM) at NTNU and SINTEF in 2013. This infrastructure, partially funded by the Research Council, has great significance for materials technology research and education.

The special focus on biotechnology begun in 2012 has had good results. In 2013, a similar effort was begun to strengthen materials technology and ICT. This process will continue in 2014.

SCIENTIFIC PUBLICATIONS

Since NTNU started tracking publication numbers and points in 2004 and through 2012, the university has seen an overall growth in publication points of 155 per cent. The increase was significant in both 2011 and 2012. Last year, the production was approximately the same as in the peak year of 2012, but with an increase in publication at the highest level (level 2). Our future efforts will be concentrated on keeping the volume of scientific publication up while increasing the percentage of level 2 publications. We also started developing a publication strategy for NTNU in 2013, along with a programme to support open access publication.

EXTERNALLY FUNDED RESEARCH

The Research Council of Norway is by far NTNU's largest external source of funding. Funding has stayed relatively consistent at a little over NOK 600 million per year.

Research funding totals from the EU are just 10 per cent of the totals from the Research Council, but this funding is very important in internationalization and in improving

the quality of research at NTNU. There has been a significant growth in funding in recent years, with an increase of 9.4 per cent from 2012 to 2013. The university has achieved its objective of being awarded NOK 450 million under the EU's FP7 by a good margin. The main focus in 2013 has been positioning for Horizon 2020. NTNU sent 20 applications to the ERC in 2013.

Our participation in the EU's FP7 was at its peak in 2013. With 23 new contracts worth a total of NOK 145.7 million, our overall funding from FP7 now totals NOK 501.2 million. The fact that we have been awarded several new joint projects where NTNU is the coordinator is particularly encouraging.

The number of projects funded in cooperation with the Central Norway Regional Health Authority continues to grow, and last year amounted to NOK 200 million. We have also seen an increase in activities funded by the business sector, particularly at the Faculty of Engineering Science and Technology (IVT). Statoil is by far the largest collaborator, but the Norwegian Public Roads Administration, SINTEF and DNV GL (Det Norske Veritas) are also significant contributors.

Contract work in 2013 showed a slight decrease compared to the previous year. One reason for this is that the University Museum, which normally has a large contract portfolio, had fewer and smaller archaeological excavation and survey projects in 2013.

DOCTORAL EDUCATION

Three hundred and seventy doctoral degrees were

awarded by NTNU in 2013, almost as many as during the historical peak year of 2012. This is a clear sign that the faculties have worked systematically with their doctoral programmes.

NTNU has approximately 2400 doctoral contracts, and generally only 2 per cent of the candidates leave the programme before their defence. The net time spent on the programme before disputation remains an average of 3.4 years for both men and women. NTNU is recruiting more and more foreign PhD candidates, especially at the technology faculties. The percentage of foreigners defending their doctoral theses increased from 27 per cent in 2006 to 41 per cent in 2012. NTNU faces a big challenge in recruiting more top Norwegian candidates for its PhD programmes.

In our survey from 2012–13, PhD candidates indicated that they were only moderately satisfied with PhD courses, their inclusion in the academic environments and supervision. Only one out of four candidates spent part of their studies abroad, and less than half of the supervisors have done longer periods of research over the last seven years. Our ambitions are higher than this, and we are working continuously to improve.

At the same time, the candidate survey showed that 95 per cent think that their educations are relevant to their occupations. The Norwegian workforce has both the room and the need for more people with PhD qualifications to strengthen research in the business world and to increase the quality of public services.

The process of including the PhD education in a quality assurance system that addresses all levels of education made headway in 2013. All the faculties have done a great job implementing a system to follow up on the quality of their PhD educational programmes.



NTNU holds a special position in the Norwegian educational landscape. Our unique main profile in the natural sciences and technology, combined with our wide range of academic disciplines and interdisciplinary expertise, give us a competitive advantage in national and international settings.

EDUCATION

The main focus in 2013 has been the new quality assurance system. This process has required effort at all levels of the organization. We have also developed a central recruitment strategy and clarified our study programme profile. In 2013, NTNU hosted Norway's first ever MOOC – an open, web-based educational provision. We will continue to digitalize education and promote innovative forms of education and learning.

HIGHLIGHTS FROM 2013:

- Stable, high application numbers
- Forty-eight per cent of all students are women– the highest percentage ever
- Consistently high quality in admitted students
- Steadily increasing numbers of student exchanges – 1460 incoming and 928 outgoing
- The number of candidates for master's or other graduate studies is increasing in accordance with student numbers
- 84 per cent of graduates are satisfied with their education



EDUCATION ACROSS MULTIPLE CHANNELS

Four projects have been awarded a total of NOK 12 million for three years to radically alter their teaching approaches. Several projects will test an inverted classroom, where the lecture is moved to a video and a virtual space that students can see on their laptop or tablet. Time in the classroom is then used for questions, discussions and group work. Lectures with several hundred students are broken up with digital voting or the use of "clickers" to answer questions. The goal is active students, and the most innovative education.

EDUCATION QUALITY

In 2013, we developed a new quality assurance system with universal requirements for evaluations of courses and study programmes at all educational levels. The system developed and clarified issues related to responsibilities and requirements for everyone involved, systematic student evaluations of courses, requirements for quality assurance of study programmes, and systematic reporting and follow-up. The students' role and opportunities for feedback have now been more clearly described. The website developed to support the quality assurance process now contains a "Let us know" page. Here, students can let us know about incidents that might require HSE follow-up, problems and issues in the learning environment, with whistle blower procedures and problems with the quality assurance system.

Good recruitment is fundamental to getting the best applicants – and getting the right ones. We developed an overall student recruitment strategy in 2013 that is in effect for 2014–2020. This applies to all NTNU study programmes, from basic programmes to PhDs, continuing and further education, and international students. The strategy is based on the assumption that motivated applicants with a relevant background are more likely to succeed as students and have a lower drop-out risk.

NTNU was the first university to change the 5-year teacher training programme according to the new national curriculum. The students accepted for the autumn of 2013 will begin their supervised professional training early, and have a well-integrated course of study.



Photo: Håvard Kallestad/NTNU SA

FLEXIBLE INNOVATIVE EDUCATION, ICT

We have been testing important methods to develop flexible educational offerings and teaching approaches. An example of this is videos of lectures. The videos are linked to the course pages in "Courses online". They are also available to the outside world via NTNUs' open video webpage, as well as on YouTube EDU and iTunes U.

In 2013, "Information Technology in the Master's Degree in Engineering" was established as a three-year project with a total budget of about NOK 5.5 million. The objective is an overall academic integration of ICT in the graduate engineering education. Four academic groups were awarded NOK 12 million in a competition for innovative education projects.

OTHER RESULTS

The percentage of women at NTNU is higher than ever, the number of primary applicants for engineering programmes has tripled over the last ten years, and the number of applications for the 5-year teacher-training programme broke last year's record. NTNU keeps track of the academic quality of its applicants through the grade point average for students accepted from secondary schools. The admission quality is generally good, and has increased over the last few years.

NTNU's candidate survey was carried out in 2013. It tells us that students first and foremost apply to NTNU because of academic interests and an expectation of a high quality education. This is a good foundation for NTNU students to succeed. The Study Quality Indicators used by NOKUT for the first time this year are based on



Girls' day at the Gløshaugen campus: Marit Hegle (right), a current NTNU student, and potential student Marit Fageraas Øien. New students are welcomed into the study environment, meet new friends and also get an effective "guided tour" of the university's jungle of activities and opportunities.

answers from all students in the second year of their bachelor's or master's degrees. The questionnaire asks about the students' perception of the quality of different aspects of the study programmes. It is very gratifying to see that we, as a diverse university, have study programmes across the organization where students are very satisfied with the quality of their education. NTNU students are very ambitious, and 80 per cent say that they want to be better than the average.

We have had an increase in the number of graduates from our two-year master's programmes, but a slight decrease in the number of graduates from five-year master's programmes.

Most NTNU graduates have a smooth transition to the workforce in positions relevant to their education, and their average salary is quite good. The candidate survey also showed us the learning outcomes for each study programme. These results are being used to increase the relevance of the different educational activities and the study programmes as a whole. NIFU's national candidate survey shows that graduate engineers from NTNU are generally very satisfied. Social scientists are just above the national average, whereas graduates in the humanities are just below.

NTNU AND SOCIAL AND WORKING LIFE

NTNU has established the Advisory Committee for University-Working Life Relations. This will be an important tool in helping NTNU meet society's future needs for qualifications and education, and in shaping the profile of the study programme portfolio and

designing our study programmes. "Experts in Teamwork" (EiT) is a compulsory course for all high-level study programmes. This year, extensive work has been done to finalize cooperation agreements between interdisciplinary student groups in EiT and employers. This effort will be further developed this year. NTNU Bridge has been launched as a portal where students and representatives from the world of work can find each other.

PLANS

NTNU will continue to work on its study programme portfolio in 2014, where internationalization is an important keyword. To strengthen our educational quality, we will work on alternative forms of assessment and educational expertise, and continue to work on innovative education and the use of ICT. NTNU is focused on developing its education management team and a culture of quality. An important step in this effort is that we want to change the annual cycle for quality reporting. We will also develop and implement our own courses for study programme managers.



Norway's prime minister, Erna Solberg, visited NTNU in the spring of 2014.

Photo: Kristoffer Furberg/Universitetsavis

NTNU has worked with innovation for more than 100 years. In the summer of 2013, NTNU completed its first four-year period with its own strategic focus on innovation. We will prioritize innovation in an even broader sense in the years to come. Interdisciplinary cooperation is critical in solving important social challenges. In 2013 and 2014 we will revamp our approach to innovation.

INNOVATION

HIGHLIGHTS IN 2013

- NTNU Discovery has contributed to the establishment of 18 new companies
- The first class from the Entrepreneurship School completed its first year and will graduate in 2014
- NTNU Technology Transfer (TTO) handled 223 patent applications, and commercialized 20 products or ideas in 2013
- The number of ideas from the academic groups to TTO increased from 90 to 123 over the last year
- Spark NTNU for student innovation was launched

CRACKING AN IMPOSSIBLE INDUSTRY CODE

No one has been able to adapt one of the world's hardest substances, silicon carbide, so that it can be sprayed as a coating on machine parts. That was before Fahmi Mubarak started his PhD at NTNU. He drew inspiration from his own kitchen by experimenting with salt and cocoa powder. The new technology can be used to enhance the efficiency of jet engines, gas turbines, wind turbines and water turbines. Mubarak has been awarded an innovation post-doctoral position at the Faculty of Engineering Science and Technology to allow him to continue to develop his groundbreaking technology.

ESTABLISHING AN INCUBATOR FOR INNOVATION

Student innovation is a highly important area. We will provide our students with better information, guidance and help to pursue their own ideas. This is why Spark NTNU was developed in 2013. Spark is one of a kind in Europe. During the autumn pilot period, 16 students were employed as supervisors and 30 ideas were listed. Twenty-one of these have been established as projects. Spark is a two-year project with funding from TrønderEnergi.

NTNU Discovery is a system that helps employees and students in the early stages of entrepreneurship. Only the best receive subsidies: Only 26 of 49 applications for main projects were approved. An external jury evaluates the quality. Eighteen new companies have been created in the three years since Discovery was started.

This means more than 30 new jobs so far. The projects that have received support from Discovery have triggered over NOK 50 million in external funding. Our annual budget of NOK 8 million for further distribution enables us to create value. The county municipalities of Sør- and Nord-Trøndelag, SpareBank1 SMN and NTNU have funded the first three years of Discovery.

INCREASED ENTREPRENEURSHIP

The Intellectual Property Institute of Norway (IPIN) was established in April 2013, with support from the Ministry of Trade and Industry. The centre is a cooperative effort of the Norwegian Industrial Property Office, the Centre for Intellectual Property in Gothenburg and NTNU.

In 2012–2014, the Entrepreneurship School has its first class of students from natural sciences and social sciences, in addition to engineering students. Each year, 30 students begin in the master's programme. They have the opportunity to work on research-based ideas through a unique cooperation with CERN, and experience the international marketplace through the Innovation Studies programme at Boston University's School of Management.

Interdisciplinarity is one of NTNU's strongest characteristics. The Norwegian Smart Grid Centre is a good example of several industries and research environments working together for systematic innovation. Six of our seven faculties are involved. The centre includes research, teaching, test projects, business development and commercialization of the energy systems of the future.

INCREASE IN IDEAS, NEW COMPANIES AND LICENSING

NTNU's Technology Transfer Office keeps track of potential business concepts from the university. In 2013, 123 ideas were registered, which is 33 more than the previous year. Thirty-nine patent applications were submitted, and TTO manages 223 active patent applications on behalf of NTNU.

TTO commercialized 20 companies or ideas in 2013. Eight of these were company establishments. Three license agreements were entered into, six technologies were sold, and three applications (apps) were registered. NTNU Accel is a new effort under TTO. Its objective is to speed up the development of new companies.



Photo: photos.com

Innovation is a mix of creativity, entrepreneurship and commercialization.

PLANS

More academic groups and students will be invited and encouraged to work on innovation and entrepreneurship. NTNU will place a strong internal focus on encouraging innovation in 2014. Working with innovation should be inspiring and valuable. To ensure this, we have to provide better incentives, facilities and conditions for innovation.

NTNU has a good reputation. This contributes to successful cooperation with external players. We will work purposefully in developing strategic relationships in Norway as well as abroad. We will further develop internal working procedures to make sure that NTNU is competitive in receiving funding from the EU's new framework programme for research and innovation (Horizon 2020).

The Advisory Committee for University-Working Life Relations will help us become more aware of the connection between education and the needs of society and the business sector. NTNU has developed several good tools for linking students and the workplace.

The objective of NTNU Bridge is to increase the numbers of employers and students working together to find good solutions to challenges in the working world. We will work actively to make this tool attractive and visible to students, academic groups and the working world.

In addition to the Gløshaugen Innovation Centre, NTNU is working with external incubators in Trondheim, such as Atelier Ilsvika. However, students want more flexible

offerings, preferably operated under their own initiative. NTNU has given initial funding to Trondheim's first coworking space, called Digs. This funding will cover two flexible places for NTNU students for an entire year.

The Intellectual Property Institute of Norway (IPIN) will hire leadership and begin operations in 2014. Starting in the autumn, the subject of intellectual property rights will be taught in introductory courses for technology management. We have begun strengthening our international network in this area. The cooperation agreement with IPI in Singapore was signed in 2013, and will be followed up by the participation of selected start-up companies in the Singapore technology expo in September.



Business leaders and researchers at Philips in the Netherlands during IPIN's first-ever continuing education course in 2013. Philips is a world leader in patenting.

Photo: Emit S. Økstad/NTNU

Good communication on a national and international level is a central element of NTNU's vision of Knowledge for a Better World. NTNU encourages its employees and students to be active in the public debate and participate in strategic areas for public interaction.

HIGHLIGHTS IN 2013

- A collective increase in public-oriented and user-oriented communication efforts.
- NTNU has been mentioned in Norwegian and foreign news stories and other media presentations at the same level as in previous years.
- NTNU's placement in different university rankings remains stable between 200 and 300. The university has a higher ranking from some ranking organizations than others.
- The sharing and publication of lectures on international websites has increased significantly.
- Visits to the University Museum have increased steadily over the last several years.

COMMUNICATION

GEMINI.NO LED TO OVER 850 MEDIA HEADLINES

News of researchers who wanted to use Botox to treat suicide headaches was first published on Gemini.no, NTNU and SINTEF's online research magazine. This news was later picked up by more than 30 national and international media. Last year, articles on Gemini.no generated more than 850 national and international media headlines. This is a five-fold increase from the previous year. NTNU had the most articles of any Norwegian university last year on www.forskning.no, which is the largest website for research news in the Nordic countries.

COMMUNICATION EXPERTISE

A thorough review in 2013 resulted in a communication policy for all of NTNU, with a series of concrete measures. These measures include ensuring that communication is rooted in all academic environments as well as in the central administration. The university is developing initiatives to support its academic staff to be better in sharing their research findings.

Over the last few years, NTNU's Faculty of Medicine has offered its PhD candidates a three-day course in research communication. Almost 90 PhD students completed the course in 2013. Similar courses are now being developed for all NTNU PhD candidates.

Since NTNU's 100th anniversary in 2010 as "the university that built modern Norway", there has been an emphasis on user-oriented communication – sharing research news with individuals who can actually put the information to use.

The establishment of Gemini.no as an online news portal has led to the almost daily publication of research news from NTNU. Two paper editions of Gemini are also published each year. Surveys show that research presented in Gemini results in increased cooperative efforts with public officials and other research groups, new projects, expanded academic networks and acceptance of more project proposals. The media regards Gemini.no/Gemini as an important source of research information. This means that Gemini is an important factor in providing user-oriented communication from NTNU.

NTNU communicates more and more of its activity on the Internet, on blogs, Twitter and Facebook. It also publishes videos on NTNU Open Video, YouTube and iTunes U, and pictures for download on Flickr.



Photo: Nina E. Tveiter/Comm.div.

The Trondheim Science Fair had 29 stands and drew 10 000 to 12 000 visitors, mostly schoolchildren.

In 2013, NTNU's new communication award was awarded for the first time, to underscore how important it is that NTNU researchers share their knowledge in the broadest possible way.

PUBLIC-ORIENTED AND USER-ORIENTED COMMUNICATION

NTNU was mentioned in more than 17,300 Norwegian and 3,300 foreign articles and news items in 2013, which is roughly the same as in 2012.

In 2013, NTNU's lecture videos and conferences were shown almost 490,000 times on web channels. Three TV programmes with NTNU researchers were broadcast on NRK Kunnskapskanalen (NRK Knowledge Channel) in 2013, all of which were produced by NTNU. These broadcasts had a total of 228,000 viewers. A list of NTNU experts is now available on NTNU's webpage. The list includes 470 researchers, and is regularly updated with an increasing number of researchers who actively want to be contact persons in their field.

NTNU has a good reputation among the Norwegian public. In 2012, a national profile survey of 85 public services ranked NTNU as number 13. The Chief Executive Survey from 2013 showed that NTNU is the best university in terms of educating chief executives in Norway's 100 largest companies (ranked by turnover).

In general international rankings like THES (Times Higher Education Supplement), Academic Ranking of World Universities (from JiaTong University) and QS World University Rankings, NTNU is still ranked between 200 and 300. We score relatively high on research,

education, internationalization and external income, but lower on reputation. Our highest scores are in cooperation with the industry and business sector. NTNU is among the best in Europe in the global Leiden Ranking.

NTNU Alumni now has almost 30,000 members all over the world, and approximately 11,000 followers on LinkedIn.

EXHIBITIONS AND EVENTS

In addition to its four permanent exhibitions and activities at Ringve Botanical Gardens, the University Museum has 11 temporary exhibitions. The museum has also arranged family Sundays, where visitors meet researchers to get first-hand information about current research.

The museum invites children between the ages of 10 and 12 to a summer school (Sommerlarm) with a host of research-based activities. Approximately 10,000 pupils have participated in communication activities from the museum's school service.

PLANS

In the years ahead, we see four additional major communication challenges. First and foremost, making NTNU's core topics visible in the mass media can be quite challenging. Secondly, 60 per cent of NTNU's communication and outreach comes from only 10 per cent of the university's researchers. A third challenge is the trend for communication to be increasingly digital, mobile, social and visual. A fourth is to improve our international reputation through communicating our research beyond Norway's borders.



Photo: Åge Hojem/NTNU University Museum

Interactive, creative and beautiful mathematics: IMAGINARY is a travelling exhibition on mathematics, and was one of the exhibits featured at the NTNU University Museum in 2013/2014.

Good governance, staff and student participation and the effective use of resources are a prerequisite for academic activity at a high international level. Many of our managers have shifted over to a fixed term of office, which has led us to put leadership development and recruiting into special focus.

HIGHLIGHTS IN 2013

- A small increase in the number of full-time equivalents.
- A significant decrease in the percentage of temporary positions.
- An increased number of female professors.
- A large decrease in energy consumption since 2010.
- A stable financial picture.
- An increase in EU-funded activities.

MANAGEMENT, PARTICIPATION AND RESOURCES



NTNU invested a great deal of time in 2013 in building skills in its management teams, both centrally and at the faculties. Here, Pro-Rector Kari Melby shares her views at the 2013 Senior Executives Conference.

A CHANGING ORGANIZATION

In 2013, we introduced a system where we hired heads of departments, which makes us the only university in Norway with managers who have been hired at all levels. We were looking for managers with the ability to define objectives for the academic activities and to realize these objectives. We also started a comprehensive management development programme.

Both the Board and the management paid a lot of attention to HSE in 2013. We followed up on the working environment survey conducted in the autumn of 2012. All units were asked to define measures to contribute to an even better and more secure working environment. We conducted surveys, introduced a digital system for reporting and managing of problems, and will soon start using an electronic risk assessment tool.

The labour organizations have criticised the management for a lack of involvement. Therefore, the Board decided to introduce defined and compulsory forums at the departments, as well as precise procedures to secure employee and student involvement throughout the decision process. We also made strides in 2013 in gender equality. The share of female professors has increased by 14.3 per cent from 2010 to 2013, and the share of female associate professors by 7.6 per cent. Gender equality is now a permanent subject in NTNU's management development programme. Similarly, we have followed up on requirements to provide secure employment terms to all employees. The number of employees in temporary positions has been reduced by 4.5 per cent over five years, and is now at 13 per cent.

We have set ourselves ambitious objectives to reduce our "global footprint". We have dropped our energy consumption since 2010, and a large percentage of our suppliers are now environmentally certified. In 2014, we will further reduce our energy consumption. We will test a new recycling system and sign a number of purchase agreements with green-certified companies.



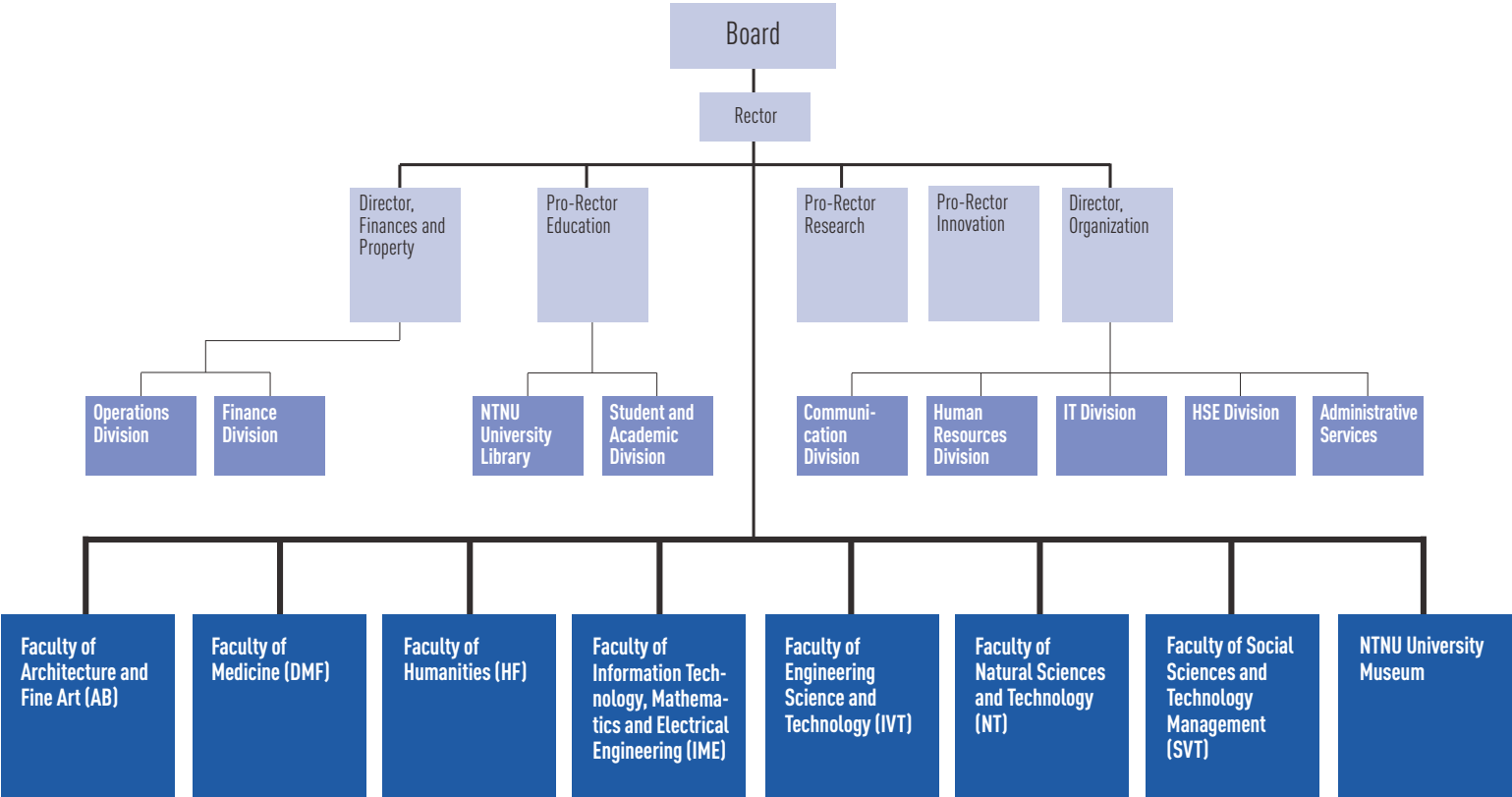
Gender equality is now a permanent subject in NTNU's management development programme.

We have written a comprehensive report (the Vision Project) on NTNU's possible long-term development. Until the campus project is realized, there is a need for significant rehabilitation and upgrading of buildings and advanced technical infrastructure.

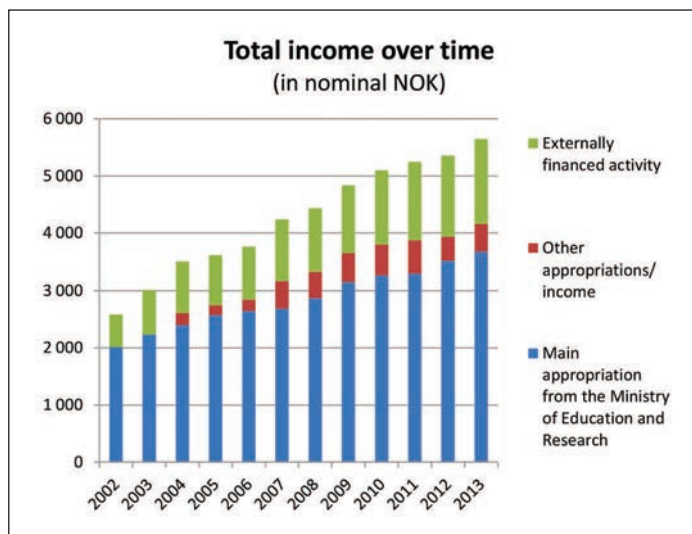
Our total income in 2013 was NOK 5.6 billion. Of this, the Norwegian Parliament's general grant amounted to NOK 3.9 billion. Economic prognoses suggest that we can expect to continue to have a healthy economy where our budget will match our financial needs over the long term (up to and including 2017).

Thirty per cent of the total income stems from our income from externally funded projects (BOA). Funding in this area has been stable over the last few years. It is gratifying to see that EU funded activity has increased by almost 10% since 2012. There are indications that the income from external projects will increase somewhat in 2014.

ORGANIZATIONAL CHART

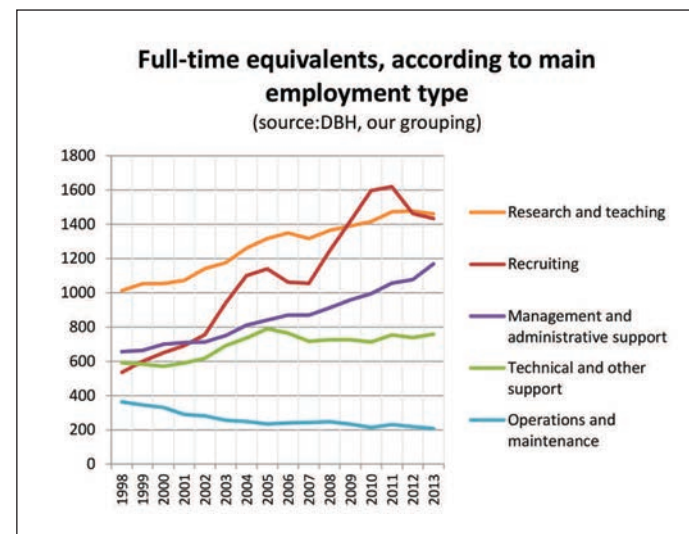


KEY FIGURES AND RESOURCES



NTNU received NOK 3 676 million in main appropriations from the Ministry of Education and Research in 2013. The university had a combined income of approximately NOK 5.6 billion where income over the main appropriation accounted for ca. 35% of the total.

Approximately 42 % of the funding for externally financed activities comes from the Research Council of Norway, while EU funding makes up 12% of the total. The Central Norway Regional Health Authority is an important contributor, while private businesses also account for a large percentage of our external income.



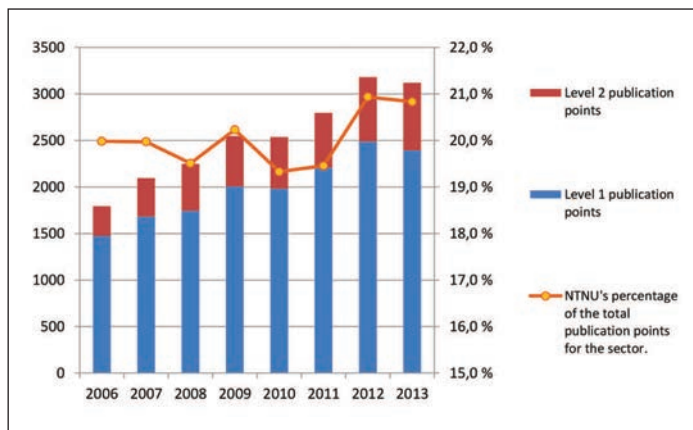
In 2013, NTNU had 5030 full-time equivalents.

NTNU is pleased to have reduced the proportion of temporary employees to 13.1% in 2013. The number of women in teaching and research positions continues to increase, and was at 30.2% in 2013.

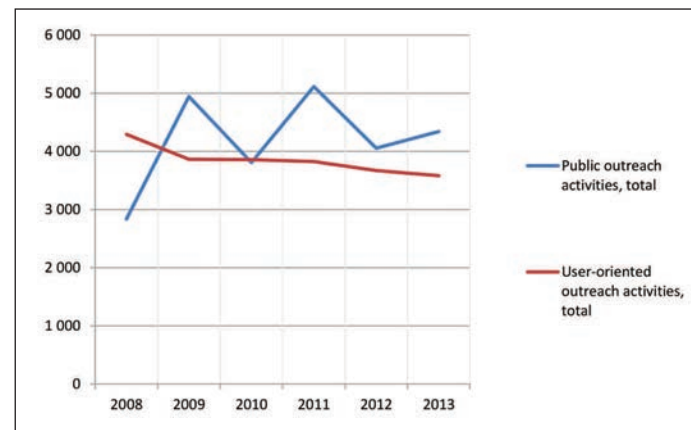
The decline in recruitment positions is somewhat concerning, but must be seen in conjunction with the decline in new doctoral appointments.

NTNU introduced a system of staff managers at all levels in 2013. Previously, department leaders were selected from within the departments. This change results in a "reclassification" of these full-time equivalents from research and teaching positions to management and administrative support.

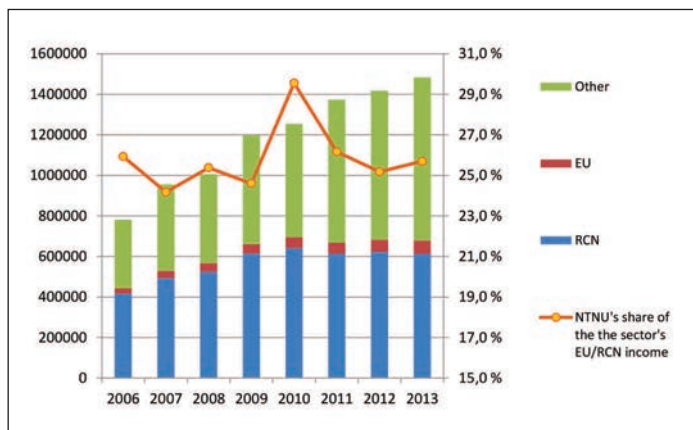
KEY FIGURES AND RESULTS



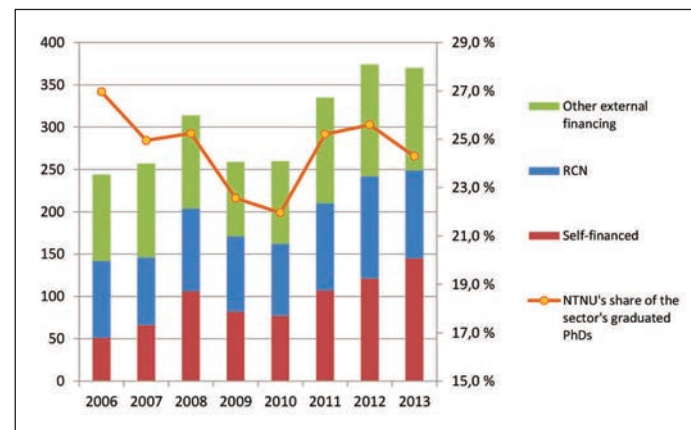
NTNU's total number of publication points showed a slight downturn in 2013, but with an increase in the number of level 2 publications. NTNU's share of the sector remained stable. (Source: DBH)



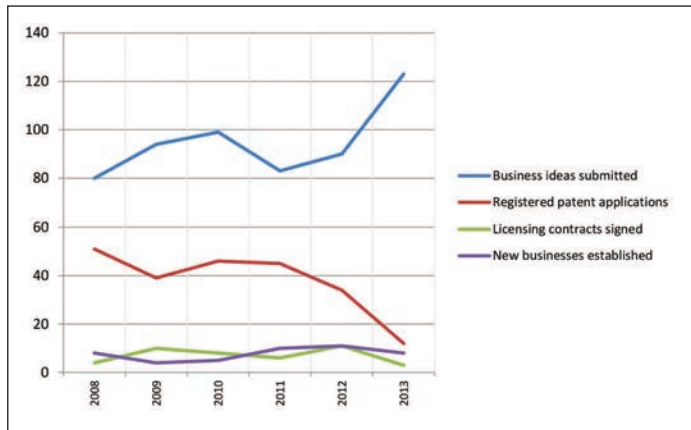
The figure shows our employees' dissemination and outreach activities. The numbers include more than 3000 media mentions (interviews) and 3000 academic lectures. (Source: Cristin)



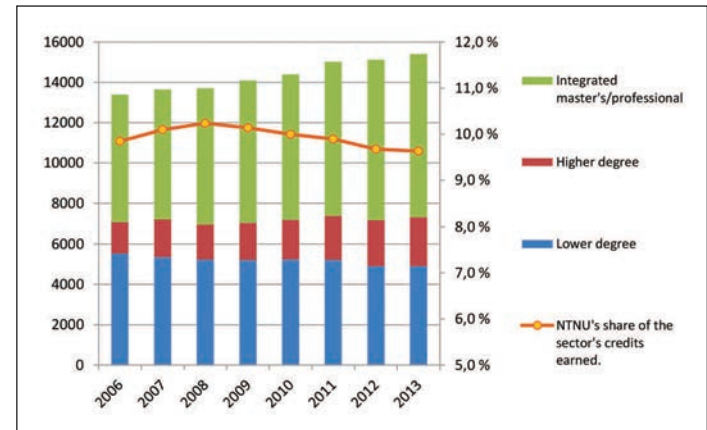
The bars show costs (ie activity) related to externally funded activity. There was a steady increase in activity in 2013. NTNU had a small increase in its share of the externally financed activity sector. (Note that in 2009 and 2010, the proportion fluctuated due to an accounting accrual effect at NTNU.) (Source: NTNU and DBH)



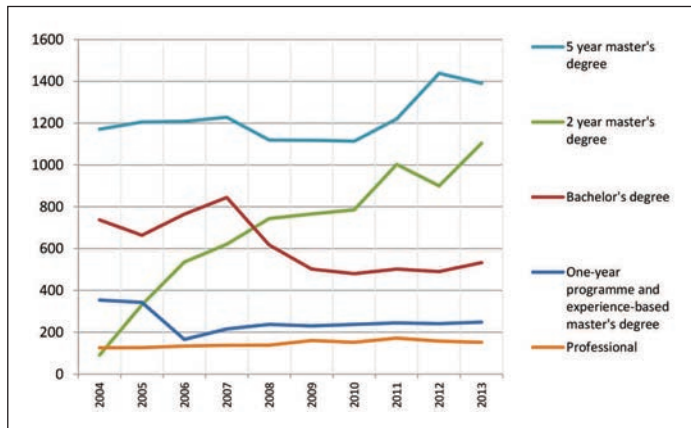
The figure shows trends in the number of graduated doctoral candidates from NTNU, and the source of their financing. NTNU has had an increase in its production of PhDs, but shows a downturn in its share of the sector's total production. (Source: DBH)



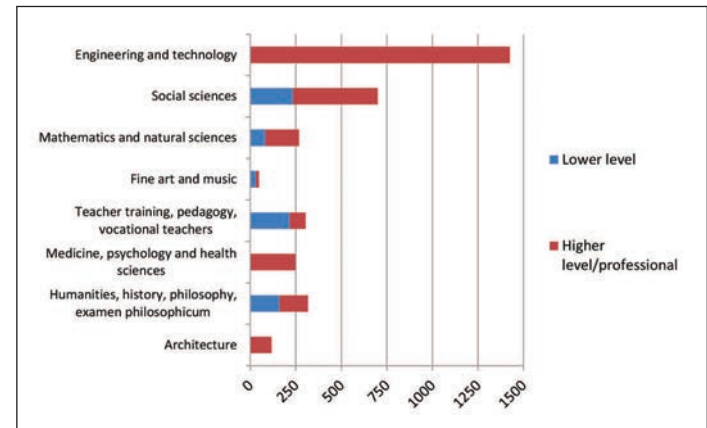
The figure shows trends in results from innovation activities. The largest increase in 2013 was in the range of ideas, particularly from students. (Source: TTO)



The figure shows the number of credits earned (full-time equivalents), divided by level. NTNU has had an increase in the number of credits earned, but has had a downturn in its share of the sector's total production of credits. (Source: DBH)



The figure shows the trend in the number of graduated candidates at all levels. A total of 3429 candidates were awarded diplomas by NTNU in 2013, an increase over 2012. We produced 8.5% of the sector's graduates. If only higher level graduates and professional degrees are considered, NTNU's share of the sector was 22.2%. (Source: DBH)



The figure shows NTNU graduates in 2013, roughly divided by study programme. Fully 41.5 % of the graduates are in engineering and technology. (Source: DBH, our grouping)



NTNU – Trondheim
Norwegian University of
Science and Technology

Annual Report 2013

NTNU – Norwegian University of Science and Technology

The Norwegian University of Science and Technology (NTNU) is Norway's primary institution for educating the nation's future engineers and scientists. The university also has strong programmes in the social sciences, teacher education, the arts and humanities, medicine, architecture and fine art.

NTNU
NO-7491 Trondheim
Norway

Phone: +47 73 59 50 00
E-mail: postmottak@adm.ntnu.no

www.ntnu.edu

