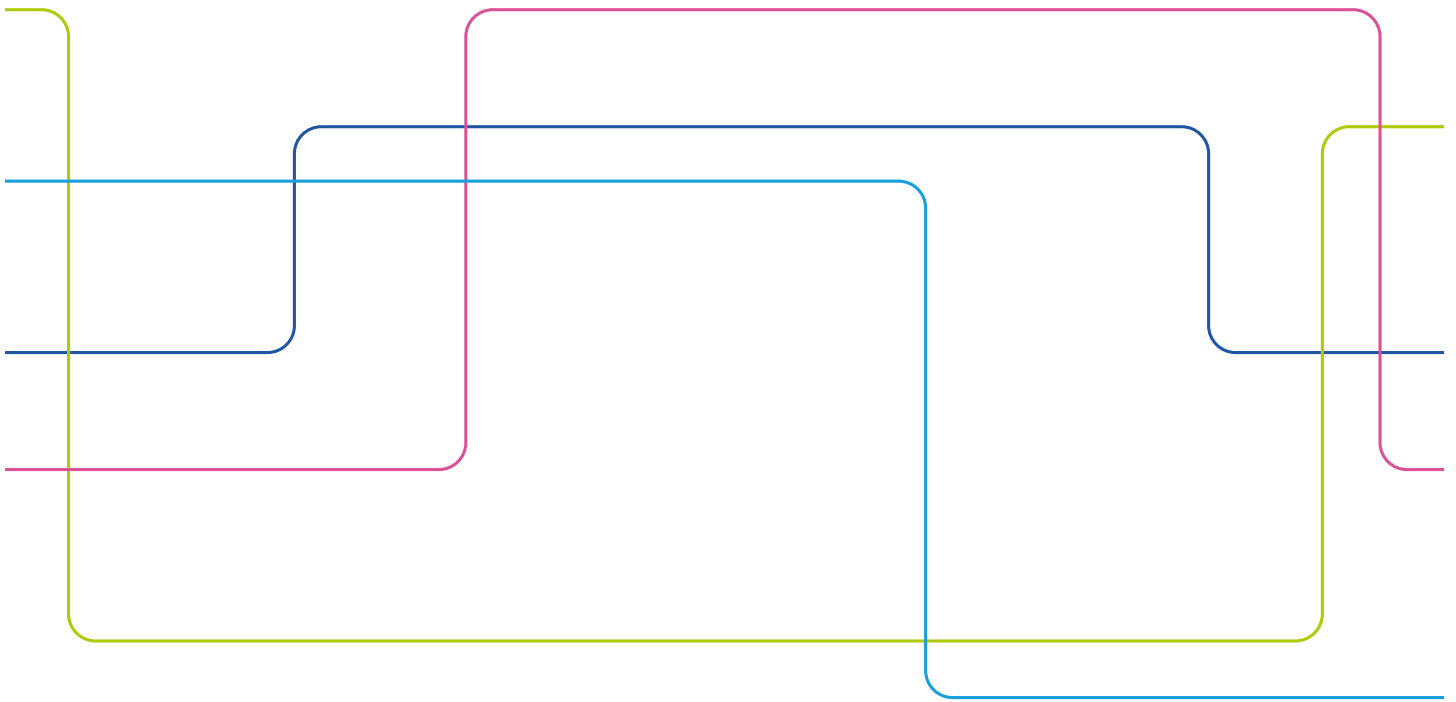




# Annual Report 2020





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# About the Annual Report

KTH's annual report is governed by the Ordinance concerning the Annual Reports and Budget Documentation (2000:605). The Annual Report will give a true and fair view of the organisation's result.

The Annual Report includes not only information that KTH must report according to the law and government assignments, but also other information that KTH has chosen to provide about its activities in general and things that have happened in 2020 in particular.

The Annual Report contains accounting and follow-up of a large number of parameters arising, among other things, from the accounting requirements contained in the Higher Education Act, appropriation directions for the financial year 2020 regarding universities and higher education institutions and the Ordinance (2000:605) concerning the

Annual Reports and Budget Documentation.

Quantitative data about volume and development are mainly derived from KTH's business system. Quantitative data in the text is often specified in the form xx (yy), where xx is the information for 2020 and yy is the corresponding information for 2019.

Qualitative data regarding operations and development are mainly derived from decisions, minutes, information on KTH's website, etc.

The Annual Report has been compiled within KTH's joint operational support.

KTH's Annual Report uses a large number of abbreviations. In order to avoid having to explain them all in the body of the text, the most important ones are listed here.

## KTH internally

<b>ABE</b>	School of Architecture and the Built Environment
<b>CBH</b>	School of Chemistry, Biotechnology and Health
<b>EECS</b>	School of Electrical Engineering and Computer Science
<b>ITM</b>	School of Industrial Engineering and Management
<b>SCI</b>	School of Engineering Sciences
<b>GVS</b>	University Administration
<b>JML</b>	Gender equality, diversity and equal opportunities
<b>JMLA</b>	Director of Gender equality, diversity and equal opportunities
<b>SciLifeLab</b>	Science for Life Laboratory

## Authorities, organisations etc.

<b>EIT</b>	European Institute of Innovation and Technology
<b>HPR</b>	Full-year performance
<b>HST</b>	Full-year student
<b>KIC</b>	Knowledge and Innovation Communities (within EIT)
<b>RISE</b>	RISE Research Institutes of Sweden AB
<b>SFO</b>	Strategic research area
<b>SSF</b>	Foundation for Strategic Research
<b>STEM</b>	Sweden's Energy Agency
<b>SUHF</b>	Association of Swedish Higher Education Institutions
<b>THS</b>	Student Union at the Royal Institute of Technology
<b>UHR</b>	Swedish Council for Higher Education
<b>UKÄ</b>	Swedish Higher Education Authority
<b>Vinnova</b>	Swedish Governmental Agency for Innovation Systems

# This is KTH

Since its founding in 1827, KTH has grown to become one of Europe's pre-eminent technical and engineering universities, as well as a key centre of intellectual talent and innovation. As Sweden's largest provider of technical education and research, KTH attracts students, teachers and academic researchers from all corners of the globe.

KTH works closely with industry and society in general in the pursuit of sustainable solutions to some of humanity's greatest challenges: climate change, future energy supplies, urbanisation and quality of life for an aging population.

Education and academic research at KTH cover a very wide area – not only in science and technology, but also within the fields of architecture, industrial economics, urban planning and education, for instance. Our innovative climate promotes versatile solutions and facilitates the creation of a new generation of engineers, architects and teachers. Over the next few years, extra focus will be placed on digitalisation, sustainability, internationalisation and gender equality.

KTH participates in international research collaborations and has many different exchange and educational programmes with universities and colleges around the world.

KTH's collaboration with strategic partners among companies, authorities and organisations offers students and researchers a wide network of contacts.

KTH conducts its education and research at five campuses in the Stockholm region. KTH's central campus is located in Stockholm's inner city next to Norra Djurgården. KTH and Stockholm University jointly organise educational programmes and research in biotechnology and physics at AlbaNova, near Roslagstull, and adjacent to KTH Campus.

The Science for Life Laboratory is located in Solna, and operated together with Karolinska Institutet, Stockholm University and Uppsala University. Education and research in the field of information technology are conducted in Kista in northern Stockholm, close to companies and research institutions involved in the sector.

With a focus on medical technology, KTH is a part of Campus Flemingsberg in the southern suburbs of Stockholm. In Södertälje, KTH is expanding its offerings in education and research in sustainable production. In collaboration with Scania, AstraZeneca and Södertälje Municipality, KTH is a key partner in Södertälje Science Park.

## KTH in figures 2020

### EDUCATIONAL ACTIVITIES

- Master of Architecture and 17 Master of Science in Engineering programmes
- Master of Science in Engineering combined with Degree in Education
- 9 Bachelor of Science in Engineering programmes
- Subject Teacher Education in Technology
- Bridging Teacher Education Programme
- Master's programmes (one and two year)
- Bachelor's programmes and two-year university diplomas
- Further education, technical preparatory year/semester
- Third cycle education
  
- 13,563 full time students, of which 34 per cent are women and 66 per cent men (including fee-paying students)
- 11,639 annual performance equivalents (including fee-paying students)
- 1,634 active research students (at least 50 per cent activity), of which 32 per cent are women and 68 per cent men
  
- 2,604 new students on the first year of Master of Science in Engineering, Master of Architecture and Bachelor of Science in Engineering programmes of which 32 per cent are women and 68 per cent men
- 1,204 admitted to the Technical Preparatory Year/Semester, of which 35 percent are women and 65 per cent men
- 2,432 new students on one and two-year Master's programmes, 35 per cent women and 65 per cent men, of whom
  - 1,217 students previously on Master of Science in Engineering studies programmes
  - 1,215 students studying on a one or two-year Master's programme at KTH
- 264 newly-admitted students to doctoral studies programmes, of which 32 per cent are women and 68 per cent men
  
- 86 Master of Architecture, 55 per cent to women and 45 per cent to men
- 1,119 Master of Science in Engineering degrees, 37 per cent to women and 63 per cent to men
- 311 Bachelor of Science in Engineering degrees, 30 per cent to women and 70 per cent to men
- 1,821 Master/Master of Science (one and two-year) degrees, 35 per cent to women and 65 per cent to men
- 228 PhDs, 30 per cent to women and 70 per cent to men
- 47 licentiate degrees, 28 per cent to women and 72 per cent to men

### FLOOR SPACE

- 301,000 m<sup>2</sup>

### RESEARCH

Primary responsibility for five national strategic research areas (SRA);

- E-science
- IT and mobile communication
- Transport research
- Production engineering
- Molecular biosciences (Science for Life Laboratory)
- Partner in another five areas

Lead partner in five programme areas within the European Institute of Innovation and Technology (EIT);

- EIT InnoEnergy
- EIT Digital
- EIT Health
- EIT Raw Materials
- EIT Urban Mobility

External financing, income from grants, 1,752 MSEK (excluding transfers):

- MSEK 290 the Swedish Research Council
- MSEK 237 EU
- MSEK 215 Wallenberg Foundations
- MSEK 167 Swedish foundation for Strategic Research
- MSEK 156 Vinnova
- MSEK 403 other government agencies
- MSEK 284 other external financing including private funds

### FINANCIAL SITUATION

MSEK 5,683 in total turnover (of which MSEK 609 transfers)

Government grants (excluding transfers);

- MSEK 1,215 First and second level (undergraduate) educational programmes
- MSEK 1,341 Research and third education cycle

### EMPLOYEES

5,035 employees, the equivalent of 3,895 full time positions, of which 1,577 are women and 2,318 men of which;

- 318 professors, 60 women and 258 men (including visiting and adjunct professors)
- 287 associate professors, 75 women and 212 men

# Organisation

KTH's education and research are organised into five schools. Under each of the Schools, there are a number of departments, institutions, competence centres and study programmes. All of the Schools report directly to the President. Each School is led by a Head of School and a Deputy Head of School, and has a Management Group. There is also a Strategic Council for each School, which is an advisory body to the Head of School in relation to certain issues.

The University Board monitors all of KTH's internal affairs and is responsible for ensuring that its responsibilities are fulfilled. The Board consists of 15 members: the President, eight external members, three faculty members and three student representatives.

The President leads the University's activities, under the direction of the University Board. The Deputy President acts as the President in the event of absence. There are also Vice Presidents for Digitalisation, Research, Sustainable Development, International Affairs, Equality and Values, as well as Education.

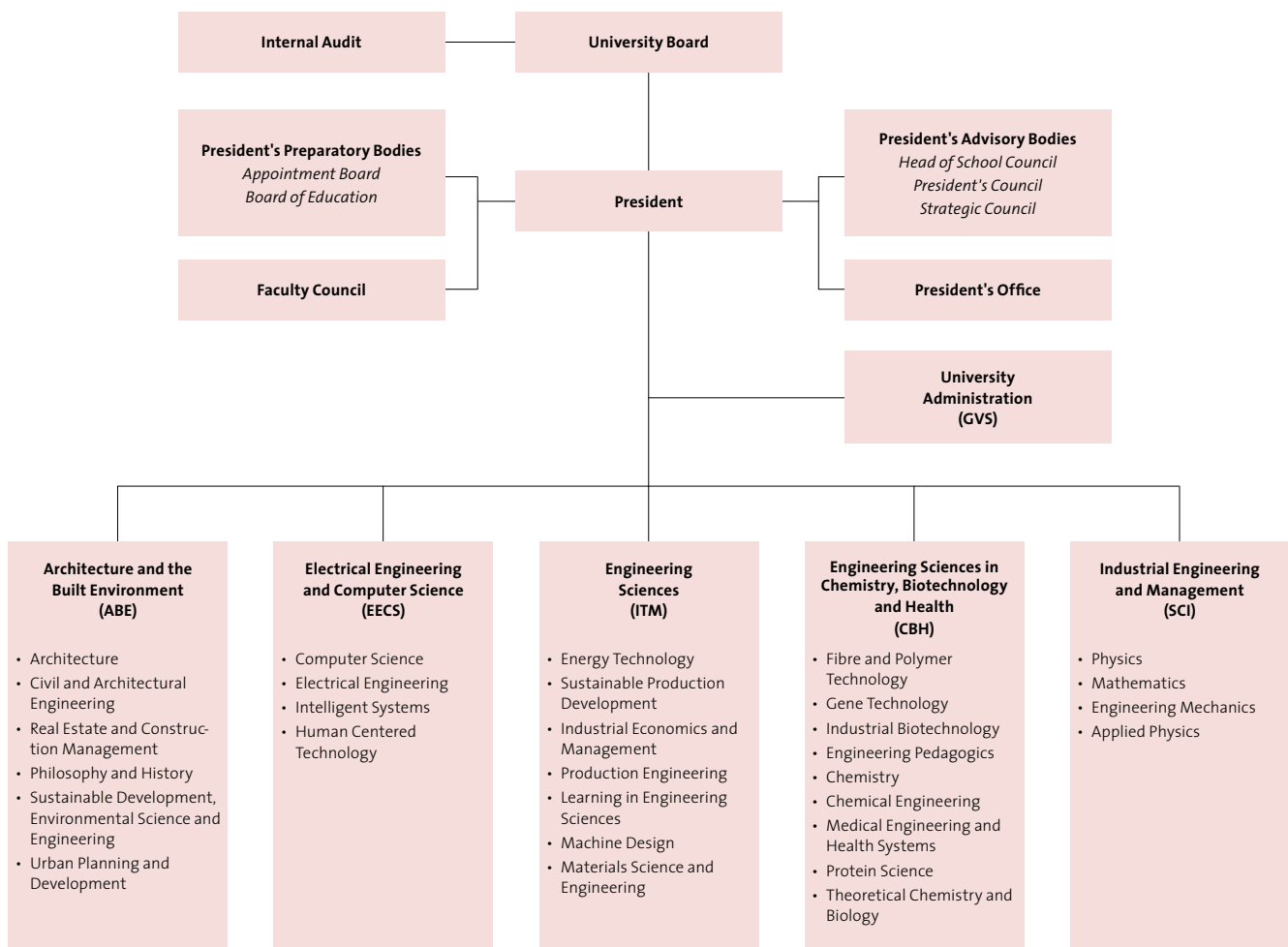
The President has a Strategic Council that deals with strategic issues that concern all Schools and acts as an information and discussion forum. The Strategic Council

comprises the President, Deputy President, Dean of Faculty, Vice Dean of Faculty, all Heads of Schools, University Director, Communications Director and two student representatives.

There is also a President's Council that supports the President in managing strategic issues and other overarching issues. The President's Council consists of the President, Deputy President, Vice Presidents, Dean of Faculty, Vice Dean of Faculty, University Director and the Chairperson of the Student Union.

In addition there is a Heads of School Council made up of the President, Deputy President, all Heads of School and the University Director. The Heads of School Council deals with school-specific issues.

The Faculty Council is a university-wide body for KTH's work on quality development and collegial foundation. The Faculty Council has overall responsibility for issues related to quality in education, research and collaboration. The majority of members are scientifically skilled and are appointed through elections among teaching staff and researchers. The Council is also an advisory body to the President.



# A note from the University President

The past year has been marked, in many ways and for most people, by the pandemic. However, the readiness and power that existed and exists among KTH's staff and students to do their best when it really matters also stood out very clearly. This can also be seen in our results.

The new knowledge generated by the experience this year has brought will be carried by KTH in the future and further development of its operations.

Almost overnight in mid-March 2020, KTH switched all education to distance education and therefore, thanks to major efforts, the development of education towards increased digitisation took great strides forward.

This is fully in line with our vision of making digital campuses as prominent as the physical ones in the longer term. Combining the best of both worlds in future learning means that KTH's education has a solid foundation to stand on in global competition.

Last autumn, KTH conducted campus-based education with digital elements. Our campuses opened for practical and laboratory activities on site, while other teaching was conducted digitally. Our focus – that the students should complete their education – permeated the business.

Extra resources received by KTH during the year for investments in entry-level and higher education access programmes, short courses for professionals and lifelong learning, as well as a permanent expansion of training for jobs with a shortage of manpower has allowed our focus on future learning, learning environments and digitisation of education further strengthens our competence as an educational institution. The figures also speak for themselves. A total of 664 more students started studying in year 1 in 2020 compared to 2019, of which 484 in the qualifying access programmes.

Of course, research side has also been marked by the pandemic and some calls have been cancelled, changed or added. Here, KTH's researchers have, among other things, within the framework of SciLifeLab and a national research programme for COVID-19, quickly managed to mobilise their research to assist society in the search for new knowledge in this area.

This has resulted in a large number of new collaborations, tools and a number of research advances such as the development of robust antibody tests and the tracing of viruses in wastewater, to name a few.

Without the financial support of the Knut and Alice

Wallenberg Foundation, this would not have been possible and the support is needed for the research programme in the fight against the pandemic to continue until 2023.

Another of many important steps in KTH's development and progress as a higher education institution is the establishment of the Digital Futures research centre, which was inaugurated on 1 October 2020. The centre, which will deal with various societal challenges through digital transformation, spans a broad and interdisciplinary area of research from autonomous vehicles to the digital everyday life of the future.

KTH's environmental and sustainability work as well as work for gender equality, diversity and equal opportunities continues to progress.

Based on previous surveys regarding inequality and research in this area, KTH's gender mainstreaming work continues in a structured way according to the gender mainstreaming plan for KTH – JIKTH. The four prioritised objectives are collective organisation, knowledge and awareness, equal opportunities and inclusive cultures. A new plan for continued work for a gender equal KTH in 2021-2022 is under development with the same priority areas.

A review of the sustainability goals 2016 to 2020 shows that several goals are being met and that the work needs to continue at full speed in the coming years. Last year, KTH worked to develop new sustainability goals for the next five years based on Agenda 2030 and the Global Sustainability Goals. The new goals show the continued direction of KTH's work to promote sustainable development.

Internationalisation work has been affected by the pandemic, although the influx of paying international students is still relatively good.

None of the steps that KTH has taken during the year would have been possible without the great commitment, flexibility and patience shown by KTH employees during the year, since both the workplace and the work environment have changed significantly in various ways for the vast majority.



*Sigbritt Karlsson, President of KTH*



# The students have the floor

## Community, development and joy

Since 1902, the Student Union of the Royal Institute of Technology, THS, has represented all students at the Royal Institute of Technology. THS aims to monitor and participate in the development of education and the conditions for studies at KTH. In practice, this means that we want our students to get the best education they can get, while having the most fun and developing time of their lives. This is something we, as our students' representatives, can proudly say that we work *with* KTH, and not *against* KTH, to achieve. Especially in a year like this.

## Main issues of the year

As is the case for most people in the world around us, the year has not turned out as expected. At the beginning of 2020, we had some visions that could not be realised. The major issues that, despite the circumstances, we have been able to pursue are the mental health of our students, as well as work on an equal section grant at all KTH schools.

In an increasingly stressful time where humans are expected to be able to process increasing volumes information in various forms, mental health stresses are a natural consequence. This is particularly evident in the context of increased social isolation. During the year, we have collaborated with KTH, as well as other student unions in Stockholm, to improve the physical and mental health of both national and international students in various contexts. There is still a lot to work on, but we have taken a big step in the right direction.

The section grant is the financial support our sections receive at the local level within KTH to monitor and pursue, among others, education and gender equality issues. For

many years, the volume of the grant has varied greatly between sections. After this year, some sections receive a triple grant, on an equal footing with what other sections receive since previously. With this, we hope the sections are able to carry out their work in the best possible way.

## Effects of the pandemic

During the year, THS has actively participated in the planning and implementation of the changes that have taken place at KTH as a result of the pandemic. In parts such as preparation, decision-making and concretization, student representatives have participated and had an opportunity to significantly influence the issues that affect us students.

## Reception of new students

For many students, the reception is the first, and most important memory of their student years. It is a high-intensity period where all of KTH is bursting with flamboyant and vibrant students, who do everything in their power to make the new students feel as welcome as possible in the big university world. This year, this had to be done in a slightly different way by changing, rather than cancelling the reception. THS would like to thank all students and KTH for the successful collaboration during the reception and the rest of the year.

Through continued good cooperation, I know that together we, THS and KTH, can give our students a student period characterised by community, development and joy.

*Charley Jönsson, THS Union Chair*

# Education

## First-cycle and second-cycle education

### Educational offerings

KTH's range of courses and programmes are characterised primarily by courses given as a part of a programme leading to an academic degree. Less than two percent of KTH's total educational volume is given in the form of freestanding courses. The prioritisation as regards the range of educational offerings is therefore made between programme and types of programmes. Prioritisations and assessments are based primarily on demand from the students, the needs of the labour market, and KTH's particular expertise. One of KTH's goals is to increase internationalisation and the education offering is also affected by the internationalisation work, which is done, for example, through exchange agreements and international partnerships.

Representatives of the labour market can be found in several of the strategic councils and programme councils that exist within each School at KTH, where they have the opportunity to express their perspectives and opinions. External representatives are also present in the Faculty Council and the University Board. In these groups, regular discussions are held on which educational programmes are regarded as necessary in the society and which are in demand by e.g. commercial enterprises, public authorities and organisations. More specific discussions are also conducted within the strategic partnerships that KTH maintains with a number of companies, authorities and organisations. See also section *Collaboration*.

KTH's funding for education at first-cycle and second-cycle level increased by SEK 18.7 million in 2020. The increase consists of the government's expansion of engineering education and the government's investment in civil engineering, which started in 2018. Although KTH already produced education exceeding the ceiling amount, the number of beginners in these courses increased in 2018. With regard to the ceiling amount, KTH has since been unable to increase the number of beginners in the relevant courses.

The government's investment in civil engineering aims to cater to society's high demand for trained people in this sector. KTH is conducting an ongoing dialogue with representatives of various stakeholders in the sector via the strategic councils that exist within the School of Architecture and the Built Environment. The strategic councils have external representation from e.g. the business sector and governmental authorities. The courses in

the area of urban and rural development have many applicants and KTH is therefore trying to adapt the educational volumes accordingly. KTH already has a large volume of education in this field both in the form of courses that lead to vocational examinations and courses that lead to general degrees. Architecture gained additional slots already in 2017,

which is in line with the Swedish Government's focus.

There is a great shortage of teachers in some natural sciences and technical subjects. KTH therefore started a subject teacher training in Södertälje in autumn 2019. The number of beginners on the programme in the autumn term 2020 was six, the same number as the previous year.

KTH is also responding to the considerable need for trained teachers by conducting supplementary teacher training together with Stockholm University. In 2015, KTH was commissioned to start and carry out complementary teacher training. The first round of the educational programme commenced in June 2016. In addition, KTH, also together with Stockholm University, has been commissioned to start up supplementary teacher training for individuals with a doctoral degree. The training was given for the first time in 2017. KTH has already been providing an educational programme in engineering and education, leading to both a Degree of Master of Science in Secondary Education as well as a Degree of Master of Science in Engineering. See also section *Teacher training*.

### **Government education initiatives in connection with COVID-19**

During the spring, the government adopted several amending budgets with various education initiatives. Following the Riksdag's decision on these amending budgets, KTH has in 2020 been allocated additional funding for temporary investments in eligibility and higher education access programmes, short courses for professionals and lifelong learning, as well as a permanent expansion of training for jobs with a manpower shortage.

As a result of the investments, KTH has in a short time started two completely new eligibility courses that were only open for late registration. A marketing campaign was conducted to reach the target group and inspire as many people as possible to apply. Beginners in the eligibility courses increased by 67 percent in 2020 compared to 2019. See also section *Demand for an education at KTH*.

To enable more people to apply, KTH opened several independent courses for late registration. During the year, KTH developed concepts and formats for grant-funded further education with clearer target group adaptation to professionals. Courses in the special initiative for lifelong learning have generated a total of 16 full-time students. See also section *Lifelong learning*.

KTH has further developed the project Materials in a Circular Society within the framework of the initiative for short courses for professionals. The project already has funding from Vinnova and is part of Vinnova's pilot project for flexible short courses for professional specialists. The course package is planned to be launched in 2021. During the year, KTH has also developed training packages in artificial intelligence and machine learning, cyber defense and information security. See also section *Lifelong learning*.

Virtually all of KTH's educational programmes are in

areas with a manpower shortage. In the autumn term 2020, KTH admitted additional students to the Master of Science in Engineering degree programme and the Degree of Bachelor of Science in Engineering programme. A total of 664 more students started studying in year 2020 compared to 2019, of which 484 in the entry-level courses.

The number of beginners and full-year students in the Master of Science in Engineering degree programme and the Degree of Bachelor of Science in Engineering programme is shown in *Figures 2, 7 and 8*.

The investments decided during the year are beyond KTH's funding for education at first-cycle and second-cycle and the financial reporting must therefore be done separately, see further sections *Finance – results, resource use and funding*.

#### ***KTH's investment in sustainable production in Södertälje***

Jointly with the Municipality of Södertälje, Scania, AstraZeneca and the company Acturum KTH is involved in an education and research initiative in Södertälje. One of the aims of the initiative is to strengthen the competitiveness of Swedish industry through cutting-edge education and research. The initiative includes four new educational programmes, with the aim of doubling the number of educational places on KTH's campus in Södertälje in the long term. The new courses have been developed in collaboration with industry in Södertälje, and several of the courses are also being carried out in close collaboration with the business community.

In the autumn term 2020, 40 (40) students were admitted to the Master of Science programme industrial engineering and sustainability and 21 (13) students to the two-year Master of Science programme sustainable production development. This programme is closely linked to the growing research activities at KTH Södertälje and the industry in the region.

In addition, 32 (19) students were admitted to the industrial engineering and production maintenance programmes and six (six) students were admitted to subject teacher training with a focus on technology, grades 7-9. The teacher training programme is a combination educational programme and leads to the Degree of Master of Science in Secondary Education with a specialisation in technology and mathematics as well as a Degree of Bachelor of Science in Engineering. The programme is largely studied together with a major in innovation and design on the programme leading to the Degree of Bachelor of Science in Engineering with a major in mechanical engineering, and with existing supplementary teacher training.

At KTH Södertälje, 111 (91) students were also admitted to the Master's Degree in mechanical engineering programme, 140 (137) students to the regular eligibility programme for the technical base year and 295 students to the newly established eligibility programme technical base year, distance learning with campus meetings.

A total of 648 (311) students were admitted to courses and programmes at KTH Södertälje in 2020.

#### **Recruitment of students to KTH's programmes starting at first cycle**

KTH's objective is that education in technology should be upheld as a natural choice for young people who want to contribute constructively to sustainable societal development. KTH has a communication platform that specifies what KTH should communicate to prospective students. It also forms the basis of the activities and measures planned or begun to achieve a more balanced gender distribution, reduce social imbalance in recruitment and stimulate ethnic diversity. KTH also works long-term with young people in primary and lower secondary school as a target group.

Recruitment work prioritises the personal encounter between representatives of KTH and potential students. This is accomplished primarily by approx. 45 "student ambassadors", who are KTH's representatives in the interaction with upper secondary school pupils. These student ambassadors represent most of KTH's degree programmes and campuses. The student ambassadors reflect the diversity at KTH in terms of gender, geographic origins, ethnicity and social background. They are chosen with great care, with a high priority being their ability to inspire young people. All student ambassadors receive training in communicating with young people, presentation techniques, messages for student recruitment and specific information about the target group, as well as individual coaching.

In 2020, KTH's student ambassadors held 45 student recruitment meetings with upper-secondary school classes in the form of study visits to KTH and visits to upper secondary schools. However, the operations have been heavily affected by COVID-19. By comparison, in a typical recruitment year, between 120-150 student recruitment meetings are held. A concept for offering digital study visits was therefore developed in 2020.

KTH's website, the course and programme offering catalogue and personal meetings, such as visits to upper secondary schools, are the most important channels for reaching the target audience with information prior to their selection of a programme. In order to establish opportunities to make KTH accessible to more people, irrespective of where they happen to live, the website, along with other digital initiatives such as social media and student blogs, are a very important component. KTH's catalogue also continues to be an important channel for reaching and inspiring the target group to choose KTH. In order to make better use of the material produced for the catalogue, an inventory of material was carried out in 2020 to make it more accessible on KTH's website. In connection with this, there was also a major restructuring of the training web and a review in accordance with the Web Accessibility Directive.

Each year, KTH organises an open house for the purpose

of disseminating information about KTH's educational programmes, on site in the University environment. In 2020, Open House was scheduled for March, but the event had to be cancelled at short notice due to COVID-19 and the restrictions that then applied to major events. Prior to Open House, webinars were sent where prospective students had the opportunity to get information and ask questions to teachers, study counsellors and other employees at KTH. When physical events, such as Open House, were cancelled, the webinars and the Ask a KTH student function were highlighted.

During KTH's student recruitment activities, around half of the participants are women. The same applies to KTH's direct target audience, 2nd and 3rd year upper secondary students in science programmes. At present, the greatest challenge in terms of recruitment of incoming students is that certain specialisations and educational environments still have a distinct imbalance between men and women. The work of recruiting women has therefore to some extent been redirected towards the subject areas and programmes with the greatest imbalance.

Since 2014, KTH has conducted an initiative under the name "Giants" for the purpose of increasing the number of women students in programmes in computer engineering, IT and electrical engineering, by providing inspiration and more in-depth knowledge in these subject fields. Since 2019, the fields of mechanical engineering, vehicle engineering, engineering physics and technical mathematics have also been included in the initiative. During 2020, the concept has been under development with the aim of adapting communication to target groups. Due to COVID-19, no physical event has been organised.

In 2020, KTH was awarded additional funding for, among other things, eligibility and higher education access programmes as part of the government's efforts in connection with COVID-19. For the autumn term 2020, KTH therefore started two new technical eligibility courses that are partly taught remotely, one at KTH Södertälje and one at KTH Flemingsberg. A marketing campaign was conducted to reach the target group and inspire as many people as possible to apply. The places in the new technical eligibility programme at KTH Södertälje were filled and at KTH Flemingsberg the majority of the places were filled. See also section *Government education initiatives in connection with COVID-19*.

KTH is working to improve knowledge and interest in technology, science and mathematics among children and young people. Vetenskapens Hus (the House of Science) is the hub of this work. Vetenskapens Hus is run by KTH and Stockholm University, with the City of Stockholm as a long-term partner. School pupils from primary and lower secondary and upper secondary school perform experiments and activities involving biology, physics, chemistry, mathematics and technology. Advanced teacher training in

these subjects is also offered. Vetenskapens Hus also hosts a wide range of other initiatives, such as Teknikrättan and ForskarFredag, with a focus on increasing knowledge and interest in technology, science and mathematics. Vetenskapens Hus has the capacity to welcome more than 80,000 students and teachers per year, but in 2020 the operations have been affected by COVID-19.

## Recruitment of students to second-cycle study programmes

KTH's Development Plan makes it clear that the recruitment of qualified students must take place both nationally and internationally. A significant number of tuition-paying students is a measure of KTH's strong position internationally, and further efforts must be made to strengthen the quality within this area. International programme students are mainly found within KTH's approximately 60 Master's and Bachelor's programmes, all of which are in English.

### Focus during the year

During the year, KTH has focused on continuing the transition to increasingly digital communication with the target group. The work intensified due to COVID-19, which resulted in the cancellation of recruitment efforts normally carried out on site around the world, such as trade fairs, university visits and other events.

Early on, KTH offered a website that addressed common questions related to the pandemic. Prospective students were continuously updated on the situation via newsletters, social media, digital events and webinars. Given the uncertain circumstances that prevailed during the spring and summer, the outcome was still positive with 582 (653) registered new fee paying students and 688 (693) fee-exempt European beginners in KTH's Master's programmes.

To provide information on the studies and student life at KTH, a virtual campus tour consisting of ten films was produced from KTH's five campuses. The films that show KTH from a number of students' perspectives have been used in a number of different contexts during the autumn and have had about 200,000 views during 2020.

KTH has offered about twenty webinars for prospective international students. Themes have included presentation of KTH, Master's programmes in various subject areas, application and admission, and practical preparations before arrival. All webinars are available on YouTube and kth.se.

A target group survey aimed at admitted students was conducted during the autumn in collaboration with an external partner. The survey has been conducted every two years since 2014 and provides a good opportunity to compare outcomes over time. This year's results showed that the respondents mainly became aware of KTH through search engines, ranking lists, web portals and family and friends. The main reasons for applying to KTH were the content of the programmes, the good reputation of the education,

KTH's ranking and the attractiveness of Stockholm and Sweden. The most common reason why admitted students do not start education at KTH is that the cost of tuition fees is too high. A large proportion also indicated that the pandemic prevented them from starting their courses at KTH. KTH's communication with the students developed positively as all channels received higher gradings than previously. The results will be used in an action plan in 2021.

During the year, KTH was granted accreditation within the US Department of Education's student loan program, which means, among others, that US students can be granted a deferral of repayment of previous student loans while studying at KTH.

As in previous years, students at KTH have been engaged to communicate with prospective students to a large extent. Students in virtually all Master's programmes have been engaged to answer questions on an ongoing basis, to contact admitted students, to contribute content to social media and to participate in digital fairs and events.

The management of e-mails from prospective students has been further developed during the year within the joint operational support. KTH now offers a common entrance for students' questions. Response times and service are also quality assured to a greater extent than before.

#### **Activities to create better visibility**

During the year, KTH developed the initiative for digital advertising aimed at prospective international students, both through search word advertising and through paid dissemination on social media. This initiative is continually evaluated and adapted to reach the right target audience.

KTH has participated in 15 virtual fairs aimed at all major markets, both in collaboration with the Swedish Institute and with other actors. Digital events have been held, aimed at some twenty partner universities and other partners.

Digital communications in social media have been continually developed, both in terms of content as well as choice of channels. Particular focus has been placed on activities on Chinese social media to overcome communication barriers.

KTH has chosen to use recruitment agents in Turkey, Vietnam, Thailand and Indonesia as a complement to other efforts in the countries. All agents charge commission. Four of the registered new students in 2020 were recruited through agents, which is fewer than the previous year (eleven).

#### **Communication with applicants and admitted students**

The recruitment work continues until the students commence their academic studies, and it is therefore considered to be a priority to provide information and support to the admitted students right up to registration.

When international students received their admissions notices in April, a new digital initiative was carried out in the

form of Admission weekend. Admitted students were able to ask questions and chat with staff and student ambassadors throughout the weekend and also contact each other.

The-departure events that normally take place around the world were replaced by a number of digital meetings for students from different regions, with the possibility to interact with responsible administrators, teaching and research staff, as well as students from the region.

With the help of 127 international students, KTH contacted the admitted in connection with the sending of admissions notices, which led to 2,200 calls or video meetings. During the year, digital newsletters were also sent to applicants and admitted throughout the process up to registration at KTH. Webinars were offered about practical preparations.

#### **Demand for an education at KTH**

The demand for an education at KTH leading to a vocational degree remains very substantial, and has increased slightly compared to the previous year. The number of first-choice applicants for these programmes totalled 6,327 (5,706) in 2020. The number of student slots planned amounted to 2,248 (2,258).

The most sought after courses were, as before, the programme leading a Master's Degree in Architecture with 1,104 (836) first-choice applicants, as well as the programmes leading to the Degree of Master of Science in Engineering with a major in Computer Science and Technology with 698 (714), Industrial Economics with 689 (675) and Engineering Physics with 448 (447) first-choice applicants. The new Master's Degree in Engineering Mathematics had 309 first-choice applicants. Constructional Engineering and Design saw the most first-choice applicants in the programmes leading to the Degree of Bachelor of Science in Engineering, with 310 (264).

KTH has an English-language first-cycle study programme, the Bachelor's Degree programme in Information and Communication Technology. In 2020, the programme had 984 (926) first-choice applicants, of whom 310 (277) were in the national admissions round and 674 (649) in the admissions round for courses given in English. This shows a great interest in courses given in English even at the undergraduate level (first-cycle courses and study programmes).

The number of applications for Master's and Bachelor's programmes given in English is large and has increased compared to the previous year. Of 18,186 (14,388) web registrations to the courses given in English in a second-cycle study programme starting in the autumn term 2020, 14,832 (11,044) were liable to pay tuition fees, of whom 7,171 (4,215) paid the registration fee.

KTH coordinates admission to the Master's programme given by EIT Digital within the framework of the European Institute of Innovation and Technology, EIT. Some of the admitted students commence their studies at a university other than KTH, and some do not study at KTH at all but

rather only at the partner universities. A total of 2,186 (1,873) applications were received. See also the section *European Institute of Innovation and Technology*.

The qualifying access programmes, Technical Preparatory Year and Technical Preparatory Term, had a total of 2,064 (1,504) first-choice applicants in 2020. The programmes start in both the spring term and the autumn term. The Technical Preparatory Year is a one-year qualifying education that is intended for students who have not met the full admission requirements for KTH's educational programmes during their upper secondary school studies. The Technical Preparatory Year provides supplementary education at the upper secondary level in mathematics, physics and chemistry. It is also possible to apply only for the second term of the Technical Preparatory Year, which is particularly suitable for those who have attended the upper secondary school's technology programme. A pass result in the qualifying Technical Preparatory Year or Technical Preparatory Term guarantees a place on one of KTH's programmes leading to a Master of Science in Engineering, a Bachelor of Science in Engineering or a Master of Science in Secondary Education.

Admissions to KTH's educational programmes take place in nationally coordinated admissions rounds in the NyA admissions system, which is administered by the Swedish Council for Higher Education.

The admission to EIT Digital takes place in EIT's own admissions portal.

### Alternative selection

Since 2011 KTH uses a mathematics and physics entrance exam as an alternative method of selection to the programmes leading to the Degree of Master of Science in Engineering with a major in Engineering Physics, Electrical Engineering and Vehicle Engineering. For the architectural education, the architecture test is used as an alternative selection. In 2020, the mathematics and physics test and the architecture test were cancelled due to COVID-19.

### Separate admissions of fee-paying students

Universities and higher education institutions can admit the fee-paying students in a separate group. KTH has applied this to the English-language Bachelor and Master programmes as well as to courses within KTH's Study Abroad Programme, a course package aimed at fee-paying students.

The number of fee-paying applicants admitted with separate admission to these programmes was 1,720 (1,524), while the corresponding number for fee-exempt applicants was 1,028 (977). Eight fee-paying applicants were admitted to courses within the Study Abroad Programme.

The admission numbers for the Master programmes have been based on an overall picture of KTH's financial scope for new grant-funded students and available capacity for fee-paying students. KTH strives for the level of knowledge to be equally high among applicants admitted from both

selection groups, as the tuition fee-funded activities are integrated into the grant-funded activities.

### Assessment and recognition of prior learning

KTH has a special working group that focuses on validation and assessment of real competence. During 2020, the group held regular meetings and developed processes, such as a processing order for the validation work at KTH.

KTH has also participated in an international project on validation, *Recognition of Prior Learning in Practice*, which started in 2019. The project is funded by the European Commission.

During the period 2017-2019, KTH developed, jointly with Chalmers University of Technology, Linköping University and The University of Borås, a model for validating real competence for engineering programmes. In 2020, higher education institutions continued their cooperation on validation in engineering education.

During the year, KTH has participated in conferences and seminars, arranged by, among others, the Swedish Council for Higher Education, with the aim of improving competence in management of real competence. During 2020, internal training on validation and real competence has taken place. KTH has also submitted an opinion for the Validation Delegation's final report.

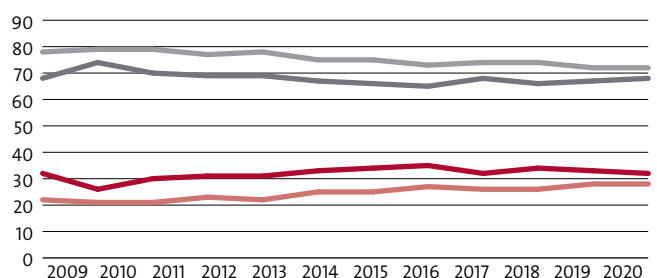
### Beginners

In 2020, a total of 2,604 (2,418) beginners commenced their first year of studies in KTH's educational programme leading to a vocational degree, of whom 93 (117) were in the programme leading to a Master's Degree in Architecture, 1,819 (1,692) on the programmes leading to a Degree of Master of Science in Engineering, and 692 (609) in the programmes leading to the Degree of Bachelor of Science in Engineering. See *Figure 2*. At the same time, the final two years of a Master of Science in Engineering degree programme constitutes a master's degree programme, which

Figure 1

Gender structure – new female and male students 2009-2020 in percent

- Bachelor of Science in Engineering, men
- Master of Science in Engineering, men
- Master of Science in Engineering, women
- Bachelor of Science in Engineering, women



Source: Ladok

Figure 2

Total number of new students 2017-2020

	2020		2019		2018		2017	
	Total	Proportion (%) of women/men	Total	Proportion (%) of women/men	Total	Proportion (%) of women/men	Total	Proportion (%) of women/men
<b>Master of Architecture, Degree Programme 300 HE credits</b>	<b>93</b>	<b>61/39</b>	<b>117</b>	<b>58/42</b>	<b>119</b>	<b>58/42</b>	<b>107</b>	<b>57/43</b>
<b>Master of Science in Engineering Degree Programme 300 HE credits</b>								
Biotechnology	79	76/24	76	58/42	82	61/39	68	68/32
Engineering and Education	58	34/66	53	45/55	56	50/50	60	43/57
Computer Science and Engineering	196	19/81	175	18/82	191	17/83	166	20/80
Design and Product Realisation	107	46/54	107	46/54	115	47/53	113	48/52
Electrical Engineering	77	9/91	92	20/80	97	20/80	83	18/82
Energy and Environment	78	56/44	77	61/39	86	62/38	82	49/51
Vehicle Engineering	95	12/88	94	15/85	113	16/84	92	13/87
Industrial Engineering and Management	160	28/72	153	24/76	159	36/64	151	25/75
Industrial Technology and Sustainability	33	39/61	34	38/62	33	39/61	-	-
Information and Communication Technology	69	22/78	66	17/83	73	21/79	74	22/78
Mechanical Engineering	146	18/82	138	17/83	159	18/82	190	19/81
Materials Design and Engineering	45	31/69	41	49/51	47	40/60	45	38/62
Medical Engineering	57	44/56	51	59/41	56	41/59	55	44/56
Media Technology	73	36/64	69	52/48	79	42/58	69	49/51
Civil Engineering and Urban Management	176	48/52	163	45/55	180	48/52	164	41/59
Engineering Physics	121	24/76	128	28/72	150	19/81	120	18/82
Engineering Chemistry	75	47/53	61	48/52	68	54/46	69	64/36
Engineering Mathematics	49	23/77	-	-	-	-	-	-
Open entrance	125	27/73	114	25/75	133	29/71	129	28/72
<b>Sub-total</b>	<b>1,819</b>	<b>32/68</b>	<b>1,692</b>	<b>33/67</b>	<b>1,877</b>	<b>34/66</b>	<b>1,730</b>	<b>32/68</b>
<b>Bachelor of Science in Engineering, Degree programme 180 HE credits</b>								
Constructional Engineering and Design	182	35/65	170	34/66	185	33/67	153	35/65
Computer Engineering	167	20/80	146	23/77	157	15/85	136	18/82
Electronics and Computer Engineering	37	11/89	33	9/91	33	15/85	33	9/91
Electrical Engineering	57	16/84	37	14/86	40	10/90	43	7/93
Industrial Technology and Production Maintenance	28	21/79	23	13/87	32	22/78	26	23/77
Chemical Engineering	46	54/46	46	43/57	45	51/49	58	52/48
Mechanical Engineering	91	20/80	80	28/72	83	11/89	95	16/84
Medical Engineering	32	56/44	24	29/71	30	47/53	39	38/62
Engineering and Economics	52	33/67	50	32/68	50	46/54	53	28/72
<b>Sub-total</b>	<b>692</b>	<b>28/72</b>	<b>609</b>	<b>28/72</b>	<b>655</b>	<b>26/74</b>	<b>636</b>	<b>26/74</b>
<b>Subject Teacher Education in Technology, Secondary Education 270 HE credits</b>	<b>6</b>	<b>67/33</b>	<b>6</b>	<b>50/50</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Bridging Teacher Education 90 HE credits</b>	<b>61</b>	<b>43/57</b>	<b>29</b>	<b>55/45</b>	<b>57</b>	<b>37/63</b>	<b>44</b>	<b>39/61</b>
<b>Bridging Teacher Education for Graduates with a third cycle degree 90 HE credits</b>	<b>26</b>	<b>50/50</b>	<b>15</b>	<b>55/45</b>	<b>13</b>	<b>31/69</b>	<b>23</b>	<b>57/43</b>
<b>Bridging programme for architects with foreign qualifications</b>	<b>-</b>	<b>-</b>	<b>3</b>	<b>67/33</b>	<b>26</b>	<b>69/31</b>	<b>-</b>	<b>-</b>
<b>Bridging programme for engineers with foreign qualifications</b>	<b>-</b>	<b>-</b>	<b>6</b>	<b>100/0</b>	<b>19</b>	<b>53/47</b>	<b>-</b>	<b>-</b>
<b>Masters programmes</b>								
Masters programmes 120 HE credits	2,380	35/65	2,392	35/65	2,472	33/67	2,338	34/66
<i>of which within Master of Science in Engineering programmes</i>	1,217	35/65	1,207	35/65	1,304	34/66	1,133	35/65
Masters programmes 60 HE credits	52	50/50	73	49/51	85	65/35	131	66/34
<b>Sub-total</b>	<b>2,432</b>	<b>35/65</b>	<b>2,465</b>	<b>35/65</b>	<b>2,557</b>	<b>34/66</b>	<b>2,469</b>	<b>36/64</b>
<b>Bachelors programmes 180 HE credits</b>	<b>119</b>	<b>36/64</b>	<b>123</b>	<b>37/63</b>	<b>117</b>	<b>37/63</b>	<b>130</b>	<b>29/71</b>
<b>University Diploma programmes 120 HE credits</b>	<b>33</b>	<b>45/55</b>	<b>36</b>	<b>31/69</b>	<b>45</b>	<b>33/67</b>	<b>42</b>	<b>31/69</b>
<b>Technical Preparatory Year, Technical Preparatory Semester 60/30 HE credits</b>	<b>1,204</b>	<b>35/65</b>	<b>720</b>	<b>30/70</b>	<b>738</b>	<b>33/67</b>	<b>717</b>	<b>38/62</b>
<b>Total</b>	<b>6,485</b>	<b>34/66</b>	<b>5,821</b>	<b>34/66</b>	<b>6,223</b>	<b>34/66</b>	<b>5,897</b>	<b>34/66</b>

Source: Ladok

means that these five-year programme students are registered as beginners on a master's degree programme when they begin the fourth year. This does not apply to the civil engineering and education programme, which is a coherent five year programme. In 2020, 58 (53) beginners started the civil engineering and education programme.

The number of beginners in the master's programmes was 2 380 (2 392). Of these, 1,163 (1,185) were students on KTH's master's programmes, while 1,217 (1,207) were previously also students in a programme leading to the Degree of Master of Science in Engineering. The master's programmes had 52 (73) beginners.

Of these beginners, in 2020 34 (34) percent were women and 66 (66) percent were men. In the development plan for 2018-2023, KTH highlights that several educational programmes have a low proportion of women. The operational plan for 2020 includes initiatives for a long-term endeavour to achieve a better balance between women and men in KTH's educational programmes. Of the beginners in the programmes leading to the Degree of Master of Science in Engineering, 32 (33) percent were women and 68 (67) percent were men in the autumn term of 2020. Of the beginners in the programmes leading to the Degree of Bachelor of Science in Engineering in 2020, 28 (28) percent were women and 72 (72) percent were men. However, the distribution between men and women differs sharply between the various programmes at KTH, see *figure 2*.

The median age for beginners in the programme leading to a Degree of Master of Architecture was 21 for both women and men. In the Master of Science in Engineering degree programme, it was 20 for both women and men. For beginners in the programmes leading to the Degree of Bachelor of Science in Engineering, the median age was 22 for women and 21 for men. The median age in master's programmes was 24 for women and 23 for men. For qualifying access programmes, the median age was 21 for women and 20 for men. The median ages are stable over time.

In addition to the admission of beginners in year 1, it is possible to begin in a later part of some educational programmes. The number of students who started in the later parts of a Master of Science in Engineering degree programme was 143 (134) and for master's programmes this number was 131 (203).

In the autumn term 2020, 582 (653) new tuition-paying students were registered at KTH, of whom 191 (200) were women and 391 (470) were men. This means that the decline as a result of the pandemic was not as severe as previously feared.

Of the fee-paying students, 63 (64) had been awarded scholarships from Swedish organisations or through scholarship programmes with whom KTH has an agreement on scholarship funding: 33 (35) UHR scholarships, six (zero) Erasmus Mundus, four (two) KTH India Scholarship

Foundation, one (two) Colfuturo, one (two) LPDP and 18 (22) through the Swedish Institute.

Of the remaining 519 (589) new fee-paying students, 65 (93) came via EIT Digital and 65 (73) came via EIT InnoEnergy.

In 2020, 688 (693) externally recruited programme beginners from Switzerland, the UK and the EU/EES including Sweden, commenced their studies in a second-cycle study programme, of whom 270 (260) were women and 418 (433) were men.

In 2020, 1,204 (720) students started on the qualifying access programmes. The sharp increase is mainly due to the fact that KTH, as a result of the government's investment in access education, has started two new technical preparatory years. Of the beginners in the qualifying access courses, 35 (30) percent were women and 65 (70) percent were men. Of those who started on the qualifying access programme in the autumn term of 2019 or spring term of 2020, 31 (38) percent, or a total of 228 (274) students continued on a programme leading to the Degree of Bachelor or Master of Science in Engineering at KTH in 2020. Of these, 31 percent were women and 69 percent were men. The majority of those who continue their studies at KTH embark on a Master of Science in Engineering degree programme.

### **Courses between upper secondary school and higher education for preparation for higher education studies**

Online-based courses for preparation for higher education studies have also been offered to students who intend to enter degree programmes in the fields of technical studies and science in 2020. The courses aim to support beginners and facilitate the transition from upper secondary school to university. In 2020, the courses have been further developed according to an evidence-based digital learning model developed within the international network Open Learning Initiative.

### **International mobility**

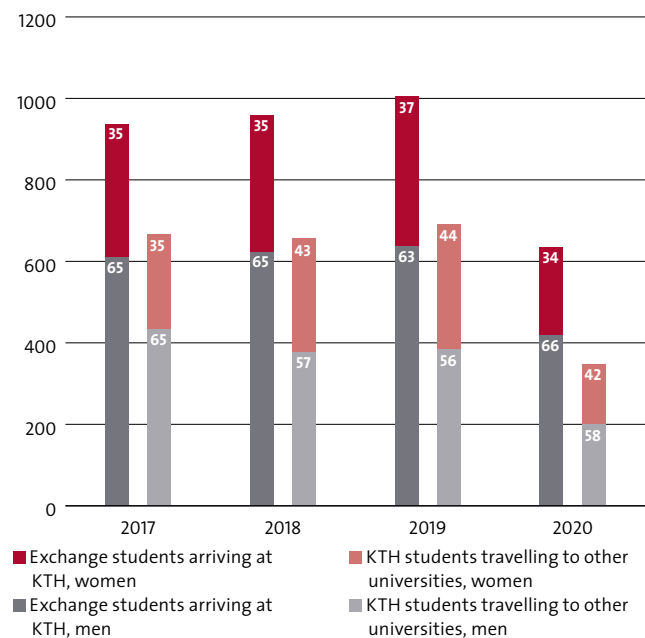
KTH works actively to ensure that, to a greater extent, the students conduct part of their education abroad. The target according to KTH's Development Plan 2018-2023 is that a large proportion of the students should study at least one term abroad within the framework of their education. In 2020, 348 (690) students started studying abroad. The sharp decrease in numbers compared to 2019 is due to COVID-19. KTH's policy has been that study abroad can continue in countries to which Sweden's Ministry for Foreign Affairs has not advised against travel. As the Ministry for Foreign Affairs' advice against travel has applied to all countries outside the EU/EEA/Schengen area and the UK, no outgoing exchange student has been able to take up his/her exchange place at a partner university outside Europe in autumn 2020. In addition, a number of KTH's European partner universi-



Figure 3

Student exchange 2017–2020

Number of students who began student exchange per year, in absolute numbers and proportion of women and men in percent



Source: Ladok

ties cancelled their exchange activities in the autumn term 2020. The most common countries for studies abroad that could go ahead were Switzerland, Italy, the USA, Singapore and France, which is a change from the previous year. Of the students travelling to study abroad, 35 (55) percent studied at a university outside the EU/EEA/Switzerland/UK.

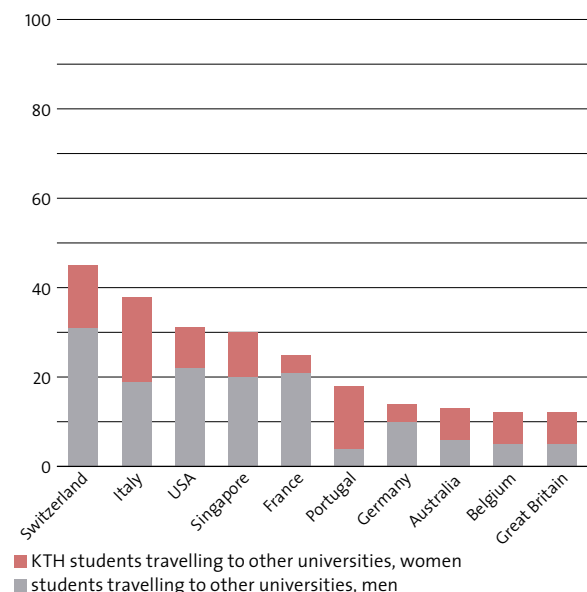
There is still great interest in studying as an exchange student at KTH, but due to the ongoing pandemic, fewer exchange students started their studies at KTH in the autumn of 2020 compared to autumn 2019. Primarily, it was overseas students who did not have the opportunity, or decided not to, to take up their exchange place at KTH. During the year, 635 (1,006) foreign exchange students commenced studies at KTH. Within Europe, most students came from universities in France, Germany, Switzerland and Spain. Of the total number of incoming exchange students, 33 (39) percent came from countries outside the EU/EEA/Switzerland/UK, with the majority coming from Singapore, the USA, China including Hong Kong, and Australia.

KTH Global, renamed Virtual KTH Global in 2020, is the annual event that highlights all the international opportunities offered during the study period. For the ninth year in a row, the joint operational support and KTH schools have jointly organized KTH Global, this year Virtual KTH Global, which is part of the effort to increase in exchange studies. This year, all activities were digital. Over three days, the students were able to take part in live and recorded talk shows about studying abroad, digital information sessions

Figure 4

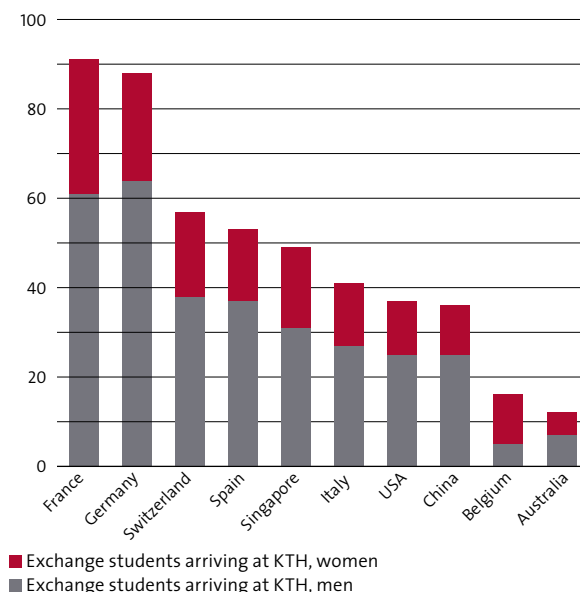
Student exchange – most popular countries 2020

Number of students who began student exchange during the year: the most popular countries KTH students travel to



Source: Ladok

Number of students who began student exchange during the year: the most popular countries exchange students originate from



about foreign opportunities for existing international students and digital information meetings at KTH schools. The feedback on the various activities was positive. This means that KTH will keep certain parts of the digital activities next year or combine digital and physical activity at an event even if there are no longer any COVID-19 restrictions.

In addition to the exchange students, KTH has a relatively large group of incoming double-degree students within special cooperation agreements with universities in Europe and Japan. These students primarily study on a second-cycle study programme for one and a half to two years, and are then awarded a Degree of Master of Science in Engineering from KTH and an equivalent degree from their home university. The number of double-degree students who commenced studies at KTH during the year was 130 (128). In 2020, no (one) KTH student began double-degree studies abroad.

Since most of the double diploma students KTH admits come from a partner university in Europe, the impact of COVID-19 has been marginal.

There are also opportunities for various types of international experience other than pure exchange studies. During the year, 82 (70) KTH students commenced Erasmus internships at companies or organisations in Europe. Internships are the mobility least affected by the pandemic. Few students cancelled their internship in spring 2020 and the number who departed in autumn 2020 was relatively unchanged compared to the previous year.

51 of the 53 scholarship holders awarded Minor Field Studies 2019 for departure in spring 2020 were greatly affected by the pandemic. 15 students did depart, but all had to cancel their field studies prematurely. Thirty-six students were stopped shortly before the departure. Two students turned down the scholarship before it was paid out. Due to COVID-19, KTH has decided not to have a call for scholarships for spring 2021. However, KTH has already received 65 scholarships from the Swedish Council for Higher Education, which is an increase from the previous year. A call will be announced when the global situation allows.

Since 2005, KTH has collaborated with the National University of Singapore (NUS) for internships at startups in combination with courses. During the spring term, six (seven) KTH students travelled to Singapore as part of the collaboration. In August, eight students from Singapore started KTH-courses remotely while completing their internship in Singapore.

## Digitisation of Education

As a result of COVID-19, 2020 was an eventful year, including in relation to the digitisation of education. With a few days' notice, KTH's educational activities switched to distance learning. As a result of the government's decision, after 18 March KTH switched entirely to online teaching and examination for the rest of the spring term. During the

autumn term, the education was campus-based with significant parts of digital elements, where the campus was opened up to practical and laboratory elements and beginner students received parts of their education on campus while other education at KTH was conducted digitally.

### *Open online training*

In 2020, KTH offered a total of 14 open online courses (Massive Open Online Courses, MOOC) through the consortium edX. Three courses in sustainable development were offered for the first time. The other eleven courses have also been offered in previous years. In addition, two course packages were offered, *Digital Transformation* and *Risk Assessment of Workload Injuries*, where the participant, upon completion of assignments, received a so-called Professional Certificate. Through edX, KTH also offered more advanced courses in computer science, cyberphysical systems and adaptive finite element method, as well as a basic course in science theory for engineers. All courses were offered in English and with a flexible course pace. A total of 43,465 participants were enrolled in the courses offered in 2020.

As a result of KTH's MOOC initiative, educational and support material was distributed through the special initiative on digitization in connection with the pandemic. The MOOC initiative has also contributed to strengthened teaching skills and more efficient processes in developing flexible scalable online courses and digital course materials.

During 2020, KTH has also provided study preparation courses in programming and computer science for approximately 3,500 students and in mathematics for approximately 3,200 students. KTH has provided preparatory courses in mathematics and programming for more than ten years, but the courses have been offered as MOOC courses since 2018 (mathematics) and since 2020 (programming). Preparatory courses in physics and chemistry have not been offered in 2020.

In 2020, KTH's resources in relation to digitisation have otherwise mainly focused on online teaching and examination as a result of COVID-19.

### *Working group for digitisation of education*

As a result of the urgent digital transition, the President decided to set up a special working group on the digitisation of education, in order to gather forces and quickly communicate, coordinate and prioritise the most critical activities. The working group comprised the administrative objects E-learning and study administration as well as the digital examination project. Two synchronization teams were also established; one for education administration and one for web meeting, video and streaming. In addition, formal coordination was established with, among others, IT operations and support, the management office within the joint operational support and the higher education teaching activities. During the spring term when the campus was closed, the working group was able to borrow staff from

other parts of KTH, who were temporarily released. Work in the autumn term was carried out with the resources who normally work with IT support of education, reinforced with a communicator.

In summary, the support activities for the digitisation of education in 2020 consisted of

1. Ensuring access to digital education systems and tools and adapt capacity for increased use.
2. Supporting teachers' digital transformation with teaching, technical and administrative solutions, training materials, educational activities, supervision and support.
3. In particular, supporting the implementation of examinations by the schools.

### **Digital education**

The principles that KTH and most of the education sector globally have applied are referred to as emergency remote teaching. It involves replacing the teaching and examination activities normally carried out on campus with digital equivalents but without any functional change. During the autumn term, several steps were taken towards moving from emergency remote education to conducting planned campus-based education with a significant part consisting of digital elements.

An essential part of the teaching normally offered on campus was carried out through digital meetings in combination with written material and pre-recorded videos. The total call time in KTH's digital meeting tool, Zoom, on an average working day has increased from about 200 hours per day before COVID-19, to 28,000 hours per day by the end of 2020.

Use of KTH's learning platform Canvas has doubled during study periods where there have been restrictions on campus teaching. The total number of Canvas page views on an average working day has increased from 218,000 per day before COVID-19, to 452,000 per day by the end of 2020.

Of all courses at KTH (excluding postgraduate courses and degree projects) with eight or more students, Canvas was used 94 percent compared to 90 percent in 2019. The courses that did not use Canvas in 2020 are usually courses that are read together with other higher education institutions, where their learning platform is used instead.

### **Digital examination**

From mid-March to and including August, all examinations at KTH were conducted digitally. During the autumn term, about half of the examinations were conducted on campus and half digitally. The digital examination was mainly conducted in Canvas where special examination rooms

have been developed. In total, in 2020, students submitted 828,000 assignments and quizzes in Canvas (compared to 544,000 in 2019).

Of the different digital examination forms, oral examinations increased the most. During an oral examination, the

student meets a teacher via a digital meeting and answers questions and describes solutions orally. Furthermore, there were various forms of home examination where the student must solve one or more problems with access to aids, such as course literature, the internet etc., with limited time.

One solution that has received a lot of attention is written digital examinations with camera surveillance via Zoom. There is a long tradition at KTH of examining through exams in a controlled environment and this emergency solution involved a minimum of functional difference. Among the challenges are concerns about failure to take advantage of the possibilities of technology and that camera-monitored examinations are perceived as invasion of privacy, less legally certain than the controlled environment in a physical exam hall, and create anxiety and stress among students and staff.

### **Support for teachers**

Support for teachers' digital transformation was implemented by intensifying the activities that already existed before COVID-19 around educational activities, training materials, supervision and support. For example, in 2020:

- A total of 49 digital so-called *Lunch 'n' Learn* webinars were held (compared to six in 2019) regarding pedagogical perspectives on digital teaching and examination. These were recorded and made available on KTH's intranet.
- Support and supervision on 4,600 occasions for KTH teachers, administrators and students in need of support regarding digital teaching and examination.
- Further development of KTH's intranet for education with a large number of new articles, guides and reports on digital education.

In addition to the general support, targeted support was also implemented during the summer and the autumn term to extend access education at KTH. During the autumn term, two new basic year programmes, access education, started, which are conducted online with campus meetings. In the beginning, the staff who had previously worked with so-called MOOC courses, Massive Open Online Courses, made critical contributions to the support.

In addition to the activities in direct response to the increased digitization due to COVID-19, regular support activities for, and maintenance of, KTH's systems, tools and processes were carried out. In addition, a new tool was launched to produce and publish quality assured course memos.

### **Looking ahead**

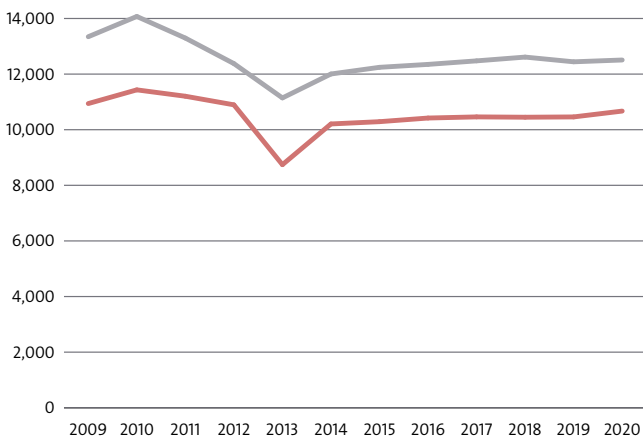
For 2021, KTH intends to continue to coordinate the digitisation of education through the special working group on the digitisation of education as long as restrictions on campus-based education remain in place. KTH's priority is to secure access to adequate tools and systems for conducting teaching and examination digitally and to further develop

support for the digitisation of education. In addition to continuing the central investments in educational activities and materials, local support for the digitisation of education will also be established in the schools. Digital examination will be a special priority area where the goal is to develop a culture with several established examination formats for the digital environment in 2021. In summary, during 2020, KTH has taken major steps towards fulfilling KTH's vision 2027 to make KTH's digital campus as prominent as the physical.

**Integration initiatives**

Since 2011, the course Intensive Swedish for Engineers in Stockholm County, Sfinx, has been a coordinated educational programme that is an integral part of KTH's regular activities. The purpose is to facilitate entry into the labour market for graduate engineers who have immigrated to Sweden. Sfinx is a collaboration between KTH, Järfälla Municipality, City of Stockholm, the County Administrative Board in Stockholm County and the Swedish Association of Graduate Engineers (Sveriges Ingenjörer). For 18 months, the engineers can study Swedish, from the level Swedish for immigrants up to upper secondary level, as well as English. They participate in the programme at KTH without being registered in courses, and they have the opportunity to participate in a mentorship programme for which the Swedish Association of Graduate Engineers is responsible. They also receive information about Swedish industry and the Swedish labour market. The programme has more than 100 participants every year, and in total it has been attended by almost 1,200 participants. The students' reporting take the form of reports that are integrated into Swedish teaching and contribute to the grade in Swedish.

Figure 5  
Full year students and full year performances 2009-2020



— Full year students (FYS) are defined as the number of students who have started studies on a course multiplied by the number of course higher education credits divided by 60.  
 — Full year performance (FYP) is defined as the number of higher education credits gained on a course or sub-course divided by 60.

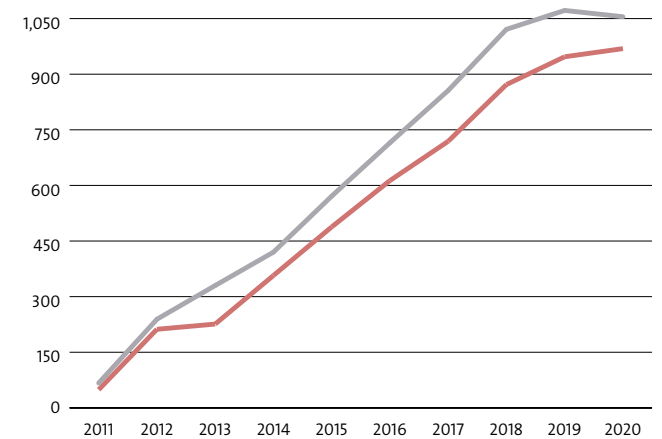
Source: Ladok

Since 2017, KTH has conducted a Marianne and Marcus Wallenberg-funded project “Software Development Academy,” where new arrivals are quickly trained in software development with innovative pedagogical methods and with far-reaching cooperation with industry. In 2020, 93 participants started and overall 306 participants from 58 countries have completed the programme. In 2018, the project was granted additional support from the EU ESF in the amount of SEK 16 million. In 2020, the project has expanded nationally and is now conducted completely digitally with an experimental *learning analytics approach* offering participants an asynchronous individualized learning experience. The project has received additional funding from Erasmus+ for European expansion. The European Social Fund finances certain development and research with a view to better understanding mechanisms around advanced retraining and society's skills development capacity. The project will run until 2022.

**Bridging programme for architects and engineers with completed foreign education**

Within the framework of the assignment, KTH has planned and established supplementary courses for both architects and engineers. The programme encompasses 120 higher education credits and includes general vocational preparatory courses in subjects such as law, social studies, communication, sustainable development, entrepreneurship and leadership, as well as subject-specific advanced specialised courses or broadening courses. For the subject-specific courses, a study plan is drawn up based on an interview with the student. Existing skills, personal interests and the specific skills needs of the labour market in the field of the

Figure 6  
Full year students and full year performances, fee-paying students 2011-2020



— Full year students (FYS) are defined as the number of students who have started studies on a course multiplied by the number of course higher education credits divided by 60.  
 — Full year performance (FYP) is defined as the number of higher education credits gained on a course or sub-course divided by 60.

Source: Ladok

Figure 7

## Full year students (FYS) 2017-2020

	2020		2019		2018		2017	
	FYS	Proportion (%) of	FYS	Proportion (%) of	FYS	Proportion (%) of	FYS	Proportion (%) of
		women/men		women/men		women/men		women/men
Master of Architecture, 270/300 HE credits	461	60/40	446	58/42	455	58/42	449	61/39
Master of Science in Engineering 270/300 HE credits	5,165	34/66	5,371	34/66	5,415	33/67	5,451	33/67
<i>in addition, within Master programmes</i>	2,351	35/65	1,995	34/66	2,120	33/67	2,053	33/67
Bachelor of Science in Engineering 180 HE credits	1,513	29/71	1,511	28/72	1,491	27/73	1,489	26/74
Bridging Teacher Education 90 HE credits	70	48/52	52	49/51	50	38/62	66	39/61
Subject Teacher Education in Technology, Secondary Education, 270 HE credits	5	55/45	2	53/47	1	100/0	3	100/0
Masters Programmes 60/90 HE credits	50	49/51	63	55/45	88	63/37	106	55/45
Masters Programmes 120 HE credits	3,486	35/65	3,295	34/66	3,372	34/66	3,297	33/67
<i>of which within Master of Science Engineering programmes</i>	2,351	35/65	1,995	34/66	2,120	33/67	2,053	33/67
Bachelors Programmes 180 HE credits	272	35/65	261	34/66	259	35/65	255	37/63
Technical Preparatory Year, Technical Preparatory Semester 60/30 HE credits	811	32/68	605	32/68	613	35/65	577	38/62
University Diploma 120 HE credits	61	35/65	59	30/70	71	28/72	68	21/79
Exchange students arriving at KTH Courses <sup>3)</sup>	431	35/65	634	37/63	606	35/65	574	34/66
<b>Total</b>			<b>12,442</b>	<b>34/66</b>	<b>12,612</b>	<b>34/66</b>	<b>12,476</b>	<b>34/66</b>

Source: Ladok

Figure 8

## Full year students and performance rate, fee-paying students 2017-2020

	2020		2019		2018		2017	
	FYS	pr grad (%)	FYS	pr grad (%)	FYS	pr grad (%)	FYS	pr grad (%)
Master of Science in Engineering 300 HE credits	7	71	2	36	1	79	1	58
Bachelor of Science in Engineering 180 HE credits	3	71	3	85	2	97	1	110
Bachelors Programmes 180 HE credits	15	93	12	88	10	90	7	76
Masters Programmes 60 HE credits	13	99	18	87	20	87	19	108
Masters Programmes 120 HE credits	1 013	92	1 032	88	978	85	818	84
Courses	0	105	0	119	2	59	1	58
Science without Borders	0	0	0	137	0	0	0	0
Study Abroad Programmes	3	98	4	96	8	124	9	61
Nordig	1	105	1	214	1	55	-	-
<b>Total</b>	<b>1 055</b>	<b>92</b>	<b>1 072</b>	<b>88</b>	<b>1 021</b>	<b>85</b>	<b>856</b>	<b>85</b>

Source: Ladok

profession or work are taken into account. The aim is that the individual who has completed an education abroad as an architect or an engineer is to receive the supplementary knowledge that is needed to be able to practice their profession in Sweden. The educational programme does not lead to an academic degree.

KTH has accepted students for the two variants of this programme in both the spring and autumn terms in 2018 and 2019. In 2018, a total of 26 architects/architecture students and 19 technical engineers/engineering students started the courses, collectively generating the equivalent of 22 full-time student equivalents. Three architects and six engineers started the courses in 2019, generating five full-time student equivalents.

KTH has decided to cancel admission for the start of the spring term 2020 due to too few eligible applicants for the courses and difficulties in achieving financial and teaching sustainability for the courses. As a consequence, admissions for the autumn term 2020 were also not opened. In 2020, the programmes have generated a total of twelve full-year students from the admission round in 2018 and 2019, including three full-year students for engineers and nine full-year students for architects.

No student has so far completed the entire programme. Three people have formally reported an interruption of studies in 2020, two of whom will start a supplementary pedagogical education. A number of students have not scored any credits or been active but have not formally

Figure 9  
First degrees 2017-2020

	2020		2019		2018		2017	
	Total	Proportion (%) of women/men	Total	Proportion (%) of women/men	Total	Proportion (%) of women/men	Total	Proportion (%) of women/men
<b>Degree of Master of Architecture 270/300 HE credits</b>	<b>86</b>	<b>55/45</b>	<b>114</b>	<b>57/43</b>	<b>84</b>	<b>60/40</b>	<b>88</b>	<b>58/42</b>
<b>Degree of Master of Science in Engineering 270/300 HE credits</b>	<b>1,119</b>	<b>37/63</b>	<b>1,150</b>	<b>35/65</b>	<b>1,134</b>	<b>34/66</b>	<b>1,161</b>	<b>34/66</b>
Biotechnology	38	55/45	39	64/36	49	59/41	48	73/27
Engineering and Education	27	37/63	35	54/46	34	38/62	24	50/50
Computer Science and Engineering	110	15/85	87	14/86	83	18/82	97	10/90
Design and Product Realisation	85	55/45	91	53/47	66	55/45	108	56/44
Electrical Engineering	54	24/76	63	13/87	42	5/95	46	7/93
Energy and Environment	57	68/32	56	57/43	59	53/47	64	58/42
Vehicle Engineering	92	14/86	100	15/85	115	14/86	98	16/84
Industrial Engineering and Management	132	35/65	140	37/63	123	42/58	101	45/55
Information and Communication Technology	35	37/63	34	18/82	32	19/81	48	13/87
Engineering Chemistry/Chemistry and Chemical Engineering	36	50/50	30	57/43	35	69/31	46	39/61
Surveying	0	0/0	0	0/0	0	0/0	1	0/100
Mechanical Engineering	109	28/72	123	25/75	122	18/82	101	19/81
Materials Design and Engineering	34	44/56	25	36/64	32	38/62	25	28/72
Medical Engineering	36	58/42	30	57/43	33	55/45	30	47/53
Media Technology	42	48/52	34	38/62	46	59/41	59	44/56
Microelectronics	0	0/0	4	0/100	4	0/100	6	0/100
Civil Engineering and Urban Management	146	50/50	142	53/47	138	41/59	137	47/53
Engineering Physics	77	22/78	98	18/82	105	14/86	111	18/82
Civil Engineering	0	0/0	0	0/0	0	0/0	1	0/100
Not within programme/specialisation	9	22/78	19	47/53	16	38/62	10	30/70
<b>Degree of Bachelor of Science in Engineering 180 HE credits</b>	<b>311</b>	<b>30/70</b>	<b>267</b>	<b>32/68</b>	<b>273</b>	<b>26/74</b>	<b>337</b>	<b>33/67</b>
<b>Degree of Master of Science</b>	<b>57</b>	<b>42/58</b>	<b>72</b>	<b>44/56</b>	<b>49</b>	<b>45/55</b>	<b>26</b>	<b>50/50</b>
in Secondary Education, 225 HE credits, 2 teaching subjects	1	100/0	4	0/100	8	75/25	2	50/50
in Upper Secondary Education, 210 HE credits, 1 teaching subject	4	75/25	5	40/60	3	33/67	6	50/50
in Upper Secondary Education, 300 HE credits, 2 teaching subjects	41	34/66	53	45/55	38	39/61	18	53/47
in Secondary Education, 270 HE credits	9	44/56	10	60/40	-	-	-	-
in Secondary Education, 180 HE credits, 1 teaching subject	1	100/0	-	-	-	-	-	-
in Secondary Education, 240 HE credits, 2 teaching subject	1	100/0	-	-	-	-	-	-
<b>Degree of Master of Science 120 HE credits</b>	<b>1,743</b>	<b>33/67</b>	<b>1,904</b>	<b>33/67</b>	<b>1,287</b>	<b>36/64</b>	<b>1,864</b>	<b>35/65</b>
<i>of which also graduated as a Master of Science in Engineering <sup>1)</sup></i>	<i>596</i>	<i>37/63</i>	<i>661</i>	<i>35/65</i>	<i>550</i>	<i>34/66</i>	<i>832</i>	<i>38/62</i>
<i>of which joint degree</i>	<i>47</i>	<i>41/59</i>	<i>31</i>	<i>48/52</i>	<i>23</i>	<i>30/70</i>	<i>21</i>	<i>24/76</i>
<b>Degree of Master of Science 60 HE credits</b>	<b>74</b>	<b>61/39</b>	<b>106</b>	<b>61/39</b>	<b>102</b>	<b>63/37</b>	<b>136</b>	<b>50/50</b>
<b>Master Degree 60/90 HE credits <sup>2)</sup></b>	<b>4</b>	<b>75/25</b>	<b>2</b>	<b>50/50</b>	<b>1</b>	<b>0/100</b>	<b>0</b>	<b>0/0</b>
<b>Degree of Bachelor of Science 180 HE credits</b>	<b>891</b>	<b>34/66</b>	<b>934</b>	<b>37/63</b>	<b>700</b>	<b>37/63</b>	<b>1112</b>	<b>39/61</b>
<b>University Diploma 120 HE credits</b>	<b>17</b>	<b>47/53</b>	<b>28</b>	<b>14/86</b>	<b>28</b>	<b>25/75</b>	<b>27</b>	<b>22/78</b>

1) this year and earlier

2) according to older regulations

reported that they have interrupted their studies. Some of those who do not study have found work, which is in accordance with the intentions behind the education. Someone or some have been admitted to other courses. One student has been refused a permanent residence permit and another was unable to begin the studies because of refusal to grant a visa. Inactive students are difficult to reach, which affects the quality of follow-up. It is therefore not possible to draw any conclusions based on the follow-up to date.

## Performance

The number of full-year students and annual performance equivalents in first-cycle and second-cycle study programmes in 2020 offset against appropriations granted amounted to a total of 12,507 (12,442) and 10,670 (10,460) respectively, see *figure 7*. Some of the examinations for the autumn term are always scheduled for late in December. For the outcome in 2020, 432 annual performance equivalents were registered in 2020 and relate to the examinations that took place in December 2019.

Of the total number of full-time students, 77 percent were linked to the field of education technology and 17 percent to the field of science, which adds up to 94 per cent. In 2020, KTH was able to offset a maximum of 133 full-year students and full-year performance equivalents in the field of design. However, the design area encompasses 367 full-year students and 331 annual performance equivalents for 2020. The full-year student equivalents and annual performance equivalents in excess of 133 are offset against the technology educational area.

The degree of performance for first-cycle and second-cycle study programmes was 85 (84) percent, calculated as the number of annual performance equivalents in relation to the number of full-year students. The degree of performance is stable over time.

The proportion of women among full-time students was 35 percent and the proportion of men was 65 percent, which represents an increase in the proportion of women by one percentage point compared to the last three years. In the programme leading to the Degree of Master of Science in Engineering, the proportion of women was 34 percent and the proportion of men was 66 percent, while the programme leading a Master's Degree in Architecture had a reversed distribution with 60 percent women and 40 percent men. In the programme leading to a Degree of Bachelor of Science in Engineering, the proportion of women was 29 per cent and the proportion of men was 71 per cent, which represents an increase in the proportion of women by one percentage point annually since 2017. The master's degree programmes had 35 percent women and 65 percent men. The access education had 32 percent women and 68 percent men, i.e. the same distribution as the previous year but a decrease in the proportion of women compared to 2017 and 2018, see *Figure 7*.

In addition to the performances set-off against grants,

the fee-paying students have generated 1,055 (1,072) full-time student equivalents and 969 (947) annual performance equivalents during 2020. The performance ratio has thus increased from 88 to 92 percent from 2019 to 2020, see *Figures 6* and *8*. In addition to the outcome in 2020, 57 annual performance equivalents were registered in 2020, which relate to the examinations that took place in December 2019.

In total, KTH had 1,627 (1,676) fee-paying programme students in 2020, of whom 492 were women and 1,135 were men. Of these, 177 (198) were scholarship-funded by Swedish or KTH-affiliated scholarship programmes, which corresponds to about eleven percent. Among the scholarship holders there were 67 women and 110 men, that is, a slightly higher proportion of women than in the entire population of fee-paying programme students. In addition, there were 13 fee-paying students, of whom seven were women and six were men, on freestanding courses. This means that the largest proportion of fee-paying students are either paying themselves or financed by scholarship programmes about which KTH does not have information.

## Degrees

In 2020, a total of 1,119 (1,150) Degrees of Master of Science in Engineering, 86 (114) Degrees of Master of Architecture and 311 (267) Degrees of Bachelor of Science in Engineering were awarded. In total, KTH awarded 1,743 (1,904) Degrees of Master of Science during the year. Of these, 596 (661) have also received a Degree of Master of Science in Engineering in 2020 or earlier. KTH thus granted 1,147 (1,243) master's degrees to students who do not also have a Degree of Master of Science in Engineering from KTH. A Degree of Master of Science was awarded to 74 (106) students, see *figure 9*.

Of the 891 (934) Degrees of Bachelor of Science awarded, 713 (759) have been received by students in the Master of Science in Engineering programme and 64 (65) by the students in the programme leading a Master's Degree in Architecture.

The trend of students earning more than one academic degree based on the same studies is continuing. In 2020, the proportion who earned one or more additional degrees combined with a Degree of Master of Science in Engineering was 61 (55) percent.

The proportion of women among those graduating with a Degree of Master of Science in Engineering amounted to 37 (35) percent and the proportion of men 63 (65) percent. For those graduating with a Degree of Master of Architecture, the proportion of women was 55 (57) percent and the proportion of men 45 (43) percent. See *figure 9* for the gender distribution within programme types and individual programmes.

KTH also awards master's degrees jointly with other universities. The number of degrees awarded jointly with other universities was 47 (31) in 2020.

In 2020, 16 (19) master's degrees and 503 (528) master's degrees, 3 (3) bachelor's degrees and 2 (1) Degrees of Bachelor of Science in Engineering were granted to students who paid tuition fees for their studies at KTH. These degrees are included in the data above.

### Career support

KTH's career advice activities are focused on providing support for students in their transition to a life in the workplace. Activities during 2020 have included individual career coaching for students, drop-in review of CV and application letters, as well as lunch seminars and workshops in English and Swedish. During the year, large parts of the operations were conducted digitally via Zoom due to COVID-19. In all, approximately 1,100 students have participated in the various activities.

## Third-cycle (doctoral) education

### Recruitment

KTH conducts coordinated calls for applications to vacant doctoral slots. The purpose of coordinated advertising is to make KTH visible both as a workplace and as a university, thereby increasing interest among prospective applicants. KTH advertises doctoral vacancies nine times a year.

In 2020, calls for applications for a total of 290 (316) slots for doctoral students were made. In all, 20,732 individuals applied for these slots, of whom 5,288 were women, 15,345 were men and 99 did not state their gender. Recruitment for doctoral education also takes place after advertising in a different order and without prior advertising, which applies, for example, to externally employed doctoral students.

### Admissions

In 2020, 277 (333) doctoral students were admitted, of which 264 have started their studies. Of those who have started their studies, the proportion of women is 32 percent (37) and the proportion of men is 68 percent (63). Nine per cent of the newly admitted doctoral students who have started their studies have been admitted with the goal of completing a licentiate degree. And of these, 39 percent were women and 61 percent were men.

Of this year's new admissions, 36 (42) doctoral students, of whom 36 percent are women and 64 percent are men, have their primary activities outside of the University and pursue doctoral studies within the framework of their employment (externally employed doctoral students). The employer may be either private or governmental.

Of those who were admitted to a programme at the doctoral level in 2020, 40 (35) percent, or 110 (116) individuals, have an academic degree from KTH. Of the new admissions with an academic degree from KTH, 50 (53) percent have a master's degree and 45 (43) percent have a Degree of

Master of Science in Engineering. Of the new admissions in 2020, 44 (46) percent have an academic degree from a country other than Sweden.

### Level of activity and financing of academic studies

Of the 1,803 doctoral students registered with some activity in third-cycle studies in 2020, 1,634 doctoral students have had a degree of activity of at least 50 percent and 1,785 have had a degree of activity of at least ten percent.

At year-end, 1,270, or 70 percent, of KTH's doctoral students had study financing in the form of doctoral positions on a full or part-time basis. Of those who had a doctoral position, 32 (33) percent were women and 68 (67) percent were men.

Of the students in a third-cycle study programme, 16 percent financed themselves by means of paid work connected with the educational programme (externally employed doctoral students), three percent by means of other employment at a higher education institution, and nine percent by means of full-time or part-time scholarships. Four percent, on a full or part-time basis, finance their studies in some other way. Many of the doctoral students who have their studies funded via scholarships receive these via KTH's joint collaboration with the China Scholarship Council.

### KTH's doctoral programmes

The doctoral programmes were established in 2011 and there are currently 32 such programmes. In order to establish a doctoral programme, a number of quality requirements are set with regard to purpose, target group and content, as well as and other related considerations. All new doctoral students are admitted, in addition to a subject at doctoral level, to a doctoral programme or a programme that KTH offers in cooperation with one or more partners. The purpose of the doctoral programmes is to secure the quality of the educational programme via an organised structure of studies.

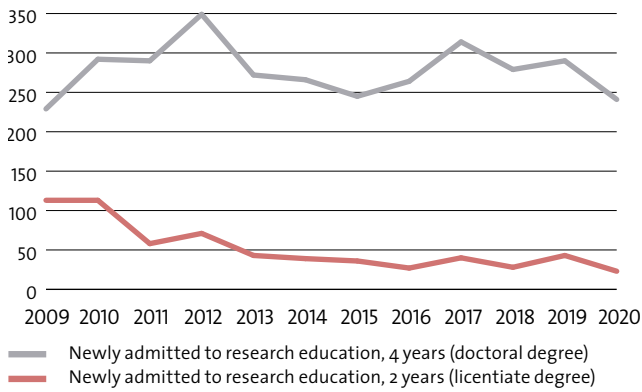
### Student mobility within the programmes at the doctoral level

There is a large international component in KTH's doctoral education, including through many international doctoral students and supervisors. Statistics Sweden requests information, on behalf of the Swedish Higher Education Authority, concerning stays abroad for those receiving doctoral degrees or licentiate degrees during the past year. The latest survey, conducted in 2019, showed that 30 percent of the newly graduated students had spent time abroad within the framework of their educational programme. KTH should continue its efforts to improve the documentation of doctoral students' stays abroad. There is also the potential for more doctoral students to spend time abroad during their course of studies.



Figure 10

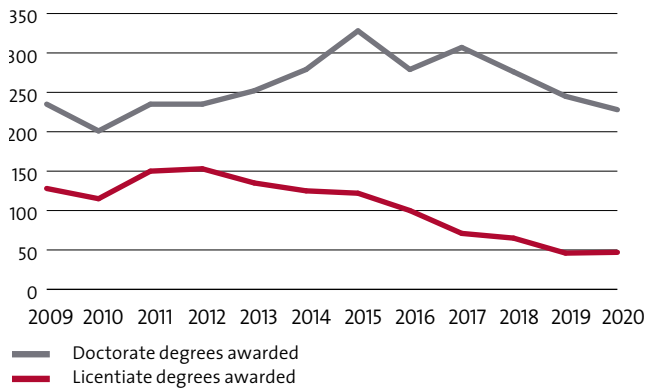
Newly admitted research students 2009-2020



Source: Ladok

Figure 11

Licentiate and doctorate degrees 2009-2020



Source: Ladok

Figure 12

Newly admitted and registered research students 2017-2020

New students per research field	2020		2019		2018		2017	
	Total	Proportion (%) of women/men	Total	Proportion (%) of women/men	Total	Proportion (%) of women/men	Total	Proportion (%) of women/men
Biological Sciences	3	67/33	4	0/100	2	100/0	5	20/80
Computer and Information Science	62	27/73	65	15/85	55	33/67	45	20/80
Economics and Business	1	100/0	0	0	1	0/100	7	43/57
Electrical Engineering, Electronic Engineering, Information Engineering	29	17/83	47	30/70	45	29/71	54	19/81
Philosophy, Ethics and Religion	1	100/0	0	0	1	0/100	1	100/0
Physical Sciences	18	22/78	24	33/67	33	27/73	24	29/71
History and Archaeology	1	100/0	3	67/33	6	17/83	2	0/100
Health Sciences	6	67/33	3	67/33	6	50/50	7	57/43
Industrial Biotechnology	16	63/37	23	52/48	18	22/78	23	48/52
Chemical Sciences	8	38/63	9	22/78	10	30/70	11	45/55
Chemical Engineering	16	56/44	28	71/29	15	53/47	30	37/63
Arts	1	100/0	7	71/29	1	100/0	1	0/100
Mechanical Engineering	36	17/83	42	45/55	32	38/62	61	25/75
Mathematics	19	16/84	7	14/86	12	50/50	9	33/67
Materials Engineering	21	38/62	36	31/69	37	16/84	43	21/79
Medical Engineering	0	0	0	0	3	33/67	1	100/0
Environmental Engineering	1	100/0	2	0/100	2	0/100	2	50/50
Civil Engineering	21	29/71	23	35/65	23	43/57	25	32/68
Educational Sciences	4	75/25	10	90/10	5	20/80	4	25/75
<b>Total new research students</b>	<b>264</b>	<b>32/68</b>	<b>333</b>	<b>37/63</b>	<b>307</b>	<b>32/68</b>	<b>355</b>	<b>28/72</b>
<b>Total number of students registered</b>	<b>1,803</b>	<b>32/68</b>	<b>1,841</b>	<b>32/68</b>	<b>1,934</b>	<b>30/70</b>	<b>2,000</b>	<b>30/70</b>

Source: Ladok

**Degrees**

In 2020, 228 (245) doctoral degrees and 47 (46) licentiate degrees were awarded. Of the doctoral degrees awarded, 30 (32) percent were to women and 70 (68) percent were to men. Of those who completed their licentiate degree, 28 (28) percent were women and 72 (72) percent were men. Of this

year's doctoral degrees, eight (eight) were awarded jointly with other universities.

Earning a licentiate degree as a stage in your education at doctoral level, and thereby obtaining a natural validation of studies completed so far, remains relatively common at KTH. Of the doctoral graduates in 2020, 20 (22) percent have

Figure 13

## Doctorate and licentiate degrees 2017-2020

Doctorate degrees per research field	2020		2019		2018		2017	
	Total	Proportion (%) of women/men	Total	Proportion (%) of women/men	Total	Proportion (%) of women/men	Total	Proportion (%) of women/men
Biological Sciences	2	0/100	2	50/50	1	100/0	3	0/100
Computer and Information Science	19	32/68	28	14/86	41	24/76	35	26/74
Economics and Business	0	0	1	100/0	1	0/100	8	38/63
Electrical Engineering, Electronic Engineering, Information Engineering	37	16/84	36	31/69	50	24/76	40	25/75
Philosophy, Ethics and Religion	0	0	1	0/100	2	0/100	1	0/100
Physical Sciences	12	33/67	18	22/78	28	11/89	24	29/71
History and Archaeology	2	0/100	1	0/100	1	100/0	4	50/50
Health Sciences	4	0/100	5	80/20	4	50/50	6	0/100
Industrial Biotechnology	13	38/62	19	63/37	14	57/43	20	40/60
Chemical Sciences	23	48/52	8	38/62	9	44/56	19	37/63
Chemical Engineering	18	44/56	32	34/66	21	33/67	15	53/47
Arts	2	0/100	0	0	6	83/17	2	0/100
Mechanical Engineering	33	30/70	29	48/52	35	31/69	40	13/88
Mathematics	8	25/75	10	20/80	9	22/78	7	14/86
Materials Engineering	24	13/87	18	17/83	26	23/77	36	36/64
Medical Engineering	5	80/20	6	0/100	2	100/0	4	50/50
Environmental Engineering	5	40/60	9	33/67	4	25/75	8	50/50
Civil Engineering	16	31/69	21	29/71	22	38/62	33	48/52
Educational Sciences	5	40/60	1	0/100	0	0	1	100/0
Other Engineering Technologies	0	0	0	0	0	0	1	100/0
<b>Total</b>	<b>228</b>	<b>30/70</b>	<b>245</b>	<b>32/68</b>	<b>276</b>	<b>30/70</b>	<b>307</b>	<b>32/68</b>

Licentiate degrees per research field	2020		2019		2018		2017	
	Total	Proportion (%) of women/men	Total	Proportion (%) of women/men	Total	Proportion (%) of women/men	Total	Proportion (%) of women/men
Biological Sciences	1	0/100	0	0	3	33/67	0	0
Computer and Information Science	2	0/100	4	0/100	2	0/100	9	11/89
Economics and Business	1	0/100	1	100/0	0	0	1	100/0
Electrical Engineering, Electronic Engineering, Information Engineering	13	23/77	11	45/55	15	13/87	12	8/92
Philosophy, Ethics and Religion	2	50/50	0	0	0	0	2	0/100
Physical Sciences	2	0/100	2	0/100	3	100/0	4	25/75
History and Archaeology	0	0	0	0	0	0	1	100/0
Health Sciences	0	0	0	0	0	0	1	100/0
Industrial Biotechnology	0	0	1	100/0	2	100/0	2	50/50
Chemical Sciences	1	0/100	1	0/100	1	100/0	1	100/0
Chemical Engineering	1	0/100	3	0/100	0	0	5	20/80
Arts	1	100/0	1	100/0	1	0/100	1	0/100
Mechanical Engineering	2	50/50	4	0/100	7	43/57	4	75/25
Mathematics	2	0/100	1	100/0	2	50/50	2	50/50
Materials Engineering	4	50/50	6	17/83	12	25/75	6	17/83
Medical Engineering	0	0	0	0	1	100/0	0	0
Environmental Engineering	2	50/50	1	0/100	3	33/67	1	0/100
Civil Engineering	13	31/69	10	30/70	12	42/58	18	22/78
Educational Sciences	0	0	0	0	1	100/0	0	0
Other Engineering Technologies	0	0	0	0	0	0	1	0/100
<b>Total</b>	<b>47</b>	<b>28/72</b>	<b>46</b>	<b>28/72</b>	<b>65</b>	<b>37/63</b>	<b>71</b>	<b>25/75</b>

Source: Ladok

previously completed a licentiate degree. KTH's assessment is that a technical licentiate degree has a high relevance for employment in industry.

The net study time for doctoral students who graduated in 2020 was 4.2 (4.3) years for the doctoral degree, and 3.0 (2.8) years for the licentiate degree. Men had a longer net study time than women for PhDs and women had a slightly longer study time than men for licentiate degrees. The calculations of the time spent as a graduate student are produced according to the procedures provided by the Ladok study documentation system.

## National collaborations

### Prerequisites for educational collaborations

According to KTH's Development Plan for 2018–2023, KTH will deepen and expand its international partnerships. Collaborations must contribute to KTH's development, both with regard to education and research. KTH has a large number of educational collaborations, both national and international. KTH has developed an internal regulatory framework as well as support documents and processing arrangements that are used when planning educational collaborations. The preparatory group for educational collaborations, which has been active since 2015, has developed extensive knowledge concerning the preconditions for educational collaborations, and offers support to KTH's Schools.

### Teacher education programmes

#### *Master of Science in Engineering and Education*

The educational programme in engineering and education has been given since 2011 in cooperation with Stockholm University. The programme leads to both a Degree of Master of Science in Engineering as well as a Degree of Master of Science in Secondary Education for work in upper secondary school in the field of mathematics plus one of the subjects of physics, chemistry and technology. KTH has degree-awarding powers for both degrees. In autumn term 2020, the programme had 104 first choice applicants and 529 applicants in total. 58 students commenced the programme, of whom 34 percent were women and 66 percent were men. During 2020, 27 students graduated from the programme, of whom 37 percent were women and 63 percent were men. One of these students has completed the educational programme in engineering and education which was offered between 2002–2010. This was an education which was a government assignment (U2002/1041/UH).

All students in the engineering and education programme have mathematics as their first teaching subject. During the first year of the programme, the students gain basic knowledge in the subjects that are included in the programme's

various majors. The subjects are physics, chemistry and technology, with a specialisation in information and communication technology or a specialisation in energy and the environment. Before starting the second year, they are free to choose between four majors (specialisations) that offer the second subject field. In connection with the choice of major, the students are notified that there is strong demand for teachers in all these subject fields. The largest teacher shortages are in chemistry and technology. As a consequence of the shortage of teachers, it has been difficult since 2017 to find sufficient places for practical internships in upper secondary schools, in particular in the field of mathematics. The transition to digital teaching that took place in spring 2020 due to COVID-19 has placed new demands on teachers. In some cases, students who complete their VFU have been a resource for teaching. All students in engineering and teachers were eventually offered a VFU place, although it was sometimes close to the beginning of the period or involved very long travel times.

#### *Degree of Master of Science in Secondary Education Programme*

The Degree of Master of Science in Secondary Education with a specialisation in technology comprises 270 credits and commenced in the autumn term 2019. In the autumn term of 2020, the programme had 37 (42) applicants, six (six) of whom started the programme.

The programme leads to two different academic degrees, a Degree of Master of Science in Secondary Education with a focus on work in the lower secondary school grades 7–9 in the fields of technology and mathematics and a Degree of Bachelor of Science in Engineering. The educational programme includes four and a half years of full-time studies and two summer terms, and is located at both KTH Södertälje and KTH Campus

#### *Bridging teacher education programme*

The supplementary teacher training educational programme, KPU, comprises 90 higher education credits and leads to a Degree of Master of Science in Upper Secondary Education or the Degree of Master of Science in Secondary Education in lower secondary school grades 7–9 for teaching in one or more of the subject fields of physics, chemistry, mathematics or technology. In order to be admitted to the programme, it is necessary to have sufficient academic qualifications in one or more of these subject fields. The programme is partially given as distance learning, with teaching at KTH a few days per month. Other time is devoted to self-study and teaching via a web platform. Some parts of the teacher training programme are given by Stockholm University. The programme is also in progress during the summer months, which means that a student who starts in June can be a qualified teacher at the end of August the following year. One-third of the educational programme

consists of an on-site internship at a school where the students participate in the daily work under supervision. VFU placements have become more difficult to secure in the right subject and at the right level for KPU students. This is especially true in the subjects of mathematics and technology in upper secondary school. Some students complete VFU in primary school years 7–9 even though they qualify in their subject in upper secondary school.

According to the assignment in the 2016 regulatory letter, the number of beginners on the KPU programme was to increase by 20 for 2015 and 2016, compared to 2014. This target was achieved in 2016 when the programme started and the number of beginners in subsequent years has exceeded the assignment.

In 2020, there were 175 applicants, of which 157 first-choice applicants for the programme, 100 applicants were admitted and 61 students started the programme, see *Figure 2*. At the end of the autumn term, 42 are still active. In 2020, 19 students graduated.

#### ***Bridging teacher education programme, KPU, for third-cycle graduates***

KPU for individuals with a doctoral degree is operated by KTH and Stockholm University jointly, and leads to a joint degree. The programme is part of a project that is running between 2016–2021 and aims to educate 250 specialist subject teachers during the period. Other participating institutions are Karlstad University and Umeå University. Those who are admitted to the programme have the opportunity to receive a special educational programme financial allowance during their studies. The number of student slots in the educational programme is governed by the allocation of educational grants, which is limited, on average, to 50 students per year. In previous years, about 18 students per year have been admitted in Stockholm. Since 2020 was the last round of admissions for the initiative, admissions could cover as many as there was financial scope for.

The programme encompasses 90 credits and runs over twelve months with an accelerated pace of study. For the admission in January 2020, a total of 244 applicants applied, of whom 157 were first-choice applicants. In 2020, 29 students were admitted and 24 students started the programme. The pandemic has had a negative impact on the programme. Four of the students were not allowed to participate in operational training during the spring, which means that their education has been delayed. One of them chose to cancel.

In February–March 2020, a programme evaluation survey was conducted with the students from the third round (2019). Eight of the 16 students who completed the entire programme responded to the survey. They were mainly positive about the programme, above all in relation to the practical internship element and the courses in subject didactics. The most important objection by the respondents relates to the fact that a number question the usefulness of a degree project.

During 2020, eleven students have graduated from the programme, five women and six men.

KPU for postgraduates was started as a time-limited project and is due to expire at mid-2021. The students who started in January 2020 therefore constituted the last round. After the end of the project, students have the right to apply for the award of a qualification for another four years.

#### **Joint collaborations with university colleges of fine, applied and performing arts**

KTH is working to develop the joint collaborations with university colleges of arts. In order to offer doctoral students, academic supervisors and researchers a high-quality, shared environment, a centre was established in 2019, called Navet. The centre works to strengthen research in the field of art, technology and design, as well as to establish this subject as a field. KTH, Konstfack, the Royal College of Music in Stockholm and Stockholm University of the Arts all work in collaboration at Navet. The centre provides a networking space that can initiate new research projects that have been spread across different environments and provide them with support in the form of shared resources: laboratories, equipment, courses and training.

#### **Stockholm Trio University Alliance**

In 2019, KTH formed the Stockholm Trio University Alliance together with Karolinska Institutet and Stockholm University. The aim of the Alliance is to promote international partnerships with prominent universities through cooperation in research and education and to increase the international attractiveness at recruitment, as well as to improve the universities' capacity to act jointly on a regional, national and international level. During the autumn, the Alliance established a joint representation in Brussels in cooperation with Region Stockholm with the aim of improving the universities' capacity for strategically proactive work in terms of European research funding, policy work and education policy. Within the framework of the alliance's collaboration with the University of Tokyo, a joint virtual workshop has been organised on the theme of sustainable development during the autumn. Furthermore, the Alliance has decided on targets for the Alliance's work 2020–2024 and initiated various measures aimed at increasing cooperation in research, education and operational support. One example is the report produced in collaboration with the Swedish Science City Foundation on the lack of communication regarding walking and cycling paths and municipal traffic between Alliance universities.

Several training collaborations between the parties within the Stockholm Trio are already underway. KTH and SU entered into an agreement in 2012 on a joint educational programme at the master's level in mathematics, which leads to a joint degree. In the autumn of 2020, 23 (21) students commenced the programme and nine students graduated with a degree during the year.

A three-party cooperation in education between KTH, Karolinska Institutet and Stockholm University was established in 2014, starting with the Science for Life Laboratory in Stockholm. The educational collaboration takes place within the framework of a master's degree programme leading to a joint degree. The first students started in autumn 2015. In the autumn of 2020, 29 (25) students commenced the programme and 25 graduated with a degree during the year.

Since 2014, KTH and Karolinska Institutet have been operating a joint educational programme at the doctoral level in medical technology. The collaboration leads to a joint degree. The agreement has been updated in 2020. Two doctoral degrees were awarded during the year within the collaboration.

### Other joint collaborations

MTK and Mid Sweden University collaborate since 2011 on the Master of Science in Engineering degree programme. The agreement has been extended and now remains in effect until 2021. The collaboration entails that after the first three years in the Master of Science in Engineering degree programme provided by Mid Sweden University, students can continue in some master's programmes at KTH. In the autumn term 2020, 24 (20) students from Mid Sweden University began a master's degree programme at KTH. After completing their education, the students can obtain a Master of Science in Engineering degree and a master's degree from KTH and a bachelor's degree from Mid Sweden University. During 2020, a joint Master of Science in Technical Chemistry Engineering degree programme in has been established. The first three years, students will study mainly at Mid Sweden University, and the final two years at KTH. The programme leads to a joint degree from KTH and Mid Sweden University. The first students will be admitted in the autumn term 2021.

## International collaborations

### Strategic collaborative partners and networks

In 2020, KTH has extended its collaborations with five strategic partner universities: The University of Illinois at Urbana-Champaign in the USA, Nanyang Technological University in Singapore, Shanghai Jiao Tong University in China, Indian Institute of Technology Madras in India, Hong Kong University of Science and Technology in Hong Kong and the University of Tokyo in Japan. The partnership with the University of Tokyo is taking place along with Karolinska Institutet and Stockholm University within the framework of Stockholm Trio. Joint initiatives have been launched within both education and research.

In 2020, Hong Kong University of Science and Technology and KTH conducted three workshops and seminars in areas related to the pandemic.

KTH has signed an agreement with Shanghai Jiao Tong University regarding a framework agreement for joint doctoral education leading to a joint degree. The agreement is valid from 2020 and five years ahead.

For the partnership with the University of Tokyo, a digital conference was held during the year on how COVID-19 has affected the activities of universities, changes in operations that can be expected to remain and future development needs in terms of digital learning and collaboration.

During the year, KTH has also continued to engage in international networks, such as CESAER, Conference of European Schools for Advanced Engineering and Education, in which 50 technical universities collaborate on policy issues related to higher education, and the network T.I.M.E., Top International Managers in Engineering, an association of 57 member universities for cooperation primarily related to student exchange leading to a double Master of Science in Engineering degree. KTH holds the chairmanship of T.I.M.E. KTH is also involved in the Nordic Five Tech networks, which are an alliance of five technical universities in the Nordic region, and CLUSTER, Consortium Linking Universities of Science and Technology for Education and Research, an association of 13 technical institutions in Europe.

### KTH Global Development Hub

KTH Global Development Hub, GDH, supports the development of challenge-driven education within KTH and partner universities in Eastern and Southern Africa. Challenge-driven education is mainly used in project courses where students work with solutions to locally formulated societal challenges related to the UN's sustainability goals. The pandemic has had a major impact on GDH's exchange activities. During the spring term 2020, KTH received eleven incoming students. Three outgoing students who were due to leave during the spring never left due to KTH's decision to cancel the spring exchange studies within GDH. As a result of the pandemic, GDH had no outgoing or incoming students in the autumn of 2020.

### China Scholarship Council

During the year, 17 doctoral students with a scholarship from the China Scholarship Council (CSC) have been admitted to KTH. Seven guest doctoral students and three visiting researchers have also been awarded scholarships.

### Linnaeus-Palme

Linnaeus-Palme is an exchange programme funded by Sida with the aim of stimulating bilateral exchanges between higher education institutions in Sweden and low- and middle-income countries. KTH applied for one (three) Linnaeus-Palme project for 2020, which was awarded funding for teacher exchanges in electrical engineering.

## Erasmus+

As in previous years, KTH received a large number of scholarships for mobility within Europe for studies, internships and staff exchanges. In the 2020 call for proposals within Erasmus+, KTH was awarded funds for a total of nine projects as coordinator or partner, which is fewer than the previous year. Due to COVID-19, several meetings, conferences and training courses have been converted into digital meetings and events. The project period has also been extended for several projects to allow completion in 2021.

In the Erasmus+ Capacity Building programme, KTH will participate in three new projects as a partner. These new projects have a geographical spread that includes Central Asia, the Middle East, South and Latin America and South Africa. In total, KTH is participating in more than 36 (36) projects within the programme, and as a coordinator in three. The projects concern the development of new courses in technology, the environment and sustainable development, climate change, industrial paradigm 4.0, circular economy, e-learning, smart campuses, geographical information systems, business systems and development of infrastructure to support academic researchers, students, innovations and university administration.

Within the Erasmus+ Strategic Partnerships Higher Education programme, KTH has been granted two projects, in one of which KTH is coordinator. In total, KTH is participating in 17 (15) projects. The new projects granted in 2020 concern the development of railway technology and the development of course programmes for new arrivals to enable rapid access to the labour market. Within the Erasmus+ Knowledge Alliances project, two projects where KTH is a partner have been granted.

A total of five (five) Erasmus Mundus Joint Master students were registered in 2020. KTH participates as a partner in two Erasmus Mundus joint master's programmes. All five Erasmus Mundus doctoral programmes have now been finalised.

KTH has actively participated in projects within the Swedish Institute's Baltic Sea Cooperation Programme. The initiative to create a partnership within the Swedish Institute's framework is new, and concerns participation in training courses and events carried out in an existing project within Erasmus+, coordinated by KTH.

## European Institute of Innovation and Technology

KTH is a partner in five of eight consortia in the EU initiative within the European Institute of Innovation and Technology, EIT. The areas in which KTH is participating through EIT's knowledge and innovation communities, KIC are ICT (EIT Digital), Energy (EIT InnoEnergy), Materials (EIT Raw Materials), Health (EIT Health) and Transport Systems (EIT Urban Mobility). For the latter, the work in 2020 has largely focused on the establishment of processes to run a Master's school. EIT Urban Mobility admitted its first students for the

autumn term 2020. Five students started at KTH. Like EIT Digital, KTH will be responsible for the coordination of the Master's school.

Interest in Master's programmes within the framework of EIT remains strong despite a decrease in the number of scholarships and the challenges faced by the programmes in connection with COVID-19.

The number of applications has increased compared to the previous year. During the year, 1,094 (887) applicants were admitted to EIT Digital's master's programmes and 288 (374) students started their studies at one of the 18 partner universities within the consortium. Of these 288, 60 (73) began their studies in the first year at KTH. After spending their first year of study at one of the partner universities, 85 (125) students began their second academic year at KTH in 2020. KTH's main commitment within EIT Digital remains the master's school, but there has also been an effort to recruit industrial doctoral students within the framework of EIT Digital.

KTH is participating in five of the Master's programmes offered within EIT InnoEnergy. In autumn 2020, 69 (80) students began their first year at KTH. 20 (41) students began the second year of their studies at KTH after a year at one of the partner universities.

EIT Health opened in autumn 2020 for applications to a master's programme in innovative technology for a healthy living environment. The doctoral programme BEHealSy, in the field of biomedical engineering and health systems, which is led by KTH, took place during the year and will also continue next year.

Within EIT Raw Materials, the main focus is now on courses and study programmes with a particular focus on sustainability issues, such as life cycle analysis, recycling and replacement of critical raw materials.

## European Universities – UNITE!

UNITE! is a network of universities in seven countries with the aim of designing new virtual and physical collaborations between universities. The work of UNITE! during the year has focused partly on the internal work at KTH and partly on joint processes within the network.

During the year, the network has collaborated on educational development, learning environments and courses for language and culture. The network has also developed concepts for virtual exchange of courses, enabled students to participate in selected summer courses and offered staff a place on competence development courses.

In the autumn, UNITE! was granted funds from the EU's Horizon 2020 research programme with a view to creating a platform for research cooperation and a common agenda to disseminate research results to society.

### **Marie Skłodowska-Curie Actions**

Marie Skłodowska-Curie Actions is the EU's researcher mobility programme.

In 2020, KTH's researchers were invited to a large number of applications and also submitted more applications than in previous years.

Within Innovative Training Networks, nine (six) new projects in which KTH is participating were granted to support doctoral students. Furthermore, KTH received funding for its first Doctoral Student in Innovative Training Network – European Joint Doctorate.

Within Individual Fellowships, three (four) new postdocs were granted to KTH. In total, KTH is participating in more than 56 (60) projects within the programme.

# Research

## Objectives

According to the Development Plan for 2018–2023, KTH is to be characterised by world-leading research. Applied research is to be strengthened and given greater depth by means of curiosity-driven basic research and interdisciplinary/multidisciplinary collaborations. The innovative and cutting edge research that is being conducted in a number of fields is to be clearly highlighted both externally and internally. Up-to-date, fit-for-purpose infrastructure is of fundamental importance to outstanding research. KTH will therefore, during the period, inventory the need for investments and ensure that the infrastructure is used as efficiently and widely as possible.

## External funding for research

The research community has had to adapt rapidly in connection with the pandemic. Some annual calls have been cancelled due to unrest in the financial markets, other calls have been converted to needs-driven research on COVID-19 and there have been completely new calls related to COVID-19.

KTH has a high proportion of external funding, both from the public sector as well as from other parties in Sweden and abroad. Swedish and foreign companies contribute to external financing through involvement in many research projects. KTH has worked several years to establish strong strategic partnerships with companies, where research funding becomes part of the collaboration, for example via centres or research projects. In most cases, however, the cooperative efforts with the business community do not mean that the

financing is actually from the companies, but rather is based on the fact that they contribute with work input. See also the *Joint Collaborations* section.

## International research funding

International research funding accounts for approximately 9 percent of research revenue. The EU is the main source of funding. KTH also receives research funding from other funders within Europe and the US, but also from, for example, the UN.

## EU funding

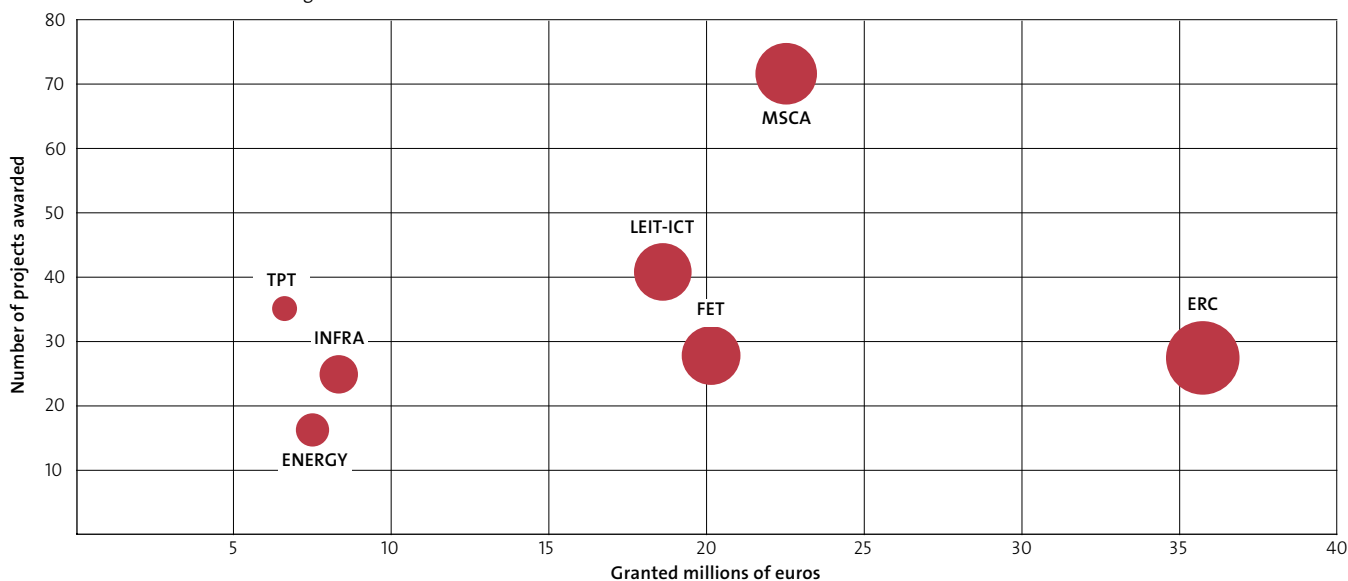
Within the EU Framework Programme Horizon 2020, the last work programme for 2018-2020 is under way. KTH has received 299 projects from Horizon 2020 to date, more than any other Swedish academic institution. In terms of funding, KTH is ranked third among Swedish participants in Horizon 2020, with just over 151,7 million euros in EU funding during the period 2014–2020.

In order to increase KTH's research grants from the EU, KTH has conducted a number of support activities. Some examples of these support activities include a workshop for each open call by the European Research Council (ERC), an information meeting on Future Emerging Technologies and a seminar on the theme of involving stakeholders in European research projects. In preparation for the upcoming Framework Programme Horizon Europe, a theme week called KTH Horizon Europe week was organised in October 2020. During the week, seminars and presentations were

Figure 14

KTH-projects within Horizon 2020 (2014-2020)

Research fields with most awarded grants at KTH



- ERC European Research Council (individual pioneering research)
- MSCA Marie-Sklödowska-Curie Actions (researcher mobility)
- LEIT-ICT Information and communication technologies
- FET Future and Emerging Technologies

- INFRA Research Infrastructure
- ENERGY Secure, clean and efficient energy
- TPT Smart, green and integrated transport

Source: Horizon 2020 dashboard



given on various financial instruments and programmes, for example within the ERC, Marie Skłodowska-Curie Actions, MSCA, and Clusters, missions and European partnerships. There were also sessions on critical aspects for successful project applications and a seminar on strategies for participation in Horizon Europe together with KTH's strategic partners. Nearly 300 people took part in the theme week.

In 2020, KTH has submitted around 300 applications to Horizon 2020, of which 60 have been granted during the year. Divided into the various programmes, five are found in ERC (individual groundbreaking research), ten within Marie Skłodowska Curie Actions (academic researcher mobility), and 43 within the rest of Horizon 2020. Within Innovative Training Networks (MSCA), who support doctoral students, nine new projects in which KTH is participating were granted.

Otti Tammissola, SCI, has been granted funding for a project within Marie Skłodowska-Curie Actions, Initial Training Network. Tammissola is the project coordinator. In fierce competition, these project funds were granted by the European Commission over a four-year period. The consortium has seven partners, as well as seven additional partner organisations. The project's budget is EUR 3.2 million. The project also includes twelve so-called Early Stage Researchers, doctoral students, who will conduct research and obtain degrees in accordance with the existing project plan.

Researchers in polymer technology at KTH, who have developed a unique glue to patch up bone fractures, have received funding under the Future Emerging Technologies Proactive programme. The research is led by Michael Malkoch, CBH, and the project, involving six partners, is coordinated by Daniel Hutchinson, CBH. The project is allocated EUR 4 million over a four-year period to further develop the technology so that it can be applied to more types of fractures where bones cannot self-heal, for example in bone cancer. The hope is to phase out the use of metal plates and screws.

Danica Kragic Jensfelt, EECS, has been awarded the ERC Advanced Grant, which is awarded to world-leading researchers. The five-year project, with a grant of EUR 2.7 million, will give the research team the opportunity to study in depth how to make robot hands act like the human model.

Jens Bardarson and Iliaria Testa, SCI, have each received the ERC Consolidator Grant, which is awarded to researchers with the potential to become a world leader in their field. The grants run for a period of five years. Jens Bardarson is awarded nearly EUR 1.9 million and his research group will study the part of quantum physics that deals with non-equilibrium dynamics. Understanding such complex quantum systems forms the basis of rapidly evolving quantum technology, using the quantum computer as an example. Iliaria Testa is awarded just over EUR 2.3 million for the Project InSpIRE where she and her research group at SciLifeLab will image and study the inner world of the brain.

They will study synapses – the contact between the neurons (nerve cells), which allows people to think, learn things and develop emotions.

Ian Hoffecker, CBH, has received a start-up grant from the ERC of EUR 1.5 million. The call is aimed at promising researchers at the beginning of their careers as support to start their own research groups and develop innovative projects in various scientific fields. The goal of Ian Hoffecker's five-year project is to develop methods in microscopy using reactions between DNA molecules, sequencing techniques and computational algorithms instead of traditional optical instruments.

Joachim Oberhammer, EECS, has received EUR 150 thousand through the ERC grant Proof of Concept. The funds will be used to test the innovation potential of Oberhammer's research into the development of terahertz technology, as a new way of constructing microsystems used in everything from medical equipment to wireless communication technologies.

*Figure 17* shows the distribution and funding of KTH's projects to date within Horizon 2020 (2014–2020) for the areas where KTH has been granted the most money.

## National external financing

KTH's external research funding from Swedish financiers follows the same pattern as in recent years. During the year, KTH has been successful in receiving funding from the Swedish Foundation for Strategic Research, SSF, as well as from the Swedish Research Council's large call, which largely supports basic research. *Figure 18* shows this year's revenue from grants for research from the largest funders.

In order to increase KTH's national external funding, KTH has conducted a number of support activities in the form of seminars, workshops and individual counselling during 2020. For example, Formas and the Swedish Research Council have been invited to KTH to provide information on calls of particular interest to researchers at KTH.

In 2020, the Swedish Research Council awarded KTH grants of SEK 261 million, of which SEK 166 million was awarded within the major call for science and technology. As in previous years, KTH was one of the higher education institutions that received the most funding within this call.

In the major call in humanities and social sciences, a researcher at KTH was granted the largest grant of all applicants. Jens Edlund, EECS, was awarded SEK 22 million in the call for digitisation and accessibility of cultural heritage collections. With the help of the grant, researchers at KTH and the University of Gothenburg will identify and highlight the occurrence of terrorism in Swedish politics from 1968 to the present day. The aim of the project is, among others, to demonstrate the importance of emotions in the debate on terrorist legislation. The project will run during the period 2021–2025.

Of the eight projects that received funding in the Swedish Research Council's call for grants to Röntgen-Ångström Cluster, a German-Swedish research collaboration in structural biology and materials science, two were KTH projects. Researchers Greta Lindwall, ITM, and Ulrich Vogt, SCI, will be awarded SEK 8 million each during the period 2020-2023. Greta Lindwall is designing a miniature 3D printer that enables so-called in-situ measurements with high-energy synchrotron X-ray light. Ulrich Vogt is developing a stereo-X-ray microscope to better visualize chemical nanoparticles.

KTH has also been granted two consolidation grants that give the most prominent younger researchers an opportunity to consolidate their research and expand their activities as independent researchers. The grants go to Anna Herland, EECS, and Jens Badarson, SCI. The appropriations amount to SEK 10 million each and run for a six-year period, 2021-2026.

**The Knut and Alice Wallenberg Foundation** is investing SEK 3.7 billion in basic research focusing on data-driven life sciences, DDLs, during the period 2021-2032. The initiative spans basic research in a variety of areas such as new drugs, spread of infection and infection biology, precision medicine and diagnostics, and cell and molecular biology. This initiative also includes funding for data support and databases. As a whole, the initiative will contribute to improving human quality of life and well-being, protecting biodiversity and creating a sustainable society. The initiative is coordinated by SciLifeLab, a collaboration between the four host universities Karolinska Institutet, KTH, Stockholm University and Uppsala University, of which KTH is the principal. DDLs also involves many other higher education institutions in Sweden as well as the Swedish Museum of Natural History.

The Knut and Alice Wallenberg Foundation has also financed SciLifeLab with SEK 50 million during the period 2021-2022 for research projects related to COVID-19 and an additional SEK 50 million for research and development of methods and analyses for large-scale testing of COVID-19. In 2020, Emil Björnson was recruited to EECS. Emil Björnson was appointed a Wallenberg Academy Fellow at Linköping University in 2019 but will now do his Fellowship at KTH. Emil Björnson, who will develop algorithms for the connected society, will receive a total of SEK 5 million during the period 2021-2025. Anna Herland, EECS, will continue to receive funding as a Wallenberg Academy Fellow, totalling SEK 12 million over a six-year period. Dimos Dimarogonas, EECS, and Josefin Larsson and Fredrik Viklund, both SCI, will continue to receive funding as Wallenberg Academy Fellows, each receiving SEK 9 million over a five-year period.

Researchers at KTH will receive five out of 16 grants awarded this year by the Knut and Alice Wallenberg

Foundation to eminent mathematicians.

The Wallenberg AI, Autonomous Systems and Software Program – Humanities and Society, WASP-HS, is expanding its investment in the humanities and social sciences for the study of artificial intelligence and autonomous systems, with support for eleven new research groups at nine universities. Sabine Höhler, ABE, is behind the research group at KTH that has received funding for an assistant professorship in media and the environment. For each group, an associate professor and a doctoral student will be funded by the WASP-HS research programme, while an additional doctoral student or postdoctoral fellow will be funded by each respective university.

Within WASP-HS, the **Marianne and Marcus Wallenberg Foundation** finances ten projects in social sciences. Two of the projects will go to KTH. Mats Engwall and Emrah Karakaya, ITM, will investigate how AI and autonomous systems will affect Swedish industrial companies. The assumption is that large technology shifts tend to shake up old industry structures and established business models. The grant is for SEK 6 million spread over three years. André Holzapfel, EECS, investigates what happens when AI creates increasing volumes of art and music. Our computers are playing a greater role in the creative work of creating art, articles and music. This creates a number of new challenges and among them are ethical, economic, cultural and legal issues. The grant is for SEK 6 million spread over four years.

**The Marcus and Amalia Wallenberg Memorial Fund**, also within WASP-HS, finances two projects in the humanities. One of the projects will go to KTH researcher Olof Engwall, EECS, who investigates how social robots open up new opportunities for AI support in learning, as they mimic human communication more than conventional screen-based methods. Olof Engwall will seize these opportunities by developing robot-borne AI systems for learning support adapted to students' different linguistic, cultural and experiential backgrounds. The project will run for three years and is financed with SEK 4.9 million.

In 2020, the **Swedish Foundation for Strategic Research (SSF)**, awarded grants to KTH totalling SEK 213 million. SSF will award SEK 200 million in grants to four research centres in a call related to Agenda 2030, Agenda 2030 Research Centers, over a five-year period. Half of the funding will go to the centre led by researchers at KTH, Per Olsson, SCI, and Göran Lindbergh, CBH. See the section *Centres and other special initiatives*.

Joachim Oberhammer, EECS, is one of six researchers awarded framework grants under the research programme Computing and Hardware for ICT Infrastructures. The call is aimed at hardware for next generation wireless communication (6G), accelerated computational power and more energy efficient information and communication technology.

The project THz Communication – NU is awarded SEK 35 million over a five-year period and the aim is to act quickly to ensure that the Swedish telecommunications industry has access to the higher radio frequencies.

Within SSF's call Future Research Leader Generation 7, three young researchers at KTH were awarded grants of SEK 12 million each over a five-year period. The researchers who will participate in the leadership programme are Klaus Jöns, SCI, who researches quantum repeaters, Iolanda Leite, EECS, who researches interactive learning for robots, and Marina Petrova, EECS, who researches intelligent robust wireless networks with ultra high speed.

Fredrik Lundell, Göran Stemme and Val Zwiller at KTH have each received SEK 10 million from SSF for collaborations with Taiwanese researchers. Fredrik Lundell, SCI, leads the project A Chip-based Accelerator for Material Research and Health. Göran Stemme, EECS, will develop nanopores that can be manufactured in a scalable way within the project Scalable CMOS-Integrated Nanopore-based Biosensors. Val Zwiller, SCI, will, within the project Two-Dimensional Quant-optoelectronic Components develop industrial production of new materials with direct applications in new communication technologies.

SSF has also decided on funding for twelve new industrial doctoral students, three of whom are at KTH. Each industrial doctoral student will receive SEK 2.5 million spread over five years.

in 2020, Vinnova granted KTH grants totalling SEK 82 million. For example, Björn Hellström, ABE, has been awarded SEK 10 million, and together with partners from business, the municipality and region Jämtland will counteract growing differences in living conditions between urban and rural areas. The goal of the project is for the Duved community to develop into a self-sufficient rural village and innovation engine that shows the way for local communities to serve as role models for sustainable habitats.

The Swedish Energy Agency granted KTH funding of SEK 101 million in 2020. Two researchers at KTH have been awarded funding within the Swedish Energy Agency's call for energy systems research institutes. They are Frauke Urban, ITM, who will receive SEK 13.8 million for the Energy Transition project for a more sustainable aviation industry, and Shareq Mohd Nazir, CBH, who is awarded SEK 13.7 million for the project Energy Efficient Negative Emissions from the Agricultural Sector. The projects will run for a period of four years.

Forma's call for centre formations for sustainability and competitiveness of the food system in 2020 is for SEK 200 million over a four-year period. As part of this initiative, Fredrik Gröndahl, ABE, has been awarded SEK 48 million for a centre called Blue Food – Centre for the Future of Seafood. See the section *Centres and other special initiatives*.

Figure 15

### Professors 2020

#### Newly appointed professors (externally recruited)

- Processes for Fibre Based Materials from Forest Resources

#### Promoted to professor

- Computer science with focus on Machine Learning
- Electrical and Hybrid Drive Systems
- Integrated Devices and Circuits
- Chemical Engineering
- Mathematics
- Mathematical Statistics
- Fluid mechanics
- Theoretical Physics with specialization in Condensed Matter Theory
- Theory of Phase Transformation in Metals
- Translational Proteomics

#### Newly appointed visiting professors

- Computer Science with Specialization in Artificial Intelligence and Data Analytics
- Power Electronic Systems
- History of Science, Technology and Environment
- Chemistry and Biology
- Critical Studies and Gender Theory
- Quantum Materials
- Mathematics
- Production Management and Innovation
- Transport Science with emphasis on Rail Traffic Systems
- Wireless Communication

#### Newly appointed adjunct professors

- Building Materials with focus on Life Cycle Assessment Methodology
- Computer Science with focus on Software Engineering
- Internal Combustion Engine Mechatronics
- Innovation Management
- Power System Stability
- Marine Systems
- Applied Physics and Material Science

Source: HR+

One of Forma's largest targeted calls to date is an investment in research related to Agenda 2030. The initiative comprises just over SEK 210 million and eleven projects. One of the people who has received grants under this initiative is Sabine Höhler, ABE. She is awarded SEK 20 million for the project A Mediated Planet: The power over the environmental data of the SDGs. The project runs over a four-year period.

Mistra will distribute an additional SEK 45 million over a four-year period to the Mistra SAMS, Sustainable Accessibility and Mobility Services programme. The program is led by Anna Kramers and Jonas Åkerman, ABE, and has been running since 2016. Mistra has already financed the first phase in four years with SEK 40 million. Among others, the programme has established a so-called Living Lab in the form of a local job hub in Tullinge, south of Stockholm. A job hub is a professional workplace near home. This is to investigate how new digital solutions can help suburban residents and smaller communities to work in a professional work environment remotely, thereby reducing journeys to their workplace and during their free time.

The Erling-Persson Family Foundation will continue to provide funding with an additional SEK 20 million to Jan Linnros, SCI, for a research project that develops new technology for cancer diagnostics. The project, which is interdisciplinary and involves about 25 researchers, is led by KTH. The work is done in collaboration with Karolinska Institutet, Uppsala University and RISE. The research focuses on the detection of so-called exosomes that form in our cells and are found in the blood. The goal is to develop a fast and inexpensive technology to diagnose a certain type of cancer through a regular blood test.

## Prizes and awards received by KTH researchers

Mark Pearce, SCI, has been elected as a member of the Royal Swedish Academy of Sciences (KVA). His research includes experimental physics and he develops instruments and methods that facilitate the study of cosmic radiation from space platforms. Being elected as a member of the KVA is a recognition of major contributions in outstanding research or other major contributions in support of science.

Britt Östlund, CBH, has been appointed a member of the Government's Council for research on the elderly. The Council is a way for the Government to make better use of research that can improve the lives of the elderly. A total of 15 researchers are included in the Council, which will act as a sounding board for Minister for Health and Social Affairs Lena Hallengren. Among others, it will discuss how the future of elderly care should be developed, how diseases should be prevented and how more people can remain healthy.

Alvaro Guarín, ABE, will assist the University of Cauca in Colombia with knowledge of the Swedish innovation model and the international innovation model Trippelhelix, where universities, industry and authorities collaborate. KTH will play a key role in a newly established Colombian research centre on road infrastructure at the University of Cauca. Funding for the Centre, Technological Development Centre for Road Infrastructure Innovation, amounting to SEK 26.4 million, comes from the Colombian state.

Kristina Höök, EECS, has received the SIGCHI Academy Award. SIGCHI is an international network for academics, students and professionals in human technology and human-computer interaction. Höök is the first Swede to be awarded the award. In her research on interaction design, she is known for so-called Soma design, which is a process that allows designers to investigate and improve the connections between experiences, emotions, subjective understanding and values.

Sverker Sörlin, ABE, has been appointed a member of Riksbankens Jubileumsfond's Board. The purpose of the Fund is to promote and support Swedish research in humanities and social sciences to achieve a prominent position internationally.

Emma Frid, EECS, has received this year's musical Bernadotte Scholarship for a project exploring haptic modality. Within the project, she has developed an audio installation, Ljudskogen, at the Performing Arts Museum and created new works for this. The research is conducted within the research group Sound and Music Computing at KTH.

Jan Gulliksen, Vice President for Digitisation and Professor of Human-Computer Interaction at KTH, has been elected as a member of the Board of Directors of the publishing house Natur & Kultur. Jan Gulliksen's research is primarily about digital accessibility, usability and work environment.

Tigran Haas and Jing Jing, ABE, have received scholarships from Riksbankens Jubilee Fund The Good City. The project that is rewarded, Mitigated Loneliness for Better and Happier Cities, will receive SEK 160 thousand. By studying the local street environment in detail, the project will provide answers on how densification can be designed to stimulate social life in the neighbourhood. Hanna Erixon Aalto and Ania Öst, ABE, will receive SEK 200 thousand from the same fund, for Architecture Strategies for Stockholm's Green Wedges. They will examine how to achieve a greater consensus on the densification of buildings in or near green spaces.

Cecilia Hermansson, ABE, has been appointed as the new Vice-President of the Climate Policy Council. The Council's task is to evaluate the compatibility of the government's overall policy with the climate goals adopted by the parliament and government.

Shervin Bagheri and Lucie Delemotte, SCI, have been elected to the Young Academy of Sweden. The Academy is an

independent forum for young, leading researchers from all fields of research. The Academy's operations focus on research policy, internationalisation, interdisciplinary studies and outreach activities and has approximately 40 members.

John Ågren, ITM, has been awarded the ASM International Gold Medal for his many years of work in materials science. ASM, the world's largest organisation in materials science, emphasises Ågren's breadth, which includes both science, with over 200 publications, as well as innovation and entrepreneurship.

Four researchers at KTH have been awarded prizes from Göran Gustafsson's foundations, which are given to young researchers at KTH and Uppsala University. Ute Cappel, CBH, and Lilian Matthiesen, SCI will each receive research grants amounting to SEK 2.75 million, which may be used over a three-year period. Katharina Jochemko, Stephan Steinhauer and Ricardo Vinuesa, all from SCI, have received Göran Gustafsson's small prize of SEK 750 thousand each.

Mikael Karlsson, ABE, has been elected as a member of the Swedish Royal Academy of Engineering Sciences (IVA). Karlsson has been elected to IVA's Technical Basics and Border Areas department.

Peter Hedström, ITM, has been awarded Chester Carlson's research prize of SEK 100 thousand for his research where he brings together extensive knowledge in metallic materials and artificial intelligence. The explanatory statement emphasises that in the development of special steels he combined physical experiments with modern computer science methods. The prize is awarded by IVA.

Joakim Lundeberg, CBH, has been elected as one of ten members of a newly formed advisory board of the New York Genome Center. The centre serves as a hub for international genome research. The research includes the development of computational and experimental genome methods and disease-focused research to better understand the genetic basis of cancer, neurodegenerative and neuropsychiatric disease. In 2020, the centre also focused on research on COVID-19.

## Examples of publications in highly regarded scientific journals

Researchers at KTH, with Michael Malkoch, CBH, have developed a way to speed up the production of so-called dendrimers, a precision polymer with several applications in medicine. The previous manufacturing time, of about eight hours in eight steps, has been shortened to two hours and 20 minutes, and to one step. This results in a more advanced dendrimer that can be loaded with active substances such as cytostatics, diagnostic dyes and target-seeking molecules. According to the researchers, dendrimer is the ultimate, synthetically produced carrier of drugs and with therapeutic uses. The researchers' work is published in the *Journal of the American Chemical Society*.

Artificial intelligence and radar are used to monitor forest fires. Researchers Yifang Ban, Puzhao Zhang and Andrea Nascetti of ABE, who are developing technology for improved monitoring of natural disasters, have had their latest findings published in *Nature Scientific Reports*. The technology used is so-called synthetic aperture radar images from satellites in combination with artificial intelligence in order to monitor in almost real time how, for example, floods and fires develop. The technology can penetrate clouds and smoke and provide a quick overview of, for example, the huge fires that have recently hit Australia, California, last year's forest fires in Sweden and the flood disaster in Mozambique.

Researchers from KTH and Stockholm University have been able to show in detail how malaria parasites absorb sugar, a discovery that can lead to better antimalarial drugs even if work remains to be done before a new drug can be developed based on the research results. With the newfound knowledge, substances known to affect the malaria parasite can be improved so that they do not cause side effects in the form of stopped sugar transport in human cells. This finding, in turn, increases the likelihood that substances blocking the parasite's sugar transport can be developed into a drug. The research findings, produced by Sarah E. McComas and Lucie Delemotte, SCI, and SciLifeLab, among others, have been published in the journal *Nature*.

Researchers at KTH in fluid mechanics, SCI, have been involved in developing methods for modernizing the design of aircraft within SSEMID, a European research project funded under Horizon 2020. The researchers, Guillaume Chauvat, Dan Henningson and Ardeshir Hanifi, have studied, among others, how the effect of small surface deformations and joints on the wing affects airflow to reduce friction and, consequently, fuel consumption. Another part of the project investigates what happens when a jet is used for cooling or flow control, for example in turbo machines. The results are published in an article in the *Journal of Fluid Mechanics*.

Anders Andersson, researcher at CBH, has led an international collaboration to map plankton of the Baltic Sea. Through gene sequencing, the genetics of one third of the small water-based organisms have been studied more closely. The mapping gives researchers the opportunity, through machine learning, to predict the functions of individual species. The research results have been published in *Communications Biology*.

Seven researchers at SCI have received the Highly Cited Paper Award for an article published in the Springer Nature journal *Microsystems & Nanoengineering*. The article is a review of a new field in sensor and electrical engineering, where the researchers combine micro- and nanomechanical sensors with conventional transistor-based electronics to produce new, more compact devices with a functionality that was previously not possible. Behind this article, Integrating MEMS and ICs, are researchers Andreas Fischer, Fredrik

Forsberg, Martin Lapisa, Simon Bleiker, Göran Stemme, Niclas Roxhed and Frank Niklaus.

Janosch Hauser, PhD student at SCI, has been awarded the Widmer Award, which was presented at MicroTas, an international conference on miniaturized systems in chemistry and life science. Hauser is rewarded for work on how to improve sample preparation for electron microscopy, a powerful technique that facilitates the visualization of the shape and size of virus particles and to identify the virus family in order to improve, for example, coronavirus sampling. The research paper, A microfluidic device for TEM sample preparation, is published in the journal *Lab on a Chip*.

The total number of peer-reviewed scientific publications in 2020 was 3,140 (3,220). See also the section *Essential data*.

## Centres and other special initiatives

Research centres are important for developing competitive research environments with relevant problems and for contributing with networks for academic researchers and other stakeholders. A research centre is a collaboration platform where different parties agree on a common plan and contribute resources for its implementation. KTH has over 50 centre formations and below is some news from the year.

Formas has granted SEK 48 million to the Centre Blue Food – Centre for the Future of Seafood in its call Centre Formations for Sustainability and Competitiveness in the Food System. KTH coordinates the centre. The goal of the centre formation is for Sweden to become a world leader in sustainable production of food from maritime areas. Within the centre, KTH collaborates with the University of Gothenburg, Chalmers University of Technology, the Swedish University of Agricultural Sciences, Uppsala University, RISE, IVL Swedish Environmental Research Institute and Innovatum, as well as some 70 companies and organisations.

SSF has granted four centre formations within the call Agenda 2030 Research Centers, with SEK 50 million each. Two of the centres are coordinated by KTH. The centres' funding covers five years. The Centre Production, Use and Storage of Hydrogene, PUSH, concerns research to find solutions within the UN's Global Sustainability Goal Number 13: Fight climate change. The centre will conduct research into the production, use and storage of hydrogen together with the parties Lund University, Chalmers University of Technology, Umeå University and RISE. The Centre Sustainable Nuclear Energy Research In Sweden, SUNRISE, relates to research to find solutions within the UN's Global Sustainability Goal number seven: Sustainable energy. The centre will conduct research to prepare for the construction of a fourth generation nuclear reactor together with Uppsala University and Luleå University of Technology, among others.

In January, KTH established the centre Digital Futures in

the strategic research field of IT and mobile communication. See the section *Digital Futures*.

The Swedish Research Council's final evaluation of the ten-year investment in Linnaeus Centre was published in 2020. The evaluation showed that the initiative has been successful. KTH's three Linnaeus Centres ACCESS, FLOW and ADOPT, which ended in 2019, were all evaluated with a positive outcome. They have contributed to KTH's continued strong development in its respective research areas. For example, the research environment that emerged within ACCESS has continued to develop within Digital Futures.

KTH has established an interim Resource Centre for the coordination of electron microscopy to increase utilization rates and streamline the use of these instruments within KTH.

Centres that were extended by KTH in 2020, with a renewed term of office, include the Center for Biomechanical Modeling and Experimentation, Design and Management of Manufacturing Systems, Integrated Transport Research Laboratory, Centre for Transport Studies, Railway Group, Center for Sustainable Aviation and SweGRIDS. This also includes the two network centres KTH Water Centre and KTH Space Centre.

In 2020, KTH initiated a network for centre directors, for relevant information addressed to them as directors of strategic research cooperation initiatives, as well as knowledge transfer between centre directors. Three network meetings have been held on different themes. Support functions relevant to the theme of the meeting participated. See the *Personnel* section.

In 2020, a self-assessment template for centres whose term of office is ending has also been developed. The self-assessment template should be used in cases where the research funder does not carry out an evaluation.

## Competence development for leaders of collaborative research

Research funders and collaborative partners are placing ever higher demands on KTH to promote sustainable development, gender equality, open data, integrity issues, utilisation and management of intellectual property assets, etc. As a result, KTH has a series of seminars with workshops focusing on these areas. The aim is to increase skills and exchanges between collaborators and other relevant staff. The seminar series is principally aimed at research collaborators regarding major or strategic research initiatives at KTH. The seminars in 2020 have dealt with issues such as sustainable development and global sustainability goals, stakeholder participation, ethics and compliance with various regulations in research collaboration such as export control, communication and gender equality and equal opportunities in research collaboration. The seminars have involved a total of about 80 participants.

During the year, KTH completed a canvas course in the form of e-learning in IP management. The joint operational support at KTH has also produced the material to be included in the canvas course *Data management and open science*. Both canvas courses will start in 2021. Additional course modules will be developed and implemented.

## Strategic research areas

The investment in strategic research areas, SFO, has been ongoing since 2010. KTH is participating in ten out of a total of 43 strategic research areas and is the principal for five of them. In its role as principal, KTH has received a total of SEK 2.3 billion in grants for SRA activities during the period 2010–2020, including SEK 318 million for 2020. Within KTH, several new interdisciplinary and internationally successful research fields have emerged through strategic investment in the recruitment of assistant professors. KTH has a leading role in five national strategic research areas: transport, production, e-science, IT and mobile communication, and molecular life sciences. At a national level, the SRA structure has created natural incentives for institutions of higher education to develop strong research fields, as interdisciplinary collaborations between different disciplines are required in order to achieve excellence. This allows Sweden's combined research resources to be utilised optimally.

**SFO TRENOP**, strategic research areas in transport research, has created six new positions during the year, two of which are held by women. Eight new doctoral students have been employed in two major research projects, including the project Sustainable and Integrated Urban Transport Systems, HITS2024, for the development of smart solutions for sustainable freight and passenger transport in an urban environment. A multidisciplinary research collaboration on transport, communication and energy systems with parties within and outside KTH has been initiated within the project Smart City Concepts in Curitiba – Low Carbon Transport in a Digital Society. KTH-MIT Senseable Stockholm Lab conducts four research projects in collaboration with SFO TRENOP. The aim is to explore how Big Data, AI and machine learning can integrate urban technology, urban science and design.

**SFO XPRES**, strategic research areas in production research, continued to work towards a paradigm shift in production by integrating sustainability and digitisation issues. XPRES has during the year hired an additional associate professor and two assistant professors. New international contacts have been established, primarily with Loughborough University of Technology and the Manufacturing Technology Centre. Cooperation with industry in Europe has been expanded through new projects such as Typhis, ICARUS, MAESTRO

and DiManD. This has also resulted in financial support for new researchers who will carry out their projects in different companies. XPRES will be the main organiser of CIRP 2025, the *International Academy for Production Engineers*, the world's largest conference in production technology, to take place in Stockholm in 2025.

**SFO SeRC** conducts research in e-science and in 2020 has continued to develop the multidisciplinary collaboration programmes introduced in 2019 as part of SeRC 2.0. The purpose of multidisciplinary collaboration programmes is to achieve added value through collaboration between strong research environments within applied research, method development and infrastructure. The six MCPs started are Brain-IT, e-science for prevention and control of cancer, data-driven computational material design, SeRC Exascale Simulation Software Initiative, Visual Data Analytics in e-Science Applications and SeRC Data Science. In 2020, approximately 40 senior researchers, a number of computer experts and approximately 100 doctoral students and postdocs were active in the multidisciplinary collaboration programs. SeRC has a scientific production of around 200 publications per year, with a high citation rate and receives approximately SEK 100 million per year in external grants. SeRC develops and maintains software for research in, for example, molecular dynamics simulation and flow mechanics, with a very large number of users internationally. In 2020, a number of projects related to COVID-19 have also been launched. In addition, SeRC has funded about ten transition projects for young promising SeRC researchers, to give them more time to find new employment in connection with the COVID-19 restrictions. The annual meeting 2020 was held as a virtual annual meeting with approximately 100 participants.

**SFO IT and mobile communications** have been strengthened thanks to increased government funding of SEK 78 million per year for the development of research areas in digitisation. During the year, the collaboration between KTH, Stockholm University and RISE was developed with a new agreement between the parties that regulates cooperation within both ICT TNG, Information and Communication Technology the Next Generation, and the Digital Futures centre. A major effort has been made during the year to get the new research environment Digital Futures up and running in the best way.

## Science for Life Laboratory

Science for Life Laboratory, SciLifeLab, is one of the government's major investments in research infrastructures in Sweden. SciLifeLab assists Sweden's research community in molecular life sciences with advanced technologies and expertise to facilitate cutting edge research and answer complex biological and medical questions. The direct state funds for SciLifeLab amounted to approximately SEK 275 million in 2020. SciLifeLab's operations are also funded through strategic research areas from SciLifeLab's four host universities KTH, Karolinska Institutet, Stockholm University and Uppsala University. In 2020, the funds for strategic research areas amounted to approximately SEK 162 million. The funds contribute to enabling SciLifeLab to make targeted local efforts to further strengthen the local research environment at each university.

In early 2020, SciLifeLab's Board of Directors decided to adopt a 10-year roadmap, SciLifeLab Roadmap 2020-2030, which was developed in 2019.

In 2020, the research infrastructure continued to provide service to academic researchers from all the major universities conducting life science research in Sweden. In addition to the academic projects, the research infrastructure has also provided services to health and medical care and to industry.

As a result of COVID-19, SciLifeLab initiated several initiatives to meet the needs identified as most important in the fight against the pandemic. This was done, among others, through a focus on, and promotion of, national research collaborations and open data sharing. Increased availability of both analytical methods and expert support for research projects related to COVID-19 in molecular life sciences was ensured by prioritising these projects. In June, SciLifeLab's Data Centre was launched, on behalf of the Swedish Research Council. This is a web portal for sharing collected research data on COVID-19, which constitutes the Swedish node in a European network led by the European Commission.

SciLifeLab quickly transformed its operations to, in addition to providing service to academic researchers, also assist society at large. By special authorization from the government, SciLifeLab, on behalf of the Public Health Agency of Sweden, helped to achieve increased testing capacity both for the detection of viral infection and antibody analyses. In addition to these efforts, SciLifeLab also supported large-scale coordinated collection of samples from patients with COVID-19.

Through an open call from the Knut and Alice Wallenberg Foundation, 67 research projects received funding, preparing the ground for a national research programme in relation to COVID-19. SciLifeLab allocated national funds for programme coordination and development of the research infrastructure to meet specific needs identified by the programme's researchers. In 2020, the programme has already resulted in many new research collaborations, the

building of capacities and tools for research into COVID-19, and a large number of breakthroughs in research published in reputable journals.

Researchers in SciLifeLab's COVID-19 research programme also started a project focusing on measuring and analysing the amount of detectable virus in wastewater and the presence of viruses in public transport. The project detected coronavirus already in spring 2020, and the second wave of COVID-19 was predicted during the autumn in Stockholm and Uppsala based on wastewater analysis. With allocated national funds, the research area has begun preparations for a biobank facility for environmental samples and environmental monitoring of viruses and other infectious pathogens.

Financial support from the Knut and Alice Wallenberg Foundation was a prerequisite for the implementation of SciLifeLab's efforts in the fight against the pandemic, and thanks to continued funding from the Foundation, the investments within SciLifeLab's national research programme for COVID-19 will continue until 2023.

During the spring, an international evaluation of SciLifeLab's research infrastructure was carried out. Due to the pandemic, the evaluation was carried out through a digital process. This evaluation, and the inventory of needs carried out last year, are both the basis for the decision by SciLifeLab's Board of Directors in November on technologies and service areas that SciLifeLab will provide in the next four years.

In October, the Knut and Alice Wallenberg Foundation announced that they will donate SEK 3.7 billion in a twelve-year investment in data-driven life science research, which SciLifeLab will coordinate. In November, SciLifeLab's Board of Directors decided to take on the assignment and to start the Data-driven Life Science program. A director and a steering group have been appointed for the programme.

In addition to the research infrastructure and its users, SciLifeLab's scientific activities also encompasses research environments that consist of academic researchers working at the host universities and affiliated with SciLifeLab. The research infrastructure, its users and the research environment are part of an ecosystem where technologies and knowledge are utilised and developed to facilitate competitive research in molecular life sciences in Sweden. The Stockholm hub of SciLifeLab, Campus Solna, is the largest single research environment. In May, the new Campus Solna Manager function was appointed, a three-year assignment to improve the coordination of the research environment and to streamline and improve the quality of the service provided at Campus Solna. In August, the new function Curator of Campus Solna was also appointed with the task of working together with the Campus Solna Manager and the local support organisation.

This programme helps to improve the quality of the research in the field of life sciences, and in the longer term, to



ensure that the level of knowledge in Sweden is raised. The programme also contributes to Sweden being at the forefront internationally. During the year, 33 group leaders were active in SciLifeLab's fellows program, three of which took office during the year. During the year, three SciLifeLab fellows completed the programme, and four fellows were promoted to senior lecturer.

## Digital Futures – a research centre that meets societal challenges through digital transformation

Digital Futures was inaugurated on 1 October 2020 through a hybrid event where about 25 invited speakers and others participated in Digital Future's physical premises, and over 150 invited people from some 40 organisations participated virtually. The Minister for Higher Education and Research, Matilda Ernkrans, held an opening speech together with KTH President Sigbritt Karlsson. The programme also included ten presentations on everything from research on autonomous vehicles to forward-looking 2030 on how everyday life is transformed through new digital technologies.

During the year, an external evaluation was carried out of nine interdisciplinary, one-year pilot projects involving up to 50 research leaders. A decision was made to scale up all projects to four-year collaboration projects within Digital Futures. The research projects cover several subject matter areas, such as digital assistants within elderly care and the handling of sensitive personal data, to smart solutions for water distribution and programmable robotics material on a microscale. Six two-year research couple projects have been started, where two younger research leaders from different disciplines collaborate on a challenge-driven digitalization issue. In addition, nine international postdocs have been recruited to a mobility program for research talents in digital transformation. Demonstration projects and projects to support diversity are planned to start early next year together with a new recruitment of international postdocs.

Work is underway to establish a partner network with actors in the private and public sectors to establish Stockholm as a world-leading hub in digital transformation. The aim is to initiate and run innovation projects, as well as accelerate the development of project groups with increased success with national and international funding bodies. In addition, an international dialogue on cooperation is held with prominent higher education institutions. KTH Digital Futures will also be home to smaller projects, networking, education and inspiration. One important task is to provide the opportunity for researchers to test new ideas in meetings with colleagues across subject boundaries and in collaboration with the private and public sector. The centre has been established in the Architecture House at KTH Campus as a meeting place for research on digitalisation.

Due to the current circumstances, digital forums for exchange between researchers and other actors are devel-

oped, including through regular online seminars on various themes related to digitalisation. In this spirit, the *Digitalize in Stockholm* conference, which was first held in 2019, became a fully digital event in the sequel on 8-9 November 2020. The aim of the conference is to promote collaboration between different countries, sectors and disciplines. This ambition was manifested by the support of more than 550 visitors from around 40 countries, including 52 percent from academia, 38 percent from the business community and 8 percent from the public sector. On 11 November, KTH invited researchers at the beginning of their careers to the Future Digileaders conference, also for the second consecutive year, and this time digitally. The conference gathered about 70 researchers from more than 20 countries.

## Research platforms

KTH has several research platforms that are related to KTH's strong interdisciplinary and multidisciplinary research areas, and aim to catalyse the coordination of inter-School activities and strategic initiatives within each field of research. There are six research platforms at KTH: Digitisation, Energy, Industrial Transformation, Materials, Life Science Technology and Transport.

The year 2020 was marked by the current pandemic, which affected the platforms' operations during the year. Many activities could be customized and have been possible to carry out digitally, while some have had to be cancelled or postponed until 2021. Due to COVID-19, all platforms joined forces in a joint call during the spring to stimulate and accelerate innovative solutions in connection with the pandemic and prevent or mitigate future crises. Many good applications were received and a total of 11 projects were granted funding.

**The Digitisation Platform** has continued the strategic pilot activities with KTH Live-in Lab and the KTH-MIT collaboration Senseable Stockholm Lab, facilitating and establishing a common environment for data sharing at KTH. Through three internal calls, the platform has granted support to nine different projects carried out by researchers at KPH in the field of digitisation.

**The Energy Platform** The energy platform has arranged a number of seminars, workshops, external events and continued its school visits. Four internal calls have been made to support initiatives in energy research at KTH. The platform has also assisted KTH in, among others, responding to consultations. This year's *KTH Energy Dialogue*, with an emphasis on the country's energy competence centre, was broadcast live from the National Museum of Science and Technology with approximately 150 participants via Zoom. Instead of the usual poster exhibition, participants were invited to a virtual room with some 40 pre-recorded presentations.

**The Industrial Transformation Platform** has had an internal call and supported The Integrated Flying Lab and ICES network with funds. A research network aimed at junior researchers from different disciplines has been started, among other things, the network has arranged a seminar series. In addition to two ongoing preliminary studies, focusing on the automotive and pharmaceutical industries and development towards biological medicines based on bioproduction, a feasibility study in construction and community building has also been initiated.

The theme of this year's Transformation Day was the development of biological drugs based on bioproduction and focusing on the transition the pharmaceutical industry needs to make to contribute to achieving the 1.5 degree target while maintaining competitiveness. The platform has also collaborated with Scania on lifelong learning.

**The Life Science Platform** arranged a workshop with the theme *AI for Life Science*, jointly with the Digitisation Platform. This year's *KTH Life Science Day* focused on research infrastructures. The platform has granted funding for nine activities through internal calls and assisted KTH in connection with consultation responses as well as participation in various expert panels and working groups.

**The Materials Platform** has granted eleven applications regarding travel support for the use of large-scale infrastructure and funding for seven material-related initiatives. In addition, funds have been granted to support eight Knut and Alice Wallenberg Fellows applications in the field of materials. Together with the Energy Platform and the Life Science Technology Platform, the platform has financed the start of an interim centre for electron microscopy at KTH. This year's theme for Materials Platform Day was *Polymers 100 years* and it was arranged in collaboration with IVA.

**The Transport Platform** has continued its internal work within transport-related centres at KTH and collaborates with the Platform for Industrial Transformation in the Fordonsdalen project. The webinar *Risks and Consequences of Data Bias in a Digitized World* was arranged jointly with Road2Science. A feasibility study on electric flights, The Green Raven Project, has been granted funding. Furthermore, platform management has board and steering group assignments in Region Stockholm, Integrated Transport Research Lab, Bombardier and Scania, among others.

## European Institute of Innovation and Technology

KTH is the main partner in five of the EIT's eight knowledge and innovation groups, KIC. KTH participates in the fields of ICT (EIT Digital), Energy (EIT InnoEnergy),

Materials (EIT Raw Materials), Health (EIT Health) and Transport Systems (EIT Urban Mobility). Digital and InnoEnergy have been running since 2010, while Raw Materials and Health were established in 2015. Urban Mobility is the latest, established in 2019 with KTH as a main partner.

The commitment within EIT is strategically important for KTH and a tool for promoting KTH researchers' networks and collaboration with European research groups and industrial partners. The networks facilitate an increased capacity for strong EU applications and a higher degree of EU funding for KTH. In addition, EIT offers many opportunities to renew KTH's own core activities in both education and research.

In 2020, however, there have been a couple of overarching challenges to continued cooperation with EIT. The EIT has pushed to ensure financial sustainability for each KIC, which has shifted the focus to more short-term projects and higher technology maturity which generally does not fit into KTH's research environment as well as previously. Furthermore, the planning for the future of Horizon Europe has been characterised by ambiguities, in particular in relation to the contractual terms and conditions, but also the budget. The European Commission has announced that it intends to call for a major change in KIC to new so-called institutional partnerships, which will completely change the role of partners. The regulatory framework for 2021 is therefore not anticipated to be in place until the middle of the year, entailing accompanying repercussions on activities.

In EIT Digital, KTH still plays an important role as one of the largest academic partners in the programme. KTH participates in the master's school and continues to have the highest number of students within the programme. During 2020, KTH has been active in several events, including the tenth anniversary of EIT Digital. In addition, KTH has participated in a handful of innovation projects in areas such as cross-border authentication, anonymization of health data and electroanalytic chemistry, which have led to the establishment of a number of startups.

Within EIT InnoEnergy, the number of innovation projects remains low for KTH's part. However, there are several good examples of start-up companies founded by KTH academic researchers or students who have progressed further in their development and attracted attention both nationally and internationally. The best example is the startup SciBreak, which this year has reached the so-called 33 list of the most promising startups in Sweden in the field of technology.

KTH is involved in several projects within EIT Health. Two projects continued within the innovation track during 2020: POSITIVE which deals with home monitoring of the individual's physical, mental and psychological ability and IndiRock'nSole which focuses on foot ulcers in diabetics. KTH is also involved in new projects that have been granted

funding, such as the doctoral programme BEHEalSy, which has received the EIT Label, and the master's programme SHAPE. The Digital Summer School HelloAI, on the application of artificial intelligence in European healthcare, was conducted in collaboration with the EIT Regional Innovation Scheme.

Within EIT RawMaterials, several projects have been successfully completed in 2020. For example, CE-COSP, to train doctoral students in circular economy and recycling, as well as QM-FORMa to further develop the methods of materials design with regard to a circular economy. Some new projects have been launched, such as MetaLSF, which focuses on training industry R&D staff to use large-scale facilities in their material research, and RM@Skolor 4.0, which aims to improve the image of science and technology by explaining the value and role of raw materials in the transition to green energy.

Within EIT Urban Mobility, KTH has coordinated the courses for the master's school and been responsible for the office. KTH has also participated in several projects, including three innovation projects, a project specifically aimed at COVID-19, a business development project and a further education project. KTH has also been involved in organising a Nordic conference.

## Research infrastructures

KTH relies on access to topical and up-to-date research infrastructure to conduct cutting-edge research and education. In 2020, KTH conducted extensive development work with the goal of ensuring that the research infrastructures that are strategically important for the University's research and education are supported in the long term. As part of this, during the year work was initiated to develop a roadmap for research infrastructures for the period 2020–2023. However, during the initial phase of the KTH Research Assessment Exercise, RAE, 2020–2021, a need for a proprietary panel for evaluating the research infrastructures was identified and the work to produce texts and content for this has started. As a result, the planned roadmap is postponed in order to benefit from the research infrastructures' own texts as well as the RAE panel's evaluation and views on the design of KTH's long-term strategy.

During the year, the Swedish National Financial Management Authority's consultation on a clear and transparent regulatory framework regarding the collection of fees for the use of research infrastructures has also been investigated and answered. KTH supports the proposal put forward by the investigation and believes that a fee model based on full cost recovery will benefit KTH's research infrastructures so that they can eventually become self-sufficient.

A number of activities were carried out in 2020 within KTH's research infrastructures. At the beginning of the year,

a decision was announced and adopted on the allocation of SEK 20 million to the established research infrastructures with the aim of investing in new instruments or upgrading existing ones. A follow-up of the activities of all research infrastructures was carried out during the year with initial written reporting, followed by individual quality-enhancing dialogue meetings. The dialogue meetings were attended by the director, deputy vice-chancellor and coordinators from the Research Support Department within the joint operational support. Two new research infrastructures were established at the beginning of the year, the Sustainable Power Laboratory and the Hultgren Laboratory.

Two quality-enhancing meetings were held during the year together with representatives of all research infrastructures. The theme of the meetings has focused on web pages and communication.

## Investment in sustainable production in Södertälje

The research profile for the department's sustainable production development in Södertälje has three different specialisations: production management, industrial reliability and production logistics. At the end of 2020, around 65 people were working at KTH Södertälje. The establishment of the research organisation is in full swing and as at the end of 2020 has grown to 27 people on site. These include three professors, two adjunct professors, three lecturers, an assistant professor, five postdocs, one researcher, six employed doctoral students, four industrial doctoral students and two research engineers. In addition to these, other KTH-employed researchers and doctoral students also occasionally spend time in Södertälje. The expansion is continuing, with ongoing employment of lecturers, doctoral students, associate professors and postdocs. At the same time, there is close cooperation with Scania and AstraZeneca in respect of taking on a number of externally employed doctoral students. Collaboration within the framework of Södertälje Science Park has also been further strengthened in 2020, including through *Science Week*.

In 2020, the department ran six major Vinnova-funded research projects, a large Eureka-funded project and several smaller projects with funding from national and European financiers. The total research grants in 2020 amount to approximately SEK 29 million, of which approximately SEK 11 million comprises state grants and SEK 18 million is external funding. In addition, the department is part of Vinnova's Helix competence centre, which is running from 2017–2021 and which has its headquarters at Linköping University. In 2020, the department published six scientific articles, fifteen conference articles, and one book chapter. The conference *PLAN FoT* was held in October with about 140 participants. During 2020, the department has also

taken an active role in ITM's initiative IRIS (Research Initiative on Sustainable Industry and Society) and KTH's platform for Industrial Transformation.

During 2020, the competence centre KTH Leancentrum, in addition to its regular activities, completed a new assignment training *Lean & Green* and a new web-based course within the framework of KTH's further education *Sustainable Leadership with Lean*. Leancentrum has also expanded with additional staff focusing, among others, on ITM's development of lifelong learning training. In the EU project MatLust, Leancentrum is responsible for the lean programme, where companies receive both knowledge and tools to develop their activities. The Lean Centre also has regional leadership responsibility in the national Produktionslyftet (production lift) and Robotlyftet (robot lift) programmes.

## Export control

At KTH there are currently two certified export control administrators who support researchers in their work to review their research based on export control regulation. One of the export control administrators will leave their employment shortly, and therefore the newly hired ethics officer will be certified to also be able to handle export control issues.

The final report of the Swedish Inspectorate of Strategic Products, ISP, supervisory visit in autumn 2019 came in September 2020. ISP believes that KTH sufficiently ensures compliance with the export control regulations. At the same time, the authority requires KTH to take certain further measures to ensure compliance. The classification procedure of products with suspected dual use needs to include post-checks. The export control policy also needs to be updated in some respects. The export control function has revised the export control checklist and the export control programme, which is a policy document aimed to meet ISP's requirements. Feedback to ISP took place in January 2021.

Export control was also touched upon at a seminar in spring 2020 on ethics and compliance, aimed at researchers.

## Ethics in research

During 2020, the joint operational support at KTH in collaboration with KTH's faculty council made a special effort to develop a system of ethics and compliance at KTH. Through this work, KTH created a discussion forum for compliance issues in research.

In January, representatives from different departments within the Joint Operations Support and the Faculty Council met for an ethics workshop. In April, a seminar on ethics and compliance in research was also arranged. Some seminars during *KTH Horizon Europe Week*, in October 2020, dealt with research ethics and associated ethical issues. In October, Pierre Lafolie of the Ethical Review Authority was

also invited to give a lecture to KTH researchers on ethical review.

A research ethics advisor position has been newly established and was filled on 1 September 2020. The position will contribute to ensuring that the ambitions regarding research ethics and good research practice, for example in KTH's ethical policy and quality policy, continue to permeate the business, and that the export control programme is followed. The research ethics advisor will, among others, advise researchers primarily on ethical and export control, but should also be helpful in other areas of research ethics. The research ethics advisor also convenes the above-mentioned discussion forum once a month, and convenes the Faculty Council's Ethics Committee. The research ethics advisor also represents KTH in national and international research ethics networks.

## EU Charter for Researchers

In 2019, preparations began for KTH to accede the EU Charter for Researchers with guidelines for the recruitment of researchers, EU Charter & Code (EU C&C). EU C&C encompasses a number of principles governing the relationship between employers and researchers with the aim of creating good conditions for research, promoting greater internationalisation and increased research cooperation. Accession to the Charter strengthens KTH's competitiveness and brings a number of benefits, especially in EU-initiated projects.

The principles largely coincide with Swedish legislation and are based on ESG's principles for quality assurance and the European Code of Conduct for Research Integrity. The Charter covers four main areas: ethical principles and professional responsibility, recruitment, working conditions and continuing training.

Accession takes place through a specific application procedure to the European Commission and involves the implementation of a number of mandatory preparatory steps. An external expert has been hired to lead the preparatory work and to prepare the application. In the autumn of 2019, an analysis of KTH's regulations was carried out, which formed the basis for continued work in 2020. All four areas mentioned above were analysed in relation to the principles of the Charter. In parallel with the analysis, a number of improvement measures to increase clarity were carried out on KTH's web pages and information about the regulations was updated.

In spring 2020, an action plan was developed with a number of identified necessary measures to improve long-term compliance with the Charter's principles. The measures include, in particular, the establishment of democratic forums for collaboration, discussion and continuous development work in a number of areas and creation of greater clarity online about career development and further educa-

tion activities on offer. The application was drawn up and submitted to the Commission on 23 June.

## Honorary doctorates

In June, the Faculty Council awarded three honorary doctorates on the following stated grounds

**Professor Adisa Azapagic**, Department of Chemical Engineering and Analytical Science, University of Manchester, UK. Adisa Azapagic is a world-leading academic in the field of Engineering for Sustainable Development. She leads the multidisciplinary group Sustainable Industrial Systems at the University of Manchester. From a life cycle perspective, she studies how different sectors of society can contribute to a sustainable society. She integrates ecological, social and economic sustainability into her analyses. Through her research, she highlights the importance of a holistic perspective when technology is developed and evaluated, and through this she drives the development of engineering. She has also been appointed Member of the Most Excellent Order of the British Empire in addition to receiving a number of prestigious awards and honorary assignments. Adisa Azapagic collaborates with KTH through, among others, participation in scientific reference groups and through co-publications. This is a collaboration that KTH would like to develop.

**Professor Alicia Dickenstein**, Department of Mathematics, University of Buenos Aires, Argentina. Alicia Dickenstein is a world-renowned mathematician active in the fields of algebraic geometry and combinatorics. More recently, she has also worked with applications aimed at predicting the behaviour of biological systems without knowledge of precise parameters. Alicia Dickenstein is also strongly involved in international activities in gender equality, natural sciences in primary school and mathematics in developing countries. Among many prestigious appointments and assignments, she has been vice president of the International Mathematics Society and has been named both Fellow of the American Mathematical Society and the Society for Industrial and Applied Mathematics Fellow. Alicia Dickenstein has visited Sweden and KTH many times, for example she was visiting professor at Institut Mittag-Leffler in 2011 and Wallenberg visiting professor at KTH in 2017.

**Professor Svante Lindqvist**, former professor at KTH, Head of the Nobel Museum and Marshal of the Realm. Through a long professional career, Svante Lindqvist has been important to KTH in several ways both academically and in society. In 1989, Svante Lindqvist became Sweden's first professor of technology history when he received KTH's newly established professorship on the subject. Under his leadership, the technology and science history operations at KTH grew to become an internationally recognized research

environment. In 1998, Svante Lindqvist left KTH for the Nobel Museum, which he founded and successfully led until 2010. The Nobel Museum has encouraged young people to be interested in technology and science, through extensive school projects and activities. Between 2010 and 2018, Svante Lindqvist was Marshal of the Realm. He stimulated the King's interest in technology, science and the environment and also contributed to several royal visits to KTH. Svante Lindqvist is a member of the Royal Swedish Academy of Engineering Sciences, the Royal Swedish Academy of Sciences and the Royal Swedish Academy of Letters, History and Antiquities and an honorary member of the Royal Swedish Academy of Fine Arts. Among his many awards is H.M. The King's medal 12th size in the Band on the Order of the Seraphim ribbon and a number of international merit orders.

# Collaboration

The purpose of strategic collaboration is to contribute to improved quality and relevance in education and research. KTH is working to establish and develop a systematic approach to collaboration via central support functions consisting of expertise in alumni relations, strategic partnerships and collaboration with small and medium-sized companies and regional parties.

In 2020, a plan with specified targets for collaboration 2021-2022 was developed. The plan covers areas that aim to further strengthen KTH's strategic partnership, clarify working methods, processes and roles. The plan also includes further development of collaboration support, international collaboration, personal mobility to and from KTH and incentives for collaboration. Collaboration should also be included in the planning, development and evaluation of research and education.

## Strategic partnerships

KTH has established strategic partnerships with ABB, Bombardier, Ericsson, Saab, Sandvik, Scania, Skanska, Region Stockholm, City of Stockholm, Stora Enso, Vattenfall, Stockholm Environmental Institute and IVL Svenska Miljöinstitut. In 2020, a further agreement was signed regarding enhanced cooperation with the research institute RISE. Each partnership is followed up annually by KTH's senior management alongside the senior management of the partner in question.

In addition to activities within each partnership, KTH also performs a number of partner-wide activities. A meeting, with partners at management level, has been held where it was discussed how KTH and the strategic partnerships can work together to address the most important challenges. The challenges include sustainable development and digitalisation, increased visibility to strengthen Sweden and Stockholm as a knowledge nation and region respectively, stimulate cross-disciplinary initiatives and attract young people to technical education and technology-related professions. Thematic workshops on circular economy, lifelong learning and the upcoming EU Framework Programme Horizon Europe have also been carried out. During the year, an in-depth dialogue with Region Stockholm was also initiated to find out how KTH and the strategic partnerships could contribute competences regarding Data Science and the management and analysis of health data linked to COVID-19.

## Personal mobility

An important part of KTH's strategic collaboration consists of personal mobility between academia and other organisations – both companies and public administration. KTH offers several forms of personal mobility to KTH: adjunct professor, affiliated faculty, affiliated professor and industrial doctoral student. In addition to this, KTH is working actively

to increase personal mobility out of KTH and has allocated special funds to encourage personal mobility from KTH to external organisations. KTH's schools report how these funds have been used. Pursuant to the Deputy Vice-Chancellor's assignment in KTH's Business Plan 2020 to evaluate the initiative, KTH has compiled a follow-up that later formed the basis for the school dialogues during the autumn of 2020. In accordance with KTH's development plan 2018-2023, KTH is also working to develop collaborative skills as a qualification in conjunction with employment and promotion, which is a prerequisite in order for personal mobility to be viewed as an attractive choice in a person's career.

## Work to increase the impact of KTH's research and education in society at large

The sector and societal impact work includes creating the preconditions for increased societal impact, capturing effects and disseminating information about KTH's research and education. Impact managers at KTH schools have integrated the impact perspective into the core business by running doctoral courses with impact as a focus, conducting inspirational workshops and seminars regarding impact in research applications and research projects, and supporting researchers/teachers to develop Impact cases. Another focus during the year has been to connect to KTH's Research Assessment Exercise, RAE, in the area of Impact and engagement in society. The work has involved participating in the design of guidance to self-assessment, support in self-assessment work and involvement in the thematic panel on impact in RAE.

## Development projects related to strategic collaboration

In 2017, Vinnova launched the programme "Development of the universities' collaborative capacity for strategic collaboration". In total, approximately SEK 120 million was allocated until and including 2021 and 18 university-wide development projects were started. KTH has been in charge of the project Methods for Relevance Assessment of Education, MerUt, and participated in eight more projects. Several of the projects expired in 2020 and, taken overall, the participation has resulted in extensive learning and exchange of experience resulting in reports, models, methods and recommendations to strengthen the collaboration capacity of higher education institutions. KTH has reinstated a priority development group, PriU group, within working life and collaboration that will continue to work on how educational collaboration can be boosted and developed further at KTH. The results of the university-wide development projects will form a basis for the PriU group's work.

## Collaboration with society at large

KTH promotes collaboration with small and medium-sized enterprises, SMEs, and regional development by developing instruments for collaboration in research and education.

In the EU's Structural Funds partnership, there is particular emphasis on cooperation with SMEs, with the fund being focused on projects that work for growth and employment in Sweden. During 2020, KTH has been involved in the preparation group and in two projects financed by the Structural Funds partnerships; Frontrunners for Sustainable Innovation and Fordonsdalen. In Frontrunners, KTH, together with Södertälje Science Park and Kista Science City, has worked to increase collaboration in KTH's courses by matching teachers and students with SMEs. The project has also worked to make KTH's infrastructure available to the target group SME.

In Fordonsdalen, which was granted in 2020, KTH will work jointly with Region Stockholm to strengthen the regional automotive industry's competitiveness in the transition to the sustainable transport system of the future.

Digital Demo Stockholm is an innovation collaboration that will improve and facilitate for the inhabitants of the Stockholm region with a starting point in Region Stockholm and the City of Stockholm priority needs in communication and logistics systems, healthcare and care, climate and the environment. The collaboration includes representatives of the public sector, academia and business. An investigation was conducted during the year, which has led to the integration of the initiative into the Digital Futures centre. See section *Research*.

Open Lab is a collaboration between the City of Stockholm, Region Stockholm, Karolinska Institutet, Stockholm University, Södertörn University and KTH. The core of the collaboration is interdisciplinary master's programmes and courses for professionals in the Design Thinking method.

KTH's digital platform, KTH's ExjobbPortal make it possible for KTH's students and employers to contact each other. Via KTH ExjobbPortal, companies, organisations, institutes and institutions can publish proposals free of charge relating to degree projects, project assignments, trainee positions and internships. In 2020, more than 1,000 assignments were published, of which about 800 were degree projects.

## Alumni relationships and KTH Opportunities Fund

In accordance with KTH's mission to establish and maintain good relations with its alumni and increase long-term engagement both in Sweden and abroad, the year began with a number of activities and events. These include the start of this spring's mentorship program, a thank you event for KTH Opportunities Fund, and alumni meetings with KTH's international alumni associations. From mid-spring, due to

the pandemic, the operations switched from physical to digital meetings. New meeting formats and communication concepts were developed, such as the Online Alumni Mingle and Quiz. Short films replaced the presentations by the fund's grantees. The digital presence enabled remote participation and promoted accessibility, as demonstrated by the increased number of participants in activities and the influx of new members into the alumni network. Other activities in 2020 are: a fundraising campaign for KTH Opportunities Fund, a survey on alumni entrepreneurship that was developed together with KTH Innovation, a lecture with Alumni of the Year and the pilot meeting for one of the master's programmes at ITM.

## Lifelong learning

The pandemic initiated a number of investments in lifelong learning from the government. The investments coincided with the extensive development and transition work entailed by the adaptation from campus education to distance education. Due to the transition, few teachers had the time or ability to take advantage of the initiatives and opportunities offered. During the year, KTH developed concepts and formats for grant-funded further education. The format provides flexibility and availability in time and space and provides a clearer target group adaptation to professionals. The format also provides new opportunities in assignment training and regular programme training. Implementation is ongoing and will continue in the coming years. The specific investment in lifelong learning is presented under the section *Education*. In total, KTH offered 67 further education courses.

KTH continues to train staff in companies in radio system technology, electrification of heavy vehicles, real estate economics, Lean and industrial production. During the year, in-depth collaboration with partners and authorities has resulted in new training packages in artificial intelligence and machine learning, cyber defence and information security. A package of courses in materials in a circular society will be launched, probably in 2021.

In collaboration with six other universities, KTH has a government assignment to continue to implement skills development initiatives within artificial intelligence, AI. Chalmers University of Technology coordinates the operation and reports back to the government in special order.

In 2019, a working group was set up to develop proposals for a new organisation as well as processes and templates for assignment training. In spring 2020, the working group reported to the Vice President for Education. During the autumn, the proposals from this work have been prepared and further developed to facilitate establishment of a new organisation and new ways of working in 2021. At the same time, new objectives have been set for activities in the field of lifelong learning to grow and become an essential part of the

scope of educational activities. The goal is to reach 20 percent by 2023. The goal is for KTH to be a leading player within lifelong learning, and thereby to support Swedish companies and organisations.

In the development work, KTH continues to have a close dialogue with companies and organisations. Especially with strategic partners, KTH is looking to develop more far-reaching and business-integrated collaborations on education and lifelong learning.

## Fundraising

KTH's fundraising activities comprise strategic, structured and long-term work to increase private external funding to KTH. The activities should be viewed as a complement to traditional financing. The larger funders with a multi-year commitment include the Erling-Persson Family Foundation, the Birthe & Per Arwidsson Foundation, the Axel and Margaret Ax:son Johnson Foundation and companies such as Scania, Ericsson, Brummer & Partners and Einar Mattsson. KTH's fundraising work is a focused effort aimed at increasing the involvement and support for KTH from industry and society in existing and new networks. A complementary and very important part of the work is to arrange various types of seminars that increase the awareness of KTH's activities and strengthen relations with society at large.

During 2020, work has been made more difficult due to COVID-19 as many activities have been postponed. The turmoil in the financial markets has also had a clear impact. During the spring, KTH was able to change and direct the efforts in favour of support for research into COVID-19.

## Innovation Office

Since the inception of the Innovation Office, KTH has worked very closely with universities and other institutions of higher education in the region. These collaborations have been extended over the years and, and KTH has been allocated funds to provide services to universities in the region, in particular Mälardalen University, the Stockholm School of Economics, the Swedish School of Sport and Södertörn University.

KTH has collaborative agreements with these universities regarding the provision of services for innovation development and the transfer of funds, in order to build up basic collaborative skills and in-house innovation support at each university. Innovation development services include support and advice regarding activities development, financing, patents and recruitment. Each of the four universities, together with KTH, has produced an action plan for activities and initiatives aimed at strengthening the innovation support locally. At the same time, KTH has opened up its innovation support activities to individual academic

researchers and students at the four universities. Since the establishment of the innovation office at KTH, it has worked closely with Uppsala University within patent support and participated actively in other exchanges of experiences with other innovation offices.

In autumn 2019, the government appointed a special investigator to conduct an investigation into developed innovation support at universities and colleges. A dialogue meeting was held in February 2020 between the investigator and KTH's management as well as representatives from KTH Innovation and KTH Holding AB. In connection with the investigation, a large number of meetings and talks have been held and data has been developed to highlight how KTH's Innovation Office has performed its mission so far.

The internationalisation programme Brighter Startup was conducted for the eighth consecutive year, this time in digital format. During nine webinars, the selected 24 projects from KTH, SSE and Södertörn University gained an insight into innovation hubs in London, Munich, Silicon Valley, Boston and Tokyo. The aim of the programme is, among others, to increase the participants' knowledge of entrepreneurship in an international context and to create meetings between Swedish startups and international actors.

## Activities supporting innovation

KTH Innovation works to ensure that research results and activities ideas from academic researchers and students at KTH will evolve and meet the market

The overall objectives of KTH Innovation are to:

- Create the conditions for innovations to arise and be developed throughout KTH to strengthen KTH's competitiveness and attractiveness as an innovative and entrepreneurial university.
- Enable more ideas and results from KTH's students, researchers and employees to meet the market and become successful innovations that contribute to sustainable social development.
- Drive and further develop an efficient and inclusive innovation process to best develop and support the path of ideas and ideas towards a market.
- Further develop a strong, internationally connected, complementary ecosystem for innovation support at KTH.

2020 has in many ways been a different year with major challenges affecting the operations as a whole. During the year, KTH Innovation has worked to develop its way of working, its processes and digital offering to continue to offer high-quality education under the conditions prevailing during COVID-19.

During 2020, KTH Innovation has continued work with identifying how ideas in the innovation support process relate to the UN's sustainable development goals. The aim is to increase the number of ideas that make a positive contribution to sustainable development. A recurring activity is to



allow idea carriers to map their ideas against the UN's sustainable development goals as a way to view their climate impact and make early choices that lead to a more sustainable business model.

The annual Global Change Award, initiated by the non-profit H&M Foundation, aims to protect our planet and living conditions by accelerating the shift from a linear to a circular fashion industry. In addition to a financial contribution, the five winners participate in a twelve-month accelerator program in which KTH is a partner. This year's accelerator program has been run in a digital format where KTH Innovation contributed continuous commercialization support to the participating teams.

During 2020, KTH Innovation has continued its work aimed at increasing the number of women who are developing their ideas. KTH Innovation has joined The Yes Way, a cross-business initiative within the innovation ecosystem aimed at promoting gender equality and inclusion. Gender equality aspects have been introduced in KTH Innovation's business plan and are monitored on an ongoing basis, such as setting targets and following up both the number of new ideas from women as well as the number of women who are active in the innovation support process. The share of KTH cases with at least one woman on the team has increased from 32 percent to 37 percent since last year, and the number of women active in innovation development has increased from 104 to 146.

KTH Innovation possesses expertise in process-oriented innovation development. There has been considerable interest from the outside world during the year, and licence agreements have been concluded with both Swedish and international companies, universities and innovation offices, including Imperial College in the UK and University of Boulder in the USA. The licence relates to the use of the tool KTH Innovation Readiness Level™ through the website built up by KTH Innovation. The page describes the tool and how it can be integrated into innovation development at other innovation offices.

KTH has funding from the Bicky Chakraborty Entrepreneur Program, which focuses on lifting entrepreneurs with ideas that focus on growth in Sweden. In 2020, a fourth round of participants has undergone the Bicky Chakraborty Entrepreneur Programme, including funding, coaching, tailored courses and mentoring.

KTH Innovation received 362 new ideas in 2020, of which around one-third are from academic researchers and two-thirds from students.

The commercialisation projects supported by KTH Innovation have attracted a total of just over SEK 66,5 million in funding, including from the Vinnova-funded programme "Validation for application", which is managed by KTH Holding AB. During the year, 35 companies have been formed, of which 18 were student companies, and 26 patent applications have been submitted. During the year, 34

projects have been admitted to the pre-incubator programme at KTH Innovation, five companies have been admitted to the business incubator STING and six to other Swedish and international incubators.

Stockholm has an attractive ecosystem for entrepreneurship and startups where, among others, many business angels offer our cases an alternative to classic incubation.

# Quality work

## KTH's quality work within education, research and collaboration

KTH's systematic quality work is based on KTH's quality assurance policy. The quality assurance policy is based on KTH's Development Plan for 2018–2023, as well as the quality requirements set out in the Higher Education Act, the Higher Education Ordinance and European standards and guidelines for the quality assurance of higher education.

In KTH's quality work, it is extremely important for students, teachers and other personnel to be included and involved. At the same time, there is a clear formal division of responsibilities and joint operational support for the quality assurance work.

The Faculty Council, under the direction of the Dean, is the collegial body that has the overall responsibility for quality in education, research and joint collaborations. At each School, there is a member of the faculty with responsibility for the first-cycle and second-cycle educational programmes, named the Director of First and Second Cycle Education (GA), and member of the faculty with responsibility for third-cycle studies, named the Director of Third Cycle Education (FA). Each educational programme has a Programme Director (PA). Quality assurance work is included as a natural part of each position.

## The role of the Faculty Council in the quality assurance work

The Faculty Council has an advisory role vis-à-vis the President, and it has overall responsibility for the quality assurance of KTH's education, research and joint collaborations. This means that the Faculty Council is responsible for developing KTH's quality system and for leading KTH's strategic quality work at an overall level. The Council also has the overall responsibility for the collegial foundation of quality assurance.

Through the Dean and the Vice Dean, the Faculty Council has been involved in the continual monitoring and has followed up the Schools' quality work within education, including skills provision and collaboration. The Faculty Council has also, through the Dean, been involved in the planning of a regular review of research referred to as Research Assessment Exercise, RAE.

## Student influence and the Student Union's role in quality management

The Student Union, THS, continues to have the status of the student union for the whole of KTH. KTH has long worked alongside THS, in part to ensure that KTH's students are represented in all decision-making bodies and in virtually all preparatory groups and working groups. THS has also worked to ensure the doctoral students' representation in the continuous follow-up and in the quality dialogue. KTH's

experience is that THS selects students who represent different parts of KTH and also reflect social, ethnic and cultural diversity as far as possible.

During 2020, THS has focused in particular on issues arising in connection with COVID-19. THS actively participated in the planning and implementation of distance teaching and examination during the spring as well as the campus-based education with significant parts of digital elements that were used during the autumn. Particular focus throughout has been the students' study-social situation, which has been strongly affected by the changes. In relation to the reception of new students, THS and KTH have worked closely together to offer a good introduction to the studies at KTH and lay the foundation for the social life of the new students during their time at KTH.

## Development of KTH's quality assurance system

KTH's quality assurance system consists, at an overall level, of continual, annual follow-ups and regular audits every six years. The continual follow-up, which includes a quality dialogue with all five of KTH's Schools, has been carried out annually since 2017.

The development of continuous follow-up during the year has meant that experts from KTH's Equality Office, Sustainability Office, business collaboration and learning in STEM, Science, Technology, Engineering and Mathematics, as well as operational support for educational development have been given a clearer role in the follow-up work. There has also been development regarding feedback to schools and education managers in the form of presentations at network meetings and written reports where the Dean and Vice Dean's reflections have been included. Feedback has been provided partly to the schools and partly to the President's annual school dialogue and for work on strategic business planning.

The regular review of training is under further planning. The first review will cover KTH's Degree of Bachelor of Science in Engineering programme and will be carried out as a pilot where methods of regular review are tested. During 2020, the Vice Dean has held workshops and meetings with first cycle and programme managers at the courses to coordinate and anchor the review that will take place in 2021.

In order to facilitate the work with monitoring and reviewing the quality of education and research, the schools have during the year been tasked with appointing a function within each school that will coordinate the quality management and be the contact person internally and at central level at KTH on these issues. Three schools (ABE, CBH and EECS) have appointed such a function, while two schools (ITM and SCI) have chosen to include this responsibility in existing functions within the management of the schools.

## Quality assurance work within education

During the year, the rapid transition and adaptation to digital teaching has dominated quality management in education. A follow-up to this transition is being prepared in the autumn to be included in the continuous follow-up in 2021.

In third cycle education, a new template and new procedures for quality assurance of general study plans have been developed and adopted.

In education at undergraduate and advanced level, several steering documents have been reviewed and compiled into a joint document for all levels of education on, among others, syllabuses, grading systems and examinations.

### The Swedish Higher Education Authority's audits and evaluations

In spring, the Swedish Higher Education Authority (UKÄ) reviewed KTH's quality assurance work. KTH's quality assurance work has received the overall grade Approved with reservations. The outcome means that KTH was approved in five out of six assessment areas where the area of gender equality was not deemed to meet the requirements. The assessment team considered that KTH had failed to show, clearly and satisfactorily, how it takes gender equality into account in the content, design and implementation of the courses. This means that UKÄ will review how KTH has addressed the identified deficiencies in March 2022. See also the section *Gender Equality, Diversity and Equal Opportunities*.

In 2020, the results of the educational evaluations that UKÄ launched last year were adopted by UKÄ. KTH's subject teacher education in mathematics was deemed to be of high quality. Third cycle courses in art, technology and design, which have undergone a reassessment after deficiencies were discovered in UKÄ's assessment process last year, were deemed to have questionable quality also in the review. UKÄ will follow up on how KTH has addressed the shortcomings in the education in June 2021.

During the year, KTH is included in UKÄ's evaluation of third cycle education in the subjects of analytical chemistry, physical chemistry and organic chemistry. During the autumn, KTH has carried out self-assessments and compiled the documentation that UKÄ requires for the evaluation.

During the autumn, employees participated in UKÄ's workshop on broadened recruitment in preparation for UKÄ's thematic evaluation of how universities and colleges work with broadened recruitment, starting in early 2021.

### Higher education development

The higher education pedagogical operational support is intended to support and strategically promote the development of education at KTH. This is done by conducting eligibility courses for higher education pedagogical courses and arranging workshops, networking meetings, big

meetings and working groups for priority development areas, PriU groups, and every two years conducting a pedagogical scientific conference. The operational support has also contributed to the analysis of the schools' documentation in the continuous follow-up regarding the educational development needs of the courses and the teachers.

In 2020, eleven higher education pedagogical courses were completed, with 19 course sessions and 477 registered participants in total, of which 195 were women and 282 men. The newly developed higher education pedagogical continuation course Digital Learning in Higher Education was conducted during the autumn. All courses have been conducted completely digitally since March 2020, except for one course which offered, at one point, a course with boarding and hybrid teaching. The course Enhancing Higher Education, which is given annually to staff at international partner universities, was cancelled due to COVID-19 and is scheduled to be offered digitally in 2021.

In relation to network meetings, in addition to the already established meetings with programme managers and directors of studies, respectively, the following took place in 2020:

- Support of third cycle education has been boosted and a network with a special focus at this level has been designed with meetings twice per term.
- In connection with the COVID-19 outbreak, the network meetings were expanded and were offered weekly during the most intense periods. The meetings were open to everyone at KTH, which led to a record of about 350 participants at the meeting concerning repeat exams in April.
- A particularly large meeting was held after Midsummer with a focus on the autumn term's courses and programmes.

KTH has eight active PriU groups, one of which is brand new and focuses on examination. Another resurrected group is about working life and collaboration. Teachers, staff, student representatives, educational developers and education researchers from all over KTH participate and the groups are open to anyone who wants to participate.

Two PriU groups have been developed to work in particular with broadened recruitment and participation. During 2020, there have been developments for all PriU groups, with each group having its own date in 2021 when they will report to the Board of Education on the work carried out.

The scientific conference Scholarship of Teaching and Learning, KTH SoTL, will be conducted digitally in 2021. The work during the year has involved creating themes, marketing and working to develop contributions to conferences. A new element is that participants should be able to publish in an educational journal.

## Survey follow-ups

KTH conducts regular surveys of students, alumni and doctoral students, in the form of initial surveys, interim surveys, career surveys and doctoral student follow-ups. During 2020, KTH conducted the start-up survey and doctoral student follow-up. The questionnaires are part of KTH's systematic quality assurance work, and the fact that they are conducted regularly provides the opportunity to monitor developments over time. The results can be analysed for the entire population as well as for individual programmes, broken down by gender, Swedish citizens/non-Swedish citizens, and parents' educational background. The results are presented in tables (overall, by programme type, programme and school) as well as in an overall report. The results can therefore be used in development work as well as quality monitoring at different levels of the business. These questionnaires are followed up in collaboration with Statistics Sweden (SCB).

Work has continued in 2020 on improving the dissemination and the use of the results of the surveys. During the year, KTH's Vice President for education was appointed academic principal for surveys. This clarifies the purpose of the surveys as quality development as well as strategic. Working groups with representatives from KTH schools and the joint operational support have been set up for the start-up survey as well as for the career survey. The purpose of the working groups is also to ensure that the questionnaire is more firmly anchored and adapted to the needs of the recipients of the results.

### Doctoral student survey

During 2020, KTH conducted the doctoral student survey that follows up doctoral students admitted 2012-2016. The purpose of the follow-up was to follow up KTH's third cycle education regarding how well doctoral students have established themselves in the labour market, primary tasks, employers and how they assess their third cycle education when they look back on their experiences after the education. Parts of the target group are still active doctoral students and give their perspective on the education in relation to learning. Of those who are no longer active doctoral students, 86 per cent are employed, five per cent say they are unemployed, while the rest are evenly distributed between parental leave, entrepreneurs and further studies. In general, they found the research environment stimulating and supportive. They are also satisfied with the supervision they have received in terms of content and quality. They would still like to see more support in relation to a future career and conversations about goal fulfilment, however a positive development can be seen when compared to previous follow-ups. The respondents also felt prepared for working life and felt to a large extent that the education matched the competence requirements for their work.

The results also show that the former doctoral students

believe that the third cycle education has given them very good knowledge of theory and method, in-depth subject knowledge, critical thinking and the ability to conduct research independently. Doctoral student colleagues, networks and the quality of the education are highlighted as positive. They were more critical of the elements of entrepreneurship and leadership. They also perceive the connection to industry and business during their education was poor. Increased elements of gender equality, ethics and opportunities to learn Swedish are also in demand. The former doctoral students are satisfied with their third cycle education and their time at KTH, but there are also answers about disagreements, stress and ill health. These are important issues for KTH to continue to investigate. Men are still slightly more satisfied than women. A majority of respondents would do their third-cycle education at KTH again.

### Start-up survey

Due to COVID-19, the start-up survey was conducted as a completely digital survey. It was sent out to the students admitted to the five- and three-year programmes in the autumn term 2020. The students come mainly from the Stockholm region. Women make up 32 percent of the population. Of the total population, 26 percent studied at another academic institution before starting their studies at KTH. Just over one in four people admitted to one of the five-year programmes does not have study funding to cover the entire programme. This may have a negative impact on the individual's ability to complete their studies and thus also on the throughput rate.

The students applied to KTH mainly because of the reputation of the programme, interest in science and technology and good career opportunities and the university's high ranking. Also important are proximity to home and a good choice of different types of work after graduation.

The survey responses show that 46 percent of students hesitated at some point when choosing an education in engineering. More than every other woman was unsure. The main reasons for hesitation for the population as a whole were uncertainty about whether professional life afterwards would be suitable, uncertainty over their interest in technology, uncertainty about coping with the pace of study, difficult mathematics and whether the education would be interesting enough.

The students in the five-year programmes consider that their knowledge in mathematics, physics and chemistry is higher than the others. Based on the results of this study, it appears that the students in the architecture and civil engineering programmes are better placed to complete their education than those studying a three-year programme.

## Quality assurance work within research

A regular review of KTH's research, the Research Assessment Exercise (RAE), has been initiated during the year. The work is led by the Vice-President for Research and is supported by a steering group and a project group. During the spring, self-assessment of KTH's research was conducted. However, the planned site visit by international experts in August was postponed for one year due to COVID-19 and instead internal dialogues and seminars were conducted. During the autumn, the self-assessment work has been followed up and the panels responsible for the self-assessments have received feedback to further improve the quality of self-assessments ahead of a restart of RAE 2021.

## Quality work in skills provision

During 2020, the Dean of Faculty has appointed a working group for faculty development which has worked on the development of the schools' plans for faculty development and skills provision. The aim is to carry out strategic planning of KTH's skills provision in respect of teachers and academic researchers, as well as to deal with a number of aspects such as recruitment, promotion, development and gender equality.

In the faculty development and skills supply plan 2021, even more focus will be placed on discussion about the work on renewal in connection with new recruits. Quantitative personnel data will continue to be drawn up centrally in order for the documentation to be consistent for all schools and comparable over time at an aggregated level. Furthermore, there is still a need for efforts to achieve greater gender equality during recruitment and in order to retain female teachers.

During the quality dialogues, needs have been identified within a number of aspects of skills provision. For example, the central programmes for academic career support and skills development within leadership and gender equality are extremely important for KTH's skills provision.

In 2020, the President has established Arena for Leadership and Teaching, ALP, which is a steering group responsible for KTH's strategic goals and initiatives with a special focus on leadership and teaching. There is also a strategic council for ALP, chaired by the Vice President for Education. ALP has been tasked with reviewing the cohesive organisation and KTH's range of competence development in leadership and teaching and ensuring continuity of operations.

Within educational skills development, the range of higher education teaching training courses has continued to develop. First-cycle courses are made available in ways that are adapted to the teachers' working conditions. The range of higher education teaching training courses needs to continue being developed, with a focus on gender equality, equal opportunities and accessibility. The courses will be offered to all teaching staff, regardless of their position.

## Quality assurance work within collaborations

Working life perspectives and collaboration have been included as a focus area in the continuous follow-up of education in 2020. During the year, a working group on priority development areas, the PriU group, was also reinstated in the field of Working Life and Collaboration. The PriU Group will continue to work with, among others, development points from the continuous follow-up and feedback from UKÄ's review of KTH's quality assurance work in 2019 and 2020.

KTH sees collaboration as an integral part of education and research. The 13 established strategic partnerships constitute an important part of KTH's systematic quality work within collaborations. KTH collaborates with strategic partners to improve relevance and quality in education and research. The partnerships contribute to increased contact between education, research and society (see more under the section *Collaboration*). The partnerships have been followed up in the annual management dialogues. Regular meetings have been conducted with the partner managers and partner leaders within KTH who are involved in the quality development partnerships. During 2020, platform managers for KTH's research platforms have also participated in these meetings in order to strengthen the links between the partnerships and the platforms.

Within the collaborations and the strategic partnerships, personal mobility is a prioritised area. In order to maintain a dialogue with adjunct professors and affiliated faculty, the Forum for Adjunct Faculty is held on a regular basis. This forum is used as part of KTH's quality development work within collaborations.

In the field of collaborations, KTH has continued the work of developing and strengthening Societal Impact, i.e. sectoral and social impact, during 2020. The role of impact manager at KTH's Schools is at the heart of this work. Active work on Sector and Societal Impact is still included as part of the schools' assignments. The work has been supported by a project group with representatives from joint operational support, with a unifying coordinator. Seven joint meetings with impact managers have been held during the year. These meetings involve an exchange of experiences and learning for the further development of KTH's sector and societal impact. Prioritised activities linked to previously developed school-specific strategies have been implemented at Schools. A focus area for the impact work 2020 has been to link it to planning, implementation and follow-up of impact in the internal Research Assessment Exercise, RAE.

In 2020, an action plan for collaboration until 2022 has been developed with the aim of increasing and developing the quality of KTH's collaboration with the surrounding society. The action plan has five main areas of action:

1. Further develop work with strategic partnerships and large-scale collaboration platforms.
2. Increase personal mobility to and from KTH.
3. Develop incentives for collaboration.
4. Develop and coordinate support for collaboration.
5. Ensure that collaboration is included in the planning, development and evaluation of research and education.

KTH has continued to be the convener and coordinator for the national management network regarding strategic collaboration, KLOSSnet (Knowledge exchange and learning about strategic collaboration). KLOSSnet provides opportunities for capacity building and quality work in the collaboration area. In 2020, two KLOSSnet meetings have been held. Due to COVID-19, these have been implemented digitally.

During the year, KTH has been active in the portfolio of national operational development projects within the field of collaborations that are supported by Vinnova, known as the K3 projects. Several projects in which KTH participates have a direct bearing on quality development, such as the project Collaboratively integrated quality system for increased utilisation (SKÖN), which is led by Linköping University. KTH is responsible for the project "Methods for relevance assessment of education", MerUt, which aims to develop the collaboration perspective in the quality systems with a focus on education. Another project that is related to KTH's quality work is "Merit value of collaborative skills" (MerSam).

Via its alumni, KTH receives regular support and feedback to its operations. They also contribute with a national network as well as a growing international network. In order to strengthen and develop the relationship with KTH's alumni, efforts have been initiated which aim to increase understanding of how alumni want to become involved and contribute to KTH's educational programmes and research.

## Rankings

Ranking measures excellence in research, education and joint collaborations, and can be seen as a measurement of the value of a university's international competitiveness. The importance of visibility and rankings continues to increase. This applies to areas such as student recruitment, recruitment of international academic researchers, international collaborations, grant opportunities and influence on various policies, investments in excellence and expressions of national prestige. Several advocates of rankings, including the European Commission, see rankings as an incentive to increase the quality of research and higher education.

KTH generally performed well in 2020. In the QS World University Rankings, KTH is in the same position as last

year, i.e. 98. KTH's international reputation, both among employers and academics, remains strong in the QS poll. In THE World University Rankings, KTH is, like previously, in the 201–250 interval. KTH continues to lose in terms of citation values and reputation. At the same time, other universities have

advanced their positions and the level of international competition is expected to increase.

KTH was ranked as number 77 in the world in THE Impact Rankings, which address the UN's 17 global sustainability goals. This is a drop by 70 rank positions. The drop can mainly be attributed to methodological changes and that significantly more universities participated this time compared to 2019. KTH performed particularly well in Objective 12: Sustainable consumption and production and was ranked 13th. The ranking was based on extensive documentation of texts related to the sustainability goals, above all taken from KTH's website, as well as bibliometrics and other quantitative data. See also section *Environment and Sustainable Development*.

KTH has continued to perform comparatively well in subject area and subject rankings. In THE's subject area ranking for engineering and technology, KTH was ranked as the 69th best university in the world. However, this is a drop by nine rank positions since 2019. The decline can be attributed primarily to impaired rankings in terms of reputation and citations. In QS's corresponding ranking, the university was ranked the 30th best, which is an improvement of six places. In QS's subject rankings, KTH is represented with 15 subjects, nine of which are among the top 50. Electrical engineering was the highest ranked, in 17th place, followed by architecture and Petroleum Engineering in 20th place.

KTH's foremost strength in terms of rankings is the very high production of publications per teacher and researcher. In addition, there is a very high proportion of co-publishing with researchers from international higher education institutions and with industry. KTH is successful in obtaining research funding from external funders, is performing relatively well in reputation measurements and is still performing better than other Nordic universities of technology in QS. KTH also has a high proportion of international researchers, teachers and students, which is important in a rankings context.

KTH's reputation is stronger than the university's performance in the bibliometric indicators. One weakness is the values in indicators that measure the impact and excellence of the research. This is shown by the relatively low field standard citation rate, which in 2020 was 1.13 (1.10), which means that KTH's research is cited 13 percent above the world average. KTH ranks 571st according to THE World University Rankings and also shows a downward trend. KTH has relatively few highly cited researchers and only just over half of KTH's departments are cited above the world average.

# The environment and sustainable development

KTH's ambition is to be a leading technical university in the environment and sustainable development and have an identity and a brand associated with these issues. As a technical university, KTH has a key role in influencing the development of society in a positive direction in order to contribute to the UN's global goals. KTH's educational programmes provide the next generation of leaders with the knowledge and skills needed to address current and future challenges. To contribute to a sustainable society, KTH's research must be disseminated and turned into practice. Accordingly, KTH attaches great importance to collaboration with various societal bodies and to highlighting new research findings.

KTH's strategic work on the environment and sustainable development is based on KTH's sustainable development policy, the overall sustainability goals for 2016–2020 and the climate goals for the period 2020–2045. During 2020, KTH has worked to establish new sustainability goals and measures for the period 2021–2025. During the year, work also continued to integrate environmental and sustainability work within departments into the joint operational support and at the school's departments.

Between 2011 and 2020, KTH's Vice President was in charge of sustainable development. KTH has an academic reference group that will promote the integration of sustainability. The reference group consists of representatives from the schools, the Faculty Council, KTH's Student Union and the KTH Sustainability Office.

KTH has a Sustainability Manager who is responsible for the environmental and sustainability work carried out within the framework of KTH Sustainability Office. KTH Sustainability Office is tasked with supporting management, the schools and operational support at a university-wide level in the work to integrate sustainable development into the business. KTH Sustainability Office supports the work to achieve KTH's sustainability goals, participates in national and international meetings and networks, and is responsible for maintaining and developing KTH's certified environmental management system.

## Environmental management system

Since August 2015, KTH's environmental management system has been certified according to the international environmental management standard ISO 14001 and complies with the requirements in the Ordinance (2009:907) on Environmental Management in Government Agencies.

KTH's work to promote sustainable development has been linked to the environmental management system by planning, implementing and following up the work on integrating sustainable development in education, research and collaboration within the framework of the systematic

working methods of the environmental management system. This also applies to sustainability work regarding the environmental impact of own operations, such as business travel, energy consumption, procurement, chemicals, waste management and more.

KTH has, within the framework of the environmental management system, established a sustainability policy, sustainability goals, climate goals and action plans to achieve the goals. KTH conducts annual internal and external environmental audits. At KTH, there is twice a year a follow-up of environmental and sustainability work at different levels within the organization.

KTH follows up on the results of the Swedish Environmental Protection Agency's report to the government, which includes rankings. KTH uses rankings to compare its own environmental and sustainability work with other higher education institutions within Sweden. Ranking plays an important role in internal improvement work.

KTH's work with Agenda 2030 and the global goals is linked to the education, research and collaboration that KTH conducts, as well as to the work with the environmental and sustainability impact of KTH's own operations. The systematic working methods of the environmental management system are used as a basis for implementing and following up the work on the global goals.

KTH participated for the second consecutive year in the Times Higher Education Impact Rankings, which is a world ranking of the university's sustainability work in relation to the UN's 17 global goals. KTH ranked 77th out of 766 universities, see further section *Quality Management*. KTH has produced an annual report for 2019 that shows good examples of how KTH contributes to all of the 17 global sustainable development goals.

KTH has both a commitment and the leadership required to develop and improve the current environmental and sustainability work. This offers the business new opportunities to meet the demands of the outside world for sustainability management based on Agenda 2030 and the global goals. In 2020, KTH has carried out a new environmental and sustainability survey, which describes, among other things, the link to the global goals. The survey is one of several documents to describe the significant environmental and sustainability impact of the operations. During 2020, KTH has worked to develop new sustainability goals and measures for the period 2021–2025, based on the global goals. The new sustainability and climate goals will identify the additional steps that KTH intends to take to promote sustainable development.

## Education

UKÄ's Thematic Evaluation 2017 states that "the Royal Institute of Technology has a well-developed process for the work on sustainable development in education". The systematic work described in the self-assessment that formed the basis of the evaluation has since been developed and deepened. One change is that action programmes describing objectives and activities for the integration of sustainable development are no longer established for each individual education programme, but have been replaced by an action programme at school-level.

The school-wide action programme summarizes the school-wide activities, such as the number of teachers who will take the higher education teaching course *Learning for Sustainable Development* or the number of courses at the school that will have learning goals on sustainable development. With regard to work at programme level, programme managers describe sustainability integration in the annual programme analyses. These are compiled by the schools' undergraduate and postgraduate education managers in a school report and form the basis of the dean and pro-dean's quality dialogues held with each school. In this way, the sustainability issue is now integrated into the quality system. In addition to the sustainability work within the education programmes being addressed within the framework of KTH's own quality work, these issues are followed up in the annual internal and external audit.

An important part of the work to follow up on the sustainability goal for education is to capture the students' view of their education and its sustainability content. Sustainability issues have already been integrated into the career survey, which is sent to former students to find out to what extent they are required to deal with sustainability issues in their job and to what extent their education has catered to this. Nowadays, the mid-year survey also includes sustainability issues and students who are in the middle of their education are allowed to indicate to what extent they believe that the programme meets KTH's sustainability goals for education. See also section *Quality Management*. Other surveys are also carried out by the schools themselves, for example at the School of Architecture and the Built Environment, where many departments follow up their sustainability goals through surveys completed by their doctoral students.

KTH has also developed information for students about the link between the UN's global sustainability goals and the various education programmes at undergraduate and advanced level. Each programme has also developed a description of areas of work with relevance to sustainable social development for students upon graduation. Foreign students applying for a scholarship from KTH to cover the tuition fees are now required to write a justification with a sustainability focus.

Funds from the grant for first and second cycle education have been set aside for a number of education-related projects, known as Environment and Sustainable Develop-

ment across Disciplines (MHU across Disciplines). In 2020, an additional training initiative was also announced with funding from both the grant for education at first and second cycle level and from the grant for third cycle research and education of a total of SEK 1 million for education projects in sustainable development. In third cycle education, there was a need for course development. Funding from the grant for third cycle research and education was allocated, among other things, to a school-wide education project at ITM: Designing and Testing a Collaborative PhD Course on Sustainable Development: "Sustainability Perspectives for Assessing and Designing Research, Projects and Policies".

In 2020, the overall sustainable development goal in education has been followed up and new targets have been proposed, including the climate targets adopted in 2019. The number of higher education teaching courses that include sustainability issues has increased since a couple of years ago. The previously established course *Learning for Sustainable Development* with 4.5 credits now has a continuation course: *Learning for challenge-driven education with global development goals*. Sustainable development is also addressed in a number of other higher education pedagogical courses, such as *Leading educational development* for education leaders and *Basic communication and teaching theory* for doctoral students.

The number of first-cycle and second-cycle study programmes with a focus on the environment and sustainable development is the same as in recent years, with two Master of Science in Engineering programmes, ten master's programmes and one doctoral programme. The number of courses marked as related to the fields of the environment or sustainability has increased from 738 to 786 between 2019 and 2020.

Various forms of environmental and sustainability training have been conducted in 2020, for example in connection with the introduction of new employees and KTH's managerial and leadership training. Staff training in sustainability has been carried out for employees working with service issues within joint operational support. In order to support the work to integrate sustainable development into the operation, workshops on the topic have been conducted at the schools, aimed at both teaching staff and various groups at joint operational support.

## Research

Via the building up of networks and particular support for preparing applications, the KTH Sustainability Office supports larger applications in the field of sustainability. Ten interdisciplinary and multidisciplinary initiatives within research, education and collaboration have been granted funds of up to SEK 100,000 each within the framework of the initiative Environment and Sustainable Development across Disciplines.



Some of these received an additional SEK 50,000 to cooperate with small and medium sized companies with regard to sustainability.

In 2020, 24 percent of the notifications of a vacancy for a faculty position were linked to sustainable development, which is a decrease of eleven percentage points compared to the previous year. Between 2018 and 2019, scientific publications in the field of sustainability decreased from 17.6 percent to 16.6 percent of KTH's publications (this indicator is measured with a one-year lag). By contrast, the number of authors published in the field increased from 358 to 371. The share of external funding from research funding bodies in sustainable development decreased from 13.8 to 13.1 per cent of the total amount of external research funding. The funding bodies were the Swedish Environmental Protection Agency, Mistra, Formas and the Swedish Energy Agency.

During the period 2019 to 2020, KTH has retained its ranking in both the Academic Ranking of World Universities (ARWU) (rank 151-200 in Environmental Sciences and Engineering) and the QS ranking (101-150 in the field of Environmental Sciences), and been ranked number 282 in the subject Environment/Ecology in National Taiwan University Ranking. See also section *Quality Management*.

## Collaboration

In order to develop joint collaborations with existing and new partners, stakeholders and students who contribute to sustainable development, KTH has arranged seminars and other activities. In 2020, 155 externally and internally targeted conferences, seminars and workshops focusing on sustainable development have been arranged at KTH.

Information regarding sustainable development at KTH is available on the external website and KTH's intranet. Current news and information is conveyed via internal newsletters. An external newsletter regarding sustainable development at KTH is sent to external subscribers. The external newsletter is aimed at the business community, decision makers, governmental authorities and organisations, and has been published six times during the year. The Vice President for Sustainable Development has continued blogging about sustainable development every sixth week. In social media, with prospective students as the target group, and in KTH library channels, sustainable development at KTH is a recurring feature. Information concerning calls for research proposals within the fields of the environment and sustainable development has also been sent to doctoral students and academic researchers around twice a month.

KTH participates in a large number of sustainable development networks, including the Sustainable Development Solutions Network Northern, the Network for Sustainable Business and the Fossil-Free Sweden network. In the Nordic university administrator collaboration, NUAS,

KTH has taken over the chairmanship of the group working on sustainable development. In the International Sustainable Campus Network, KTH has participated in the work on how the university's sustainability work can be measured against the global goals by participating in the THE impact ranking. During the year, KTH took over the role of chairman of the interpretation group for the environmental management standard ISO 14001:2015 at the Swedish Institute for Standards, SIS.

KTH's researchers are involved in several investigations and delegations that support the government's work. These include, among others, the Swedish Government's Innovation Council, the Climate Policy Council, the Delegation for a Circular Economy and the Strategic Collaboration Programme for Health and Life Sciences.

KTH has continued to participate in the UN's 10-year framework programme for sustainable consumption and production with a focus on procurements. Three cooperation agreements focusing on the environment and sustainable development have been further developed together with KTH's strategic partners Stockholm Environment Institute, IVL Swedish Environmental Research Institute and Akademiska Hus.

Other strategic partnerships have also been strengthened in terms of sustainable development within the framework of the Vinnova-funded project Agera, which aims to strengthen collaboration for Agenda 2030.

Within the framework of the Conference of European Schools for Advanced Engineering Education and Research (CESAER), KTH has highlighted the sustainability work and participated in a workshop where KTH presented its work on ranking.

In 2020, KTH was mentioned in roughly 3,800 national and international media items related to sustainable development – a significant decrease from around 4,600 in 2019. For 2020, 27 percent of KTH's total media exposure is linked to sustainable development, down from 36 percent in 2019. The decrease can be seen in both national and international media. KTH has issued 17 press releases related to sustainable development in Swedish, compared to 18 in 2019, as well as 16 press releases related to sustainable development in English, up from seven in 2019.

## Business travel and energy consumption

KTH's number of business trips by air has decreased by approximately 83 percent compared to the previous year, which represents a decrease of approximately 69 percent in carbon dioxide emissions compared to 2019. The main reason for the reduction in emissions is the transition to digital meeting and teaching forms due to COVID-19. In parallel, planned measures for 2020 have also been taken to ensure that KTH continues to reduce its carbon dioxide emissions from travel.

Within the Climate and Economic Research in Organisations project, Cero, KTH has developed a follow-up tool for managing goals and measures to reduce KTH's emissions. A research project, Flight, has been carried out during the year in collaboration between the schools and the operational support.

The project has analyzed the employees' travel patterns to learn about how behaviour can change.

A so-called climate pot for the schools was introduced in 2020. Funding from the grant for research and education at third cycle level was allocated through a redistribution and earmarking of school funding, based on the number of flights carried out at each school in the second half of 2019. A total of SEK 1.9 million was earmarked for this purpose. The funds could be used for measures that can reduce the schools' carbon dioxide emissions or otherwise contribute to KTH's sustainability goals. The implementation of the climate pot will be analysed in 2021.

In 2020, KTH has begun an analysis of the climate impact generated by its own operations. The analysis will form the basis of KTH's continued climate work in accordance with the new sustainability and climate goals for the period 2021-2025.

## Sustainability projects at KTH's campuses

During 2020, KTH has implemented projects according to the Campus Plan for 2018–2023, with the focus on a sustainable future. The Campus Plan describes the strategic planning of buildings and grounds for all of KTH's campuses and travel between campuses.

A waste project aimed at improving, increasing and achieving a uniform sorting at source system at KTH during 2019 continued in 2020. KTH Library has received uniform waste sorting furniture with several fractions. All schools and the communal source sorting possibilities have been inventoried and action reports have been produced. Uniform signage in all waste rooms at KTH Campus has been installed. Further increases in the possibility of sorting out food waste have continued throughout the year. Collaboration with the landlord Akademiska Hus has been initiated to enable further improvements in waste sorting and biodiversity at all KTH campuses where Akademiska Hus is the landlord.

KTH Sustainability Office, in collaboration with Akademiska Hus, has recovered 20 trees that were taken down at KTH Campus. The stocks have been turned into seating for visitors to KTH Campus and at the same time a home for insects and fungi. Branches and smaller parts have been taken care of to become insect nests.

At KTH Campus there are twelve cultivation boxes that are used both for recreational cultivation and for teaching students and staff. It has been agreed to increase the number of cultivation boxes to 16.

In 2020, KTH Campus had four beehives. The bees have produced 90 kg of honey during the year. The honey is used in restaurants and cafés at KTH Campus and is available to buy at KTH Entré.

The annual sustainability and cycling day was co-organized with Akademiska Hus, Stockholm Vatten och Avfall, KTH Students for Sustainability and KTH Innovation in connection with the arrival days of international students. During the day, students and employees were able to leave items for recycling in Stockholm Vatten och Avfall's Pop-up Recycling Container and learn bike service online.

Participants could also participate in various webinars about sustainability at KTH, find out how they can get involved in student projects and organizations, and discuss climate challenges in Climate Collage workshops.

In 2020, KTH initiated a reuse project in collaboration with Akademiska Hus by renovating bicycles that have been taken care of on campus areas. These bikes will be provided to employees in the various campus areas in 2021. Within KTH's architecture program, the bikes have been used by 23 students to represent and propose solutions to promote sustainable cycling within and between different campuses as well as cycling within the city.

In 2020, the School of Electrical Engineering and Computer Science adopted a decision about sustainable catering. The decision means, among other things, that the meal options will be labelled with a recommendation on which option on the menu is expected to have the lowest climate impact and that disposable plastic items must be avoided.

# Gender equality, diversity and equal opportunities

The work on gender equality, diversity and equal opportunities (JML) at KTH relates to safeguarding democracy, people's equal value and human rights and freedoms. In addition, the JML work permeates the organisation such that it affects quality, skills provision, competitiveness and finances. In particular, JML relates to creating and maintaining a good and safe working and study environment for both employees and students.

KTH's Development Plan for 2018–2023 determines that gender equality and the rejection of all forms of discrimination are both a quality-assurance issue and a self-evident component of the university's core values. In-depth work is required in terms of creating awareness and developing skills with regard to equal opportunities and core values, in order for us to achieve our goal of an open and welcoming university. A more equal KTH entails:

- to have a more even distribution of women and men within the organisation and in decision-making bodies
- to have gender-aware leadership
- to have integrated the gender perspective into all courses, study programmes and research
- to work towards also achieving equal opportunities outside KTH
- to divide resources from an equal opportunities perspective and with equal conditions for staff across different areas of KTH

The KTH Operational Plan for 2020 describes how the University will work with equal opportunities in areas such as competence supply, courses and study programmes, research and collaboration in the current year. The plan states that:

- Knowledge and awareness regarding gender and equal opportunities must be integrated into all courses and study programmes so that after graduating, students are able to contribute to a more equal society.
- Attention should be paid to increasing the proportion of women among teachers and researchers.
- General efforts are needed to increase the recruitment of underrepresented groups to KTH's education at all levels.
- The gender perspective must also be integrated into research to a greater extent. Several funders include gender equality aspects when evaluating research applications. The question of how to address gender equality in research projects must form part of the support for research applications.
- KTH must also work outwardly for greater gender equality in academia and society at large, together with our strategic partners and international contacts.

## Gender mainstreaming of KTH – JIKTH

KTH's work on gender mainstreaming is structured according to Plan for Gender Mainstreaming of KTH, JIKTH. Four priority goals for gender equality work at KTH have been formulated based on new and inequality surveys carried out previously at KTH as well as research in this area. These are: collective organisation, knowledge and awareness, equal opportunities and inclusive cultures. A new gender mainstreaming plan, Plan for continued work for a gender equal KTH in 2021-2022, is being developed with the same priority areas.

A selection of the activities in the Gender Mainstreaming Plan that have been implemented or initiated in 2020 are summarised below.

### Collective organisation

A collective organisation refers to the development of a structure for systematic JML work at KTH, where discrimination legislation, working environment legislation, gender mainstreaming and values work are linked together. KTH Equality Office's task is to coordinate and support KTH's overall equality, diversity and equal treatment (JML) work. A clear structure for management and organisation of JML work throughout KTH has been developed through a JML manager, JMLA, at each school, the joint operating support and KTH's

Student Union, THS. JMLA is responsible for coordinating and running the local JML work with a focus on both the work environment and the study environment. Each JMLA organises a local group in the manner that best suits their own organisation. The JMLA group is a strategic group for JML that meets regularly for coordination, topping up knowledge and the exchange of experiences and it is led by the Vice President for Gender equality and values. KTH continuously reviews its existing processes in order to ensure that these contribute to gender equality, diversity and equal opportunities.

KTH conducts research-based proactive work at both a strategic and a practical level, with the aim of increasing gender equality, diversity and equal opportunities from an intersectional perspective throughout the university's organisation. This is based on both legal requirements as well as internal governing documents and guidelines.

In cooperation with other actors within the faculty and operational support, the process of change is being systematised, streamlined and expanded. The work is being conducted in relation to both employees and students, and focuses on both structural and cultural aspects of inequality.

Examples of processes in which JML perspectives have been integrated or developed in 2020 include:

#### ***Integration of JML into the SDGs***

In connection with the revision of KTH's sustainability targets in 2020, JML has been written in a clearer way. Gender equality is the fifth of the UN's global sustainability goals and reducing inequality is the tenth goal. The plan makes it clear that gender equality, diversity and equal opportunities are integrated into sustainability work at KTH.

#### ***Gender and change management, GOFI***

"Gender and Change Management" is a development programme that was conducted during 2017–2018, and which involved 18 women in leadership positions in both administration and faculties. The purpose of the programme is to develop women as change managers and thus increase the influence of women in the design of the long-term equal opportunities work at KTH. In 2020, seminars and meetings were held on several occasions. At meetings, experiences of change-leading initiatives were exchanged, and the participants discussed KTH's development in the field of JML both generally and at a local level, in collaboration with the project managers.

#### **Knowledge and awareness**

Knowledge and awareness require efforts to increase knowledge about gender and gender equality throughout the organisation. Research-based knowledge about gender (i.e. the meanings of sex) forms the basis for problem description and analysis, and knowledge of how change can be driven in an organisation is important in respect of the gender equality work in practice. Knowledge-raising efforts are conducted e.g. within leadership development, higher education teaching, staff training of various kinds and within education for students.

Some examples of measures in 2020 are:

#### ***Gender training for JML groups***

In 2020, a gender training was carried out for four of the local JML groups, including KTH schools' JMLA and people from the schools' operational support appointed to support JMLA, so-called JML partners. The JML groups that participated in the gender studies are from ITM, ABE, EECS and SCI. The aim of the programme was to increase knowledge about gender and gender equality, create exchanges of experience between schools and offer support in developing local action plans. The training consisted of three occasions, including one full day in May and two half-days in October.

#### ***Integration of JML into education – preparatory workshops***

For several years, several initiatives to integrate awareness of JML into education have been implemented. These

initiatives have been voluntary and largely based on the needs and wishes of programme managers and teachers. Pilot projects have been carried out in a number of programmes, which have been developed in terms of both content and form over the years. There has been a wide range of initiatives, from single lectures to entire gender courses. During the Swedish Higher Education Authority's audit of KTH, the assessment team found that it was not clear in the self-assessment how the higher education institution considers and integrates gender equality in the content, design and implementation of the courses and programmes. Prior to the planned implementation of the mandatory integration of JML into education, JMLIU, a plan was required for the period 2020–2022. A working group was set up in spring 2020, which could assist KTH equality office in developing a plan for how a broader integration of JML could be designed. In autumn 2020, six workshops were held with all undergraduate, postgraduate and programme managers. The aim was to present and get feedback on the integration plan developed. The results of these workshops were analysed towards the end of 2020 and will form the basis for the work that will take place in 2021–2022.

#### ***Higher education teaching***

The course *Gender Research and Gender Equality in Technical Higher Education* provides support to teachers. The course's examination consists of work with one's own courses or programmes from a gender equality perspective and a gender perspective. Work is also underway to increasingly integrate gender and gender equality into more higher education teaching courses, such as supervisor training. A working group on priority development areas, PriU group, for JML has been established.

#### ***Necessären***

Necessären is a web-based resource developed in 2020. It contains teaching tools, materials and tutorials for the integration of JML. In the coming years, a teaching developer will continuously update Necessären and act as support with guidance on how Necessären can be used.

#### ***Working and reference group JMLIU***

A working and reference group has been created for the integration of JML into education. Several workshops have been held.

#### ***Report on gender mainstreaming***

A report summarising pilot projects and other efforts to date on gender mainstreaming in education and training has been under way in 2020 and will continue into 2021.

#### ***Call for project funding***

A call for project funding for the integration of JML and sustainable development in education has been completed in

collaboration with KTH Sustainability Office in spring 2020. Assessment has been carried out by a working group that includes the Vice President for Gender equality and values and the Vice President for Sustainability. The projects form an important part of the development work for the integration of JML into education. The projects will be followed up in 2021.

#### **Network of gender researchers**

A scientific group of researchers with gender competence at KTH has been created. The aim is to create a network for the exchange of experience and for the network to contribute material of various kinds for teaching in connection with the integration of JML into education.

#### **Equal opportunities**

This includes various initiatives intended to create equal opportunities in terms of salary, power and career. This includes continued work with faculty development from a JML perspective.

#### **Training of recruitment and promotion committees**

In collaboration with the Dean of Faculty, the Vice President for Gender equality and values and an expert representing KTH Equality Office have participated in training courses for chairmen and members of committees for recruitment and promotion of teachers in 2020. Special training for chairmen has been completed on several occasions.

#### **Joint seminars with JMLA and FFA**

KTH Equality Office cooperates with the Dean of Faculty in the continued work with the FFA Group (in charge of future faculty). This strategic group has integrated gender equality early on in its work with faculty renewal. The members of the group comprise Deputy Heads of Schools or Heads of Schools from all the Schools, and are headed by the Dean. KTH Equality Office is represented by an expert who is responsible for parts of the career support for teachers.

In order to generate collaboration in respect of the JML work, an internat for the two strategic groups JMLA and FFA has been arranged since 2018. Due to the circumstances surrounding COVID-19, the internat was replaced with digital seminars. In the spring of 2020, the theme was academic citizenship, and in autumn 2020 the theme was translation of values in academic activities. The form was interactive with knowledge replenishment and dialogue.

#### **The PIL-programme**

The *Partners in Learning (PIL)* programme is a career support programme for KTH's assistant professors. KTH Equality Office, through the Vice President for Gender equality and values together with the Dean of Faculty, is responsible for ensuring that the programme is given continuously, includ-

ing in 2020. The programme is led by two expert researchers and always includes modules with JML elements.

#### **Continuous follow up and quality dialogues**

Work on active anti-discrimination measures and JML integration of education is integrated into the quality system through programme analysis templates, school report templates, education and skills development for programme managers, undergraduate and postgraduate education managers. The work includes surveying and analysing problems, identifying active measures and implementing and monitoring them via, among others, feedback to quality coordinators, the schools and the Vice Dean of the KTH Equality Office for the quality dialogue.

The schools' competence supply plans are part of the quality system, and the work in 2020 with the development of plan templates and forward-looking competence supply strategies for the operations included a gender equality and diversity perspective based on KTH's JML processes.

#### **Trade union collaboration**

During 2020, KTH Equality Office and the central collaboration group have developed new forms of union collaboration on JML issues at KTH with the aim of creating a more constructive and efficient process.

Based on the new regulations, good union collaboration between employers and trade union representatives regarding several priority issues within KTH's JML work is ensured. KTH also has an active collaboration and collaboration process with the Student Union regarding JML issues.

#### **Work on active measures under the Discrimination Act**

During 2020, the work to coordinate, support and clarify the work with active measures against discrimination has continued, both for KTH as an employer and as an education officer. The new structure for JML within KTH facilitates review and follow-up in all areas. The work on active measures is summarized and documented in two separate action plans that are further developed annually in a dialogue with the operations. All grounds of discrimination are taken into account and correlated with each other and this work is continuously developed.

In 2020, all JML groups, all trade union representatives and different specific target groups such as new employees, researchers and staff in operational support at KTH schools have been trained in the Discrimination Act and work on active measures, as well as in gender mainstreaming. Training on racism and anti-racism has been coordinated for THS sections as an active measure against discrimination. A knowledge-enhancing effort for employees on mental illness and mental disabilities has begun in 2020 and will continue next year.

**Salary mapping**

Since 2018, KTH has a new process for the annual salary survey, which is completed before the salary review to be a contributing basis for salary setting managers. KTH monitors the existence of any unreasonable salaries and considers unequal salary provisions in budget and salary processes. The spread of salary mapping results can be developed systematically to benefit all employees. The salary survey action plan, with proposed measures to promote fair salaries, is followed up annually at the same time as other active measures.

KTH takes gender equality aspects into account in its own calls for strategic funds, as well as in nomination processes relating to major research applications. Gender equality in this aspect is monitored annually in the quality dialogues. An assignment to the heads of schools to map how funding in research and education at third cycle level is distributed among the sexes has been developed in 2020 and is included in KTH's operational plan for 2021.

**Inclusive cultures**

Inclusive cultures are based on awareness of values, code of conduct and how an inclusive culture can be created. This also means awareness of the relationship between sustainable development and equal opportunities issues: a clear zero tolerance of harassment and discrimination and transparency and clarity in communication on equal opportunities work at KTH.

Examples of initiatives in 2020:

***Cooperation programme against sexual harassment and gender-based vulnerability***

KTH, alongside Karolinska Institutet and Malmö University, has initiated a research and collaboration programme intended to combat sexual harassment and gender-based vulnerability. The goal is to establish research-based knowledge about inclusive working and study environments as well as a sustainable organisation for the prevention of sexual harassment and gender-based vulnerability in the academic world. The programme will ultimately help to strengthen and intensify the work on the university's organisational culture, with the focus on quality, sustainable development, the working environment, leadership, gender equality and equal opportunities. The programme includes a national study regarding the prevalence of sexual harassment throughout the Swedish higher education sector, the development of new research-based knowledge about sexual harassment, as well as the development of common platforms for research collaborations and the process of change. KTH is represented both in the steering group and in the working group within the programme. During 2020, the work has focused on completing the survey for the national study which will be conducted by Statistics Sweden in spring

2021. A pilot study was carried out at the end of 2020. The programme has also conducted a number of digital open seminars during the autumn of 2020, including a research seminar where ongoing research projects were presented and discussed.

***Handling cases of sexual harassment against students and employees***

The annually revised processing order is followed when KTH becomes aware of harassment of employees or students. HR staff at GVS and at the schools have a central role in investigating and proposing measures, which requires that they receive continuous further training.

A review of the processing of sexual harassment and harassment cases in relation to employees and students was started in 2020.

***Reception of new students***

During 2020, KTH has continued its work on the systematic integration of JML in the reception activities through a collaboration between the Human Resources Department, the Education Support Division and THS. During 2020, all project managers, group managers, sponsors (including international sponsors) involved in reception of new students, about 700 students, have been trained in JML, sexual harassment management and racism/anti-racism.

# Staff

KTH is a university where people with a wide range of different backgrounds and experiences work together with the common purpose of managing, renewing and imparting knowledge for the society of today and tomorrow. KTH should be a workplace where the desire for personal development and personal responsibility is stimulated. The development plan for 2018-2023 provides that KTH shall be a leading international university of technology that creates knowledge and expertise for a sustainable future. KTH strives to achieve the goals in the development plan towards becoming pre-eminent, integrated, visible, open, increasingly digitalised, more sustainable, more international and more equal. A number of activities that have been conducted in 2020 in the field of human resources based on KTH's development plan are outlined below.

## Skills provision

The overall goal of KTH's skills provision is that KTH should always have access to the skills that the operation needs in order to achieve its goals. This requires that the work on skills provision should take place in a strategic and structured manner, and that KTH works actively on its employer brand in all communications, both internally and externally.

## Employer brand

In 2020, KTH conducted a current and external analysis as part of developing the work with the employer brand. The analysis forms the basis for a communication strategy in relation to the employer brand. The strategy will be implemented in the organisation and includes a developed and updated employer offer with associated messages aimed at both current and prospective employees. The strategy and its parts will contribute to achieving KTH's goals and visions by attracting, recruiting and developing the employees that the organisation needs.

## Skills and career development

In order for KTH to be a leading university in education, research and collaboration, KTH must be able to attract and retain researchers and teaching staff as well as administrative staff with solid knowledge and competence in their respective fields. However, knowledge and competence need to be continuously developed in a changing world. All employees have a responsibility to continuously develop their skills in their respective areas. KTH promotes lifelong learning through courses and competence development efforts. Sustainable development, digitalisation, internationalisation and gender equality goals are all integrated in methods and course content.

## Introduction

New employees are introduced at both strategic and operational level in order to promote affinity with KTH. A more

in-depth introduction for new employees was necessary to create context for employees as for many employees the work, due to COVID-19, was mainly conducted remotely in 2020.

The bilingual welcome day in Swedish and English brings together all new employees to provide a common university context. Good examples of research, education, operational support and collaboration that contribute to societal development and benefits are highlighted, and KTH's management describes values and visions. The welcome day was given twice in 2020.

All new employees have access to three introductory courses regarding the higher education sector and its governing principles, the environment and GDPR. The in-depth introduction to KTH and the higher education sector, for technical and administrative staff, aims to promote cohesive, professional and accessible operational support for an integrated KTH. The six-month programme is based on KTH's Development Plan for 2018–2023, is conducted once a year and includes seminars, exchanges of experiences and internal job shadowing. In 2020, the programme had 26 participants, including 21 women and five men.

## Staff training

2020 has been a year of transition that has led to the regular supply of skills development being postponed, cancelled or made digital. In order to offer hybrid teaching, premises have been equipped with technology and trainers have been offered both facilitation and technology support. Through a central initiative, digital training courses that were available online were made available on KTH's intranet. The transition has entailed competence development through a change in the way we work due to increased use of digital tools. Digital learning has been offered on an ongoing basis for various users.

A quality-conscious approach and legally certain operations are supported by basic and systematic staff training in HR, law, finance, security and government administration. Regulations, processes and practices are made visible in each area.

In order to promote bilingualism at KTH, English language courses have been conducted at Cambridge University with the support of Erasmus+. This year they were conducted digitally. In 2020, eleven employees participated, including eight women and three men.

During the year, KTH offered courses in Swedish as a foreign language for employees with a foreign background. The courses were offered on five different levels. As of autumn 2020, all courses have been redesigned to increase their relevance to KTH's and the participants' activities. In addition to the courses, individual teaching has been expanded. In total, 241 people participated. To provide further support, four teacher-led language cafés for foreign employees at various language levels were held at KTH

Campus and KTH Kista. During the autumn, the language cafés were held via Zoom at two different language levels and with twelve gatherings.

An internal training in competence-based recruitment with a focus on structured interview technique has been carried out to improve competence and quality of recruitment. The training was offered to both recruiting managers and recruitment committees as well as HR staff. In 2020, 136 people, including 78 women and 58 men, participated in the training. Competence-based recruitment is a methodology that promotes equal treatment and a non-discriminatory approach to the recruitment process. The pursuit of gender equality, diversity and equal opportunities is both a quality issue and an obvious part of KTH's core values.

Training has been offered in conversation methodology for cases of discrimination, harassment, sexual harassment and abusive discrimination. The need for action was identified in connection with KTH's study on the management of sexual harassment among students. In 2020, nine employees, including six women and three men, completed the training.

Competence-enhancing activities have been organised for researchers in the form of seminars, workshops, lectures and information meetings. They have included the Green Deal programme, career support from the Swedish Research Council in the form of international postdoctoral positions, ERC Advanced Grant, Formas open call 2020, Future Emerging Technologies and engaging stakeholders in European research projects. KTH Horizon Europe week was organised with interactive seminars and presentations on the upcoming framework programme for research and innovation within Horizon Europe. The seminars on Sustainability and Stakeholder Engagement and Ethics and Compliance have been offered specifically to leaders of research collaboration. In addition, a network of research infrastructure directors and a network of centre directors are run.

## Career support

Various forms of career support activities are offered to employees at KTH to develop expertise or a new role. In addition to the examples below, individual coaching in rhetoric for educators and lecturers has been provided during the year. "*Swedish and Swedish (work) culture*" is an eight-week establishment programme that is aimed at employees from abroad, presenting various career paths and requirements for a career in Sweden. The Swedish labour market, languages, traditions, laws and other governing principles in Swedish society are explained. For KTH in a global world, all programme participants also have a Swedish-speaking KTH employee as a study-buddy for networking and mutual intercultural awareness. In 2020, 24 women and eleven men participated.

Associate professors and professors have been given the

opportunity to apply for funding for a limited period, referred to as a sabbatical period, to spend time at another institution of higher education or external party outside the university in order to concentrate on education and research. The sabbatical period has been financed with central funds and funds from the School level. Due to COVID-19, the spring application period was cancelled. During autumn 2020, five men applied for and were granted international sabbatical periods. All staff at KTH are encouraged to carry out an international exchange or job shadowing at a partner university. During the year, 13 individuals, of which eleven women and two men, completed Erasmus+ mobility in the form of courses, guest lectures, job shadowing and visits to partner universities.

KTH offers employees life and career planning, partly to promote personal development and partly to support internal and external mobility. Life and career planning includes individual guidance and coaching and is funded by local joint conversion funds. During the year, a total of 29 employees, including 19 women and ten men, applied for and completed life and career planning.

Every year, KTH's managers are offered to participate in mentoring programs. In collaboration with other universities in Stockholm and companies in Sweden, KTH offered two mentoring programmes with six participants in 2020, all women, from KTH. In addition, subject-specific courses are provided regarding regulations, processes and practices that are required knowledge for managers and leaders at KTH. These courses include basic labour law, structured interview technique and skills-based recruitment, managing labour disputes with mediation and crisis and human support.

A position within the academic career path, the "Tenure track," means a long-term commitment from KTH in the form of resources and personal development opportunities. The career development support clarifies what is required to obtain the requisite qualifications and experience to become an associate professor or professor, and offers opportunities for development within relevant areas. Skills support for active career planning for assistant professors is offered in the "*Partners in Learning*" (PIL) programme, with the aim of clarifying the requirements for further qualifications to become associate professors and professors and to develop the participants' awareness of academic leadership and KTH's values. In 2020, the programme has had 19 participants, including 13 men and six women. The programme was conducted digitally. In order to create awareness of their own significance as role models and leaders, associate professors are offered leadership training. The aim is to increase knowledge about the development of groups, its processes and the importance of leadership in the group. The number of participants in "*Leadership for Associate Professors*" was 17, including six women and eleven men.



## Relocation

KTH Relocation works primarily with the reception and integration of those individuals who KTH recruits from abroad. Reception refers to employees and scholarship recipients as well as to those employed by a party other than KTH, although who are intending to carry out a longer exchange or a sabbatical period at KTH. In 2020, around 600 people registered with KTH Relocation. Assistance is principally requested in relation to finding accommodation, which is provided during the first year at KTH. Other activities include excursions, guided tours, various gatherings to network with both Swedes and other newly recruited people, as well as language and cultural training. The activities are done with the aim of facilitating integration in Stockholm and Sweden and for the individual to quickly adjust to KTH's organisation and governance. There is also a procured career support programme for individuals accompanying professors, associate professors and assistant professors.

## Management and leadership Employeehip

The year 2020 has been marked by COVID-19. This has placed high demands on both managers and employees and has entailed extensive self-leadership. The willingness to change and goodwill of KTH's employees has enabled the necessary transition that has been required to meet the needs of the operations.

For managers and leaders at KTH, special support has been developed to lead forward in times of crisis and to lead remotely when working temporarily from home. This has included support materials for crisis support, employer responsibility and tasks in work environment work, risk of abuse and advice on leading employees who feel worried. In addition, a collection of frequently asked questions and answers has been made available specifically to managers. The support has been communicated via KTH's intranet. Together with occupational health care, KTH's managers have been offered supervision in groups and the possibility of an increased number of counselling sessions from three to six. During the autumn, 41 people, including 30 women and eleven men, participated in management training.

A pre-eminent KTH is driven forward by professional leadership based on KTH's values and an awareness of sustainability and gender equality. In 2020, the President established Arena for Leadership and Teaching, ALP, which is a steering group responsible for KTH's strategic goals and initiatives with a special focus on leadership and teaching. There is also a strategic council for ALP, chaired by the Vice President for Education. The purpose of establishing the ALP is to create a forum to discuss common issues in the area.

## The working environment

As a consequence of COVID-19, all employees have had to relate to working from home, and accordingly work environment issues have gained increased focus. During the spring, the business switched to distance learning and teleworking. In connection with this, new digitized ways of working were developed. Further adjustments to both working methods and the working environment resulted from the sudden transition. At an early stage, advice was formulated to create a good culture at digital meetings, advice to prevent the risk of social isolation and a guide in case of suspicion of risky use or abuse of substances. Other specific initiatives for the transition have included increased opportunities for counselling with occupational health services, webinars on sustainable work and alcohol, drug and gambling problems, and management training in groups. The information on KTH's intranet has also been expanded with tips regarding ergonomics when working from home and questions and answers on topical themes. KTH has also offered yoga via Zoom, outdoor training in groups and a computer breakout programme to encourage exercise breaks.

In the systematic working environment management, KTH works e.g. with recurring health surveys, digital support materials and education. The Schools draw up annual working environment plans, where activities in the physical, organisational and social working environment are documented and followed up. The business conducts safety rounds as before. During 2020, safety rounds have also been carried out with regard to the risk of infection. The Protection Committee has informed all safety representatives about work using a checklist to catch health and safety issues and thereby reduce the risk of spreading COVID-19.

Work has begun to implement a digital system for managing deviations within the work environment. The system is a service from the Social Partners' Council's Sustainable Working Life programme, from which KTH has used several services during the year.

The number of risk assessments in chemicals management has increased annually and now exceeds 400. The risk assessments are carried out in the chemicals management system KLARA. At the same time as more assessments are made, the quality of risk assessments carried out should be monitored. During the year, work has begun to introduce a new and more efficient chemicals organisation at KTH.

## Staff structure

The average number of employees in 2020 increased by nine persons to 5,035 (2,111 women and 2,924 men), compared with 5,044 in 2019 and 4,925 in 2018. In terms of annual labour forces, there has been an increase of 135 to 3,895 (1,577 women and 2,318 men) in 2020 compared to 3,760 in the previous year. In 2018, the number of FTEs stood at 3,628.

Measured in annual labour forces, the proportion of women is still 40 percent as in 2019.

### Age structure

The average age of employees at KTH is 40 years (41 for women and 39 for men). The average age of teachers and academic researchers is 42 (43 for women and 41 for men). The average age of doctoral students with employment is 30 (31 for women and 30 for men). The average age of technical and administrative staff is 47 (45 for women and 47 for men).

### Teaching staff and academic researchers

The number of teachers has increased by eight years to 816. Women have increased by ten to 212 and men have decreased by two to 604. This professional group is made up of professors, visiting professors, adjunct professors, associate professors, assistant professors and lecturers. The proportion of women among teaching staff has increased by one percentage point to 26 percent compared to 2019.

### Professors, visiting professors and adjunct professors

In 2020, the number of FTEs within the professor group (professors, visiting professors and adjunct professors) has increased by one FTEs to 318 (women have increased by two to 60 and men have decreased by one to 258).

The number of professors has increased by one FTE to 313 (women have increased by two to 58 and men have decreased by one to 255). The proportion of women has increased by one percentage point to 19 percent. The number of visiting professors has increased by one FTE to five (women are unchanged two and men increased by one to three).

In 2020, 21 new professors and visiting professors were hired. Of these, the proportion of women was 14 percent. The number of new professors and visiting professors employed totalled 32, 25 and 22 in 2019, 2018 and 2017, respectively. Of these, the proportion of women was 25, 36 and 32 percent, respectively.

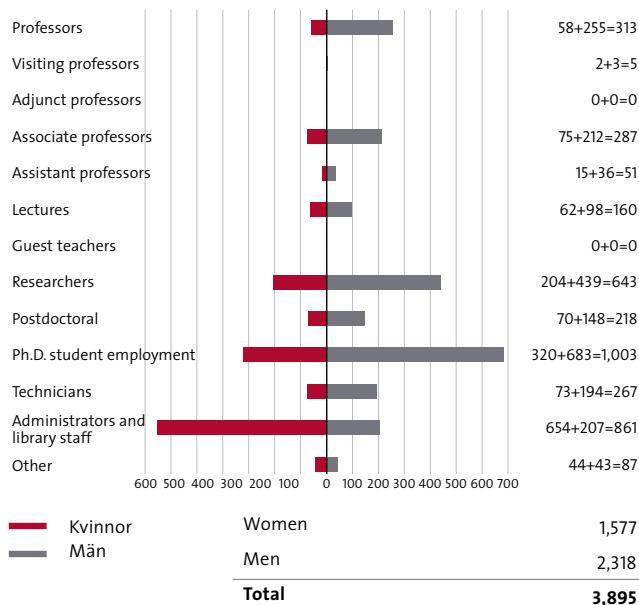
The number of adjunct professors has decreased by one person, amounting to 49 at the end of the year (women remain at seven and men have decreased by one to 42). The proportion of women is still 14 percent as in the previous year. During the year, seven people have been newly recruited to an adjunct professor position (seven men). All adjunct professors are employed by KTH, although their primary activities are located outside of KTH. The employment covers a minimum of 20 percent and a maximum of 30 percent of full-time, and most of these adjunct professors do not receive any salary from KTH. The number of FTEs for those who receive a salary amounts to less than 0.5 FTEs in 2020.

### Associate professors and lecturers

The number of senior lecturers is still 287 FTEs as in 2019 (women have increased by four to 75 and men have decreased

Figure 16

#### Staff 2020



Source: HR+

by four to 212). The proportion of women has increased by one percentage point to 26 percent compared to the previous year. During the year, 25 new senior lecturers were hired (12 women and 13 men). The proportion of women among the new employees has increased by 13 percentage points to 48 percent compared to 2019.

The number of lecturers has increased by seven FTEs to 160 compared to 2019. The proportion of women in this category has increased by one percentage point to 39 percent.

### Career-development positions: assistant professor and postdoc

At KTH, assistant professors and postdocs make up the category of career-development positions. Postdoc is a fixed-term position for a maximum of two years. Career development positions have decreased by 12 FTEs to 269 during 2020 (women have increased by six to 85 and men have decreased by 17 to 184). The proportion of women increased by two percentage points to 32 percent compared to 2019. During the year, 15 assistant professors were hired, (seven women and eight men). The proportion of women stands at 47 percent, which is an increase of 17 percentage points compared to 2019. In 2019, the proportion dropped drastically by ten percentage points to 30 percent compared to 2018.

The number of postdocs has decreased by nine FTEs to 218 (women have increased by seven to 70 and men have decreased by 16 to 148). The proportion of women has increased by four percentage points to 32 percent compared with 2019.

### **Researchers and research engineers**

Researchers and research engineers have increased by 58 FTEs to 643 (women have increased by 18 to 204 and men have increased by 40 to 439). The proportion of women stands at 32 percent, which is the same as the previous year.

### **Doctoral students with an employment position**

Doctoral students with an employment position have increased by 39 FTEs to 1,003 during 2020 (women have increased by 17 to 320 and men have increased by 22 to 683). For doctoral students with an employment position, the proportion of women stands at 32 percent, which is an increase of one percentage point compared to 2019.

### **Technical and administrative personnel**

Technical and administrative staff, including library staff, have increased by 55 FTEs to 1,128, compared to 1,073 FTEs in 2019 and 1,017 FTEs in 2018 (women increased by 43 to 727 and men increased by 13 to 401). The proportion of women is still 64 percent as in the previous year.

### **Docents**

KTH has appointed 30 docents during 2020, including 12 women and 18 men. Of these, the proportion of women is 40 percent. Being appointed as a docent is part of an academic career in which teaching staff and researchers, by acting as primary academic supervisors for doctoral students, can build up their own research groups. An individual who has been appointed as a docent is expected to be the primary academic supervisor for doctoral students, to act as an opponent and participate in grading committees during the public defence of doctoral dissertations within their area of expertise, to contribute to teaching within their subject area at second-cycle and third-cycle level, and to conduct scholarly activities at an international level.

# Premises

At the end of 2020, KTH had approximately 301,000 m<sup>2</sup> of premises, excluding accommodation for students and visiting researchers. Just over 41,000 m<sup>2</sup> are sublet to e.g. the Red Cross University College of Nursing, Stockholm University and Karolinska Institutet. The share of vacant premises stands at around four percent, which is an increase from previous years. The vacant premises are primarily office premises, individual lab premises and storage rooms.

## Accommodation for students and visiting researchers

KTH currently arranges a large number of student apartments and student rooms for exchange students, master's degree students from abroad and visiting researchers.

In 2020, KTH Accommodation was able to provide accommodation for 1,928 students. The rental stock amounted to 1,236 rooms and apartments with a total of 1,423 places in the spring term and 1,148 rooms and apartments with 1,355 places in the autumn term. The occupancy rate has been approximately 80 percent in the spring term and 93 percent in the autumn term. COVID-19 has affected occupancy as students have cancelled their studies to travel home.

KTH Relocation provides accommodation to foreign doctoral students and visiting researchers. KTH had total holdings of 280 residences spread across the Greater Stockholm area in 2020. Due to COVID-19, the occupancy rate was significantly lower than expected, about 83 percent. In addition to this accommodation, there is also a so-called guesthouse, Matsällskapet in Solna, where KTH's occupancy rate was lower than previous years due to the pandemic, around 21 percent compared to 75 percent in 2019. In total, more than 800 incoming visiting researchers and newly hired foreign visiting researchers and doctoral students have received their accommodation through KTH in 2020. KTH Relocation has offered a housing solution to all people who have contacted us. KTH believes that the need for housing for foreign doctoral students and visiting researchers is covered for the next few years.

For the coming years, KTH forecasts that the need for housing for students will continue to be high.

The total number of places in student accommodation at KTH Campus is approximately 1,000, and these are offered to both students and visiting researchers.

# Finances – earnings, use of resources and financing

## Financial performance and capital change

KTH's financial position remains strong, although COVID-19 during the year has affected both revenues and costs. Uncertainty about the coming years is also greater than before due to COVID-19. Revenues have increased by just over two percent, which is lower than the forecast provided in the budget base. The total costs are about the same as in 2019, where the forecast was that costs were expected to increase by just under four percent. Last year, the costs were affected by a one-off provision for a terminated contract for student housing. Without this item affecting comparability, the business's costs have increased by just over one percent.

The financial results for 2020 amount to SEK eleven million compared to the negative result of SEK -69 million in 2019. The results are divided between a deficit within first-cycle and second-cycle programmes totalling SEK -36 (43) million, and a positive result within research and third-cycle education amounting to SEK 47 (-26) million. The total budgeted forecast for KTH was a surplus of SEK +15 million.

The results in both undergraduate and advanced education and research and education at third cycle level have been affected by the transition that has taken place during the year due to COVID-19. In education, costs have increased, while, for example, income from renting student housing has decreased. In research, the positive result is largely due to the fact that the funding from the government has not been used up, which is also partly due to the fact that the business has focused on the conversion of education and the cost has thus been lower than forecast. Within the expanded investment in the strategic research area of IT and mobile communication, approximately SEK 34 million has not been allocated in 2020 and has a positive impact on the result.

KTH's commitment to SciLifeLab affects KTH's finances in several ways. For example, operations conducted within SciLifeLab generate revenues in the form of grants and fees

Figure 17

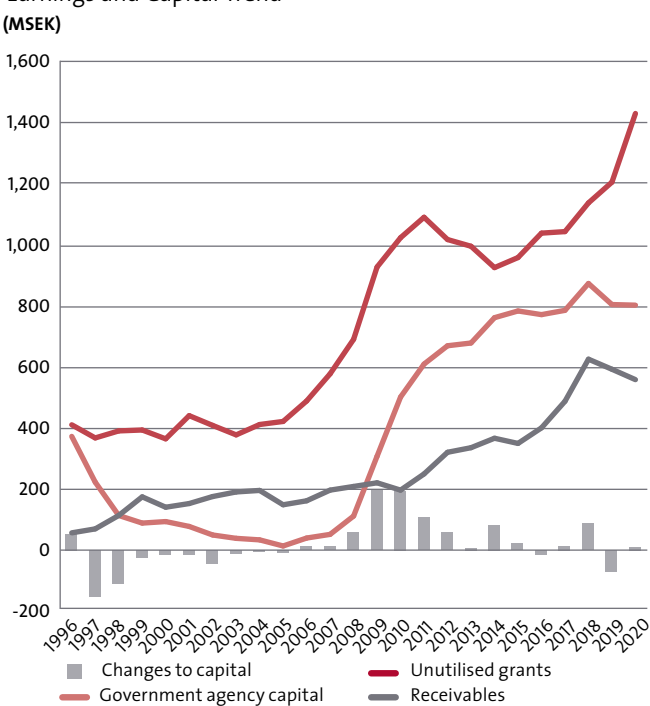
### Surplus/deficit

(msek)	2020	2019
Revenues	5,074	4,962
Costs	5,063	5,033
<b>Profit/loss</b>	<b>11</b>	<b>-71</b>
Profit/loss subsidiaries	0	2
Revenues for transfers	609	605
Grant issued (costs for transfers)	-609	-605
<b>Profit/loss</b>	<b>11</b>	<b>-69</b>

Source: Financial system

Figure 18

### Earnings and Capital Trend



Source: Financial system

Figure 19

### Capital development

(msek)	Balance carried 2020	Profit/loss 2020	Balance carried 2019	Profit/loss 2019
First and second level studies	-9	-36	-44	71
Purchased courses	6	0	0	12
Commissioned courses	1	0	1	-5
Research and doctoral studies <sup>1)</sup>	782	45	-21	771
Commissioned research	16	2	-5	19
<b>Total</b>	<b>796</b>	<b>11</b>	<b>-69</b>	<b>867</b>

Source: Ekonomisystem

of SEK 240 million, which corresponds to just under five percent of KTH's total revenue. Further information about the operations and funding within SciLifeLab can be found under the section *Research* and in the annual report that KTH submits to the government in connection with the annual financial statements. Furthermore, the principalship affects KTH's financial performance and government capital through the research grants KTH receives that are largely transferred to other participating higher education institutions. During 2020, KTH received SEK 388 million within

the research grant for SciLifeLab of which SEK 118 million was allocated to KTH's operations. The appropriation is deducted in its entirety in connection with KTH receiving the funds and is not accrued. As a result, previous years' funds in the infrastructure construction appropriations at SciLifeLab and funds within the SciLife

Lab for research in earlier stages of drug development, which have not been used in their entirety, have resulted in a surplus that is part of KTH's government capital. During 2020, the funds within the grant for SciLifeLab have been distributed in their entirety, and SEK 16 million of previous funds have also been utilised, which is having a negative impact on the earnings within research and third-cycle education in the same amount. In 2019, the result was negatively impacted by SEK 7 million for the same reason.

Turnover has increased by two percent compared to 2019, amounting to SEK 5,683 (5,566) million, measured as revenue from operations, including funds for financing of transfers. Over the past ten years, KTH's revenues have increased by around 44 percent, with revenue from operations increasing by 37 percent and transfers by more than 200 percent. The fact that the transfers have increased by so much is primarily due to increased grants for the strategic research areas and the university's role as principal of SciLifeLab.

At the end of 2020, government capital amounts to 796 (798) million, which corresponds to 14 (14) percent of sales as defined above and 16 percent (16) percent of operating income. The fact that government capital has decreased despite a positive result is due to KTH Holding AB's results and capital as of 2020 being reported according to a new principle and no longer affecting KTH's capital change. KTH has made several decisions on strategic investments financed with government capital. In 2019, a strategic initiative started following a board decision in 2018 on, among others, strengthened faculty funding and upgraded infrastructure. The previous initiative that started in 2016 has also continued in 2020. In 2020, these initiatives have affected earnings by SEK -58 (-43) million.

## Revenues

Operating revenues have increased by just over two percent compared to 2019 and amounted to SEK 5,074 million, SEK 112 million more than in 2019.

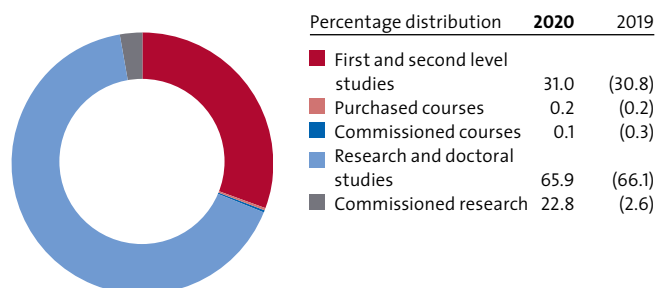
### First-cycle and second-cycle education

Compared to 2019, these revenues have increased by SEK 33 million and constitute 31 (31) percent of total revenue. Revenues in 2020 amounted to SEK 1,589 (1,557) million.

Revenues from the funding allocation at first-cycle and second-cycle level have increased by three percent and amount to SEK 1,215 (1,180) million. The increase is due to the price and salary conversion of the appropriations and the

Figure 20

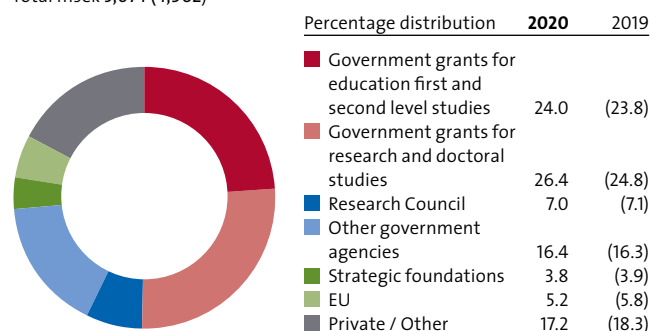
Field of activity 2020 (2019)  
Total msek 5,074 (4,962)



Source: Financial system

Figure 21

Sources of income 2020 (2019)  
Total msek 5,074 (4,962)



Source: Financial system

government's continued investment in the construction of engineering and civil engineering education. During the year, due to COVID-19, the government has decided on investments in education that gives access to university, training in jobs where there is a shortage of labour, lifelong learning and more. For KTH, this has resulted in SEK 30 million in increased grant revenue. More information about this initiative can be found under the section *Education*.

During the year, KTH produced full-time student equivalents and annual performance equivalents which are set off against the appropriation with a value just below the ceiling amount. Output overproduction has thus decreased slightly and KTH has set off the entire ceiling amount.

Revenues from fees and other income in education have decreased by six percent, equivalent to SEK 19 million, and amount to SEK 285 million in 2020. The decrease is mainly explained by lower rental of student housing, but also by the fact that the turnover of the assignment education has almost halved and is SEK nine million lower than in 2019. Revenues relating to fee-paying students amounted to SEK 155 (153) million, which corresponds to around ten percent of total revenues in education in 2020 as well. See further comments on the operations financed by tuition fees below.

## Research and education at third-cycle level

Revenues account for 69 percent of total revenues and amounted to SEK 3,484 (3,405) million, which is an increase by almost two percent compared to 2019.

Revenues from the grant for research and education at third cycle level have increased by SEK 112 million compared to 2019, which is partly due to new basic grants and the government's price and salary recalculation, but also to the increased investment of SEK 78 million in the strategic research area of IT and mobile communication. Part of the research grant has been used to finance transfers within SciLifeLab, among others, and this part of the grant is thus reported as transfers and not within the income of the business.

Revenues from fees and other income have increased by SEK 24 million, just over six percent. Revenues have increased by SEK 6 million for the provision of analysis services in connection with COVID-19. In addition, revenues from user fees within SciLifeLab have also increased in 2020, by SEK 15 (9) million.

Revenue from grants has decreased by SEK 55 million compared to 2019, which is a trend break from the steady increase that has occurred over the last ten years. The revenue correlates with reported costs as grant revenues normally arise to match the reported costs for the year within a research project. In 2020, other operating costs in particular decreased, which means that grants have not been used to the same extent as before. Instead, non-utilised grants have increased. See further comments below.

The revenues from KTH's three largest providers of funding within research and education at third-cycle level, in addition to direct government grants, have changed somewhat compared with 2019. As before, the Swedish Research Council is KTH's largest external provider of funding, with revenues from grants totalling SEK 290 (276) million. The EU is the second largest external funder with grant revenues of SEK 237 (256) million. Revenues from the Wallenberg foundations total SEK 215 million (223), making it the third-largest provider of funding within research. More information about KTH's funders can be found in the *Research* section.

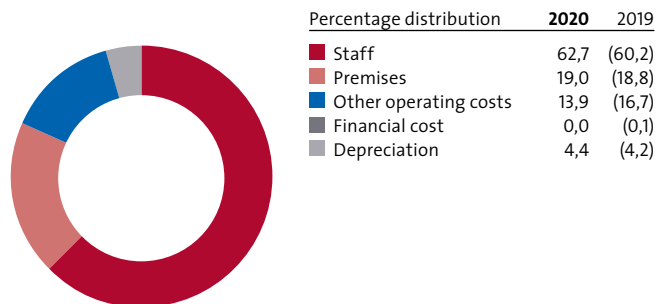
## Costs

Operating costs have increased somewhat compared to 2019 and amount to SEK 5,063 (5,033) million.

Personnel costs have increased by SEK 146 (187) million, which is largely explained by the fact that the number of annual labour forces has increased by 135 compared to 2019, resulting in higher costs for salary, employer's contributions and pension premiums, etc. Personnel costs have also been affected by the annual salary review, as well as by the general increase in pension premiums. Further information about KTH's personnel structure can be found in the *Staff* section.

Figure 22

Costs 2020 (2019)  
Total msek 5,063 (5,033)



Source: Financial system

Operating costs have increased by two percent and amount to SEK 963 (945) million. As described above under Financial results and change in capital, KTH has made a provision of almost SEK 29 million in 2019 for the termination of an agreement regarding student accommodation. Without the cost of this extraordinary provision, the cost of premises has increased by about five percent compared to 2019. See also the *Premises* section.

Other operating costs have been greatly affected by the transformation and adaptation of operations in connection with COVID-19. In total, these costs have decreased by SEK 141 million, with the largest share in research and education at third cycle level, which is commented on below.

## First-cycle and second-cycle education

These costs account for 32 (32) percent of the total costs and amount to SEK 1,626 (1,600) million. Personnel costs have increased more than forecast and reflect the work that has been done to switch to distance learning and to meet the demand for the new initiatives, among others, regarding eligibility training.

## Research and education at third-cycle level

These costs continue to account for 68 percent of the total costs and amount to SEK 3,437 (3,433) million, an increase of SEK nine million compared to the previous year. Personnel costs have increased by SEK 78 and SEK 45 million, respectively. At the same time, costs for other operations have decreased by SEK 121 million. Mainly costs associated with travel and conferences that have decreased.

Figure 23

## Outcome for education at first and second cycle

(msek)	2020	2019	2018
<b>Operating revenues</b>			
Government grants	1,215	1,180	1,159
Revenues from tuition fees and other charges	285	304	308
Revenues from grants	89	72	65
Financial income	0	1	1
<b>Total operating revenues</b>	<b>1,589</b>	<b>1,557</b>	<b>1,533</b>
<b>Operating costs</b>			
Staff costs	944	876	824
Costs for premises	371	397	371
Other operational costs	244	265	251
Financial costs	0	1	2
Depreciation	0	0	0
Total operating costs	66	61	59
<b>Total operating costs</b>	<b>1,626</b>	<b>1,600</b>	<b>1,507</b>
<b>Total operating outcome</b>	<b>-36</b>	<b>-43</b>	<b>27</b>

Figure 24

## Outcomes for research and education at third cycle

(msek)	2020	2019	2018
<b>Operating revenues</b>			
Government grants	1,341	1,229	1,208
Revenues from tuition fees and other charges	390	366	337
Revenues from grants	1,752	1,807	1,704
Financial income	1	2	3
<b>Total operating revenues</b>	<b>3,484</b>	<b>3,405</b>	<b>3,252</b>
<b>Operating costs</b>			
Staff costs	2,229	2,151	2,016
Costs for premises	592	547	510
Other operational costs	461	581	522
Financial costs	1	3	5
Depreciation	0	0	0
Total operating costs	155	150	148
<b>Total operating costs</b>	<b>3,437</b>	<b>3,433</b>	<b>3,201</b>
<b>Total operating outcome</b>	<b>47</b>	<b>-28</b>	<b>51</b>



# Management of foundations

KTH currently manages 100 private foundations via related management. The foundations have been formed via various donations to KTH. The oldest foundation originated in a gift dating from 1874, which was donated to KTH's predecessor, the Kongl. Teknologiska Institute (Royal Technical College). The purpose of the Hultqvist Foundation is to award scholarships to middle-aged or less well-off and diligent students at the university, who, through diligence and good manners, have earned it. Samuel Owen's scholarship foundation also has the purpose of awarding scholarships to students at KTH and both foundations still award scholarships to students at KTH.

During 2020, one new foundation was formed and six foundations were wound up. During the year, the Foundation KTH Innovation Prize was established through a donation of SEK 10 million. The two donors want an annual award to be awarded to one or more people linked to research or education at KTH.

The following foundations have distributed the entire foundation capital for their respective purposes and been wound up: Stiftelsen Nordstjernans Jubileumsfond and Stiftelsen Gösta Miltons donation fund.

Many activities have been cancelled or carried out digitally due to the pandemic, which has affected the utilization rate of scholarships awarded.

## Management for the purpose of the foundation

The purpose of each foundation is stated in each foundation's charter. In 2020, foundations affiliated with KTH distributed SEK 14 million.

The largest group of KTH's affiliated foundations, 46 in total, provide scholarships to first-cycle and second-cycle students. These foundations decided to award almost SEK 6 million through 307 scholarships. Of these, just over SEK 3 million constitutes funds from the largest foundation managed by KTH, Stiftelsen Henrik Göransson's Sandviken Stipendiefond. The Foundation has a capital of SEK 218 million.

Travel grants to teachers, researchers and doctoral students are awarded from 30 foundations. From these, grants totalling more than SEK 3 million were distributed through 114 scholarships in 2020.

The other 24 foundations contribute e.g. to the research activities at KTH. During the year, a decision was taken to distribute grants totalling approximately SEK 5 million, divided among 33 scholarships for such activities.

The second-largest foundation managed by KTH is the KTH Great Prize Foundation from a donation made in 1944. The donor stipulated that the prize should go to a Swedish citizen who, for example through epoch-making discoveries, ingenious applications or artistic activities, has been of great significance for Sweden. The prize this year amounts to SEK

1.1 million and will be awarded in conjunction with KTH's ceremony for the conferment of doctor's degrees and inauguration of professors on 17 June 2021. The recipient of the prize in 2020 is Tom Alandh. The University Board's motivation reads: "With the perfect ability to really listen, even to those who whisper,

Tom Alandh opens up new paths to recognition. His curious and at the same time gentle gaze for the waywardly human in every person he portrays is also reflected in the society and time the person lives in. Tom Alandh lets the viewer get close – always with a genuine respect for the person he films and interviews. As an unassuming master of documentary reporting, Tom Alandh is a very worthy recipient of KTH's grand prize."

The foundations pay an annual management fee to KTH for the costs incurred in connection with their administration. The fees amounted to SEK 1.8 million in 2020.

## Management of assets

The capital of the affiliated foundations is managed in a discretionary fashion by two external asset managers. This means that the asset managers are entitled to implement reallocations in the portfolio, within the framework specified in KTH's investment guidelines for its affiliated foundations.

The total amount of the assets belonging to the foundations amounted to SEK 940 (880) million at year-end.

Figure 25

Size and number of foundations  
Capital, MSEK at end of December 2020

	Number	Capital, MSEK
Foundations, 15-218 MSEK	14	617
Foundations, 5-15 MSEK	22	204
Foundations, 1-5 MSEK	46	109
Foundations, up to 1 MSEK	18	10
<b>Total</b>	<b>100</b>	<b>940</b>

Source: Bank statements of the foundations

# Financial Statement

	2020	2019	2018	2017	2016
<b>Operating revenues</b>					
Government grants	2,556,455	2,409,564	2,367,083	2,264,457	2,215,352
Revenues from tuition fees and other charges	674,633	670,376	645,225	581,022	543,086
Revenues from grants	1,840,929	1,878,724	1,769,529	1,698,050	1,662,645
Financial income	1,738	2,908	4,001	5,161	5,114
<b>Total operating revenues</b>	<b>5,073,756</b>	<b>4,961,571</b>	<b>4,785,838</b>	<b>4,548,690</b>	<b>4,426,198</b>
<b>Operating costs</b>					
Staff costs	3,173,160	3,027,200	2,839,754	2,727,105	2,669,311
Costs for premises	963,441	944,574	880,878	836,017	807,880
Other operational costs	704,745	845,588	772,464	745,230	731,618
Financial costs	834	4,754	7,623	7,566	8,552
Depreciation	220,945	210,442	206,842	219,432	227,156
<b>Total operating costs</b>	<b>5,063,126</b>	<b>5,032,557</b>	<b>4,707,562</b>	<b>4,535,350</b>	<b>4,444,518</b>
<b>Total operating outcome</b>	<b>10,630</b>	<b>-70,986</b>	<b>78,276</b>	<b>13,340</b>	<b>-18,320</b>
<b>Outcome from shares of subsidiary companies and other interests</b>	<b>0</b>	<b>2,072</b>	<b>9,491</b>	<b>229</b>	<b>4,059</b>
<b>Transfers</b>					
Funds allocated from government budget for financing of grants	372,472	353,460	339,865	317,409	309,729
Funds allocated from government agencies for financing of grants	153,025	158,431	150,459	143,103	111,489
Other funds received for financing of grants	83,370	92,664	89,621	66,412	60,411
Grants made	-608,867	-604,555	-579,945	-526,925	-481,629
<b>Outcome of transfers</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Changes to capital for year</b>	<b>10,630</b>	<b>-68,914</b>	<b>87,767</b>	<b>13,569</b>	<b>-14,261</b>

## Financial Statement per operational area

	Total	Education at first and second cycle		Research and education at third cycle		
		First and second level studies	Purchased education	Comissioned education	Research and doctoral studies	Comissioned research
<b>Operating revenues</b>						
Government grants	2,556,455	1,215,405	0	0	1,341,050	0
Revenues from tuition fees and other charges	674,633	268,048	9,397	7,428	249,513	140,248
Revenues from grants	1,840,929	88,753	0	0	1,752,176	0
Financial income	1,738	276	0	48	1,401	12
<b>Total operating revenues</b>	<b>5,073,756</b>	<b>1,572,482</b>	<b>9,397</b>	<b>7,476</b>	<b>3,344,140</b>	<b>140,260</b>
<b>Operating costs</b>						
Staff costs	3,173,160	937,905	2,710	3,752	2,173,465	55,330
Costs for premises	963,441	370,243	401	465	583,976	8,357
Other operational costs	704,745	234,195	6,711	3,289	395,542	65,009
Financial costs	834	174	0	1	542	116
Depreciation	220,945	65,890	0	9	145,264	9,782
<b>Total operating costs</b>	<b>5,063,126</b>	<b>1,608,407</b>	<b>9,821</b>	<b>7,515</b>	<b>3,298,789</b>	<b>138,594</b>
<b>Total operating outcome</b>	<b>10,630</b>	<b>-35,924</b>	<b>-424</b>	<b>-39</b>	<b>45,351</b>	<b>1,666</b>
<b>Outcome from shares of subsidiary companies and other interests</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Transfers</b>						
Funds allocated from government budget for financing of grants	372,472	1,177	0	0	371,295	0
Funds allocated from government agencies for financing of grants	153,025	26,268	0	0	126,757	0
Other funds received for financing of grants	83,370	547	0	0	82,824	0
Grants made	-608,867	-27,992	0	0	-580,875	0
<b>Outcome of transfers</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Changes to capital for year</b>	<b>10,630</b>	<b>-35,924</b>	<b>-424</b>	<b>-39</b>	<b>45,351</b>	<b>1,666</b>

# Balance Sheet

	2020-12-31	2019-12-31
<b>ASSETS</b>		
<b>I. Intangible fixed assets</b>	<b>0</b>	<b>0</b>
Capitalised expenditure for development	0	0
Intellectual rights and other intangible assets	0	0
<b>II. Tangible fixed assets</b>	<b>762,998</b>	<b>710,139</b>
Improvements to non-owned real estate	338,016	293,325
Machines, inventory items, installation etc.	411,794	390,890
Construction in progress	13,188	25,924
<b>III. Financial fixed assets</b>	<b>27,014</b>	<b>39,529</b>
Interests in wholly and partially owned companies	26,925	39,439
Other investments held as fixed assets	90	90
<b>VI. Receivables</b>	<b>137,251</b>	<b>136,343</b>
Receivables - costumers	28,346	32,133
Receivables - other government agencies	108,319	103,443
Other receivables	586	766
<b>VII. Cut of items</b>	<b>840,102</b>	<b>834,523</b>
Prepaid expenses	267,387	245,459
Accrued grant revenues	552,277	585,792
Other accrued revenues	20,438	3,272
<b>VIII. Settlement with Government</b>	<b>0</b>	<b>0</b>
Settlement with Government	0	0
<b>IX. Investments</b>	<b>0</b>	<b>12,000</b>
Other investments	0	12,000
<b>X. Cash and cash equivalents</b>	<b>1,627,336</b>	<b>1,476,074</b>
Balance and interest-bearing account at Swedish National Debt Office	1,512,682	1,413,205
Cash and cash equivalents	114,653	62,869
<b>Total assets</b>	<b>3,394,700</b>	<b>3,208,608</b>
<b>CAPITAL AND LIABILITIES</b>		
<b>I. Agency capital</b>	<b>796,297</b>	<b>797,572</b>
Government Capital	28,230	26,620
Outcome from shares of/in subsidiary companies and other interests	0	11,443
Changes to capital brought forward	757,437	828,423
Changes to capital according to Financial Statement	10,630	-68,914
<b>III. Provisions</b>	<b>43,684</b>	<b>71,550</b>
Provisions for pensions and similar commitments	10,541	12,246
Other provisions	33,143	59,304
<b>IV. Liabilities etc.</b>	<b>1,010,243</b>	<b>1,025,902</b>
Loans from Swedish National Debt Office	649,349	598,686
Accounts payable - other government agencies	73,629	102,280
Accounts payable - suppliers	60,196	135,642
Other accounts payable	227,225	188,175
Deposits	-155	1 119
<b>V. Cut-off items</b>	<b>1,544,476</b>	<b>1,313,584</b>
Accrued expenses	104,683	88,583
Unutilised grants	1,424,447	1,198,537
Other prepaid revenues	15,345	26,464
<b>Total Capital and Liabilities</b>	<b>3,394,700</b>	<b>3,208,608</b>
<b>CONTINGENT LIABILITIES</b>		
Government guarantees for loan and credits	none	none
Other contingents liabilities	none	none