



Development Plan 2018–2023

School of Engineering Sciences
in Chemistry, Biotechnology and
Health (CBH)





Foreword by the Head of School

The School of Engineering Sciences in Chemistry, Biotechnology and Health (CBH) has recently been created by the merging of three smaller schools, and the integration work is proceeding throughout the whole of 2018. The school currently consists of nine departments varying in size, activities and future challenges. The school's activities within research and education are very broad but can be grouped together under the four areas of strength materials, the environment, energy and health.

The CBH School has great potential to be an internationally leading, attractive education provider, operator of research with international impact and workplace with a strong sense of community which creates conditions for a stimulating and developmental working life. One part of this work is CBH's development plan, which also reflects KTH's development plan for 2018–23.

To CBH's development plan, we will be linking an action plan containing activities, schedules and indicators for each objective. Work on the school's action plan will be taking place in the autumn of 2018.

Mikael Lindström



- Kursinfo
- Diagnostiskt prov
- Demo
- Python
 - print, variabler,
 - reserverade ord,
 - input, kommentarer,
 - beräkningar, datatyper, if-satser

1. Education from preparatory to second cycle level

Analysis of the current situation

CBH was formed on 1 January 2018 and has a very broad educational assortment, with programmes of different structures. This creates opportunities of conducting high-quality education in many different areas within the field of engineering.

Master of Science in Engineering Programmes

- » Biotechnology
- » Engineering Chemistry
- » Medical Engineering

Bachelor of Science in Engineering Programmes

- » Chemical Engineering
- » Engineering and Economics
- » Computer Engineering
- » Medical Engineering
- » Electrical Engineering *

Master's programmes

- » Chemical Engineering for Energy and the Environment
- » Industrial and Environmental Biotechnology
- » Macromolecular Materials
- » Medical Biotechnology
- » Medical Engineering
- » Molecular Science and Engineering
- » Molecular Techniques in Life Science
- » Sports Technology
- » Technology, Work and Health

Engineering foundation year

- » Campus Valhallavägen
- » Campus Flemingsberg

The wide range, from foundation year programme to bachelor of science in engineering, master of science in engineering and master's programmes, makes CBH an entry point for recruitment to the whole of KTH. The school's location on different campuses, including Campus Flemingsberg, creates strength through the opportunity of broader recruitment.

In terms of internationalisation, CBH currently has few international partnership programmes leading to joint or double degrees and the school recruits a comparatively small number of students who are required to pay tuition fees. Students from CBH's programmes travel to other universities on exchange studies to a lower extent than other KTH students.

* Belongs to EECS but is run in its entirety by CBH.

Development opportunities – Education from preparatory to second cycle level

Collaboration and research basis

CBH's study programmes focus on a wide variety of areas. Nonetheless, essential for all is a good collaboration with industry and healthcare sector, as well as with the research units within the school.

The school shall strive to ensure that all course coordinators at the master's level conduct research and that a large proportion of course coordinators at both first-cycle level and on the master and bachelor of science in engineering programmes have experience from industry and/or work to promote partnerships with external stakeholders. This can involve, for example, active participation in the activities KTH arranges for the purpose of creating clearer links to external stakeholders. This shall primarily take place in partnership with KTH's strategic partners, of which several have a clear link to CBH's activities.

Sustainable development

At CBH, sustainability is one of the main objectives of several education programmes, but there is a clear difference in how this is being realised in the different programmes. Several programmes include courses in this area, but in almost all programmes there is also a need to spread this to other courses to a greater extent. Introducing the UN's Sustainable Development Goals into programmes at an early stage creates the opportunity to gradually build on these and apply them in future courses. So called 'Programme cohesive courses' which are studied over several years may also be a way of ensuring that sustainable development forms a natural part of the education.

At the master's level, prior knowledge of sustainable development varies greatly between students from different programmes as well as among international students, which means it is difficult to find an appropriate basic level. The combined expertise within CBH provides good opportunities to create new courses that could be studied jointly by students from several different CBH programmes. This would provide a basis for progression of the knowledge within sustainability during the course of the studies.

In order to ensure that students from different master's programmes have comparable knowledge and skills within areas such as sustainable development, the school should work to develop an equalisation course in the mould of TaMoS. This is a course in scientific theory and research methodology which is included as a compulsory course in the majority of KTH's master's programmes. CBH's equalisation course could be included in several of the master's programmes and cover areas including sustainable development, ethics and economics.

Gender equality

The CBH School shall act to ensure diversity and inclusion among both the student body and the teaching staff, reject all forms of discrimination and work to promote gender equality in accordance with KTH's guidelines.

With regard to gender and gender equality, the knowledge and expertise of managers and teaching staff should increase, and knowledge of these issues should be integrated into teaching in order to enable students to contribute to an equal society. In environments and programmes that have a low proportion of women, specific efforts should be made in order to better utilise the recruitment potential.

The school should explicitly highlight female role models. This should primarily be done by increasing the proportion of women in faculty and among teaching staff, but also through actions such as having more female guest lecturers, preferably alumni from the school's own programmes. To increase the number of female students in the Computer Engineering programme, CBH should maintain and strengthen its involvement in KTH activities such as national recruitment projects, for example the GIANTS project.

Internationalisation

CBH should have the ambition to develop at least one, but preferably several, international master's or doctoral programmes that lead to joint or double degrees. As far as possible, these partnerships should be sought with KTH's strategic partner universities. An important strategy for this should be the identification of partners that complement the school's programmes, i.e. that can offer course packages within areas that CBH does not currently cover. This would, for example, make it possible to create new tracks within the master's programmes which automatically involve at least one semester of study at another university.

The master's programmes at CBH have potential of attracting more tuition-fee paying students. CBH should endeavour to increase the number of these students at least at the same rate as this student group expands within KTH as a whole. CBH shall establish a long-term plan setting out how this is to be achieved. Examples of measures may be to contact those who have been offered places in order to provide them with information and thereby increase the likelihood that they will accept the offer, and to increase CBH's cooperation with the universities from which many applicants come.

The number of students travelling abroad from CBH's programmes should increase. Achieving this requires a long-term and determined effort that will make exchange studies a natural part of education. A balance between incoming and outgoing exchange students shall be achieved over time. To facilitate for outgoing students, CBH's education programmes should be structured so that there is at least one semester where an exchange is possible without missing elements which are central to courses that will be sat once the student has returned. The school should also strive to sign agreements with suitable universities that are able to offer complete course packages which can replace one or two semesters' studies at KTH.

Range and volume

In the short term, there are seemingly no reasons to alter the range of study programmes and the new school will therefore continue to offer the existing programmes mentioned above. However, as the subject expertise among CBH's teaching staff spans several fields of engineering, there is good potential for future expansion of the number of study programmes offered at the new school.

The initiative concerning a combined master of science in engineering-medicine programme together with Karolinska Institutet that came to a stop should be resumed and run by CBH. In the longer term, there are good opportunities to increase the range of courses and programmes in the second cycle through collaboration between different departments at CBH, e.g. within initiatives such as EIT Health.

CBH shall draw up a long-term plan for how the future range of FTEs shall be distributed between the first and second cycles. This plan shall be based on the number of applicants, the needs of external stakeholders and the composition of the faculty. Faculty members shall have the opportunity to teach in both the first and second cycles, which is why it should be an explicit objective that recruited faculty members shall also be able to teach in Swedish within a certain time. In order to ensure a balance and link between teaching and research, it is important that teaching at the school continues to be provided by both lecturers and faculty.

Quality development

In the present situation, the quality of the education shall be ensured, and the students' influence through a continuous process in which each course is evaluated and documented in a course analysis. Programme coordinators, teaching staff, students and representatives from external stakeholders meet in quality and programme councils as well as through link meetings, semester faculty meetings etc. This process shall be harmonised and rooted within the school by using a similar structure for all programmes within the same cycle.

Some central points for this are:

- » A clear annual cycle for quality assurance
- » A model for the clear transfer of information between course offerings
- » A clear model for student influence
- » Evaluation of whole semesters and academic years, not just individual courses

Educational days, workshops and similar, at which new teaching staff is introduced to this process and pedagogical tools are presented and discussed, shall also be arranged continuously.

In conjunction with programme analyses, a multitude of different ways of working with quality issues have been identified. Some key points are:

» **Progression inom programmen**

General review of all course syllabuses, including a focus on the introduction of objective-based grading criteria and an update of entry requirements so that students are given a clear picture of what is required for entry to subsequent courses in the programmes and to begin their degree projects. It shall also be clarified how the progression of knowledge within the areas covered by the UN Sustainable Development Goals are fulfilled within the different programmes.

» **Professional development among teaching staff**

One key matter is ensuring that there is a clear correlation between the school's research areas and study programmes so that there is adequate staff to cover all courses.

All teaching staff shall be offered the opportunity to participate in KTH's higher education pedagogical courses and in pedagogical days, workshops etc. in order to be inspired by and made aware of new pedagogical methods.

It is essential that teaching staff teaching a course for the first time are given lots of support. A manual for the administrative aspects of course coordination shall be produced.

» **Inspiration and motivation**

Students shall be given clear role models, and information about the programme objectives shall be provided continuously throughout the education.

In partnership with the student union, CBH shall work to improve contact between students and alumni, e.g. by inviting alumni to the start of new courses where they can describe how the course has been of use to them in their work.

Indicators

- » Proportion of teaching staff with higher education pedagogical training encompassing at least 15 credits (the school shall work to ensure a clear validation of educational skills)
- » Number of first-choice applicants
- » Number of degrees
- » Number of study programmes with double or joint degrees
- » Number of students required to pay tuition fees (AUA, LADOK, VIS)
- » Number of incoming and outgoing students (based on individuals, not FTEs/APEs) (LADOK)
- » A more equal distribution between men and women among students and teaching staff
- » The gender perspective is integrated in the study programme



2. Third-cycle study programmes

Analysis of the current situation

Third-cycle education at the CBH school is carried out within the five doctoral programmes stated below.

Doctoral programmes

- » Biotechnology
- » Chemical Science and Engineering
- » Medical Technology
- » Technology and Health
- » Theoretical Chemistry and Biology

The doctoral programmes cover various third-cycle subject areas for which there are separate general syllabuses that govern formal requirements (e.g. compulsory courses) and regulations and procedures linked to the programme. Prior to the merger in January 2018, the doctoral programmes were administered by three different schools (CHE, BIO and STH).

Subsequent to the merger, local variations have been discovered in procedures (e.g. for mid-way review) and regulations that govern doctoral programmes. This creates ambiguity and discussion with regard to what applies to doctoral students at CBH in certain matters. Some overlap between different third-cycle subject areas and the matters these address has also been identified. This may be perceived as ambiguous both internally and to those on the outside who are considering applying for a doctoral programme at CBH.

According to the course register, the number of third-cycle courses being organised by CBH is relatively high (> 310). Doctoral students still think it is difficult to find appropriate courses as many courses in the register are inactive or no longer taught on a regular basis. A review and update of the range of courses will be carried out in 2018 in conjunction with the introduction of 'new LADOK' (LADOK 3), which will hopefully improve the situation. However, there is still a lack of courses that provide practical skills, as the majority of existing courses are taught in a seminar format and do not contain any practical exercises.

Many current societal challenges with links to issues within chemistry, biotechnology and health warrant examination in a scientific and methodological manner and are therefore suitable to be tackled within the scope of a doctoral programme in one of the subjects in which CBH's staff possesses expertise. CBH's doctoral programmes are closely linked to the research projects being conducted at the school. This research has a very strong position both domestically and internationally and exhibits a large network encompassing industry, research institutes and other universities.

Many research projects are carried out in very close collaboration with industry and are interdisciplinary in nature. Doctoral programmes are largely financed by external funds and the results of applications to research councils etc. therefore have an impact on the potential to recruit new doctoral students.

Doctoral student salaries at KTH are high in comparison with other universities (approx. SEK 3 000–5 000 higher per month compared to Stockholm University, Uppsala University, Karolinska Institutet and Umeå University). In addition, the new rules concerning the possibility of financing doctoral students via scholarships, which enter into force on 1 July 2018, will probably have a detrimental impact on the number of new admissions of doctoral students, primarily through the effect on partnerships between KTH and the Chinese Scholarship Council (CSC).

Over a four-year period, the total number of registered doctoral students has remained stable at around 400, 23 of whom were externally employed doctoral students in spring semester 2018. The registered doctoral students are distributed among 75 active principal supervisors. The total number of doctoral students admitted to third-cycle studies in each of the past four years has been around 65–70, approx. 40 per cent of whom have been women.

The proportion of newly admitted students who meet the entry requirements through a foreign qualification has increased in recent years and made up a majority of new admissions in 2017 (53 per cent). The number of examinations each year averages approx. 75. Of the 73 doctoral students who were examined in 2017, approx. 15 per cent had spent some of their time studying abroad (international mobility).

There is currently a major focus at KTH on matters that relate to the development of a sustainable society. There are also qualitative targets linked to these matters within doctoral programmes. Sustainability is included in the majority of doctoral projects, but there is a need for tools that can be used to identify, concretise and elucidate these.

Development opportunities – third-cycle programmes

It is important that the expertise CBH has is passed on to and refined by a new generation of researchers who will be participating in building the society of the future and shaping Sweden as a knowledge economy. Consequently, it should be a goal of CBH to maintain and, if possible, increase the number of doctoral students. However, this goal is linked to increased resources, in most cases external funding, which means that this ambition may be difficult to realise. An increased number of externally employed doctoral students, financed by industry, may be one way to increase the number of externally funded doctoral students.

Internationalisation

CBH should have an ambition to increase the proportion of doctoral students who spend some of their time studying abroad. This provides valuable experience and insights into conditions in the rest of the world, provides new contacts, and may also lead to joint publications with researchers from foreign higher education institutions and to foreign doctoral students spending time at KTH. This can be stimulated by various forms of cooperation within doctoral studies between KTH and other universities, for example double degree and joint degree programmes or other programmes that involve international mobility by doctoral students.

Integration and harmonisation

CBH should have a goal to conduct a review of the subject syllabuses for the various third-cycle subject areas that are included in the school's doctoral programmes. Some degree of harmonisation of the differences in terms of formal requirements for compulsory courses, activities for which credits are awarded, mid-way reviews, quality requirements for doctoral and licentiate theses etc. would provide all doctoral students at CBH with more equal circumstances and could also be a step on the path towards the vision 'One KTH'.

In a wider perspective, a review should be conducted of the subjects and specialisations in the third cycle in order to investigate overlaps and synergies that could lead to a lower number of third-cycle subjects and which could thus entail a larger number of supervisors per subject. This could support the integration of the former units into one school.

It should be a goal for CBH to have a range of third-cycle courses, all of which have clearly stated intended learning outcomes and state when the course will next be taught. The number of courses that provide practical skills should increase.

Sustainability

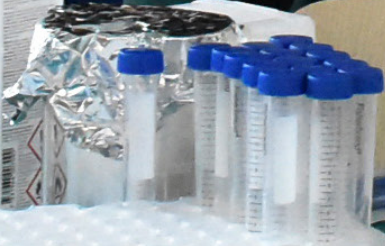
CBH should have an ambition that doctoral and licentiate theses highlight the way in which the research conducted is linked to sustainability (a sustainable society) and is of relevance to society.

Indicators

- » Number of doctoral students
- » Number of externally employed doctoral students
- » Number of doctoral students who spend some of their time studying abroad
- » Number of double degree and joint degree programmes
- » Number of courses that provide practical skills
- » Number of courses in the KOPPS register that are active and have a clear course syllabus
- » Number of doctoral and licentiate theses in which sustainability aspects and relevance to society of the research conducted have been described
- » Number of differences between subject syllabuses pertaining to procedures and formal requirements



Pappret som fångar bakterier



3. Research

Analysis of the current situation

CBH's research is generally of a high quality and CBH accounts for a significant proportion of KTH's academic publications.

However, the activities themselves and the conditions for research do vary between the different departments in the school, which can be exemplified by research funding. Of all KTH's schools, CBH as a whole has the highest degree of external funding, but these funds are unevenly distributed between the school's departments. It is also possible to observe that the research conducted in the school's environments has varying degrees of academic and societal impact (sectoral and societal impact).

With regard to the supply of skilled staff, several of the research environments currently see the need to recruit new researchers and teaching staff, but the causes differ, and these needs can be due to a heavy teaching workload, future retirements, an uneven gender balance or the desire to reinforce strategic research fields. CBH has many examples of good industrial partnerships, for example in the form of competence centres or involvement in KTH's strategic partnerships. The school also plays host to several research infrastructure ventures that are of major importance to KTH.

Large parts of the school also display a high degree of international visibility and many partnerships are in place with KTH's international strategic partner universities. There are currently a number of examples of research partnerships between the various parts of the school and which were initiated prior to the merger. Nevertheless, there is deemed to be untapped potential here and good opportunities to develop new interdisciplinary initiatives across departmental boundaries in the school's new organisational structure.

Development opportunities – research

Interdisciplinary initiatives

Over the course of the period 2018–2023, CBH will increasingly be focusing on the development of a stronger sense of unity and improved synergy between the various subject areas within the school. The goal is to use increased cooperation both within the school and with other parts of KTH

to improve the quality and relevance of the school's research, facilitate new types of research funding and increase the societal benefit.

In order to encourage new partnerships between the school's departments, integration funding will be invested in new associate professor posts and doctoral studentships at the overarching school level, with principal supervisors and assistant supervisors from different departments. Additional meeting places for the school's researchers that encourage new partnerships also need to be created. These could take the form of seminar series for younger faculty members, school-wide doctoral student days and school-wide mini conferences on various themes.

New, effective communication pathways need to be created in order to distribute information within the school, for example about guest lecturers that have been invited. The school shall also encourage improved utilisation of research infrastructure across departmental boundaries in order to spread information about available infrastructure, for example by organising an infrastructure conference and compiling lists of instrumentation and contact details on the school's intranet.

The school should also obtain assistance from KTH's bibliometric experts in order to learn more about current partnerships within the school and make it possible to monitor developments in the years ahead.

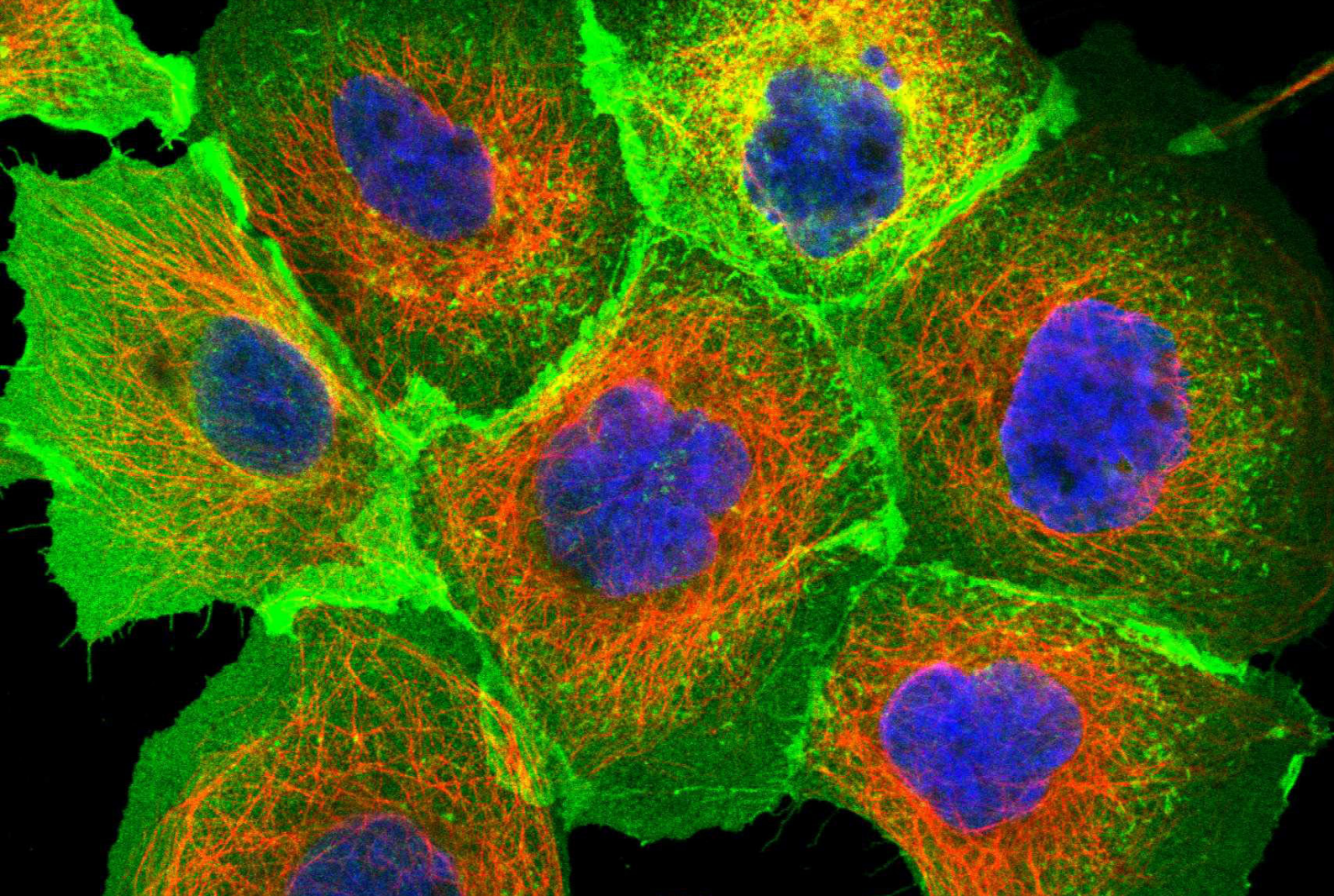
Academic and societal impact

The school is endeavouring to increase awareness of impact throughout the school and to develop new types of partnership with industry and the rest of society. One way for the school to increase impact is to create new processes for distributing information about research and education. This venture includes the development of new communication channels for information distribution, for example via social media. The school is also planning to establish a new third-cycle course in science communication. As preparation ahead of future quality evaluations, the school's departments should document their impact in the form of what are known as 'impact cases' and draw up plans describing how academic and societal impact could be increased.

As part of an impact project, the school shall also work to ensure that the sustainability relevance of the research conducted is made more visible. In order to make the school's impact on wider society more visible, effort will be made to follow up on the school's alumni (doctors and engineers) and to chart who their current employers are and what work they are doing.

Research infrastructure

The school will be working to ensure that the Science for Life Laboratory (SciLifeLab) continues to develop strongly. SciLifeLab is a piece of national infrastructure for molecular life sciences and CBH is responsible for several of its technical platforms. In the years ahead, there will be a major focus on running and developing the school's other strategically important pieces of research infrastructure. Examples of these are Treearch, which builds on close collaboration between industry and academia and is focused on inno-



vative research into new materials and chemicals from forest raw materials, and the newly built piece of high-tech infrastructure called the Jonasson Centre for Medical Imaging.

International visibility

The school can see the development potential of internationalisation, where the goal is to increase the degree of international visibility, create more international partnerships and increase the degree of funding coming from foreign sources. The school has appointed an internationalisation coordinator who is to work on these matters and will be working to increase the number of international partnerships with foreign universities. So as not to limit these to KTH's partner universities, the school is also endeavouring to establish school-specific agreements with other foreign partner universities concerning, for example, student exchanges. In this context, seed funding may be an appropriate way in which to stimulate collaboration.

CBH should also have an ambition to increase the proportion of publications that are published jointly with international partners. To support this, CBH's employees should be given reasonable conditions that allow them to set aside the time required to act as a main or co-applicant in, for example, EU programmes, and should be encouraged to spend shorter or longer periods of time at other higher education institutions.

The school should investigate which factors are of significance to the subject rankings in order to interpret the outcome of international rankings and to define where its strengths lie in terms of research that is easier to communicate internationally

Industrial partnerships

The school endeavours to maintain good collaboration with industry. In order to facilitate the drawing up of agreements in conjunction with industrial partnerships the school should appoint an agreement coordinator who can act as a point of contact between the school's researchers and KTH's legal department.

The school shall also focus on improving internal stakeholders' knowledge of KTH's innovation systems in order to promote entrepreneurship and the commercialisation of research, for example through seminars. Existing and new industrial contacts shall be utilised in order to apply for external funding, for example in the form of new competence centres. Adjunct posts and affiliations are another tool that can be used to increase contact for the purpose of collaboration. Improved contact between the school's departments is expected to lead in the long term to new projects and joint ventures with industrial and clinical partners.

Research funding

The school currently has and is striving to maintain in future a high degree of funding from central government and private-sector funding sources, primarily within the areas in which the school's strengths lie: sustainability, energy, materials and health.

The school shall establish an improved collaborative relationship with the KTH Research Office in order to distribute information about different sources of funding and calls for proposals. The school should also focus internally on improving the administrative support provided in conjunction with applications, and on providing information about what external assistance can be utilised, for example consultants.

The school shall work on direct funding of costs and reducing indirect costs in order to get overheads to a level that is acceptable to external sources of funding and makes a higher degree of external funding possible. Teaching shall be staffed in such a way that all teaching staff have the opportunity to gain further qualifications and apply for external funding.

Supply of skilled staff

The school's goal in terms of the supply of skilled staff is to achieve a more even gender distribution, a better balance between the various categories of staff and a more resilient organisation.

The school will be introducing an annual cycle for the planning and implementation of the recruitment of new faculty members. One benefit of a coherent process for recruitment is that it becomes possible to systematically monitor aspects related to gender equality and to ensure that areas where there is the potential to achieve a high proportion of female applicants are represented among new faculty posts proposed within the school. Another benefit of this process is that an annual school-wide prioritisation will be conducted through which resources can be moved, when necessary, between different disciplines and the automatic refilling of previous faculty

post is avoided. Societal challenges and teaching needs should be considered when deciding which proposals have priority.

Perspectives from more than one discipline should also be taken into account in conjunction with the creation of new teaching posts. This can be done by including teachers' representatives from different parts of the school in the recruitment committees. With regard to the financing of teaching posts, it is the school's ambition that at least half of the salaries for faculty is financed by base funding. Recently published studies conducted at KTH show that a higher degree of base funding and less centralised control may be beneficial to the quality of the research.

Indicators

- » Field normalized citation rate in Web of Science
- » Field normalized Journal Impact Factor
- » Number of doctoral students with principal and assistant supervisors from different CBH departments
- » Number of joint publications between CBH departments
- » Number of joint publications with foreign partners
- » Number of joint publications with external partners outside of the higher education sector
- » Number of externally employed doctoral students
- » Number of adjunct/affiliated professors
- » Total funding from industry
- » Total EU funding
- » Total funding from sources that focus on sustainability
- » Proportion of women in CBH's faculty
- » Proportion of women in management posts within the faculty



4. Innovation and entrepreneurship

Analysis of the current situation

CBH's different departments and their subdivisions have varying conditions for innovation and there are considerable differences in terms of their experience of innovation and entrepreneurship activities. Some departments have a great deal of expertise and experience and have already drawn up procedures for patent applications and for attracting sufficient funding. CBH is already successful when it comes to innovations and entrepreneurship. In the last ten years, CBH's researchers have accounted for more than one quarter of the ideas (232) that have been channelled into KTH Innovation's system.

CBH's various research environment are probably home to plenty of ideas that are innovative in nature, but there is a fair degree of uncertainty as to whether knowledge about the innovation process and patenting is as well distributed. It is also likely that there is substantial room for improvement in terms of what CBH's researchers, doctoral students and students know about KTH Innovation and the various parts of its support process; from idea to value-generating innovation.

Conditions – KTH and its innovation system

In a recently published American book, "Startup cities"² Stockholm is described as one of the foremost "innovation and startup" cities in the world. KTH and its innovation system are described in very positive terms, as are prominent researchers from KTH with a good "track record" when it comes to innovation and entrepreneurship.

In the evaluation³ of Sweden's innovation offices conducted by VINNOVA in 2015 at the behest of the Ministry of Education and Research, KTH received the highest possible rating. Only Mid Sweden University received the same rating, albeit with a much smaller organisation. The test of the report highlights a range of positive opinions, for example good support from the university's senior management, a high level of efficiency and quality and good analysis of completed activities. Collaboration with the university's holding company and other relevant stakeholders close to the university were deemed to be especially positive.

2 Startup Cities, Why only a few cities dominate the global start-up scene and what the rest should do about it, Peter S. Cohen, Apress, ISBN-13: 978-1-4842-3392-4, 2018.

3 Utvärdering av Innovationskontor (VINNOVA Dnr, 2014-06382), 2015.

Our university, KTH, thus offers exemplary conditions for innovation. KTH Innovation (KTH I), which is tasked with supporting and inspiring researchers and students to commercialise ideas and research findings, is divided into the units Business Development, Legal and IP, and Communication, Project management and Administration. One of the factors behind the success of KTH I is that it offers free advice in all aspects of the process of moving from idea to innovation, for example business development, commercial law, patenting, team development and funding. And all without demanding co-ownership.

KTH I also runs a pre-incubator programme for researchers and students who want to start companies where they and others participate in specifically adapted workshops and events and are given access to premises. KTH I also runs an internationalisation programme for companies that have the potential for global growth. KTH I makes a contribution to the initial funding round, primarily through the validation programme VFT, which give people with ideas the opportunity to obtain support (grants or loans) worth up to SEK 300 000 in order to validate their business concept, as well as by facilitating contact with, for example, the incubator STING and KTH I's network of investors and via the investments that KTH Holding AB makes.

All in all, it is possible to conclude that CBH's researchers and students should have excellent opportunities and conditions to allow them to turn



innovative ideas into value-generating innovations that, through patenting, can be commercialised via licensing or by starting a company so that these ideas can benefit society and lasting value can be created.

Development opportunities – innovation and entrepreneurship

CBH should have a goal to create an innovation culture within the school's departments that stimulates the process through openness and increased expertise. It should be natural to consider patenting a good idea instead of disclosing it via conferences or through publication.

The school should strive to ensure that innovation becomes a self-evident aspect of research activities. This is done by improving researchers', doctoral students' and students' knowledge of the various stages in the process of moving from an idea to potential commercialisation and also their knowledge of the in-house support available via KTH I.

CBH should take advantage of what is offered by KTH I and establish close relationships with its representatives so as to benefit from their expertise in various ways to disseminate knowledge (seminars, question times, case studies, workshops etc.) in order to improve our expertise in this area. The school should aim to offer doctoral courses on the innovation process, including patenting. There should also be consideration of whether components concerning the innovation process should also be offered in first-cycle study programmes.

Indicators

- » Number of patents applied for and approved that have at least one representative from CBH
- » Number of newly started companies that have at least one representative from CBH
- » Number of ideas that enter KTH Innovation
- » Number of companies that obtain financial support from KTH Holding or other investors at an early stage
- » Number of representatives from CBH that participated in course activities within the field of innovation and entrepreneurship



5. Quality system and administration

Analysis of the current situation

The administration is currently part of a large number of complex processes running in parallel that, despite actually having many significant points of contact, are flowing in what can be compared to drainpipes. This circumstance is applicable within the university administration (UF), in the relationship between UF and the schools and at the school level. CBH's administration is too fragmented and the various functional areas do not have insight into one another's processes.

One way to describe the school's current processes is as an orchestral score; the arrangement of the notes for all the instruments in an orchestra. The orchestral score is used by the orchestra's conductor, who can follow along with what the instruments are playing and when they are playing in order to gain an overview. At present, the orchestra consists of a large number of professional musicians, who all know how to play their instruments, but the orchestra is sitting there with 50 different sheets of music with one tune each. And instead of playing like a symphony orchestra, there are a large number of experimental jazz performances instigated independently.

Effective and qualitative administration forms the basis of a successful organisation. It is therefore of the utmost importance to make it clear both what the organisation expects from its administration and what processes the administration is able to offer. At present, the expectations and remit are somewhat unclear, which leads to unnecessary complications. Insufficient communication between the organisation and the administration leads to solutions being focused predominantly on administration.

To a large extent, there is a lack of common procedures within the administration, which means that more than one group are working on the same matters unaware of one another. This results in unnecessary wastage of resources.

The school has a clear responsibility, as a public authority, to students, sources of funding and other stakeholders to ensure that the product delivered is of a high quality.

Development opportunities – quality system and administration

The administration needs to become more efficient in order to enable it to support the organisation. What is vital is the ability to prioritise and find the correct balance between time, cost and effectiveness. The administration's services and processes should be sorted into three levels in order to make it possible to equip it with staff that have the right expertise and in sufficient numbers:

1. Duties that are currently undertaken and have characteristics that mean there are or should be clear procedures and crib sheets for their performance (e.g. invoice processing)
2. Duties that are undertaken relatively routinely but which require more advanced processing and the interpretation of rules (e.g. admission of master's students)
3. Duties that are undertaken rarely and which require skilled processing and potentially the design of new procedures and plans

It is important that the drainpipes between the administration's various functional areas are broken down and common processes are created, and also that systematic working practices are introduced that ensure the quality of these. If this is to be possible, the administration must have the mandate to take ownership for and manage these processes. Having clear processes makes it easier to do the right thing and more time can be spent on providing more advanced support.

Future efforts must be focused on quality and efficiency. Accordingly, working methods similar to those used in quality management, or similar, should be identified and incorporated into the administration's day-to-day work. This includes following up on the goals that have been set and working with proposals for improvement on the basis of the organisation's activities, in particular in accordance with KTH's guidelines for sustainability, gender equality and internationalisation. CBH has the expertise to develop quality assurance models. In the context of quality, it is also important to document what is done, when this is done and by whom. A case management system or similar is a good tool to assist in the documentation of these processes. A system of this type should be produced and incorporated into day-to-day work.

The school's senior management and organisation should set goals indicating what the administration is to achieve and provide the administration with the authority to determine how these goals will be achieved.

The foundation of a powerful administration that is able to work towards an integrated CBH and a more uniform KTH lies not only in strong and clear leadership, but also in rules of procedure that clearly allocate responsibilities and powers.

Integration

CBH is still in a consolidation phase and there is a need to integrate operations at various levels. The use of digital meetings should increase in order to ease collaboration across the school's various locations.

Indicators

- » Degree of satisfaction, questionnaire or interview with users
- » Internal CBH audit
- » A more equal distribution between men and women in organisations and decision-making bodies

