Development Plan 2013-2016
School of Computer Science and Communication
Development Plan 2013-2016

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Introduction

The School for Computer Science and Communication (CSC) will continue to strengthen its position as an internationally renowned research and education institution and act as a role model workplace providing inspiration and support for continuous career development.

During 2013-16 CSC will:

- conduct education, research and innovation at the highest international level,
- build on its truly multidisciplinary research environment to find novel ways of achieving the above,
- recruit the best students, and offer them a modern, stimulating, efficient and relevant education that produces highly employable researchers and professionals,
- strategically plan its research to achieve significant scientific and societal impact, addressing relevant problems that contribute to the development of its research fields, and to society at large,
- increase scientific impact by publishing in the most competitive peer-reviewed journals and at conferences in relevant fields,
- increase citations and visibility through strategic communication by faculty, and active interaction with the society at large,
- secure funding from the most competitive external funding sources (the European Research Council (ERC), the EU, The Swedish Research Council (VR), Vinnova, the Swedish Foundation for Strategic Research (SSF)),
- increase industrial collaboration with strategic partners,
- continue to develop as an attractive research and education environment that manages to recruit and retain leading researchers in computer science and communication at all levels,
- work actively to implement the tenure track system and establish adequate career paths for faculty,
- work actively towards increased gender equality among staff and students,
- increase international collaboration, both in education and research, for increased international recognition and greater mobility,
- be a role model in the use of ICT services and technologies in education, research and administration,
- increase the mobility between industry and academia,
- maintain a support organisation that is perceived as excellent in terms of efficiency, by students and staff, with a clear goal of facilitating for all staff to involve themselves more in their core tasks.
1. Education

Education is a very important part of CSC’s work and goals. CSC values pedagogical skills highly and encourages pedagogical development of its subjects and teachers. CSC’s ambition is that its education should develop in a way that will keep pace with the rapid changes in the computer science and media technology fields, with specific focus on industrial and scientific relevance, technology-enhanced learning, internationalization and industrial liaisons.

i. Industrial and scientific relevance

Undergraduate education at CSC should entail a high degree of employability, as well as a close connection to actual industrial work and to the high quality research performed at CSC. This includes concrete, result-oriented project work at all levels of undergraduate programmes, on relevant topics suggested by both the CSC’s research groups and industry partners. Illustrative guest lectures from industry and renowned researchers should be a common element in CSC courses.

The aim further means that the progress within the programme’s content should be transparent to students and teachers. The learning outcome for each course should clearly state how the course contributes to the overall programme goals and its relation to courses preceding and following it. The programme curriculum should contain compulsory high quality courses at the basic level as well as an adequate number of elective courses on the advanced level, permitting students to specialize in specific topics that are relevant for their future careers. The palette of advanced level courses should display a great variety, while maintaining balance in number and financing between basic and advanced level courses.

ii. The pedagogical development of curriculum and faculty

CSC should continuously improve teaching quality by using state-of-the-art methods and tools from educational research to promote active learning and student creativity. This includes didactic discussions within faculty, the use of activating peer instruction methods, formative assessments, and the use of automatic assignment checking tools. The course structure should further be tailored to suit the students’ learning, making larger use of forms such as one-hour lectures, student peer reviewing, alternative and continuous examination, as appropriate. The overall ratio of credits examined through alternative methods to traditional written classroom exams should remain high (2/3).

CSC aims at being a national leader in technology-enhanced learning and will continue to devote efforts to develop online courses. The possibilities of providing more Massive Open Online Courses (MOOCs) will be investigated. Established connections with ECE should be cultivated.

CSC has well-defined and high ambitions regarding the pedagogical standards and development of its faculty. A completed set of didactic courses should be the norm for employed faculty. Pedagogical curriculum development should be viewed as a worthwhile contribution. Funding for small-scale pedagogical projects should be announced on a regular basis.

In order to meet the requirements of a closer connection between undergraduate education and research, all faculty members should be actively involved in undergraduate education.
iii. Internationalization
CSC regards international contacts as fundamental for students of its programmes and will encourage all programme students to study at least one semester abroad at a partner university that has an appropriate mutually acceptable curriculum. Language courses in at least one language other than Swedish and English should be a natural option in the school’s programmes.

CSC’s programmes should also be attractive for incoming foreign students, including those from non-EEA countries. CSC intends to actively push for an increased number of paying students in its Master’s degree programmes by specifically directing the recruitment campaigns towards KTH’s prioritized regions - India, China, Southeast Asia, Africa and Brazil.

iv. Recruitment and throughput
The undergraduate programmes at CSC already attract a large number of applicants, and should be regarded as being among the primary choices for applicants interested in Computer Science and/or Media Technology.

The Master programmes at CSC should be highly competitive in terms of attracting the most talented students in their fields, regionally, nationally and internationally.

CSC should continue its efforts to attract female students to its undergraduate programmes. This includes profiling the Computer Science programme as a varied curriculum with features such as an undergraduate specialization in language technology and the opportunity to take elective language courses, and a broad spectrum of specializations at the Masters’ level. It also means increased efforts to recruit female teachers, providing them with equal opportunities within tenure track, and increasing their visibility to undergraduate students.

Increased throughput and percentage of graduated students will be given a specific focus, including structured methods to continuously follow current and older students from admission to graduation. Specifically, a supportive infrastructure for administration, supervision and examination of Masters’ theses should be introduced, preferably in close collaboration with KTH centrally.

In particular, CSC aims at graduating, by June 2015, a significant number of students who were admitted before 2007 and are already close to graduation.

v. Industry involvement
The interaction with industry should increase through involvement in commissioned and external education for the industry, and guest lectures and/or small-scale projects in CSC courses from the industry. Both affiliated faculty (industrial partners visiting CSC) and affiliated researchers (CSC teachers visiting industrial partners) should be used actively to stimulate industrial involvement.
2. PhD studies

The PhD education is of utmost importance for CSC as well as for KTH. CSC wants to have a well-organized PhD programme, characterized by high quality work, good working conditions and a goal of producing PhDs that find great Postdoc opportunities at the leading universities in the world, or that make good use of their education in industry. We hope to educate and graduate some of the future leading researchers in their fields. During their PhD studies, PhD students should be engaged in research of the highest standards, the supervision should be excellent and they should have access to courses enabling them to deepen and widen their expertise.

a. Doctoral programme

CSC aims to strengthen the doctoral programmes in their role of providing a structure for PhD studies, including courses and quality processes. Within both doctoral programmes of the school, discussions of present and future needs of courses have been conducted. These discussions have been performed in the doctoral programme councils, and among doctoral students and their supervisors. This work has led to the establishment of new courses and the maintenance of a list of suggested/available courses. These course lists need to be improved, particularly in terms of updated course descriptions including next planned dates when courses will be offered. We aim to provide all PhD students with opportunities to take PhD courses in innovation following the model from EIT. In 2012 and 2013, CSC has discussed and further developed the quality process of the PhD education, in particular within the two doctoral programmes. During meetings of the doctoral programme councils, the quality process has been discussed and documented. One outcome of this has been a document describing policies for assessing a student’s progress throughout his or her PhD studies.

vi. PhD students’ working conditions

The PhD students comprise about a third of the staff at CSC. CSC wants to ensure that the working conditions and the work environment for the PhD students are satisfactory within the possible framework. PhD students should be treated in the same way as other employees. Over several years, the school has provided new PhD students with an introduction to PhD studies. From a recent work environment survey, CSC learned that many PhD students experience stress and an inadequate work environment. CSC has been focusing on improving the situation for PhD students for the last two years, and this work needs to continue in the future as well. During 2012, CSC has held two seminars on topics of general interest to all PhD students, including how to plan and execute a research project, how to find balance in life, how to work together with the supervisor and with other PhD students and how to get started documenting results.

vii. PhD project planning

PhD studies should be planned in such a way that all PhD students have the opportunity to finish their PhD within the allotted 48 months. This is a responsibility shared between the PhD students and their respective supervisor. EU project deliverables or industry project hindrances should not slow down the time it will take to complete the PhD education. It is important for project managers and supervisors to understand this. Similarly, PhD students need to realize that they have obligations to deliver the PhD project results that they were hired for.
viii. Support to supervisors
The CSC ambition is to be able to attract and obtain the best candidates to its PhD education. CSC intends to improve support to supervisors during the recruitment process of a new PhD student. Supervisors, too, should be given opportunities to attend courses on PhD student supervision and courses on leadership and management.

ix. Industrial collaboration
As mentioned in the research section, industrial collaboration is very important. CSC plans to increase the number of industrial PhD students and thereby increase industrial collaboration. Industrial PhD students should be accepted when this fits with the general purpose of the research at CSC, and when the project and conditions provided in the collaboration are suitable for PhD studies. Considerations must also be made based on a decision whether the PhD student has the capacity to finish his or her PhD education and whether sufficient resources for supervision are provided.

x. Equal opportunities
CSC has the ambition to ensure equality with respect to gender, religion, cultural heritage, or disability. Any discrimination or harassment of any kind will be unconditionally opposed. CSC also works with the goal of providing equal opportunities for PhD students. CSC is aware that there are regulations hindering it from providing exactly the same financial opportunities for PhD students on stipends as for PhD students in positions, but CSC will as far as possible work with the goal of creating equal opportunities. As a step towards this, both doctoral programmes provide possibilities to apply for financial support for attending a conference or a fee-based course, for example.

i. Internationalization
CSC intends to work actively to provide every PhD student with international experiences and networks, through international collaboration, conference participation or guest study periods at reputable international institutions. These goals should be followed up in every individual study plan update.

ii. Preparing for life after graduation
Many PhD students have observed that after graduation, they are left to sort out their future on their own. The employability of the PhDs is an important measure of the success of CSC’s PhD programmes. CSC intends to make sure to support PhD students in their subsequent career choice and help them with contacts and support to become successful in their future careers.

i. Progress discussions
In addition, all PhD students should engage in required progress discussions by somebody other than their main supervisor, to ensure the existence of a forum to discuss things beyond their PhD project, such as work-life balance, educational obligations, supervision and how this can be developed beyond that which is possible to discuss with their immediate supervisor.
3. Research

CSC’s aim is to conduct research and innovation at the highest international level, having both scientific and societal impact, addressing relevant problems that contribute to the development of the research field, and to society, at large. CSC’s research spans from basic to applied, covering the core areas of computer science and communication. The primary guiding factors for CSC’s research are scientific excellence and societal relevance, where the contribution is both in terms of the development of new theoretical work and the solving problems of more applied nature. CSC’s faculty contributes to the continuous development of the scientific disciplines; CSC is visible and active in the research society by contributing to the research agenda, through memberships in evaluation committees and as board members of the most relevant journals and conferences. CSC will additionally support research that has societal impact directly or indirectly, such as by contributing to patents or start-ups, standardization, policy making, societal change and development.

CSC’s researchers are active in applying and securing external grants and attracting research funding that raises their international visibility. CSC’s research will continue to be funded by the most competitive external funding sources (ERC, EU, VR, Vinnova, SSF), as well as through industrial contracts. There is a sound balance between individual grants, such as those granted by VR, and collaborative grants financed by the SSF (nationally) and EU (internationally), where CSC’s researchers are frequently asked to join various consortia. CSC’s research will continue to span everything from highly theoretical to applied, and not the same funding sources are of interest to everybody. However, raising awareness among faculty of what funding opportunities are available and how one to write successful applications to a particular granting agency will continue to have high priority. CSC will therefore continue to work actively raising the number of funded grant applications by increasing the quantity and improving the quality. A very important step in this regard is to raise the awareness of, and knowledge about, the peer review processes as they are implemented by different funding agencies. For this purpose, CSC will continue organizing lectures targeted toward faculty on this topic. Several senior faculty members are members of the evaluation groups at the granting councils and CSC exploits this fact by having them present their experiences at the Young Faculty and Professors Meetings. CSC will continue active assessment of internal applications. The first in a series of workshops was organized during 2012, and was targeted toward writing applications to the Swedish Research Council. In the future, CSC will concentrate on other applications such as European Research Council grants. Apart from submitting high quality applications, CSC also wants to commit some of its common faculty funding to test and implement some of the high risk ideas in the form of Small Visionary Projects. This seed funding can serve as a testbed for a 6-12 month research project that performs an initial study of a potentially high-risk idea before it is sent as a more elaborate application to a funding agency.

CSC’s faculty publishes in the most competitive journals and at conferences in the broad field of computer science and communication. The selection of publication venues for each individual’s research is based on the scientific quality, each respective venue’s reputation and potential for citation. CSC also works actively on disseminating its research results to society at large by increasing its popular science publications and presentations. Apart from communicating its research externally, CSC needs to improve the processes for communicating it internally. The goal is to increase the citation and recognition of the research conducted, both internally and externally. To increase the productivity and quality, CSC intends to set clear publication goals (that can be assessed on an individual level) to increase the visibility, public knowledge and scientific dissemination.
CSC will set up a school-wide distinguished speaker seminar series to invite distinguished national and international peers to provide presentations on research in its multidisciplinary area.

CSC works actively on identifying research collaborations across different departments, both internally at school level and externally. An important reason for this is to enable multidisciplinary research. CSC aims to set up a multi-disciplinary research centre, ICT4Life, developing new areas of assistive technologies and the use of ICT for health and well-being by bringing together researchers from computer science, medicine, social sciences, humanities, design, as well as other engineering sciences. CSC aims to secure necessary funding needed to set up the centre in the coming period, either through the fund-raising initiative at KTH Royal Institute of Technology or through the Swedish research funding agencies.

To enhance the connection between KTH and ICT4Life, CSC will continue tightening the collaboration with other local units, specifically with the ICT and EES schools.

CSC has taken part in the planning of the EU flagship initiative Human Brain Project, aiming for the understanding of brain function using advanced information technologies. CSC aims to secure KTH’s presence in this project by forming a Brain-IT research centre to coordinate our activities in this area.

CSC will increase its participation in KTH’s research platforms. The existing work within the ICT and Life science platforms should be further strengthened. Additionally, CSC will increase presence in the Energy and Transport platforms.

CSC will develop and deepen its collaboration within the European Institute of Innovation and Technology (EIT) and also with KTH’s strategic research areas (SRA) within ICT, The Next Generation (ICT TNG) and SERC.

CSC’s excellent collaboration with Stockholm University, specifically through the Department of Numerical Analysis and Computer Science (NADA) as well as the collaboration with Karolinska Institutet (KI) will be further deepened. CSC should also increase its relations to the Science for Life Laboratory (SciLifeLab).

CSC will also continue its successful multidisciplinary collaboration with the artistic disciplines, particularly its collaboration with the design field.

Sustainability is an important area at KTH, and CSC should continue and deepen its relation and consideration of sustainability aspects in its research. As such, the Centre for Sustainable Communication (CESC) and its group, Green Leap, are important, but other areas also need to relate to sustainability in their research.
4. Faculty recruitment and the future

To CSC, it is of utmost importance to continuously develop and improve recruitment processes and to attract world-leading researchers. Prior to announcing new positions and establishing new areas, CSC carefully analyses in what way research develops internationally, and uses this for strategic planning. For example, new research fields such as big data and assistive technologies are new areas of general interest for the school but these also fit well with the research in several areas currently pursued at CSC. CSC will develop processes for faster recruitment to faculty, relying on search committees in the process. CSC will also work on a long-term recruitment strategy where needs in education and research are met. This includes actively working for a more equal gender balance. The CSC Human Resources will guide the departments in the recruitment phase, and the school will establish a career programme for young employees.

The important strategy during the coming period will be to continue to develop processes for internal (between departments) and external collaboration. CSC finds this benefits career acceleration for faculty, especially newly recruited faculty staff. To achieve the cross-fertilization between research areas, what is initially required is to establish research positions that span over different groups, departments and/or schools. CSC will thus encourage the establishment of cross-departmental PhD and postdoctoral positions in areas that are common to several research areas, such as machine learning, human-machine interaction, and assistive technologies. This will increase the flow of ideas between research groups as well as enhance career opportunities by meeting and sharing research ideas between groups and researchers. CSC has already taken initial steps in this respect by appointing two associate professors in machine learning.

An important goal for CSC is to work on developing the academic leadership of faculty members. They need to be aware of the challenges that are involved in being given a role to lead a department, a larger group, or to direct a research centre. One concrete example of coaching is the monthly Young Faculty Meetings, a collegium where various topics necessary for your development as an academic leader are discussed. Example topics included so far are “peer review of VR/EU proposals”, “best practice in PhD supervision” and “speed-dating for cross-department small visionary project proposals”. The collegium will also invite people that have built successful academic careers to share their personal experiences in climbing the academic ladder with younger faculty members. Another example is the internal coaching process that CSC has already started: pairing a senior and a junior researcher from two different departments with a goal of meeting and discussing the requirements facing an academic leader.
5. Infrastructure

Another important prerequisite for cross-departmental collaboration is having natural meeting places, such as shared offices and laboratories. CSC’s infrastructure ambition is to provide a creative research environment where researchers and students can collaborate and interact in an efficient and creative fashion. If possible, integrating start-up companies from fields relevant to CSC on CSC premises would be beneficial. CSC will provide suitable facilities for collaborative research and teaching, making use of advanced technological support. One important part of this is to make sure CSC has well-supported lab resources for research and teaching. CSC is also hosting several computer labs mainly used for education. It is necessary to build a long-term plan for the development and maintenance of these environments to facilitate the increasingly common bring-your-own-device approach and to make use of existing resources.

CSC has received infrastructure money from KTH to establish a common infrastructure in the form of the Visualization Centre and the PMIL laboratory. In addition, CSC has several department-specific lab infrastructures. The following lab resources are currently being built or existing:

- NAO robot lab
- Visualization studio
- PMIL lab
- Haptics lab
- Presence lab (R1)
- Media technology lab (under construction)
- Interaction design studio
- Mobile office lab (under construction)

Additionally, CSC will continue with high ambitions to host the major high performance computing resources in Northern Europe, in line with the development of the PDC Centre for High Performance Computing.

One of the goals in this direction is also to establish a national infrastructure that enables basic research on the next generation of ICT systems, concentrating primarily on various types of autonomous and interactive systems. In the same way as computers and mobile phones have become an integral part of our everyday life, in the future, we will have systems that provide advanced service with varying degrees of autonomy.

The terms robots and autonomous systems are used to refer to systems that can perform tasks in situations and environments that cannot be fully controlled and are used in homes, hospitals and offices. A common objective for researchers is to make these more robust, context-aware and easy-to-use for non-skilled users.

Apart from the shared lab space, CSC will also strive to implement shared office space where it is feasible. Shared offices could be achieved by temporarily sharing offices during common projects, or by moving whole groups together that share many projects. Following the guidelines from KTH, CSC will develop a long-term investment and maintenance plan for this type of infrastructure.
6. Industrial liaisons and society at large

CSC has been successful in acquiring funding that involves SMEs and established companies, such as collaborative EU projects and big national grants. However, the level of industrial research funding can be further improved through, for example, recruitment of more industrial PhD students. Another way is to involve industry in project courses at undergraduate level.

In order to increase the collaboration at research level, three major paths should be followed: 1) setting up collaborative research projects, 2) conducting commissioned research of high scientific value, or 3) recruiting industrial people as affiliated or adjunct faculty.

CSC should also improve and maintain its industrial collaboration by inviting industry representatives as advisory board members or guests in various contexts. CSC departments have extensive networks that should be used in this process. Both the large number of companies that have participated in the CSC’s Centres of Excellence and bilateral collaborations between units and selected companies are important assets here.

To meet these goals, CSC will support an industrial collaboration group within the school, with the purpose of strategically increasing research collaboration with industry, channel contacts with KTH core research partners and promote and monitor industrial collaboration within the school.

As an example, HPCViz has collaborations with large companies like Scania, Microsoft, SAAB and Volvo Cars, and CVAP, and in the upcoming period will aim at establishing a long-term strategic collaboration with Scania in the context of intelligent transportation systems. CSC also supports the launching of start-up companies in relation to research conducted and the publication of patents. In parallel, CSC should encourage open source distribution of research results for the benefit of society.

To increase the impact of CSC’s research to society at large, CSC will investigate different ways to achieve visibility and provide publications guidance. CSC will continue developing its public and internal web pages, simplifying for departments to get their results disseminated both within CSC and among the general public.

The internal pages were developed to support young faculty on where to publish, departments will be asked to maintain web pages with the upcoming year’s most important journal, workshop and conference submission deadlines in their fields. These resources will also be useful for neighbouring departments that are involved in multi-disciplinary research projects.

CSC also supports involvement in politics, policy making and international standardization within a field of research. CSC encourages communication activities and public appearances in relation to all lines of work.
7. Management and Support

a. Management
Managing CSC is a matter of staffing the organization with great managers and employees, and making sure they have the prerequisites to fulfil their task in a resource optimized way.

CSC’s chance of reaching its goals depends on the leadership among managers at different levels across the full organisation. Each manager’s responsibility, mandate and resource framework must be clearly communicated together with the expectations on the position. A lucid and exemplary curriculum for leadership education is to be set.

During the coming period, CSC should improve processes for staffing and refine the human resource investment. Each employee should have a development plan, with annual evaluations, stating desired professional development and training.

Exchange between different research institutions of faculty and staffs is an important part of involving best practice into everyday work, and CSC will continue to support such initiatives.

CSC encourages all researchers to become involved with the scientific community as reviewers, members of programme committees and editorial boards, scientific communities and other learned societies. It is important for the building of individual careers as well as for the trademark of CSC’s research and for KTH.

Active involvement from all employees is a prerequisite for the academic management model. Hence, CSC needs to emphasise and build mechanisms for such active involvement.

A strategy for increased gender equality among staff will be worked out.

b. Support
The support organisation plays an important role in achieving the goals of CSC. Hence, a strong support organization with staff members who are well trained for their tasks is desirable. This means that both special expertise and administrative support are required.

The CSC support organization consists of basic administration and advisory and strategic support, which brings added value to research and education. The overall model is to decrease administration within the organization, decrease the costs and bring more focus on value adding support.

All support needs to be visible and easily reachable for the whole of CSC. Basic administration should be efficient and conserve resources. Routines and systems supporting work processes are important ways to meet this goal. Basic administration ought to be characterized by a balance between cost, quality and level of service. Therefore there is a need to survey what kind of support, and what level of support, the organization requires.

Interfaces will be centred on requirements, not organisation of support.

Advisory and strategic support is closely related to the core business of CSC. Work tasks performed increases the value of the research and education. This support should be designed to be a strong part of the way in which CSC meets its core business goals. Hence, this support needs to be organized in an easily adjustable way both regarding volume and type of specialisation. Within several areas, for example, internationalization and education development, support staff complements the actions performed by academics in order to reach the overall goals.