**Subpanel report**

1. **Name of subpanel members**
   Lauri Malmi (chairperson)
   Susan Eisenbach
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   Arieh Iserles
   Kerstin Johnsson
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2. **Name of KTH school:** Computer Science and Communication (CSC)

3. **Feedback to the self-evaluation groups and School management**
   In this evaluation exercise, we considered carefully the self-evaluation report and many additional documents that were provided to us in the information pack, as well as before and during the site visit. We met many faculty teachers and students during the site visit. We, however, fully recognize that this rich information we received may not reflect the full picture of activities in the school and the degree programs. We therefore emphasize that the following critique and recommendations should be carefully discussed with all faculty members in the school to validate it, and to discuss its relevance and possible actions needed, either in program, school or KTH level.

   • **What, if any, are the examples of good practice and/or aspects that are particularly innovative at this KTH School?**
     o The school organizes regular pedagogical seminar for teachers, which supports reflection of current education and discussion on new approaches.
     o The Directors of Studies give support to teachers.
     o There is transparency of teaching commitments among teachers.
     o There are good relations between faculty and students.
     o The facilities were good.

   • **What, if any, are the aspects that require corrective action and/or aspects that merit support strategies at this KTH School?**
     o Faculty seem to be disempowered and passive about what goes on in the teaching programmes.
       ▪ We got the impression from non-senior staff that there was no awareness of a strategic vision about what programmes should be providing. The senior staff assured us that there is a new strategic vision, but did not elaborate on whether this vision addressed education. Even if so, we believe that the strategic vision of the school should originate in the entire school rather than just the senior management.

       ▪ **Recommendation:** The school management should engage all faculty in discussion on strategy and future vision. The strategy should address aims, scope, focus and pedagogy of the school’s programmes.
Recommendation: As a part of strategy work the school management should take a look at the proliferation of programmes, especially on Master’s level, and decide whether some of them should be removed or merged.

It seemed to us that the school has been run by a spreadsheet mentality, i.e., counting too strictly what are the responsibilities of each faculty member and how much time each of them has been allocated to carry out these tasks. This is detrimental to change, creates an inflexible atmosphere and impedes initiative and ‘can do’ spirit; the creation of first rate teaching and research programmes requires change.

Recommendation: The school management should discuss with faculty whether this impression really holds and what could be done. The management should promote initiative among teachers and do its best to overcome possible difficulties in implementing changes, if they are considered appropriate at programme level.

- As the MSc theses are the culmination of the degree programmes we feel that it is critical to get them right and we have several serious reservations about them.
  - It was difficult for the panel to find out information about thesis work requirements and process, and the students said that they too had difficulties finding information (which does exist).
  - The examples of independent degree projects provided to us (in the information pack) were at the MSc level and were disappointing in subject matter and quality, e.g., project topics presented did not match the scope of the degree programmes, there was weak coverage of literature in several sample projects, and the tasks undertaken were not always as substantial as would have been expected for a 30 ECTS piece of work. The selected sample of projects did not all meet standards of adequate MSc theses.
  - Only during the site visit we discovered that programme leaders do not always have knowledge of theses of their students carried out in other schools or an interest in monitoring their appropriateness to their programmes. This seems to us to be a clear weakness: there is no control of what project topics are formally allowed for CSC related degrees.
  - During the site visit we were provided with a much more appropriate set of thesis reports from the school management, a set which reflected on work carried out in this school. In this set the topics were appropriate for a CSC school. We, however, were still concerned that there were accepted theses, which did not seem as substantial as would have been expected for a 30 ECTS project, including proper literature survey.
  - We investigated the grade distribution of thesis works in computer science program (2010-2011), and we were concerned on the very high percentage of thesis with best grade: 41 out of 50 theses that had a grade A-E (there were also 63 theses with grade “Pass”) had the best grade A.

- Recommendation: The school management should implement procedures which provide students easily with accessible written information about thesis requirements, process and grading.
  - ensure that CSC programs have a clear control of thesis topics which are acceptable in the CSC school. We understand well that there are cases where it is appropriate for CSC students to carry out their projects in other schools. These cases, however, have to be clearly identified in the process, as well as in any statistics related to school results. There must be the recognition that, even if the thesis is supervised elsewhere, ultimate
responsibility for quality assurance resides with the School, specifically with the programme directors,

- reconsider carefully the grading policy of thesis projects with all faculty members who are allowed either to supervise or examine thesis projects.
  - Re-evaluate the independent degree project grading scheme in order to increase the differentiation of thesis grades. Consider the weighting of the dimensions process, product and presentation, as well as the rubrics within each dimension.
  - Review programme requirements and contents to assure that all students have the appropriate pre-knowledge prior to starting their independent degree projects, including advanced-level subject matter knowledge, literature search skills and writing skills.
- It seems from our meetings with faculty, meetings with students, the prizes they win, and the statements of school management that teaching of individual courses is taken very seriously. We, however, found no evidence on that programme design receives similar kind of attention. Having the programme directors chosen primarily from junior faculty does not give a positive impression of the commitment to teaching. It seems to us a clear weakness that teaching leadership roles in a world class department are not held by senior research-active faculty.
- Recommendation: The school should reconsider nominations of program leaders and nominate them from senior (professor level) faculty. We are aware that CSC school has lower proportion of full professor positions compared with other KTH schools, and this would be an incentive for KTH to increase their number to avoid overloading current professors with excessive responsibilities.
- There is a very serious problem with the availability of information from the web about both the school and the teaching programmes.
  - At this time the only reasonably effective way of finding information seems to be via an external search engine.
  - The entire EAE CSC panel found the website opaque, often facing a mix of languages (Swedish/English) in which information is given. For example, we did not find clear information about the overall structure of degrees provided by the school.
  - Given that this is the main avenue for potential students, other researchers, and HSV to find out about CSC, we cannot overstate how important it is that the website be replaced by one which reflects the work that goes on within CSC in an easily accessible way.
  - As an example, the panel assumes that the roles of Vice-Dean of education, Director of Undergraduate Studies, and Directors of Programme are probably clear for the current staff. However, it would be good to make the roles more visible also for people from outside on the school web site.
  - There was discussion about corporate branding and whether the problems lie in KTH internal web information policies. However, the problem lies within the school and must be solved at the school level.
  - We hope that the new Dean of CSC's initiative to redo the website is effective, but are concerned that the school has not put sufficient resources into providing an informative website in the past.
- Recommendation: The school should follow the initiative carefully, and, if necessary, should be provided with appropriate resources from central level.
- The merger of the HCI and Media Departments is an important step for the School and ought to lead to new developments. We recommend that the Media Technology programme is given particular attention. It needs to have (i) a coherent mission, clearer educational objectives and focus; and (ii) a firmer research base.
- Recommendation: Efforts are made to support staff in developing their research
competence and qualifications (PhD, docent) and that the search for a new chair is a priority task.

- Course evaluations are not always presented to students. Student representatives never get to see them aggregated so that comparisons between courses and comparisons of a course over time can be made. Even though the programme as a whole is discussed in the programme integrating course, no statistics regarding student satisfaction and student retention are presented. Thus, the feedback at the programme level is lacking.
- **Recommendation:** Course evaluation results should be summarised and made available to students and especially student union representatives. Aggregated results for the courses in each programme should be presented to and discussed with student union representatives.
- There seemed to be some lack of clarity among junior faculty in how decisions are made for programme changes. Some teachers complained of the time lag between requesting a change and when it can be implemented. The administrative constraints on change encourage inertia.
- **Recommendation:** All faculty members should have a clear understanding how to proceed when they see a need to change their course in some aspect. Possible problems with updating national course information database (LADOK) should be overcome at school level.

3.1. Name of self-evaluation group: CDATETCSCM_TMAIM

- **What do you find to be the overall strengths and weaknesses of the programmes?**
- **What are your recommendations for the future?**
- **Strengths**
  - We observed that there seems to be good collaboration between staff members and students. In particular, the students seemed happy with the general attitude of staff members. “They are eager to listen to us, what we say”, we were told.
  - The lecturers whom we interviewed had got research money enabling them to do substantially less lecturing. Yet, they had decided to do more teaching than required, because they enjoyed it and were committed to the students.
  - The panel considered the regular practice of course evaluations and discussing courses with their peers in small groups a good practice.
  - Annual meetings with the Director of Studies were also useful. Academics particularly liked that every teaching task was allocated a time allowance and so people's teaching commitments were transparent. They also liked that the derivation of the tariff for each task was an iterative process over years and seemed to believe that the current tariffs were fair. In spite of these positive aspects, we felt that sometimes this time allocation is bound to cause unnecessary inflexibility in the organization: if time is not allocated for some task, some people may consider it unnecessary to accomplish it.
  - We interviewed a new lecturer who felt that the 15 ECTS pedagogical course helped her settle in, in several ways. She enjoyed meeting other new lecturers in other schools making her feel more part of the KTH community. The coursework requirement to reflect gave her greater insight into her teaching. Some of the course material was interesting and gave her ideas for her teaching.
  - From both the documentary evidence provided and the interviews with the chosen students, the degree programme seems to meet the students’ expectations. They find the academics in the school responsive to their needs. There is a mixed reaction to the Mathematics lectures. Some students don't understand why they should be required to study this material, especially certain mathematics content that they felt was not used in their programme.
  - Students have an opportunity to reflect on their studies in the Programme Integrating Course. This course also seems to support programme...
development by giving feedback to the programme on a holistic level. The interviewed teachers seemed to appreciate it.

- We have identified that there are innovative approaches to education in the CDATE program. As an example we take the “Programming under pressure” course, which is combined with the activities related to programming contests. The programme invites students to participate in both national and international programming contests, and there have been clearly successful results. We consider this as a positive and motivating factor for students interested in developing their programming skills.

- There is some work going on in computing education research, where the active development of education and educational tools have lead to scientific work. This is a development that should be encouraged, especially in cases where developing educational technology may bring forward interesting computer science problems to be addressed in other research groups. In addition, taking a research perspective of developing education can support better teaching and learning and provide evidence of the achieved improvements.

- We recognized the high employability of the students.

**Weaknesses**

- The bachelor degree project in the CS programme is organized as a course consisting of a lecture series, a group project in ten-student groups, and an individual project. The size of the independent project is 9 ECTS. This is a questionable setup with regards to the Swedish national requirements for bachelor degrees, which call for a 15 ECTS independent degree project. It can be debated whether the students meet the bachelor degree requirements.

- **Recommendation:** Decouple the group project from the bachelor degree project. Create a dedicated a group project course and let the bachelor thesis project be done individually.

- We did not find enough evidence to conclude that the programme addresses sustainability issues properly.

- **Recommendation:** Consider whether this could be addressed with a specific (compulsory) course or by incorporating sustainability issues in some of the current courses.

- Students noted a specific course related to software engineering the contents of which need revision to match current standards, and there seemed to be an inadequate response to this request from the organization.

3.2. Name of self-evaluation group: CMETE_TMETM_TMMTM_THCIM

- **What do you find to be the overall strengths and weaknesses of the programmes?**
- **What are your recommendations for the future?**

**Strengths**

- Media Technology includes physical media (for image + video + audio), software for communication (e.g., for web + mobile + spatially aware devices), management business development, and legal and governance matters. Media technology seems destined to be a large and influential field of study and an economic sector. The engineering approach to media is being developed effectively. The technical nature of the programme is important combining basic subjects of software, mathematics, and physics.

- The media and HCI programmes stand out in that they have high female participation: such as CMETE (c. 40%) and TMMTM (c. 50%). This was reflected in our meeting with students (80%).

- The media programmes created the program integration course and its beneficial effects have led to it being adopted by other programmes. We found that the course has a good response from students and teachers. We question whether its contents are worth 7-13 ECTS. We wondered if the same learning goals could be achieved in other ways with less ECTS? Could the expected
learning outcomes be extended and the requirements for passing the course be strengthened intellectually?

- The programme attracts students who otherwise would not come to KTH.
- Students seemed generally happy with education and teachers. However, there were complaints concerning the quality of teaching of mathematics (though not the relevance).
- Teachers were positive towards education and developing it.
- Students very positive of the possibility to do their MSc thesis in companies.

- Weaknesses
  - Building academic competence and capacity in new broad areas is often a multidisciplinary and volatile process. We have questions concerning the standard of education compared with other programmes at CSC. Its considerable breadth requires the programme to compromise on depth; some topics that are intellectually challenging in an engineering context may take on shallower forms in this course. This is also apparent in the learning outcomes (programme objectives) defined for the media and HCI programmes – none of the specified learning outcomes require the students to demonstrate substantially deeper knowledge in certain parts of the field as specified in KTH’s new educational framework. It is hard to see what the core of the programme is and what is the true expertise the programme produces. The only courses that are compulsory for all students, across their selected specialisation, are the non-technical media courses. We had difficulties understanding the logic of the programme beyond being a collection of mostly introductory courses.
  - Recommendation: The media technology staff members should initiate a discussion to address these issues in order to develop a coherent view of the program goals. They should ensure that students gain deep knowledge of certain focused topics during their studies, and meet the national requirements on a MScEng (“Civilingenjör”) degree.
  - The Media Management programme extends the School’s scope and we wonder whether CSC is really the right place for developing this type of programme in the future. Should KTH consider developing a School of Social Sciences for Technology for such a program or should it be located in the School of Industrial Engineering and Management?
  - The research foundation of the media programmes seems weaker than others that we have evaluated. This might be due to the fact that a significant number of the staff does not have PhDs and that professor chairs are currently vacant.
  - The school management and the programme management are all new. We did not recognize that the school or the programme management have a clear vision for future development of the programme, what it should be in the future. Apparently, the school and the programme management are waiting for the vacant chairs to be filled before initiating the work to define such a vision for the programme.

3.3. Name of self-evaluation group: TSCCM_TSVDK

- What do you find to be the overall strengths and weaknesses of the programmes?
- What are your recommendations for the future?
- Strengths
  - The research group supporting the programme is scientifically on a high international level. This is a young group with prominent research profile.
  - There exists palpable enthusiasm among the academics concerned to share their expertise with students within the programme and within KTH.
  - Teaching of numerical analysis throughout KTH is evidently at a higher level than service teaching of `standard' engineering mathematics.
The recently-introduced tutoring system is a definite strength and a positive development, although we note that its implementation is hampered by budgetary constraints.

- **Weaknesses**
  - The size of incoming student cohort is alarmingly and unsustainably small. This is a serious weakness that must be addressed promptly, without awaiting eventual outcomes of the new proposed undergraduate course.
  - **Recommendation:** The programme managers should be considerably more proactive (and given the scope to do so) in advertising the programme.
  - There are worries about the level of students who are accepted for the Master programme, in particular insofar as their mathematical proficiency is concerned. The efforts to solve this problem have been completely unsuccessful.
  - The programme falls short of equipping students with the range of competencies useful in an industrial career, e.g. mathematical modelling and basic knowledge of engineering subjects.
  - **Recommendation:** Open up the curriculum so that it facilitates for students to complement their scientific computing knowledge with knowledge of an engineering subject of their choosing. Address “industrial mathematics” in some courses or projects.
  - The likely success of the proposed three-year Bachelor programme, “Simulation Technology and Virtual Design” is questionable. We are not persuaded that, in its proposed form, duration and name, it will attract good students from Sweden in the right numbers.
  - **Recommendation:** Reconsider the decision to launch a three-year bachelor programme, and replace it with a five-year Civilingenjör programme with “mathematics” in its name.
  - We are not persuaded that the programme has sufficient core material in scientific computing. For example, there is no mention of optimisation or stochastic computations in the syllabus.
  - **Recommendation:** Revise the curriculum so that it enables students to develop knowledge of mathematical topics taught at the Mathematics department, including optimisation and stochastic computation.
  - The sample MSc theses were uneven, weak and sometimes methodologically unsound.
  - **Recommendation:** Form a working group that review the quality of master’s theses from the programme.
  - The relationship of this programme with the mathematics department is totally unclear. The historical circumstances for being in the CSC school are not a valid reason anymore and ideally scientific computing should be repositioned to School of Science as a division of the mathematics department.

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**4. Feedback to KTH management**

The range of subjects at the CSC school has to be at the centre of modern engineering and if KTH is to be a relevant 21st century technical university it must have a world class school in the information area.

- **What are your recommendations for the future to the KTH management level?**
- **What strategic decisions and investments are required, in your view?**
  - At KTH, the structure of both the schools and the departments within the science and engineering schools seems to be historically rather than intellectually based.
  - There seems to be quite some overlap between the schools of CSC and ICT. Merging these two schools would strengthen KTH’s position in the areas of CS & ICT, would make KTH’s study programme offerings appear less confusing to
prospective students, and would potentially result in increased efficiency. Given KTH’s and the School of CSC’s expertise in telepresence through the Centre for Sustainable of Communications and the Media Technology & HCI department, it should be possible to merge the two schools without having to relocate students or staff from any of the two sites.

- **Recommendation:** KTH management should set up a process to provide a strategic vision for the information area. This process should have academics and students working at the CSC/ICT at its core and pay attention to what happens at the best institutions round the world.

- Our perception is that the decision-making structures at KTH are excessively administrative and top-down. Decisions appear to be fundamentally managerial rather than strategic in nature and are arrived at the centre and filtered down to Schools, whence to Department and educational programmes. The units down the "managerial chain" have very little scope for their own action and initiatives. Specific examples include:
  - The structure of units is concerned more with administrative convenience and geographic proximity than with scholarly and pedagogical rationale;
  - It seems that the schools and departments are excluded from decision-making process in hiring their own academic personnel;
  - A system of advancement and promotion that has little to do with school contribution or initial school filter, hence leading to inevitable neglect of teaching quality as a necessary condition for promotion;
  - Centralised control over the dissemination of information on Master programmes, inclusive of both printed and web-based literature, is detrimental to proper communication of information to potential students and this may be reflected in student numbers.
  - Centralised control over the dissemination of information on Master programmes, inclusive of both printed and web-based literature;

- The consequence of such examples is that schools and departments inevitably feel disempowered and their initiative is sapped. Academics operate at their best when they have full scope to exercise their judgement and responsibility, rather than being cogs in a machine over which they have little control. Our impression is that at all levels of CSC there is considerably too little initiative and readiness to assume responsibility, too much passive acceptance of instructions from above. In our experience, the best academic practice in leading academic institutions is centred upon substantially more decentralised structure.

- **Recommendation:** We encourage KTH management to evaluate how well its centralized structures and policies provide the services that academics working in KTH schools need as support functions. This should be carried out in close collaboration with schools, possibly also with external evaluation panels.

- **Recommendation:** Problems at the programme level and repeated difficulties need to be better supported by the student evaluation system.

- Feedback from student evaluations exists, but is not as pervasive as it needs to be. The course evaluations have several omissions which need to be rectified.
  - The information is between lecturer and students only.
  - The results are only made visible to the students or other faculty, if the individual being assessed decided to do so.
  - There is no information provided across programmes or across years.

- **Recommendation:** Student representatives for external courses are not organized, which makes it especially hard to influence courses outside CSC. The student union does not seem to know how to react when they try to improve these courses.

- **Recommendation:** KTH should better support and monitor evaluation of
service courses, i.e., courses given to other programs from any KTH school.

- On all levels, we saw little awareness what happens at competitor institutions.

5. Optional: Methodological feedback

- What are your reflections on the EAE project and its methodology?
- What are your recommendations to KTH when embarking on future projects of this kind?
  - The EAE process demonstrated that there were structural problems with the preparation and changes need to be made before the National Review.
  - The School had no clear idea what information the centre had sent us. The School should have a more active interest on and possibly have a final say over the material that is released in its name.
  - At the academic staff level there was very little understanding of what the EAE was about. For the National Review all the academics at KTH have to know what the review is about and what are its goals. One would expect practice runs before the final visit.
  - The original information on independent degree projects, and how they are organized was quite insufficient for the panel, concerning the importance of these project reports in the future national evaluation.
  - It turned out that the selection of project reports given to us was almost totally from projects supervised outside the CSC school, thus poorly reflecting the school practice and levels.

Recommendations

- This kind of teaching evaluation should definitely be academically driven instead of managerially driven. The academics are the primary group to recognize fully and address the problems of education.
- There must be a much more careful plan for preparing for the upcoming national education evaluation including:
  - Informing academic staff and students about the goals and operation of the evaluation
  - Preparing the material that is provided for the evaluation panels in collaboration with academic staff.
  - Reviewing and refining the material, ensuring that it addresses the review questions properly and holds a uniform high quality across KTH