



Development Plan

The Department of Computer Science and Engineering, and the master's program **Applied data science (N2ADS)** in particular, would like to thank the external evaluation committee for their reportⁱ and suggestions to improve the program. For most of the parts we agree with the external evaluation committee and we believe that the suggestions, once implemented will lift the quality of the program. Below are our more specific comments for each suggestion from the report.

Please note that the order of suggestions and action points below is not based on the order that the suggestions appear in the evaluation report, nor are they based on the order in which they will be implemented. Neither do they reflect a priority order for implementation. A suggestion for prioritized actions will be submitted separately.

The suggestions are instead divided into three groups where group 1 contains the suggestion that received specific attention in the report. Group 2 contains suggestions that were, along with the suggestion in group 1, lifted extra in the summary. Finally, group 3 contains all other suggestions.

In order to implement the proposed action points, additional hours have to be allocated for the program responsible (PA) and study counselor (SVL). The current time budget of 20% does not cover any of the time needed to implement the action points below, except those that are already done. Required hours are total no of hours for all participants in the activity, if not otherwise specified.

The department has very recently formed a program-leader-group (PA-group) consisting of PAs from different program, vice-prefect for undergraduate education, study counselors and personnel from the department's study administration. Many of the tasks mentioned in the lists below apply to several programs and it has been decided that they should be handled together.

The overall impression of the evaluation group about the program Applied data science, that started in autumn 2020, is positive. Below a few quotations from the evaluation report (in parentheses a reference to the respective section in the evaluation report):

*"The evaluation group's overall impression is that **the Applied Data Science master program is of good quality.**" (section 2.1)*

*"The program makes a good effort to ensure that **the 'Applied' in the program's name is in focus.** [...] The application side of the program is based on theoretical foundations and many courses contain both theory and practice." (section 2.1)*

*“It is the opinion of the evaluation group that the of **teachers** the program have the **pedagogical and subject matter competence** needed to fulfill the program needs.” (section 2.4)*

*“It is the opinion of the evaluation group that the Applied Data Science master program as a whole is **highly relevant for the needs of society and students.**” (section 2.5)*

*“**The program is still young** and changes have been made for several courses during these first years. More changes are ongoing [..]” (section 2.8)*

*“**The gender distribution** in the program is ca 40% female and 60% male students. Compared to computer science and engineering programs, this **is rather positive.**” (section 2.10)*

*“**‘Diversity is an opportunity and a challenge’**” (section 2.8)*

Group 1:

Suggestion 1.1: “[..] urgent challenges relate to **the need to recruit new staff** both for broadening the program content as well as for being able to provide more specialization tracks and enough supervisors and examiners for the master’s theses.” (section 2.4, section 2.8, section 3.3)

Next step: Write an acquisition plan including a needs analysis.

Responsible role: head of division DSAI, PA, director of studies DSAI

Suggested deadline for implementation: December 2021

Required resources: 10 hours

Group 2:

Suggestion 2.1: “[..] the leadership (of the program) needs more high quality data [..] more statistics about course participation, course completion and program completion.” (section 3.3)

Next step: Form routines to continuously extract relevant information from ladok, then update that information once per term.

Responsible role: PA and SVL (mostly SVL)

Suggested deadline for implementation: Set up of routines autumn 2021, collect data continuously thereafter once per term

Required resources: Set up of routines: 40 hours, continuous update 5 hours each time

Suggestion 2.2: “[..] a matrix with course and program goals is needed to confirm that the program goals are met by all students regardless of which elective courses they choose.” (section 3.3)

Next step: A matrix will be part of an updated program description that the new PA group will work with.

Responsible role: PA-group

Suggested deadline for implementation: June of 2021

Required resources: 20 hours

Suggestion 2.3: Diagrams that show dependencies between courses (section 3.3)

Next step: Create diagrams, publish on the program’s webpage and use them in information sessions with program students.

Responsible role: PA and SVL

Suggested deadline for implementation: End of 2021

Required resources: 5 hours

Suggestion 2.4: The University of Linköping, where one of the members of the evaluation group is employed, conducts program evaluation with the help of a mandatory a reflection report in connection with the master's thesis. The evaluation group suggests the program introduces such a report. (section 3.3)

Next step 1: Find out if any structured program evaluation has been conducted for programs at the IT-faculty or any other program on the Chalmers side associated with the CSE department. Find out by asking other program responsible at Chalmers and GU, SVL, UBS and members of the IT-faculty.

Outcome step 1: No program evaluation has been done for any of the IT-faculty's programs or programs on the Chalmers side during at least the past 5-10 years. There has been one program evaluation for MPALG around 10 years ago.

Next step 2: Investigate if a program evaluation of the suggested form is a desirable step forward (course evaluation at GU is anonymous and voluntary, the suggestion for program evaluation points into the opposite direction). If not, are there other ways a program evaluation could be performed? Investigate by collecting input from the PAs of the IT faculty's programs and student representatives (e.g. with the help of a workshops or a survey).

Responsible role: PA (step 1), PA-group (step 2)

Suggested deadline for implementation: June 2022

Required resources: 30 hours

Suggestion 2.5: *"The evaluation group recommends to keep stronger contact with alumni and set up routines for, e.g., alumni meetings and alumni surveys"* (section 2.11)

Next step: Find out if there is any established alumni contact structure for programs at the IT-faculty or any other program on the Chalmers side associated with the CSE department. Find out by asking other program responsible at Chalmers and GU, SVL, UBS and members of the IT-faculty.

Preliminary outcome step 1: There seems not to be any established alumni contact structure for any of the IT-faculty's programs or programs on the Chalmers side during at last few years except efforts from a few individuals (PAs) for their specific program. When PAs change, a specific activity may not be carried on by the next person. N2ADS has a Linked-In page for former students. The current PA has a hand-made, highly incomplete list of names and email addresses of former students. Former students are invited to the social gatherings for program students (3 times a year), they serve as guest speakers in courses, the communication officer conducts interviews for the program's webpage. Alumni with suitable positions in industry can serve as contact persons/advisors for master's thesis projects.

Next step 2: Investigate if there can be found a reliable and time-efficient way to keep in contact with former students. Investigate by collecting input from the PAs of the IT faculty's programs and student representatives and – of course! - alumni.

Responsible role: PA (step 1), PA-group (step 2)

Suggested deadline for implementation: June 2022

Required resources: 30 hours

Suggestion 2.6: *"The evaluation group recommends that the program forms some sort of advisory board with industry representatives [...]"* (section 2.5) *"The evaluation group considers student representation at the program level as an action point. [...] a program board may be created and student representatives could be members of such a board"* (section 2.6)

Next step: It has already been announced by the IT-faculty that there will be an advisory board including the N2ADS program (currently the suggestion is that the advisory board should cover three

programs: N2ADS, and the two Software Engineering programs on bachelor and master level N1SOF and N2SOF). In the IT faculty's advisory boards there are always student representatives and representatives from industry.

Responsible role: CSE Department, PA-group

Suggested deadline for implementation: June 2022

Required resources: unknown

Group 3:

Suggestion 3.1: *“However, alumni certify that more mathematics (e.g., linear algebra) is needed at the beginning of the program as well as a course about research methods in data science [..].”* (section 2.3)

Next step 1: Create an overview over the first term courses and find out where more mathematics could and should be included.

Next step 2: Collect online resources about linear algebra (as well as basic calculus and discrete mathematics), written material and videos, to provide arriving students with suitable refresher material for different levels of previous background (as a supplement to what is/will be covered in the first term courses).

Next step 3: There is already a compulsory course with the title “Research methods in data science DIT875” that most students take. A possible action point could be to find out why former students ask for a course about research methods in data science despite the existing course, that is, if the existing course does not cover what students expect.

Responsible role: PA or teachers from the program

Suggested deadline for implementation: June 2022

Required resources: 30 hours (step 1), 50 hours (step 2), 5 hours (step 3) (total nr of hours for all contributing staff)

Suggestion 3.2: More Software Engineering methods and project management, either as a course or as parts of existing courses (section 2.3)

Next step: There are already several Software Engineering courses among the elective courses. Investigate how e.g. project management could be introduced in existing courses, for example those which contain project work.

Responsible: PA and teachers of program courses that contain project work, colleagues from Software Engineering

Suggested deadline for implementation: June 2022

Required resources: 25 hours

Suggestion 3.3: *“When the program developed there were no guidelines for what should be included in such a program. Currently, such guidelines exist and the evaluation group recommends to align to or take inspiration for changes from such guidelines.”*(section 2.8)

Next step: Find different sources for guidelines and check the program content against the guidelines.

Responsible: PA-group

Suggested deadline for implementation: June 2022

Required resources: 15 hours

Suggestion 3.4: *“The evaluation group recommends that the program leaders consider the possibility of including material from the guest lectures in assignments and projects in courses when possible.”* (section 2.5)

Remark: Guest lectures refer to speakers from industry or external organizations.

Next Step 1: Discuss with teachers and other PAs how this could be done.

Next step 2: Depending on the outcome of step 1, either implement the suggestion or write an explanation in case there are strong reasons why it cannot be done.

Responsible: PA or teachers of program

Suggested deadline for implementation: June 2022

Required resources: 25 hours

Suggestion 3.5: *“A recommendation of the evaluation group is that the program organizes follow-up meetings (e.g. lunch meetings) to get to know how students are doing in different aspects.”*(section 2.7)

Remark: The suggestion seems to address the need of new students in pandemic mode (i.e. online teaching). When the teaching is done on campus, there are several different occasions when SVL, PA and students naturally meet in person. However, there is probably a need of students, especially new students, to get in contact with their PA and SVL in an easy way.

Next step: Regardless if the teaching is conducted online, on campus, or both during the academic year 2021-2022, investigate what events and meeting occasions could be offered to satisfy the new students’ needs. Organize suitable events and schedule meeting occasions.

Responsible: PA and SVL

Suggested deadline for implementation: Autumn 2021

Required resources: Monthly office hours/lunch meetings during term time: 25 hours

Suggestion 3.6: Increase collaboration with other programs (section 2.8).

Next step 1: Attend meetings with all PAs of the programs at the IT faculty, establish communication channels and investigate possibilities for collaboration. Reach out to closely related Chalmers programs.

Next step 2: Broaden the search for collaboration to programs outside CSE and the IT faculty. The evaluation report suggests e.g. biology, astronomy and marine sciences. There are potentially very many collaboration partners.

Responsible: PA-group

Suggested deadline for implementation: June 2022

Required resources: 15 hours (step 1), 30 hours (step 2)

Suggestion 3.7: *“Another challenge that needs to be tackled is a decision on the prerequisites for the applicants to the program.”* (section 2.8)

Next step: Status: Done. The prerequisites have been changed recently

Responsible: PA

Suggestion 3.8: *Introduction of sustainability in the curriculum is an issue of further improvement.”*(section 2.10)

Next step 1: It is a little unclear what the evaluation group is asking for. There is a possibility to get courses sustainability-certified and there are contact persons to support that process (Birgit Penzenstadler and Jennifer Horkoff). Investigate what exactly the process of certifying courses would

imply for the courses of this program by attending a workshop on the subject matter on June 14, 2021. Status done.

Next step 2: Select 2-3 courses from the program and get them sustainability certified in collaboration with the teacher of the courses following to the process described in the workshop in step 1.

Responsible: PA (step 1), PA or teachers of the program (step 2)

Suggested deadline for implementation for step 2: Preparation June 2022, implementation in autumn 2022 for courses running in academic year HT2023/VT2024. It is unfortunately not possible to conduct this faster due to the current procedures of course plan changes at CSE. Therefore, this action point cannot be conducted within the scope of 1 year after the program evaluation, but the preparation work for the syllabi updates can be done before summer 2022. The author of this document wants to add that the matter of long processes for course plan changes already has been addressed in the program evaluation for N2SOF in 2018/2019.

Required resources: 5 hours (step 1), 20 hours (step 2)

Suggestion/remark 3.9: Different grading scales for GU and Chalmers students in joined courses (section 2.11)

Next step: Status: Done. GU allows the same grading scale as Chalmers starting from academic year 2021-2022. We have already asked for course plan changes for most of the program's courses to align the grading scales

Responsible: PA

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ⁱ The evaluation report (published on April 13, 2021), can be found at <https://medarbetarportalen.gu.se/internt-itufak/kvalitetsarbete/it-fakultetens-utbildningsutvarderingar/utvardering-2020-21/>