

Saxion University of Applied Sciences

MSc Robotics Systems Engineering

Assessment NVAO condition

April 2023

Introduction

In April 2021, an NVAO panel assessed the new master's programme in Robotics Systems Engineering of Saxion University of Applied Sciences. The advice on the programme was conditionally positive. The panel was positive about the programme's intended learning outcomes and the teaching-learning environment, but had some reservations about the system of student assessment. The panel was convinced of the quality of the proposed programme and expressed the expectation that the MSc Robotics Systems Engineering would be an attractive programme fulfilling a clear industry need. The panel's main concern was that the individual assessment needed to be clarified and safeguarded.

The NVAO followed the panel's advice and, in June 2021, granted Saxion University of Applied Sciences conditional accreditation of its new MSc in Robotics Systems Engineering. The condition to be met within a period of two years was the following:

- The programme needs to ensure proper assessment procedures and tools are in place to safeguard the assessment of individual contribution to professional products developed in a group setting. This should also be apparent in both the assessments made and the accompanying individual assessment forms.

In January 2023, Saxion described in a document (Robotics Systems Engineering. Information file) how it has addressed the panel's condition. Saxion invited the 2021 NVAO panel to assess whether the programme now meets the criteria for an unconditional accreditation. One panel member and the secretary were not able to participate and were replaced. NVAO approved the new panel composition.

The panel consisted of the following members:

- Prof. dr. Ming Cao, Full professor with tenure of Networks and Robotics, director of the Jantina Tammes School of Digital Society, Technology and AI, University of Groningen;
- Bahar Haghighat PhD, Tenure Track Assistant Professor in Robotics and Automation, University of Groningen;
- Ton Peijnenburg MSc, research fellow, High Tech Systems Center (HTSC), Eindhoven University of Technology, and manager System Engineering, VDL Enabling Technologies Group, Eindhoven;
- Willemijn Hoogland BEng (student), student MSc in Architecture, Delft University of Technology, and former student Honours Programme, Windesheim University of Applied Sciences, Zwolle, and Wentworth Institute of Technology, Boston (MA, USA).

The panel was supported by Dr. Marianne van der Weiden, independent secretary.

On 17 March 2023, the panel had an online meeting to assess whether the programme meets the condition.

Assessment

Assessment of individual contributions in group products

From the information file and the related attachments the panel learns how the programme adapted the assessment of individual contributions in group products. The examination of systems engineering is based on the assessment of professional products delivered by groups. The panel acknowledged the value of this form of assessment as it represents the professional practice. For the academic year 2021-2022 actions were taken in formative assessment and coaching. Based on these experiences, further changes in the summative examinations were made in 2022-2023.

The first cohort (2021-2022) consisted of ten students. This was large enough to thoroughly test the curriculum and examination programme, yet small enough to keep an eye on individual students. In the systems engineering courses, the performance of individual students was monitored by project coaches. Students were divided in groups of four to six students, each supervised by a project coach. In order to monitor the individual progress and to provide sufficient feedback to project group members, coaches kept track of individual students and were able to write individual characteristics for the students in their group at the end of the final systems engineering course. In addition, for each of the systems engineering courses all students signed a 'statement of own work'. The use of such a statement emphasized the importance of each student's contribution to the group product.

The most notable change in 2022-2023 is the ability of examiners to make individual adjustments to grades given to the portfolios of professional products in the systems engineering courses System Improvement, Engineering Startup and Systems Engineering and Integration. The adjustments can be made as whole points (so +1, -1, +2, -2 etc.) to accommodate individual differences in performance in the course. To support the examiner in making these individual adjustments, students need to keep track of their individual actions and contributions to the team in an individual journal and reflection form. At the end of the course, students also use this form to write an individual reflection on their experience in the course and collect the feedback from their fellow students. In case examiners decide to make individual adjustments, they motivate their decision and refer to the information in the individual journal and reflection forms and their own observations in the course. This procedure is described in the course description and supported by a standard form to motivate individual adjustments of grades. In the course Systems Engineering and Integration, students receive additional individual coaching in the form of three individual meetings with their project coach. In these meetings students define and evaluate progression of their individual learning and points of attention. The progression of the student on his own learning and points of attention are part of the individual journal and reflection form. They can be incorporated by the examiner in the individual adjustments that can be made to the grade based on the group products.

Summative examination of the first systems engineering course System Analysis and Modelling remains fully based on the quality of the group products. This course has an important place in the curriculum: not only does it provide the introduction to systems engineering principles, but the organization of the course accelerates the shaping of the learning community. To emphasize the importance of the group functioning and to provide safe learning environments for individual group members, the grade is based on the group performance for all group members. Group size in this course has been reduced in the academic year 2022-2023 to three students per group to allow the project coaches to sufficiently monitor each student.

The panel considers that the information file and the supporting documents clearly explain how the panel's original criticism has been used to adjust the assessment procedure. The panel is impressed

by the new output of the programme: a clear assessment procedure has been set up that can convincingly document the individual student contribution and progress during a project. The information file clearly lays out the two-step process which has been followed for implementing changes. The panel appreciates the reflective attitude of Saxion and how well NVAO's points are incorporated in adjusting and improving the assessment.

The additional material illustrates how individual contributions are clarified using statements of work and individual journals, with the option of adjusting individual rates based on these in combination with observations during coaching. The one systems engineering course which is still rated based on group performance (System Analysis and Modelling) has a small enough group size to make that work. The panel notes that the assessment procedure requires strong involvement and time investment of teachers. With growing student numbers, the programme may have to consider the scalability of this approach, avoiding an excessive teaching workload.

The transparency of the new assessment procedure clearly tracks the developed skills and qualities of the student and ensures that examiners have sufficient arguments to assess whether each individual student has obtained the relevant learning objectives necessary to pass the course. This form of assessment clearly shows the individual contribution of the student within a group project, which prevents joyriding. The panel agrees with the programme that the examination remains in line with professional practice and prepares students for functioning in professional practice where individual contributions and functioning are included in evaluation of job performance. An additional strength is the fact that students gain insight and are supported to take ownership of their own learning by creating awareness of their activities and contributions to the project. In this way, the student learns to adopt a reflective attitude and also becomes more aware of personal developments.

The panel concludes that in the revised assessment system, individual development has received sufficient attention and the quality of education to each individual has been convincingly guaranteed. The student assessment system **meets the condition** set by NVAO.

Conclusion

The panel concludes that the student assessment system has been adapted. It now fully ensures proper assessment procedures and tools are in place to safeguard the assessment of individual contribution to professional products developed in a group setting. This is clearly apparent in both the assessments made and the accompanying individual assessment forms.

The panel concludes that the condition is met and advises NVAO to take a positive accreditation decision for the MSc Robotics Systems Engineering of Saxion University of Applied Sciences.

On behalf of the entire assessment panel,

Prof. dr. Ming Cao, chair

Utrecht, 4 April 2023

Dr. Marianne van der Weiden, secretary