ASSESSMENT OF CONDITIONS • Advisory Report

WO-MASTER DATA SCIENCE AND SOCIETY

TILBURG UNIVERSITY

12 JUNE 2020

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Inhoud

1 Task of the panel

In 2018 (Decision dated: 31th of October 2018 - 006342) the Accreditation Organisation of the Netherlands and Flanders (NVAO) decided to accredit the new wo-master Data Science and Society at Tilburg University (TiU) but imposed conditions to be met within two years. This was in line with the advice formulated and substantiated in the assessment report by the panel of experts.

The panel concluded that the programme partially meets Standard 2. It satisfies the other standards. The panel was confident that the programme would be able to fulfil the necessary conditions to fully meet these standards within a reasonable period of time. Given these considerations, the panel advised NVAO to take a conditionally positive decision regarding the quality of the proposed programme wo-master Data Science and Society at Tilburg University. The panel advised to impose the following conditions:

- develop enrolment criteria for the programme related to the background in the other disciplines of the individual student and define a clear starting level in the 'societal domain';
- evaluate the programme as a whole and its individual courses on the contribution to the Intended Learning outcomes. Give specific attention to the objectives in the domain of communication. Strengthen where needed;
- develop a system of 'suggested individual study paths' for students as a structured combination of courses that build upon and enrich the disciplinary background of the students. Advance that students build on the strengths and what they already learned in the bachelor to develop 'substantive expertise in the field in which the data science is applied'.

The programme delivered documentation of approaches to meet the conditions for accreditation on the 17th of April 2020 to the NVAO. The NVAO invited the complete panel of 2018 to participate in the assessment of this documentation to determine if the conditions were met. The panel-members agreed on participating again in this assessment.

The panel is asked to advise the NVAO board on the question whether the programme convincingly demonstrates that the conditions are now sufficiently met.
The panel studied the dossier and exchanged first impressions and questions by email.

On June the 12th 2020 the panel arranged a video conference by MS Teams in which the members: a) discussed the first impressions and agreed on the questions to be asked; b) interviewed the academic director and the head of the Education Support Team of Tilburg School of Humanities and Digital Sciences and c) draw conclusions.

Also a collection of teaching materials was made available to the panel.
A draft report by the secretary was commented upon by all panel members. The chair finalized this draft version which was sent for approval to the panel members on the 23rd of June 2020.

The panel consisted of:

Chair

- Prof. dr. ir. Maarten van Steen, scientific director Digital Society Institute, University of Twente; professor of large-scale distributed systems, University of Twente.

Panel members

- Prof. dr. Wim Van Petegem, professor of Learning Technologies, Faculty of Engineering Technology, KU Leuven;
- Prof. dr. Elena Marchiori, professor of machine learning for natural sciences, head of section Data Science at the Institute for Computing and Information Sciences, Faculty of Science, Radboud University.

Student member

- Lennart van Doremalen, PhD candidate Subatomic Physics Utrecht University.

The panel discusses its findings and conclusions for each of the conditions in the following text. In the overall conclusion the achievements on each of the conditions are considered.

2 Realisations on each of the conditions

This report follows the order of the conditions in the initial report of the panel. This ordering does not reflect how strongly changes related to these conditions impacted the programme. The most fundamental change was the introduction of the four specialisations: Business, Health, Media and Humanities. These specialisations relate to the four schools contributing to the programme and reflect the expertise of the lecturers and their research. This brought an organizing principle to the curriculum of the programme. From that, clear individual study-paths and requirements for prior knowledge emerged. This change becomes most clear from the report on the last condition (individual study-paths).

In 2019, 287 students enrolled in the Data Science and Society MSc programme. For next year 236 students are expected (Pre-registrations).

2.1 Admission requirements

The conditions are formulated as: develop enrolment criteria for the programme related to the background in the other disciplines of the individual student and define a clear starting level in the 'societal domain'.

The admission requirements have been changed since September 2019. The principal adjustments are:

- Eligible student applicants need to have demonstrable prior expertise in a particular societal domain;
- Students with a technical degree are no longer admitted to the program because they lack a demonstrable prior expertise in a societal domain.

In practice, this means that students are eligible to apply if they have a Bachelor's degree in one of the following domains:

- Social Sciences (e.g., Psychology, Sociology, Human Resource Management, or Organizational Sciences);
- Humanities (e.g., Communication Sciences or Linguistics);
- Law (e.g., Global Law or Public Administration);
- Economics & Business (e.g., Economics or International Business Administration).

All students need to meet minimum requirements on prior knowledge in statistics and methodology.

The admission requirements have been developed over the last two years. Changes have been discussed and are evaluated thoroughly. The documents and the explanation during the interview confirmed that criteria are well defined. These are not rigid criteria: the Admissions Board applies them in an individual manner, case by case. The admission process is very well structured with the use of forms to be filled out. Applicants are well informed about the expectations and the prior knowledge needed. The clarity on the expectations will guide students not to choose for this programme in case of insufficient prior knowledge in statistics and lack of experience in a domain of application. Applicants are required to deliver information on the courses followed in the domain required. This might also be prior working experience.

In general the programme now demonstrates to have a clear picture of the type of students enrolling in the programme and the expected graduates to leave the programme. In both cases the programme is ambitious.

In the development of the requirements the programme did relate the requirements to the four specialisations of the programme: business, governance, health or media. The most recent development is that students are eligible for enrolment in the specialisation if they finished one of the required BSc programmes. In case the student does not possess a fitting BSc background the student has to meet minimum requirements on specific prior knowledge (see table below).

Specialization	*BSc background*	*If no BSc Background, minimum requirements*
Business	Liberal Arts and Science: major Business and Economics Economics / *Economie en Bedrijfseconomie* / *Economie en Informatica* / International Business Administration *Econometrie en Operationele Research/ Econometrics and Operations Research*	Minimally 30 EC on: ✓ Marketing ✓ Management ✓ Finance, Accounting ✓ Thesis with relevant subject
Governance	Public Administration Political Sciences Organizational Studies Human Resource Studies Global Law Law and Economics	Minimal 30 EC on: ✓ Public Administration ✓ Organizational Sciences ✓ Human Resource Management ✓ Political Science ✓ Thesis with relevant subject
Health	Liberal Arts and Science: major Cognitive Neuroscience: Brain and Cognition Psychology Health Sciences Sociology	Minimally 30 EC on: ✓ Neurosciences ✓ Psychology ✓ (Public) Health Sciences ✓ Thesis with relevant subject
Media	Communication (and Information) Sciences Linguistics Media studies	Minimally 30 EC on: ✓ Communications Sciences ✓ Linguistics ✓ Information Sciences ✓ Thesis with relevant subject

From the interview the panel learned that this table was further developed and improved recently. The "Admission requirements for intake September 2019" gives a detailed overview of how the Admissions Board will assess the student's disciplinary expertise as well as his/her expertise on research methods and statistics.

In particular, in case the student does not meet the enrolment criteria on statistics the Admissions Board can set additional requirements for students to be admitted to the Master's program by requiring them to complete a pre-Master's program. It is not possible to compensate for a lack in background in one of the domains by following this pre-master.

During the interview the panel convinced itself that admission requirements are properly investigated by the Admissions Board. The panel applauds the clear criteria and well thought through relation between the specialisation chosen by the student and his or her prior expertise. The panel supports the requirement of making a choice for one of the specialisations at the moment of admission. This enhances the added value of the programme Data Science and Society.

The choice not to admit students with a technical background is a courageous one and is consistent with the profile and ambitions of the programme. The multi-disciplinary ambitions can be achieved only with sufficient background in the domain of application of the data-science techniques.

The clarification of the admission requirements benefited greatly from the introduction of four specialisations as a result of the improvement of the curriculum and study-paths (see below).

2.2 Intended learning outcomes

The condition was formulated as follows: evaluate the programme as a whole and its individual courses on the contribution to the Intended Learning Outcomes. Give specific attention to the objectives in the domain of communication. Strengthen where needed.

The programme took the following key measures: it newly shaped Indented Learning Outcomes (ILOs) on both course and programme-level and corresponding assessment blueprints have been defined.

Especially the measures taken to evaluate the curriculum and the development of new intended learning outcomes convinced the panel of the thorough approach of the programme management to adjust the programme structurally to meet the conditions. The panel was convinced by the newly defined intended learning outcomes, which now clearly touch upon the societal aspect of the programme and provide a clear picture of its profile. This is the result of a broad reflection initiated by the programme board in which the students participated and on the basis of a benchmark with international comparable programmes. The ILO's now are well defined.

In the benchmark with international programmes relevant and interesting examples have been included. This benchmark also resulted in adjustments in the curriculum. Specifically, the course Machine Learning was included in the mandatory shared core, and a new elective course was added to the Business specialisation.

The panel is very positive of the new intended learning outcomes and the manner in which these are translated into the courses of the programme.

The panel established that there is a good alignment between the enrolment criteria, the specialisations, the guidance toward individual study paths, the learning outcomes of the courses and the assessment blueprint. The programme now clearly proved that master level is achieved in the societal dimension of the curriculum. In the specialisation the student will build upon a bachelor level in a relevant field related to the specialisation.

All specialisations now fulfil the “Society” aspect as mentioned in the name of the programme. This also provides the programme with a clear and recognizable profile.

Since students now, as a rule, will lack in-depth technical knowledge, the panel suggests to monitor if the materials and courses fit the starting level of the students. The ambition is to make the students ‘data science-savvy’, so, books and courses have to match that. Overall the interview convinced the panel that the programme is aware of the tensions that might rise between the ambitions of the lecturers and the abilities and background of the students. This is monitored and good examples of adjustments for this specific group of students were given. Again the programme demonstrates to have a clear picture of its profile starting from a background in a societal domain and adding data-science abilities to enable graduates to perform as a ‘linking-pin’.

2.3 Individual study paths

The condition was formulated as follows: develop a system of ‘suggested individual study paths’ for students as a structured combination of courses that build upon and enrich the disciplinary background of the students. Advance that students build on the strengths and what they already learned in the bachelor to develop ‘substantive expertise in the field in which the data science is applied’.

As of the academic year 2019–2020, the program has implemented four specialisations in the following societal domains: Business, Governance, Health and Media. The panel recognizes these as societal domains of application of data science. These domains also represent the four pillars on which the program was built in the form of research conducted by the four Tilburg University Schools involved in the program (Tilburg School of Economics and Management, Tilburg Law School, Tilburg School of Behavioural and Social Sciences, and Tilburg School of Humanities and Digital Sciences). The teaching staff is thus able to supervise students in each of the domains.

As discussed above this brought the most fundamental change and organizing principle in response to the conditions. The cross-disciplinary qualifications as a ‘linking-pin’ become clear from each of the specialisations.

In each of the specialisations data science related subjects are offered. The programme implemented guidance for students to develop individual study paths related to one of the specialisations. Students who enrolled in the programme in the academic year 2019/2020 had to make a choice for a specialisation during their admission.

The cross-disciplinary qualifications as a ‘linking-pin’ become clear from each of the specialisations.

As mentioned above, the specialisation is related to prior education of the student, this is defined in specific enrolment criteria for each of the specialisations. A relevant selection of electives is offered in each of the specialisations. Information on that is provided on Canvas. The student can make an appointment with the Academic Advisor and/or the Academic Director to discuss matters related to the individual study path.

The panel was informed on the possibility to graduate in a ‘general specialisation’, next to the requirements of the four specialisations. This possibility is required by law to provide ‘educational feasibility’ (studeerbaarheid). It will remain an exception and is not promoted by the programme.

The panel now perceives a well-structured policy to define individual study paths related to clear defined specialities and domains of application. Students will choose specialisations deepening their prior knowledge or experience at bachelor level and relate it to the corresponding application of data science. This clearly fits the profile of the programme. The programme provides guidance to determine which specialisation is most suitable for the student.

3 Conclusions

The programme presented measures to meet the following conditions:

- develop enrolment criteria for the programme related to the background in the other disciplines of the individual student and define a clear starting level in the 'societal domain';
- evaluate the programme as a whole and its individual courses on the contribution to the Intended Learning outcomes. Give specific attention to the objectives in the domain of communicaton. Strengthen where needed;
- develop a system of 'suggested individual study paths' for students as a structured combination of courses that build upon and enrich the disciplinary background of the students. Advance that students build on the strengths and what they already learned in the bachelor to develop 'substantive expertise in the field in which the data science is applied'.

The panel was convinced that the programme seriously took up the challenge to meet these conditions. In fact the panel wants to congratulate the programme with the thorough improvements. The process of reflecting upon and gradually improving the programme can considered to be a best practice. The programme now occupies its own niche with a clear, relevant and promising profile.

The intended learning outcomes considerably improved describing a clear profile of the graduate. The curriculum was evaluated from several perspectives. In this process the alignment was improved considerably between the vision of the programme, its intended learning outcomes and the assessment. The four specialisations now clearly touch on a cross disciplinary approach of data science in society. The definition of enrolment criteria related to the specialisation of the student also preserve that students build upon knowledge acquired at bachelor level to achieve a master level in a cross-disciplinary approach of data science in society. As a whole the programme is strengthened and now clearly meets its vision to:

"contribute to data science research and applications pertaining to four societal domains of Business, Governance, Media, and Health. Although data science is primarily a technology-driven area of science with applications in different areas of research, such as marketing, finance, medicine, psychology, and engineering, it is becoming increasingly clear that in order to make the most out of the field's potential, other aspects such as legal, human, and societal values need to be considered as well. These values are not limited to privacy-related issues, but also relate to human autonomy in decision making; preserving fairness in an economic and political environment shaped by the growing technological capabilities to store and analyze data; democratic values, accountability, and social cohesion in which data driven "personalization" fosters an increasingly fragmented society".

The panel suggests to add at the end of `know how to identify patterns and gather insights from large and complex datasets' (the first item of the list) the sentence `in the chosen domain' to stress the applied/specialized nature of the program mission.

The panel is now convinced that the programme fully meets the standards and advises the board of the NVAO to decide that the conditions are fulfilled and issue a full accreditation of the new programme. It considers the process of improvement to be a best practice to be promoted for learning also stressing the benefits of peer-review.

Prof. dr. ir. Maarten van Steen
Chair

drs. Frank Wamelink
Secretary

Appendix 1 Programme of the site-visit

M Data Science and Society TiU 009307

Programme assessment conditions 12 June 2020

Digital Meetings in MS Teams

11.30 -12.00 uur	Discussing first impressions, formulating questions
12.00-13.00 uur	Questioning programme manager and Head educational support service
13.00-13.30 uur	Drawing conclusions
13.30-13.40 uur	Feed back

The full report was written at the request of NVAO and is the outcome of the peer review of the new programme wo-master Data Science and Society of Tilburg University

Application no: 009307

NVAO

Nederlands-Vlaamse Accreditatieorganisatie
Accreditation Organisation of the Netherlands and Flanders

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