Assessment report
Limited Framework Programme Assessment

Master Business Information Technology

University of Twente

Contents of the report

1. Executive summary

In this executive summary, the panel presents the main considerations which led to the assessment of the quality of the Master Business Information Technology programme of University of Twente, which has been assessed according to the standards of the limited framework, as laid down in the NVAO Assessment framework for the higher education accreditation system of the Netherlands, as published on 20 December 2016 (Staatscourant nr. 69458).

The panel regards the programme objectives to be sound and relevant and welcomes the interdisciplinary nature of these. The panel noted representatives of both Faculties, programme management, lecturers and students to share the vision underlying the objectives. The objectives are definitely within the 2016 ACM/AIS Global Competency Model and therefore match the international requirements for the information science domain. The profile of the programme within this framework is clear.

The intended learning outcomes meet the objectives and reflect the interdisciplinary character of the programme, addressing the interaction between and alignment of the computer science and business administration domains. They also conform to the master level, as exemplified by the Meijers criteria and are clearly distinct from those of the Bachelor programme in this domain.

The panel welcomes the tracks in the programme, offering students the opportunity to specialise. The panel supports programme management's plans to merge the Management and Innovation and Enterprise Architecture tracks and to introduce the Data Security and Risk Management specialisation.

The panel appreciates the programme objectives to educate students to enter the labour market and to find appropriate positions in organisations and companies. In the panel's view, programme management maintains close relations with the professional field to adjust the programme to trends in this field.

The panel considers the programme to be managed conscientiously and welcomes the commitment of the Faculty of Electrical Engineering, Mathematics and Computer Science and the Faculty of Behavioural, Management and Social Sciences, as this constitutes an important factor to ensure the interdisciplinary nature of the programme.

The panel supports programme management's intentions to raise the number of incoming students.

The curriculum of the programme complies with the intended learning outcomes. The panel considers the curriculum to be well-structured, addressing the computer science, business administration and information science domains, research methods and techniques and academic skills. The curriculum is very attractive and coherent. The courses in the curriculum are closely linked to research in the domains. The panel suggests to present the curriculum more clearly. The panel also proposes to make the business administration subjects and assignments more interesting for students.

The panel is positive about the lecturers in the programme, they being strong researchers and experts in their fields. The panel advises to strengthen the research efforts in information science within the Faculty of Electrical Engineering, Mathematics and Computer Science. The lecturers are considered by the panel to be qualified for lecturing, as may be deduced from the proportion of UTQ-certified lecturers. The panel welcomes lecturers of both Faculties lecturing and working together in the modules and appreciates the meetings lecturers have to discuss the programme.

The admission requirements and procedures of the programme are adequate, applications being evaluated by the Admission Committee. The panel is positive about the bridging programme offered to students not perfectly meeting the entry requirements. The programme exemptions policy and regulations are regarded by the panel to be up to standard and clearly documented.

The panel approves of the study methods adopted in the programme. The panel regards the number of hours of face-to-face education and the study guidance in the programme to be adequate. The panel advises to increase the study load, stimulating students to spend at least 40 hours per week on their studies. The student-to-staff ratio is satisfactory. The student success rates are appropriate.

The programme examination and assessment policies as well as the formal position and authority of the Examination Board and the BIT Examination subcommittee are up to standard. The panel welcomes the pro-active attitude of these examination bodies.

The range of examination methods is appropriate, these methods meeting the course goals and course contents. The measures taken by programme management to ensure the validity of examinations and the reliability of assessments are adequate, to be deduced from examiners, being required to be UTQ-certified, from some of the examinations being peer-reviewed and from test matrices being used for all courses. The panel proposes to implement the peer review procedure for all of the examinations.

The Master Final Projects are appropriately organised. The assessment procedures involving two examiners coming from various backgrounds may be regarded to be adequate. The panel, however, considers the grades for these project to be somewhat too high. The proportion of *cum laudes* is 40 %, which is very substantial. The panel feels the scoring forms for the project may induce relatively high grades. Therefore, the panel proposes to adapt these forms. The panel appreciates the carrousel meetings to discuss and calibrate Master Final Projects' assessments and grades and advises to intensify these.

The panel assesses the course examinations to be impressive. None of the Master Final Projects reviewed are assessed by the panel to be unsatisfactory. The projects are considered by the panel to be good to very good. The panel appreciates the research methods adopted in the projects, the structuring of the written reports, the ambitious level achieved and the impressive results of the projects. The projects cover very appropriately the information sciences domain.

In the panel's view, the programme succeeds very well in preparing the programme's graduates for positions in the professional field.

The panel which conducted the assessment of the Master Business Information Technology programme of University of Twente assesses this programme to meet the standards of the limited framework, as laid down in the NVAO Assessment framework for the higher education accreditation system of the Netherlands, judging the programme to be good. Therefore, the panel recommends NVAO to accredit this programme.

Rotterdam, 9 April 2018

Prof. dr. ir. M.F.W.H.A. Janssen   drs. W. Vercouteren
(panel chair)   (panel secretary)

2. Assessment process

The evaluation agency Certiked VBI received the request by University of Twente to manage the limited framework programme assessment process for the Master Business Information Technology programme of this University. This objective of the programme assessment process was to assess whether the programme would conform to the standards of the limited framework, as laid down in the NVAO Assessment framework for the higher education accreditation system of the Netherlands, published on 20 December 2016 (Staatscourant nr. 69458).

Management of the programmes in the assessment cluster Information Sciences convened to discuss the composition of the assessment panel and to draft the list of candidates.

Having conferred with management of the University of Twente programme, Certiked invited candidate panel members to sit on the assessment panel. The panel members agreed to do so. The panel composition was as follows:
- Prof. dr. ir. M.F.W.H.A. Janssen, full professor ICT and Governance, head of Information and Communication Technology research group, Faculty Technology, Policy and Management, Delft University of Technology (panel chair);
- Prof. dr. G. Poels, full professor Management Information Systems, director Business Informatics research unit, Department of Business Informatics and Operations Management, Ghent University (panel member);
- Prof. dr. U. Frank, full professor of Information Systems and Enterprise Modelling, Institute of Computer Science and Business Information Systems, University of Duisburg-Essen (panel member);
- E.E.M. Leo BSc, student Master Educational Sciences, University of Amsterdam, (student member).

On behalf of Certiked, drs. W. Vercouteren served as the process coordinator and secretary in the assessment process.

All panel members and the secretary confirmed in writing being impartial with regard to the programme to be assessed and observing the rules of confidentiality. Having obtained the authorisation by the University, Certiked requested the approval of NVAO of the proposed panel to conduct the assessment. NVAO have given their approval.

To prepare the assessment process, the process coordinator convened with management of the programme to discuss the outline of the self-assessment report, the subjects to be addressed in this report and the site visit schedule. In addition, the planning of the activities in preparation of the site visit were discussed. In the course of the process preparing for the site visit, programme management and the Certiked process coordinator regularly had contact to fine-tune the process. The activities prior to the site visit have been performed as planned. Programme management approved of the site visit schedule.

Well in advance of the site visit date, programme management sent the list of final projects of graduates of the programme of the most recent years. Acting on behalf of the assessment panel, the process coordinator selected 15 final projects. The grade distribution in the selection was ensured to conform to the grade distribution in the list, sent by programme management. Additional criteria have been taken into account, if these had been found to be relevant for the programme.

The panel chair and the panel members were sent the self-assessment report of the programme, including appendices. In the self-assessment report, the student chapter was included. In addition, the expert panel members were forwarded a number of final projects of the programme graduates, these final projects being part of the selection made by the process coordinator.

A number of weeks before the site visit date, the assessment panel chair and the process coordinator met to discuss the self-assessment report provided by programme management, the procedures regarding the assessment process and the site visit schedule. In this meeting, the profile of panel chairs of NVAO was discussed as well. The panel chair was informed about the competencies, listed in the profile. Documents pertaining to a number of these competencies were presented to the panel chair. The meeting between the panel chair and the process coordinator served as the briefing for panel chairs, as meant in the NVAO profile of panel chairs.

Prior to the date of the site visit, all panel members sent in their preliminary findings, based on the self-assessment report and the final projects studied, and a number of questions to be put to the programme representatives on the day of the site visit. The panel secretary summarised this information, compiling a list of questions, which served as a starting point for the discussions with the programme representatives during the site visit.

Shortly before the site visit date, the complete panel met to go over the preliminary findings concerning the quality of the programme. During this preliminary meeting, the preliminary findings of the panel members, including those about the final projects were discussed. The procedures to be adopted during the site visit, including the questions to be put to the programme representatives on the basis of the list compiled, were discussed as well.

On 1 December 2017, the panel conducted a site visit on the University of Twente campus. The site visit schedule was in accordance with the schedule as planned. In a number of separate sessions, panel members were given the opportunity to meet with Faculty Boards representatives, programme management, Examination Board representatives, lecturers and final projects examiners, students and alumni and professional field representatives.

In a closed session at the end of the site visit, the panel considered every one of the findings, weighed the considerations and arrived at conclusions with regard to the quality of the programme. At the end of the site visit, the panel chair presented a broad outline of the considerations and conclusions to programme representatives.

Clearly separated from the process of the programme assessment, the assessment panel members and programme representatives met to conduct the development dialogue, with the objective to discuss future developments of the programme.

Due to personal circumstances, the student member of the panel could not attend the site visit nor could she be present during the preliminary meeting of the panel. Having been informed about the absence of the student member, programme management agreed to proceed with the site visit as planned. The panel chair and the panel members also were in agreement to go on with the site visit. At the completion of the assessment process, the panel agreed this process to have been conducted in a sound way.

The assessment draft report was finalised by the secretary, having taken into account the findings and considerations of the panel. The draft report was sent to the panel members, who studied it and made a number of changes. Thereupon, the secretary edited the final report. This report was presented to programme management to be corrected for factual inaccuracies. Programme management were given two weeks to respond. Having been corrected for these factual inaccuracies, the Certiked bureau sent the report to the University Board to accompany their request for re-accreditation of this programme.

3. Programme administrative information

Name programme in CROHO: M Business Information Technology
Orientation, level programme: Academic Master
Grade: MSc
Number of credits: 120 EC
Specialisations: IT Management and Innovation
  Enterprise Architecture
  Data Science and Business
Location: Enschede
Mode of study: Full-time (language of instruction: English)
Registration in CROHO: 60025

Name of institution: University of Twente
Status of institution: Government-funded University
Institution's quality assurance: Approved

4. Findings, considerations and assessments per standard

4.1 Standard 1: Intended learning outcomes

> The intended learning outcomes tie in with the level and orientation of the programme; they are geared to the expectations of the professional field, the discipline, and international requirements.

Findings
The objectives of this Master programme are to educate students to become reflective practitioners and independent researchers, being able to investigate and develop innovative IT-based solutions to solve complex business problems by adopting systematic and scientific approaches, to do so working in multidisciplinary teams and to take the social and temporal dimensions of this work into account.

Programme management showed the programme objectives to meet the domain-specific framework of reference, being the international MSIS 2016 Global Competency Model for Graduate Degree Programs in Information Systems of ACM/AIS. The programme especially focusses on a number of competencies mentioned in this Competency Model, being enterprise architecture, innovation, organisational change and entrepreneurship, information systems strategy and governance and systems development and deployment.

Programme management translated the objectives into a series of intended learning outcomes, specifying, among others, business – information technology alignment knowledge and skills, scientific research knowledge and skills, professional skills, such as communication and collaboration skills and abilities to analyse and discuss ethical, social, cultural and societal dimensions of problems and solutions.

Three distinct tracks or specialisations are offered in the programme, being IT Management and Innovation, Enterprise Architecture and Data Science and Business. The intended learning outcomes specifically pertaining to these specialisations, have been included in the list of intended learning outcomes of the programme. In the near future, the IT Management and Innovation and Enterprise Architecture specialisations will be merged. A third specialisation, Data Security and Risk Management will be added.

Programme management presented a table to show the intended learning outcomes to correspond to the Meijers criteria for master level programmes.

Students are educated to enter the labour market and find suitable positions in this field. Graduates are trained to become, among others, IT (project) managers, business data analysts or enterprise architects.

The BIT Advisory Board, composed of industry representatives, meets twice per year with programme management to discuss the trends in the industry and the relevance of the programme as seen from that perspective. The Board was installed in 1996.

Considerations
The panel considers the objectives of the programme to be sound and relevant and especially welcomes the interdisciplinary nature of the objectives. Students are clearly trained to in both the computer science and the business administration domains. The panel noted representatives of both Faculties, programme management, lecturers and students to share the vision underlying these objectives.

The programme objectives definitely have a place within the 2016 ACM/AIS Global Competency Model and therefore match the international requirements for the information science domain. The panel is positive about the clear profile of the programme within this framework.

The programme objectives have been well translated into the programme intended learning outcomes. The intended learning outcomes reflect the interdisciplinary character of the programme, addressing the interaction between and alignment of the computer science and business administration domains.

The panel welcomes the tracks in the programme, offering students the opportunity to specialise. The panel supports programme management's plans to merge the Management and Innovation and Enterprise Architecture tracks and to introduce the Data Security and Risk Management specialisation.

The intended learning outcomes conform to the master level, as exemplified by the Meijers criteria. In this respect the intended learning outcomes are clearly distinct from those of the Bachelor programme in this domain.

The panel appreciates the programme objectives to educate students to enter the labour market and to find appropriate positions in organisations and companies. In the panel's view, programme management maintains close relations with the professional field to adjust the programme to trends in this field.

Assessment of this standard
These considerations have led the assessment panel to assess standard 1, Intended learning outcomes, to be good.

4.2 Standard 2: Teaching-learning environment

The curriculum, the teaching-learning environment and the quality of the teaching staff enable the incoming students to achieve the intended learning outcomes.

Findings
The Master Business Information Technology in a formal sense is a programme of the Faculty of Electrical Engineering, Mathematics and Computer Science of University of Twente. In the material sense, the programme is fully supported by both this Faculty and the Faculty of Behavioural, Management and Social Sciences. The director of the programme in collaboration with the programme coordinator supervises the quality and the programme contents on a day-to-day basis. The Programme Committee, consisting of students and lecturers, evaluates the programme quality and advises programme management in this respect. The BIT Examination subcommittee of the Faculty-wide Examination Board is responsible for monitoring the examination processes and the examinations and assessments of this programme.

The influx in the programme was on average 24 students per year in the years 2013 to 2016. Programme management has set the target number of incoming students at 45 to 50 students. As the Bachelor Business & IT programme will grow, programme management expects the influx in this programme to rise as well. Programme management wants to draw students from Universities of Applied Sciences and from abroad. Graduates of the programme are in high demand on the labour market.

Programme management presented a table to demonstrate the curriculum meeting the intended learning outcomes of the programme. The curriculum consists of six core courses (30 EC), to be taken by all of the students and four mandatory specialisation courses (20 EC), pertaining to the specialisation chosen by the students. One of the core courses is the Design Science Methodology course (5 EC). In addition, students select elective courses (30 EC) from a predefined list, allowing them to gain experience in real-life situations in internships or otherwise and to broaden their knowledge and skills in application fields or in information technology or business administration subjects. In the courses, journal articles are studied. Electives other than the ones listed need approval by the BIT Examination subcommittee. Students complete the curriculum with the Research Topics course (10 EC) and the Master Final Project (30 EC). In the Research Topics course, students draft research questions for the Final Project. Most of these projects are done in companies. In the curriculum, the computer science and business administration domains are addressed on an equal footing. Students tend to find the business administration courses less demanding.

Students may spend part of the curriculum abroad, may participate in the international study tour, offered every two years or may take part in a project with University of Munster students.

Lecturers of both Faculties lecture in the programme. About 90 % of the lecturers have PhD's and are active researchers in the fields they teach in the programme. Both the Computer Science and Business Administration research groups have strong research track records. About 75 % of the lecturers are UTQ-certified (UTQ means University Teaching Qualification) or have been exempt. About 13 % of the lecturers have started the UTQ-course. Lecturers meet regularly to discuss the programme. Students are content about the lecturers, experiencing them as easily approachable. Company representatives give guest lectures.

The admission requirements for students are academic bachelor degrees in the fields of computer science, information management, industrial engineering, business information technology or the information management specialisation of business administration, or related fields. Applications are reviewed by the Admission Committee, consisting of lecturers of each of the participating Faculties. Applicants not meeting the requirements mentioned, and having deficiencies of 30 EC or less, may take the bridging programme as a premaster programme or as homologation courses in the master programme. foreing applications are studied by the Admission Committee case by case. Students are informed about the programme contents and organisation through different media, may visit information days, scheduled twice per year or may take part in the student-for-a-day activity, experiencing the programme first hand.

Students may apply for exemptions. Requests for exemptions are handled by the BIT Examination subcommittee.

Programme management promotes the interaction between lecturers and students, encouraging students to assist in courses and to take up teaching assistance duties. Study methods adopted in the programme are lectures, tutorials, lab exercises, assignments, self-study activities and projects. In some cases, students give presentations. The number of hours of face-to face education are about 9 hours per week in the first three semesters. Students may turn to the programme coordinator for support and advice regarding the programme. Study advisors counsel students on study choices, study planning and progress. The student-to-staff ratio is 23 : 1. Students consider the programme to be feasible, studying about 30 hours per week. The student success rates are 32 % for students completing the programme after two years and 75 % for students finishing after three years (average figures for cohorts 2010 to 2013).

Considerations
The panel considers the programme to be managed conscientiously. The panel is very positive about the commitment of both Faculties, as this constitutes an important factor to ensure the interdisciplinary nature of the programme.

The panel supports programme management's intentions to raise the number of incoming students.

The curriculum of the programme complies with the intended learning outcomes. The panel considers the curriculum to be well-structured, addressing the contents of the computer science, business administration and information science domains, research methods and techniques and academic skills. The courses in the curriculum are solid and closely linked to research in the domains. The panel regards the curriculum to be very attractive and coherent. The panel suggests to present the curriculum more clearly. The panel also proposes to make the business administration subjects and assignments more interesting for students, by, among others, presenting ill-defined problems.

The panel is positive about the lecturers in the programme, they being strong researchers and experts in their fields. The panel advises to strengthen the research efforts in information science within the Faculty of Electrical Engineering, Mathematics and Computer Science. The lecturers are considered by the panel to be qualified for lecturing, as may be deduced from the proportion of UTQ-certified lecturers. The panel welcomes lecturers of both Faculties lecturing and working together in the modules and appreciates the meetings lecturers have to discuss the programme.

The admission requirements and procedures of the programme are adequate, applications being evaluated by the Admission Committee. The panel is positive about the bridging programme offered to students not perfectly meeting the entry requirements.

The programme exemptions policy and regulations are regarded by the panel to be up to standard and clearly documented.

The panel approves of the study methods adopted in the programme. The panel regards the number of hours of face-to-face education and the study guidance in the programme to be adequate. The panel advises to increase the study load, stimulating students to spend around 40 hours per week on their studies. The student-to-staff ratio is satisfactory. The student success rates are appropriate.

Assessment of this standard
These considerations have led the assessment panel to assess standard 2, Teaching-learning environment, to be good.

4.3 Standard 3: Student assessment

The programme has an adequate system of student assessment in place.

Findings
The examination and assessment regulations for the programme are in line with the University of Twente Assessment Framework. For all programmes of the Faculty of Electrical Engineering, Mathematics and Computer Science, one Examination Board has been installed, having the authority to ensure and monitor the quality of examinations and assessments and the corresponding processes of these programmes. The general subcommittee of this Board discusses, among others, the examination rules with the Dean. The so-called BIT Examination subcommittee of this Board has been given the authority for monitoring the quality of examinations and assessments for this Master Business Information Technology programme and for the Master Business Information Technology programme. In this subcommittee, the two Faculties participating in the programme, are represented on an equal footing.

The course examination methods include written examinations with multiple-choice questions or with open questions or with the combination of both, presentations, assignments and essays.

For all courses, the examinations are accompanied by test matrices, relating the examinations to the course goals. Some of the examinations are peer-reviewed. Examiners are appointed by the Examination Board, being required to be UTQ-certified. In case the examiner would not have the UTQ-certificate of be exempt, he or she is assisted by a UTQ-certified examiner. Fraud and plagiarism procedures for the programme are in place and cases detected are handled by the BIT Examination Subcommittee. The effect of free-riding in group projects is countered by having at least 50 % of the grade being awarded on the basis of individual results of students.

The Master Final Project is supervised by two supervisors, coming from the computer science and the business administration fields. These supervisors also act as examiners, assessing the project and giving the grade. Company representatives may give advice on the grade. The examiners make use of a scoring form with assessment elements, such as research question, theoretical framework, research method, research design, data collection, analysis or validation of design, conclusions and writing structure. The oral presentation and defence are part of the project. Examiners are asked to grade these elements and are also asked to explain their grades on the scoring form.

Programme management has scheduled so-called carrousels, being meetings of examiners meant to discuss and calibrate Master Final Projects' assessments and grades.

Considerations
The panel considers the examination and assessment policies for the programme to be up to standard. The formal position and the authority of the Examination Board and the BIT Examination subcommittee are appropriate. The panel especially welcomes the pro-active attitude of these examination bodies.

The range of examination methods is adequate, these methods meeting the course goals and course contents.

The measures taken by programme management to ensure the validity of examinations and the reliability of assessments are adequate, to be deduced from examiners, being required to be UTQ-certified, from some of the examinations being peer-reviewed and from test matrices being used for all courses. The panel proposes to implement the peer review procedure for all of the examinations.

The Master Final Projects are appropriately organised. The assessment procedures involving two examiners coming from various backgrounds may be regarded to be adequate. The panel, however, considers the grades for these project to be somewhat too high. The proportion of *cum laudes* is 40 %, which is very substantial. The panel feels the scoring forms for the project may induce relatively high grades. Therefore, the panel proposes to adapt these forms.

The panel appreciates the carrousel meetings to discuss and calibrate Master Final Projects' assessments and grades and advises to intensify these.

Assessment of this standard
The considerations have led the assessment panel to assess standard 3, Student assessment, to be satisfactory.

4.4 Standard 4: Achieved learning outcomes

The programme demonstrates that the intended learning outcomes are achieved.

Findings
The panel studied the examinations of a number of courses of the programme.

The panel reviewed a total number of fifteen Master Final Projects of graduates of the programme, the projects exhibiting a variety of grades, ranging from satisfactory to very good. The average grade of the projects are 8.1 (figures over the years 2011 to 2016). Graduates are encouraged to turn their projects into scientific papers for (international) conferences and workshops. About 12 % of the projects in fact lead to such scientific publications.

Programme's graduates tend to find suitable positions on average within one month after their graduation. The results of a recent alumni survey show programme graduates to have positions as, among others, IT consultants, information analysts, managers or entrepreneurs.

Considerations
Having studied the examinations of a number of courses of the programme, the panel assesses these examinations to be very much up to standard and to be impressive.

None of the Master Final Projects reviewed are assessed by the panel to be unsatisfactory. The projects are considered by the panel to be good to very good. The panel appreciates the research methods adopted in the projects, the structuring of the written reports, the ambitious level achieved and the impressive results of the projects. The projects cover very appropriately the information sciences domain.

In the panel's view, the programme succeeds very well in preparing the programme's graduates for positions in the professional field.

Assessment of this standard
The considerations have led the assessment panel to assess standard 4, Achieved learning outcomes, to be good.

5. Overview of assessments

Standard	Assessment
Standard 1. Intended learning outcomes	Good
Standard 2: Teaching-learning environment	Good
Standard 3: Student assessment	Satisfactory
Standard 4: Achieved learning outcomes	Good
Programme	Good

6. Recommendations

In this report, a number of recommendations by the panel have been listed. For the sake of clarity, these have been brought together below. These panel recommendations are the following.

- To present the curriculum more clearly.
- To make the business administration subjects and assignments in the programme more attractive for students, by presenting, among others, ill-defined problems.
- To strengthen the research efforts in information science within the Faculty of Electrical Engineering, Mathematics and Computer Science.
- To increase the study load, stimulating students to spend a minimum of 40 hours per week on their studies.
- To implement the peer review procedure for all of the examinations.
- To adapt the scoring forms for the Master Final Projects, as these forms may induce too high grades.
- To intensify the carrousel meetings to discuss and calibrate Master Final Projects' assessments and grades.