Geo-Information Science and Earth Observation

Faculty of Geo-Information Science and Earth Observation

University of Twente

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This report was finalized on 6 February 2015.

Report on the master's programmes Geo-Information Science and Earth Observation of the University of Twente

This report takes the NVAO's Assessment framework for limited programme assessments as a starting point.

Administrative data regarding the programmes

Academic master's programme Geo-Information Science and Earth Observation

Name of the programme:	MSc Geo-Information Science and Earth Observation
CROHO number:	75014
Level of the programme:	post-initial master programme
Orientation of the programme:	academic
Number of credits:	118 EC
Specializations or tracks:	▪ Applied Earth Sciences (Natural Hazards and Disaster Risk Management or Geological Remote Sensing); ▪ Geoinformatics; ▪ Land Administration; ▪ Natural Resources Management (Forestry – Agriculture – Environment); ▪ Urban Planning and Management; ▪ Water Resources and Environmental Management
Joint Education Programmes:	▪ Geo-Information Science and Earth Observation (Chang 'An University, China, Single and Double degree) ▪ Spatial Planning and Risk Managament (Universitas Gadjah Mada, Indonesia, Double degree) ▪ Geoinformatics (Indian Institute for Remote Sensing, India, Double degree) ▪ GIS for Natural Resource Management (Kwame Nkruma University, Ghana, Double degree) ▪ Geo-Information Science and Earth Observation for Natural Resource Management (Beijing Normal University, China, Double degree) ▪ Geo-Information Science and Earth Observation for Environmental Modeling and Natural Resource Management (Lund University, Sweden, Double degree) ▪ Geo-Information Science and Earth Observation for Environmental Modeling and Management (Sweden, Poland, UK, Iceland, Double degree)

- Development Planning and Infrastructure Development (Technical University Bandung, Indonesia, Double degree)
- Geo-Information Science and Earth Observation for Water Resources and Environmental Management (Capital Normal University, China, Double degree)

Location(s):	Enschede
Mode(s) of study:	full time
Expiration of accreditation:	31-12-2015

Professional master's programme Geo-Information Science and Earth Observation

Name of the programme:	M Geo-Information Science and Earth Observation
CROHO number:	70043
Level of the programme:	post-initial master programme
Orientation of the programme:	professional
Number of credits:	77 EC
Specializations or tracks:	-
Location(s):	Enschede
Mode(s) of study:	full time
Expiration of accreditation:	31-12-2015

The visit of the assessment committee Geo-Information Science and Earth Observation to the Faculty of Geo-Information Science and Earth Observation of the University of Twente took place on 6, 7, 8 October 2014.

Administrative data regarding the institution

Name of the institution:	University of Twente
Status of the institution:	publicly funded institution
Result of institutional quality assurance assessment:	positive

Quantitative data regarding the programmes

The required quantitative data regarding the programmes are included in Appendix 5.

Composition of the assessment committee

The committee that assessed the master's programmes Geo-Information Science and Earth Observation consisted of:

- Prof. G. (Gerrit) van Straten (chair) is emeritus professor of Measurements, Systems and Control at Wageningen University and part-time technical-scientific consultant via his firm AgrodynamicsSupport;
- Prof. I. (Ian) Dowman is emeritus professor of Photogrammetry and Remote Sensing at the University College London;
- Prof. A. (Alexis) Comber is professor of Geographical Information Science at the University of Leicester;

- M. (Martin) Kodde MSc. is Research & Development manager at Fugro GeoServices B.V.;
- M. (Marija) Krūminaitė, BSc., is a student of the master's programme Geomatics at Delft University of Technology.

The panel was supported by A.J. (Adrienne) Wieldraaijer-Huijzer, MA, who acted as project manager and secretary.

The board of the University of Twente and the Accreditation Organisation of the Netherlands and Flanders (NVAO) approved the composition of the panel. Appendix 1 contains the curricula vitae of the members of the panel. All members of the panel and the secretaries signed a declaration of independence as required by the NVAO protocol to ensure that they judge without bias, personal preference or personal interest, and the judgement is made without undue influence from the institute, the programme or other stakeholders (see Appendix 8).

Working method of the assessment committee

Preparations
QANU received the critical reflections of the master's programmes Geo-Information Science and Earth Observation on 30 July 2014. After having established that the reflections fulfilled the criteria of relevance and completeness, the project manager distributed them along with additional information to the members of the panel. They read the reports and prepared questions, comments and remarks on each critical reflection prior to the site visit. The project manager collected these questions in a document and arranged them according to panel conversation and subject. Some additional questions were sent to the institution for further clarification.

In addition, all panel members read recent theses from the academic programme and recent GP reports from the professional programme. In consultation with the chair of the panel, 18 theses from the academic programme and 15 GP reports from the professional master's programme were selected, covering the full range of marks awarded. The selection of MSc theses included ones from all specialisations and from students enrolled in a Joint Education Programme. The panel members received QANU's checklist for the assessment of theses to ensure that their assessments were comparable and included a reflection on the achieved international and intercultural learning outcomes. Since the programmes lead to scientific and professional degrees, the panel paid specific attention to the scientific and professional level of the theses and GP reports and the academic and professional requirements. Furthermore, the panel assessed the accuracy of judgement by the reviewer of the programme, and the assessment procedure used.

Prior to the site visit, the panel requested insight into the structure, content, assessment and evaluation of all courses. During the site visit, it assessed the quality of the course descriptions, student information, and exams in more detail. An overview of all documents, theses and GP reports reviewed by the panel is included in Appendix 7.

The project manager drafted a programme for the site visit. This was discussed with the chair of the panel and the co-ordinator of the programme. As requested by QANU, the co-ordinator of the programme carefully selected discussion partners. The panel approved the selection. A schedule of the programme with all partners listed is included in Appendix 6.

Site visit
The site visit to the University of Twente took place on 6-8 October 2014. It started with a preparatory meeting, during which the panel was instructed, and its tasks and functioning were discussed. The panel members took note of the domain-specific reference framework (Appendix 2) and discussed their findings based on the critical reflections. They also discussed the theses and GP reports, the working methods, and the questions and issues to be raised in the interviews with representatives of the programmes and other stakeholders. During the site visit, the panel studied documents provided by the co-ordinator of the site visit, including minutes of the Programme Committee and the Examination Board, course descriptions, written exams, assignments and other assessments.

During the site visit, the panel interviewed the programme management, students, staff members, alumni, members of the Programme Board and the Examination Board. In addition, it was taken on an extensive tour of the building (including internationalisation facilities), and it interviewed staff responsible for the internationalisation activities within the faculty and representatives of an international partner institution. It also studied additional materials about the academic and professional master, the Joint Education Programmes and internationalisation made available by the programmes upon request. Prior to the site visit, both staff members and students were informed about the opportunity to speak to the panel confidentially during the 'consultation hour'. One request was received.

After the concluding meeting with the management, the panel members extensively discussed their assessment of the programmes and prepared a preliminary presentation of the findings. Because the assessment framework for the distinctive quality feature internationalisation does not match the assessment framework for limited programme assessments, the scorings and arguments for both assessments were discussed separately during the site visit. The panel spent one hour on each assessment. The site visit was concluded with a presentation of the preliminary findings by the chairman. It consisted of a general assessment and several specific findings and impressions of the programmes, as well as some recommendations.

Report
After the visit, the secretary produced a draft version of the report. She submitted the report to the panel. She processed corrections, remarks and suggestions for improvement provided by the panel members to produce the revised draft report. This was then sent to the University of Twente to check for factual errors. The comments and suggestions provided by the University of Twente were discussed with the chair of the assessment panel and, where necessary, with the other panel members. Based on the panel's decisions to incorporate or ignore comments and suggestions, the secretary compiled the final version of the assessment report.

In assessing the programmes, the panel established that the assessment framework for the distinctive quality feature internationalisation does not match the assessment framework for limited programme assessments. Although many topics are part of both frameworks, the standards and criteria do not follow the same structure and order. The framework of the distinctive quality feature internationalisation consists of five standards (instead of three); it requires substantiated and weighted judgements on 21 levels (instead of four); and one standard in this framework can include aspects from more than one standard of the other framework. Prior to and after the site visit, QANU consulted NVAO on how to deal with this in the report. NVAO granted QANU permission to include texts on standards and criteria of the framework of the distinctive quality feature internationalisation in the chapters

about the standards of the framework of the limited programme assessment. To improve readability, clarity and argumentation, it was also agreed that in these chapters the assessment of the criteria and standards of the distinctive quality feature internationalisation would be described in separate sections. For the structure of the sections, the panel started from 'the reference guide to existing NVAO frameworks' on page 18 of the 'Framework for the assessment of Internationalisation' (14 November 2011). The sections have been organised as follows:

LIMITED PROGRAMME ASSESSMENT	DQF INTERNATIONALISATION
STANDARD 1 INTENDED LEARNING OUTCOMES INCLUDES:	• SHARED VISION (1A) • VERIFIABLE OBJECTIVES (1B) • IMPROVEMENT-ORIENTED EVALUATIONS (1C) • CONCLUSION STANDARD 1: VISION ON INTERNATIONALISATION • INTENDED LEARNING OUTCOMES (2A)
STANDARD 2 TEACHING-LEARNING ENVIRONMENT INCLUDES:	• CURRICULUM (3A) • TEACHING METHODS (3B) • LEARNING ENVIRONMENT (3C) • CONCLUSION STANDARD 3: TEACHING & LEARNING • STAFF COMPOSITION (4A) • INTERNATIONAL EXPERIENCE AND COMPETENCE (4B) • SERVICES PROVIDED TO THE STAFF (4C) • CONCLUSION STANDARD 4: STAFF • STUDENT GROUP COMPOSITION (5A) • SERVICES PROVIDED TO STUDENTS (5C)
STANDARD 3 ASSESSMENT AND ACHIEVED LEARNING OUTCOMES INCLUDES:	• STUDENT ASSESSMENT (2B) • GRADUATE ACHIEVEMENT (2C) • CONCLUSION STANDARD 2: LEARNING OUTCOMES • INTERNATIONAL EXPERIENCE (5B) • CONCLUSION STANDARD 5: STUDENTS
GENERAL CONCLUSION INCLUDES:	• GENERAL CONCLUSION

The panel decided to draw up two parts in the report: one part on the academic programme (including the Joint Education Programmes) and one part on the professional programme in Geo-Information Science and Earth Observation. Each part includes a limited programme assessment and an assessment of the distinctive quality feature internationalisation. The distinctive quality feature internationalisation is addressed in the grey text blocks. Many topics are part of both assessment frameworks, and the two programmes have a considerable amount of overlap. As a consequence, the sections on both assessments and the two parts will overlap and sometimes refer to each another. Each part contains a separate summary for each assessment.

Decision rules for limited programme assessment

In accordance with the NVAO's Assessment framework for limited programme assessments (as of 22 November 2011), the committee used the following definitions for the assessment of both the standards and the programme as a whole.

Generic quality
The quality that can reasonably be expected in an international perspective from a higher education bachelor's or master's programme.

Unsatisfactory
The programme does not meet the current generic quality standards and shows serious shortcomings in several areas.

Satisfactory
The programme meets the current generic quality standards and shows an acceptable level across its entire spectrum.

Good
The programme systematically surpasses the current generic quality standards across its entire spectrum.

Excellent
The programme systematically well surpasses the current generic quality standards across its entire spectrum and is regarded as an (inter)national example.

Assessment rules limited programme assessment
The final conclusion regarding a programme will always be "unsatisfactory" if standard 3 is judged "unsatisfactory". In case of an unsatisfactory score on standard 1, NVAO cannot grant an improvement period.

The final conclusion regarding a programme can only be "good" if at least two standards are judged "good"; one of these must be standard 3.

The final conclusion regarding a programme can only be "excellent" if at least two standards are judged "excellent"; one of these must be standard 3.

Decision rules for distinctive quality feature internationalisation
In accordance with the NVAO Frameworks for the Assessment of Internationalisation (14 November 2011), the committee used the definitions taken from the NVAO assessment frameworks for limited programme assessments (22 November 2011). These definitions relate to both the assessments at the level of standards and criteria and the overall decision regarding the internationalisation of the programme. Assessment rules for the distinctive quality feature for internationalisation:

The programme is assessed as excellent when at least 3 standards are assessed as excellent and 2 standards as good.

The programme is assessed as good when at least 3 standards are assessed as good or excellent and no standard is assessed as unsatisfactory.

The programme is assessed as unsatisfactory when 1 or more standards are assessed as unsatisfactory.

In all other cases the programme is assessed as satisfactory.

Introduction

Structure and mission of the Faculty of Geo-Information Science and Earth Observation (ITC)

The history of ITC goes back to 1950 when former Prime Minister Schermerhorn founded the 'International Training Centre for Aerial Survey'. The mission of this original centre was to offer education on cartography and air photography to people from developing countries. Since then, the world, education and students have changed a lot. ITC has kept abreast with the times. It aspires to remain a gateway for knowledge exchange for individuals and institutes from economically and/or technically less developed countries. It now primarily carries out activities related to research, education and capacity-building in the fields of Geoinformation Science, Earth Observation and Remote Sensing. ITC has alliances and cooperation agreements with partner institutions all over the world.

Education at ITC is very diverse. ITC has created a large variety of courses, such as degree courses, postgraduate diploma courses, short courses, distance courses, tailor-made courses and PhD training. ITC has also developed Joint Education Programmes (JEPs). These JEPs are part of the academic master's programme, and have been set up with selected partner institutions abroad. JEPs allow students in the field of Geo-Information Science to obtain an ITC MSc degree without having to be at ITC full-time. JEP students take courses in their home country and in the Netherlands. In addition, they often study ITC course materials in their home country by using modern means of communication. Each JEP is tailor-made. Therefore, the set-up of the JEPs varies. Since the JEPs are an integral part of the academic master's programme, they are included in the re-accreditation process and in the section about this programme. The ITC Faculty offers a great variety of courses. The panel only studied the academic and professional master's programmes. The other courses of the ITC Faculty are not part of this assessment report.

On 1 January 2010, ITC became embedded as the sixth faculty of the University of Twente. With this step ITC has become integrated in the Dutch academic education system, while the University of Twente profits from ITC's international network. The merger has had a major impact on the organization of education at ITC. Its facilities have been integrated in the central services of the university to a great extent, and the management of education and bodies controlling the quality of education have been aligned with the Dutch Higher Education and Scientific Research Act. For instance, ITC appointed an Education Director and a Faculty Council and established an Examination Board and a Programme Committee. In terms of funding, the ITC has kept a somewhat special position within the University of Twente. Because of its capacity development mission, the ITC Faculty is funded primarily by a base subsidy from the Ministry of Education, Culture and Science. From now on, we will refer to ITC as ITC Faculty.

I – Academic master's programme

Summary judgement academic master's programme

This report provides an overview of the panel's findings and considerations regarding the academic master's programme Geo-information Science and Earth Observation of the University of Twente. The panel based its judgement on information acquired from the critical reflection, a number of selected theses, the interviews held during the site visit, additional reading material which was available during the site visit, and the digital learning environment. It found positive aspects as well as points for improvement. After careful consideration, it concludes that the academic master's programme Geo-information Science and Earth Observation satisfies the requirements for re-accreditation. In addition, the panel grades the overall quality of 'internationalisation' of the programme as 'good' and advises the NVAO to award the programme a distinctive quality feature internationalisation.

Limited programme assessment

Standard 1
The panel studied the domain-specific framework of reference and finds it clearly formulated. The framework includes an adequate description of the characteristics of the field, developments and requirements and covers the academic and professional master's programme of the ITC Faculty well. The panel is enthusiastic about the general mission of the ITC Faculty to be a gateway for knowledge exchange on Geo-Information Science and Earth Observation for individuals and institutes from countries that are economically and/or technologically less developed. There is a clear link between ITC's mission of capacity-building and the academic programme on the one hand, and between the needs of incoming students and the design and objectives of the academic degree programme on the other hand. As of the cohort 2014-2016, the academic degree programme adopted revised intended learning outcomes. The panel judges these learning outcomes to be well-formulated, appropriate for the field and of the right level. The new intended learning outcomes for internationalisation mirror one of the key-aspects of post-graduate training at the ITC Faculty: the experience of working in a different research culture and the exposure of students to problems that arise from different cultures and professional contexts.

Standard 2
The curriculum of the academic master's degree programme is comprehensive. It has a study load of 118 EC, which is spread over eighteen months and four blocks. The programme can be followed in-house or as a Joint Education Programme (JEP).

The curriculum of the academic master's programme consists of an introductory period (3 EC) and 23 modules of 5 EC. The modules in the first block deal with the basic principles of Geo-Information, Remote Sensing, the System Earth, Data Integration, the User and Academic Skills. In Block 2, students take seven domain modules. There are six domains within the programme and students specialise in one of them: Applied Earth Sciences; Geoinformatics; Land Administration; Natural Resources Management; Urban Planning and Management, and; Water Resources and Environmental Management. Block 3 is designed around research orientation, the deepening of knowledge and skills of research related to individual research topics, and the development of a thesis proposal. In Block 4, students work on their MSc thesis. The panel is of the opinion that the curriculum of the academic master's degree programme is well-developed, coherent, state-of-the art and of the right level. The six domain modules link well to the student's interests, the requirements in the field and the expertise at ITC. The panel is convinced that all learning outcomes are addressed in the programme.

The academic master's degree programme includes nine Joint Education Programmes (JEPs) in cooperation with educational institutions around the world. Students in these programmes take part of the programme at home and part of the programme at the Faculty ITC. At the end of the programme, they acquire a recognized UT degree (single degree or double degree) in Geo-Information Science and Earth Observation. Generally, JEP students take ITC-core modules, domain modules and research orientation, and write a thesis (including a thesis proposal and a thesis defence). Therefore, the findings of the panel mentioned above also apply to the JEPs. The panel established that the JEPs are clearly defined and well thought out, and comply with Dutch rules and regulations. The ITC Faculty has ample control over the content and level of the parts of the programme that are organised at partner institutions. The ITC Faculty is closely involved in the supervision and final examination of JEP theses.

Education at the ITC Faculty is based on the philosophy of 'life-long learning'. Other important didactic principles are 'blended learning', 'the international classroom'; and the 'ethically aware engineer and academic'. Although the didactical principles have not yet been streamlined with the didactic concept of the University of Twente, the panel established that they are relevant and well integrated in the programme.

The intake has remained relatively stable in the last six years. The panel studied the admission criteria and considers them to be suitable. It is enthusiastic about the diversity of the student body: the vast majority of students originate from different continents outside Europe. The programme turns out to be demanding, but feasible. The panel understands the choice of the ITC Faculty to offer a programme that is as short and dense as possible. The programme management is actively monitoring the workload and is urged by the panel to continue doing so.

Although the panel advises the programme management to encourage more staff to take additional courses on internationalisation and the multicultural classroom, the panel is confident that the programme has a good teaching staff. The quantity of the teaching staff is adequate.

The panel found that the internal quality assurance of the JEPs is well organised in practice. However, not all procedures have been formalised and are recorded. The panel strongly recommends the programme management to work on this in the near future.

Standard 3

Following the merger with the University of Twente, the ITC Faculty established one Examination Board (EB) for all of its courses. This EB works according to an annual cycle and is responsible for the assessment policy and for the safeguarding of the achieved learning outcomes. It also deals with complaints and exemption requests applicable to all examinations. The panel found that the EB is professional and has implemented clear procedures for assessment and control as well as adequate action points for the near future. It urges the EB to continue on the course it has set.

According to the panel, there is sufficient variation in the assessment types. Procedures for the assessment of JEP students at partner institutions are clearly defined. The JEPs are all working on the basis of exemptions. Each JEP has been checked by the EB. This check is repeated every three years. The quality of a JEP thesis is double checked by the ITC supervisor and the ITC chair of the TAB.

According to the panel, the thesis assessment procedure is satisfactory. It includes clear assessment instructions, multiple examiners and an extensive discussion about the final mark. Nevertheless, there are several opportunities to increase the transparency and quality of it further. The panel advises the programme to develop a thesis instruction for students, to adjust the assessment criteria, to archive separate assessment forms of the examiners, and to provide students with a written mark sheet after the thesis defence.

The panel read several theses and was impressed with the overall level achieved. In general, the selected theses are well constructed, have a clear focus, and a logical line of reasoning. The panel would like to suggest the ITC Faculty to include a formative assessment of the intercultural setting of the thesis research by adding a reflective appendix to the thesis addressing the intercultural setting of the thesis research. The programme is well-connected to the labour market. The vast majority of graduates finds employment soon after graduation.

Due to the satisfactory overall level of the theses and the good connection to the labour market, the panel is convinced that the learning outcomes are achieved upon graduation.

Academic master's programme Geo-Information Science and Earth Observation

The committee assesses the standards from the Assessment framework for limited programme assessments in the following way:

Standard 1: Intended learning outcomes	good
Standard 2: Teaching-learning environment	good
Standard 3: Assessment and achieved learning outcomes	satisfactory
General conclusion	satisfactory

Distinctive quality feature internationalisation

Standard 1
The mission of the ITC Faculty is to be a gateway of knowledge exchange in the field for individuals and institutes from countries that are economically and/or technologically less developed. The vision of the ITC Faculty on internationalisation is rooted in, and inherent to, its capacity-building mission. It includes linking up the content of education to relevant real-world problems, teaching students about research and professional practices worldwide, attracting an international student body, and responding to the needs of international students and the international working field. In the panel's opinion, the vision of the ITC Faculty on internationalisation is clear and supported by stakeholders. The link between the ITC and the university vision on internationalisation and global citizenship could be more explicit, however. The same applies to the verifiable objectives of this vision. Although the vision includes implicit and relevant verifiable objectives, they are not explicitly mentioned in a document. The ITC Faculty also needs to develop explicit procedures for the evaluation of this vision. Although there are still opportunities for improvement, the panel assesses the overall quality of this standard as satisfactory. The excellent integration of the capacity-building mission in its vision on the design of its international educational activities and the international reputation of the ITC Faculty are important factors in this decision.

Standard 2
The set of intended learning outcomes of the academic master's programme includes specific learning outcomes for internationalisation. They focus on the ability of students to operate

and communicate in a multicultural environment. According to the panel, these learning outcomes are relevant, a clear reflection of the vision on internationalisation of the university and addressed in the programme. The panel is convinced that graduates achieve the intended international and intercultural learning outcomes. However, the international and intercultural learning outcomes have only been included in the set of intended learning outcomes recently and are not yet formally tested. The panel urges the programme to develop more detailed ideas on how to test international and intercultural skills in the near future. The panel read several theses and was impressed with the overall level achieved in the academic degree programme. It found that most theses include international elements and that graduates demonstrate sufficient English language skills. Most graduates are positive about their employability and feel that the international approach and the international learning environment at the ITC Faculty have broadened their understanding of cultural differences.

Standard 3
The panel concludes that the curriculum, the teaching methods and the learning environment of the academic master's programme match the vision on internationalisation of the university and the ITC Faculty, and the intended international and intercultural learning outcomes. The teaching methods of the programme focus on multicultural group work, reflection on international case studies, and discussion about the experiences that students bring in from their home country. The curriculum reflects this focus: modules link to global issues and relevant international cases, students take excursions to companies and organisations in Europe, and the development of intercultural competencies and communicative skills is stimulated through guided discussions and group work in international teams. In the panel's opinion, the ITC Faculty offers students a unique and stimulating multicultural learning environment. In this specific respect, it can be seen as an international 'best practice'.

Standard 4
The student-staff ratio for the academic master's programme is 1:5.3 for the 2012-2014 cohort. According to the panel the number of teaching staff is adequate. The panel is also positive about their general quality and engagement. The staff is well informed about recent developments in the field. It concludes that the staff of the programme has ample international experience and expertise. Furthermore, sufficient services are in place to facilitate their international experiences, intercultural competences and language skills. In addition, the ITC Faculty offers courses throughout the world. As a consequence, staff members continue to develop and expand their international experience and intercultural competences while they work at the ITC Faculty.

Standard 5
The majority of students at the ITC Faculty come from developing countries. Most of them originate from countries in Africa and Asia, but the ITC Faculty also attracts students from the Americas, Europe, and Australia/Oceania. The panel is very impressed by the international composition of the student group and concludes that the ITC Faculty is extremely successful in its mission 'to be a gateway for knowledge exchange for individuals and institutes from countries that are economically and/or technologically less developed'. According to the panel, students have ample opportunity to develop multicultural professional and communicative skills and international experience through the curriculum (formal and informal) and the international learning environment at the ITC Faculty. Important in this respect is the fact that many students come from abroad: for them, staying at the ITC Faculty is already an international experience in itself. Many services and facilities have been put in place to support international students.

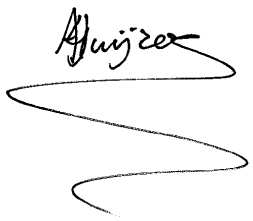
Academic master's programme Geo-Information Science and Earth Observation:

The committee assesses the standards from the NVAO Frameworks for the Assessment of Internationalisation (as of 14 November 2011) as follows:

Standard 1: Vision on Internationalisation	satisfactory
Criterion 1a: Shared Vision	good
Criterion 1b: Verifiable objectives	satisfactory
Criterion 1c: Improvement-oriented evaluations	unsatisfactory
Standard 2: Learning outcomes	satisfactory
Criterion 2a: Intended learning outcomes	satisfactory
Criterion 2b: Student assessment	unsatisfactory
Criterion 2c: Graduate achievement	good
Standard 3: Teaching and learning	good
Criterion 3a: Curriculum	satisfactory
Criterion 3b: Teaching methods	good
Criterion 3c: Learning environment	excellent
Standard 4: Staff	good
Criterion 4a: Staff composition	good
Criterion 4b: International experience and competence	good
Criterion 4c: Services provided to staff	satisfactory
Standard 5: Students	good
Criterion 5a: Student group composition	excellent
Criterion 5b: International experience	good
Criterion 5c: Services provided to students	good
General conclusion	good

The chair and the secretary of the committee hereby declare that all members of the committee have studied this report and that they agree with the judgements laid down in it. They confirm that the assessment has been conducted in accordance with the demands relating to independence.

Date: 6 February 2015.



Prof. G. (Gerrit) van Straten
Chair

A.J.(Adrienne) Wieldraaijer-Huijzer, MA
Secretary

Detailed description of the standards from the Assessment framework for limited programme assessments and the Assessment framework for the assessment of internationalisation

Standard 1: Intended learning outcomes

The intended learning outcomes of the programme have been concretised with regard to content, level and orientation; they meet international requirements.

Explanation:
As for level and orientation (bachelor's or master's; professional or academic), the intended learning outcomes fit into the Dutch qualifications framework. In addition, they tie in with the international perspective of the requirements currently set by the professional field and the discipline with regard to the contents of the programme.

Findings

This section deals with the domain-specific reference framework of the field of Geo-Information Science and Earth Observation (§1.1), the profile and mission of the ITC Faculty and the programme (§1.2), and the intended learning outcomes and level of the programme (§1.3). It also deals with the following criteria of the Assessment framework for the assessment of internationalisation (§1.4): shared vision (criterion 1a, §1.4.1), verifiable objectives (criterion 1b, §1.4.2), improvement-oriented evaluations (criterion 1c, §1.4.3), and intended learning outcomes (criterion 2a, §1.4.4).

§1.1 Domain-specific reference framework

The aim of the field of Geo-Information Science and Earth Observation is to understand the system Earth from a geographical and spatial perspective and to advance our knowledge about geophysical and social processes at the Earth's surface. As described in the critical reflection, the field focuses on processes that can be observed by remote-sensing methods and can, in principle, be spatially implemented with deterministic spatial models. The scope of these processes is wide, but all processes have in common that they are of societal relevance, are scientifically interesting, can only be fully understood in a multi-disciplinary context and have a spatial extension.

Specialists in the field of Geo-Information Science and Earth Observation are confronted with rapid professional and technological developments, which pose problems as well as opportunities. Education in this field therefore needs to be able to adapt rapidly to new circumstances. In the last decade, a shift has occurred from stand-alone applications to an Internet-based (networked) environment, and ICT developments allow the browsing of all web resources to extract location-specific information. In addition, the general public has started contributing its knowledge to databases of volunteered geographical information, and government organizations have made their geoinformation available as open-source data. Nowadays, many national and international organizations in the field work in a cooperative setting in which geographic information is obtained from, and provided to, partner organizations and the general public. In these organizations there is an increasing need for highly educated professionals.

The domain-specific framework, as described in the critical reflection, is provided in Appendix 2. The panel studied the domain-specific framework of reference and finds it clearly formulated. The framework provides an adequate description of the international field of Geo-information Science and Earth Observation and covers the academic and professional

master's programmes of the ITC Faculty well. The intended learning outcomes of the programmes have been included in the reference framework. The assessment of the intended learning outcomes will be addressed in §1.3.

§1.2 The profile and mission of the ITC Faculty and the academic master's programme

The general mission of the ITC Faculty is to be a gateway for knowledge exchange on Geo-Information Science and Earth Observation for individuals and institutes from countries that are economically and/or technologically less developed. The ITC Faculty intends to develop and extend our knowledge of earth observation and geoinformation management and to make it available to a broader international public of students and professionals in the field.

The main driving force of the ITC Faculty is capacity-building. The ITC Faculty starts from the idea that geographical information systems and remote sensing tools can be used in solving real-world problems and complex issues. This may, for example, involve determining places at risk for landslides, planning urban infrastructure, analysing food and water security, and designing an effective wildlife management system.

The importance of capacity-building for the ITC Faculty is reflected in the organization of its education. Education is focussed on individuals in different stages of their academic or professional life and starts from the philosophy of 'lifelong learning'. The ITC Faculty offers a large variety of courses, ranging from full programmes to all kinds of short courses. The academic degree programme (118 EC) is one of two full master's programmes offered by the ITC Faculty (the professional master is discussed in part II). With these programmes the ITC Faculty intends to train professionals in three categories: 1. experts in the field of spatial information handling; 2. users of geoinformation from a variety of application domains; and 3. decision and policy makers. The central goal of both master's programmes at the ITC Faculty is to provide students with knowledge and skills that help them solve problems in their current or future working environment.

The academic degree programme is geared towards young and mid-career professionals who perform, or aspire to perform, tasks predominantly in applied research or require academic knowledge and skills to enhance the execution of their work. The central aim of the academic programme is to link up academic content with an international perspective and problem-solving skills. The six specializations (domain modules) of the programme were designed to connect with the background and expertise of incoming students.

The panel fully subscribes to the mission of the ITC Faculty and the academic degree programme. During the site visit, it found that students and alumni recognize and value the mission of the ITC Faculty and the programme, which is to link actively to the needs of incoming students. Many students confirmed that they enrolled in it because there is a clear link between their needs, ITC's profile and mission, and the design of the programme. Moreover, students, alumni and partner institutions all talk about the international reputation of the ITC Faculty as an important institution for research and education in the field. In many cases, enrolment is the result of word-of-mouth advertising. The panel agrees that the ITC Faculty has an exceptional profile and a long-standing reputation in the field. In the international context the niche of the ITC Faculty and the academic degree programme is clear.

§1.3 Intended learning outcomes and the level of the programme

During the site visit, the panel consulted management and staff about the most important differences in level and orientation between the academic and the professional master's programmes. It learned that the academic master's programme is primarily geared towards problem-solving through the development of new knowledge. The professional version is more technical in nature: students learn how to solve problems by using and applying existing knowledge (for more information, see part 2). The panel is of the opinion that the focus of the academic master's programme is well-chosen and appropriate.

Based on the profile, orientation and mission of the programme, the management has formulated intended learning outcomes. For all cohorts up to 2013-2015, there were six learning outcomes. Then the learning outcomes were reviewed and described more specifically by categorizing them in domain learning outcomes, scientific learning outcomes, internationalisation learning outcomes, and general learning outcomes. This was done in consultation with an external, international panel of experts. The revised learning outcomes were linked to the Dublin descriptors, which cover the five main requirements for an academic master's programme. In addition, they were connected to the 3TU criteria, designed by the three Dutch technological universities. They are being applied starting with the 2014 cohort. Both sets of learning outcomes are included in Appendix 3.

The panel applauds this revision. The revised intended learning outcomes are well-formulated, complete and much more academic than the previous ones. The domain learning outcomes are appropriate for the field, the scientific learning outcomes reflect the academic level and focus of the programme well, and the general learning outcomes are essential for each programme at an academic master's level. The internationalisation learning outcomes mirror one of the key aspects of post-graduate training at the ITC Faculty: the experience of working in a different research culture and the exposure of students to problems that arise from different cultures and professional contexts (for more details, see §1.4).

According to the panel, it is understandable that the high-level learning outcomes are quite general because they have to fit all domain modules and Joint Education Programmes. To verify that all the domain requirements are covered, the panel requested an overview of the learning objectives of the modules within the domain modules (specialisations) and JEPs and their link to the high-level learning outcomes. It was satisfied to find that the learning objectives of the modules have a very high level of detail and connect well to the intended learning outcomes of the programme.

§1.4 Criteria and standards of the Assessment framework for the assessment of internationalisation

§1.4.1 Shared vision

The programme has a vision on internationalisation. This vision is supported by stakeholders within and outside the programme

Geo-Information Science and Earth Observation deals with the geophysical and social processes at the Earth's surface. The core aspect of the field is the idea that geographical information systems and remote sensing tools can be used in solving real-world problems and complex issues of a spatial nature. These include global climate change, the effects of El Niño, globalisation of the economy and health epidemiology. Many of the so-called developing countries are confronted with these issues.

Education at the ITC Faculty developed from a mission of capacity-building. The ambition of ITC is to be a gateway for knowledge exchange in the field for individuals and institutes from countries that are economically and/or technologically less developed. The critical reflection states that the programme wants to deliver graduates who 'can function as a change agent in their own country and organisation'.

The panel concludes that a vision on internationalisation is intrinsic to the capacity-building mission and ambitions of the ITC Faculty. According to the critical reflection, the following definition of internationalisation by the expert Jane Knight is at the heart of the educational programmes of ITC: 'integrating an international, intercultural or global dimension into the purpose, functions or delivery of higher education'. In line with this definition, the content of education at the ITC Faculty links up to relevant 'real-world' problems and teaches students to look beyond their own professional practice and to learn from other practices worldwide. ITC's vision on internationalisation also includes attracting an international student body and responding to the needs of potential students and the international working field by offering different types of education (distance education, short courses, degree programmes, joint programmes, etc.).

The panel found that the vision on internationalisation at ITC is supported by different stakeholders. One of the most important stakeholders is the Dutch government. ITC's mission and vision on internationalisation connect to the ambitions of the Dutch Minister for Foreign Trade and Development Cooperation, and education at ITC is funded with a base subsidy from the Ministry of Education, Culture and Science. Another important group of stakeholders includes the international partner institutions and organisations, which benefit from and contribute to the Faculty's educational programmes.

The panel concludes that the ITC Faculty has a strong and clear vision on internationalisation that is supported by national and international stakeholders.

In 2010, ITC became part of the University of Twente. The university has embarked on formulating a new strategy (Vision 2020), which includes internationalisation. In this new strategy internationalisation at the UT is defined as 'integrating the international and intercultural dimensions in education, research and the supporting organisation'. Key objectives of internationalisation at the UT are: educating students to become global citizens; increasing international enrolment; and active participation of staff in international networks of education, research and valorisation.

The panel concludes that the UT vision on internationalisation has a strong focus on global citizenship and on creating an international academic community. The ITC Faculty vision on internationalisation is firmly rooted in a mission of capacity-building. International enrolment and active participation in international networks are also key objectives for the ITC Faculty, as they are inherent to capacity-building. Although there is a link between the two visions, the panel is of the opinion that this link could be articulated more clearly and made more explicit. The objective of educating 'global citizens' fits well to the mission of the Faculty ITC and the intended international and intercultural learning outcomes of the programme. The panel advises the ITC Faculty to work on this in the near future.

§1.4.2 Verifiable objectives

The vision on internationalisation includes verifiable objectives

The critical reflection states that the above-mentioned vision on internationalisation is translated in an international curriculum which exposes students to the latest trends and

technologies and focuses on building capacity in developing countries and the international orientation of students. The panel found two implicit, verifiable objectives in the critical reflection. The first objective is that ITC aspires to offer courses that include real-world problems and their solutions and have an application component. According to the panel, this objective has a clear relation with the capacity-building part of the above-mentioned vision on internationalisation.

The second verifiable objective of ITC is to deliver graduates who are able to work in an international and intercultural environment and to prepare them for employment in another environment or culture. This objective relates to the 'international classroom' (see §2.8.2) and the intended learning outcomes 10 and 11 (see §1.4.5). Here, there is a link with the UT vision on internationalisation of global citizenship and creating an international student community.

The panel concludes that the ideas of the team about what is required in an international environment have led to clear objectives in the intended learning outcomes. However, the vision as such, and what this means in terms of verifiable objectives, has not been worked out explicitly in a vision document. The panel urges the ITC Faculty to work on one integrated vision on internationalisation to include capacity-building and 'global citizenship' (see §1.4.1) and to take this vision as a starting point in developing unequivocal objectives that can be tested on a regular basis.

§1.4.3 Improvement-oriented evaluations

The vision on internationalisation is evaluated periodically, and this evaluation forms the basis for improvement measures

The panel investigated the evaluation of the vision on internationalisation by the ITC Faculty. It established that the ITC Faculty evaluates the degree programmes (including the JEPs) on a regular basis (see §2.6). These evaluations include international and internationalisation components, like the quality of the programmes and their relevance and applicability to international students, alumni and employers. According to the panel, the vision on internationalisation itself is not tested on a regular basis. Although the ITC Faculty has a long history of capacity-building and educating international students, it has only recently started to think about its vision on internationalisation explicitly. At the moment, no clear procedures are in place for the evaluation of the vision on internationalisation and its corresponding verifiable objectives.

§1.4.4 Intended learning outcomes

The intended international and intercultural learning outcomes defined by the programme are a clear reflection of its vision on internationalisation.

As of the 2014 cohort, the academic degree programme has 13 revised intended learning outcomes. The complete set of intended learning outcomes is listed in Appendix 3. It includes specific learning outcomes for internationalisation. According to these intended learning outcomes, graduates of the academic degree programme are able to 'operate professionally in a multicultural environment, and act adequately on cultural differences' (LO 10) and to 'express themselves adequately to colleagues of different nationalities' (LO 11). In the opinion of the panel, the intended international and intercultural learning outcomes are relevant, well-formulated and a clear reflection of the UT vision on internationalisation because they support students in becoming global citizens. The panel would like to point out that learning outcomes related to international and intercultural communicative and professional skills are quite difficult to test (see §3.3.1).

ITC's vision of capacity-building (which is by nature international) is less explicit in the higher level intended learning outcomes addressing the technological elements of the programme. The panel judges this to be understandable, because geo-information technology and science apply worldwide without cultural differences and has no need for an international component in and of itself. Of course, this does not alter the fact that (inter)national and regional differences in *the state of* technology can be, and indeed are, part of the curriculum and the lower level intended learning outcomes (see §2.8.1).

Considerations

Considerations with regard to limited programme assessment

The panel studied the domain-specific reference framework, the mission and profile, the level and the intended learning outcomes of the academic degree programme. It found that the domain-specific framework includes an adequate description of the characteristics of the field, developments and requirements. It is enthusiastic about the mission of the ITC Faculty. There is a clear link between ITC's mission of capacity-building and the academic degree programme on the one hand, and the needs of incoming students and the design and objectives of the academic degree programme on the other. The panel compliments the ITC Faculty on the academic degree programme; in the international context, the niche of the programme is clear. The panel studied the revised intended learning outcomes of the master degree programme and judges them to be well-formulated and of the right level. It appreciates their academic character. The learning outcomes are quite general, because they have to fit all six specialisations. The panel established that this is not a problem, because they cover the more detailed learning objectives of the domain modules very well.

Conclusion

Academic master's programme Geo-Information Science and Earth Observation: the committee assesses Standard 1 as **good.**

Considerations with regard to the assessment of internationalisation

The panel established that the academic master's programme in Geo-Information Science and Earth Observation has a clear vision on internationalisation. This vision is rooted in, and inherent to, the capacity-building mission of the ITC Faculty and at the heart of all of its activities. The ITC Faculty has a long legacy in internationalisation and in working with international students and institutes, and its mission is supported by many national and international stakeholders. The link between the ITC and the UT vision on internationalisation could be more explicit.

Academic master's programme Geo-Information Science and Earth Observation: the committee assesses Criterion 1a (Shared vision) as **good.**

The panel concludes that the vision on internationalisation includes implicit, verifiable objectives. These objectives are applicable to the programme and relevant, but not explicitly mentioned in a document. The panel advises the ITC Faculty to develop more explicit, verifiable objectives.

Academic master's programme Geo-Information Science and Earth Observation: the committee assesses Criterion 1b (Verifiable objectives) as **satisfactory.**

The ITC Faculty has a long history in capacity-building and educating international students. However, it has only recently started to think explicitly about its vision on internationalisation, as required by the assessment framework for the assessment of internationalisation. The panel found that so far no clear procedures are in place for the improvement-oriented evaluation of the vision of internationalisation.

Academic master's programme Geo-Information Science and Earth Observation: the committee assesses Criterion 1c (Improvement-oriented evaluations) as **unsatisfactory.**

The panel ascertained that the academic master's degree programme has a vision on internationalisation. This vision is actively supported by stakeholders inside and outside the programme and includes implicit, verifiable objectives. Although there are still opportunities for improvement, the panel assesses the overall quality of this standard as satisfactory. The excellent integration of the capacity-building mission in its vision on the design of its international educational activities and the international reputation of the ITC Faculty are important factors in this decision.

Academic master's programme Geo-Information Science and Earth Observation: the committee assesses Standard 1 (Vision on internationalisation) as **satisfactory.**

The panel established that the programme has formulated relevant international and intercultural learning outcomes. These learning outcomes are a clear reflection of the UT vision on internationalisation.

Academic master's programme Geo-Information Science and Earth Observation: the committee assesses Criterion 2a (Intended learning outcomes) as **satisfactory.**

Standard 2: Teaching-learning environment

The curriculum, staff and programme-specific services and facilities enable the incoming students to achieve the intended learning outcomes.

Explanation:
The contents and structure of the curriculum enable the students admitted to achieve the intended learning outcomes. The quality of the staff and of the programme-specific services and facilities is essential to that end. Curriculum, staff, services and facilities constitute a coherent teaching-learning environment for the students.

Findings

This section covers the structure of the curriculum (§2.1) and the relation between the intended learning outcomes and the curriculum (§2.2). It also discusses the didactic concept (§2.3), the feasibility of the programme (§2.4), the composition of the staff (§2.5), programme-specific quality assurance (§2.6) and programme-specific facilities and guidance (§2.7). It also deals with the following criteria of the Assessment framework for the assessment of internationalisation (§2.8): curriculum (criterion 3a, §2.8.1), teaching methods (criterion 3b, §2.8.2), learning environment (criterion 3c, §2.8.3), staff composition (criterion 4a, §2.8.4), international experience and competence of the staff (criterion 4b, §2.8.5), services provided to the staff (criterion 4c, §2.8.6), student group composition (criterion 5a, §2.8.7), and services provided to students (criterion 5c, §2.8.8).

§2.1 Curriculum

§2.1.1. The in-house programme
The academic master's programme Geo-Information Science and Earth Observation has a study load of 118 EC, which is spread over eighteen months. The programme starts with an introductory period of 3 EC. In it, all students are introduced to the Netherlands and the Faculty of ITC. The training programme has a modular structure and is divided into four blocks. The blocks vary in length and are divided into three-week modules. The total number of modules is 23, and each module is worth 5 EC, totalling 115 EC. For an overview of all courses, see Appendix 3.

The first block (15 EC, modules 1-3) consists of three core modules dealing with the basic principles of Geoinformation, Remote Sensing and the System of Earth. These modules are partly used as remedial teaching due to the variation in entry level of the incoming students. In Block 2 (35 EC, modules 4-10), students take seven domain modules. The courses in the domains respond to the specific demands of the professional field in the different target countries. There are six domains within the programme, and students specialise in one of them:

1. Applied Earth Sciences;
2. Geoinformatics;
3. Land Administration;
4. Natural Resources Management;
5. Urban Planning and Management;
6. Water Resources and Environmental Management.

Block 3 (25 EC, modules 11-15) is designed around research orientation, the deepening of knowledge and skills of research related to individual research topics, and the development of a thesis proposal. The block starts off with a course on Research Skills (module 11) and two

advanced electives (modules 12 and 13) . These advanced courses are designed to equip students with specific tools, methods and applications that are important for their intended thesis research. In modules 14 and 15, students work on group research projects designed by the different scientific departments and spend three weeks on finalizing their thesis research proposal. The two advanced courses and the group research projects have to fit the intended individual thesis research topic.

During the site visit, the panel learned that the development of the thesis research proposal is guided and monitored closely. The thesis process starts off with an MSc fair in Block 2. Before this fair, students receive a list of possible research topics, linked to research being conducted in the scientific departments of ITC. At the fair, these topics are presented and explained by staff from the different departments. Students usually choose a topic from the list, but they are also allowed to develop their own MSc thesis topic. The thesis topic should be explained and described in an MSc pre-proposal that has to be submitted before the start of module 11. Apart from the thesis topic, the MSc pre-proposal must explain the choice of advanced topics and group projects (modules 12-15), available datasets, fieldwork planning (optional) and envisaged MSc supervisors.

In the third block, students prepare the final version of their MSc research proposal and defend it. The final proposal should include a supervision plan that has been approved by the two appointed thesis supervisors. At the end of module 15, a Thesis Admission Committee decides whether or not the proposal is good enough for the student to be admitted to Block 4 of the academic master's programme (modules 16-23). If the proposal is not good enough, there is a re-sit two weeks later.

In Block 4 (40 EC, modules 16-23), students work individually on their MSc thesis and have regular meetings with their thesis supervisors. At a mid-term presentation, students have the opportunity to present their preliminary results to fellow students and staff. Formal assessment takes place during the thesis defence at the end of the block. A Thesis Assessment Board (TAB) will assess the individual student based on the written thesis and a presentation plus oral defence. The chair of the TAB is always an expert on the research topic and must be an associate or full professor. For more information about the TAB, see Standard 3.

The panel studied a detailed alumni survey carried out in 2014 and found that a great majority of the alumni consider the content of the programme to be relevant, state-of-the-art and at the right level. Alumni are positive about the content of the programme, but would like to have the option of more study trips. Students told the panel that the programme now includes study excursions to companies and/or organizations in Europe (e.g. to research institutes, polder boards and offices of land registry in Germany, Austria and Belgium), but some complained that these are scheduled too early. These students would like to be able to take excursions before finalising their MSc thesis proposal. Teachers explained that study excursions do not take place at a fixed period in time. The exact timing of study excursions depends on the agendas of host companies and organizations and on the moment that the JEP students come to the ITC Faculty. The panel advises the programme management to explore if there are possibilities in the programme to accommodate students who want to take excursions before finalising their MSc thesis proposal.

The panel is of the opinion that the curriculum of the master's degree programme is coherent, has a solid structure and a logical sequence of modules. The six domains are clearly aimed towards employment and link well to the student's interests without offering them too much freedom of choice. The domain modules, advanced research courses, project groups

and the organisation of the thesis phase really allow students to connect to the research in the different scientific departments and to learn from the experts.

§2.1.2. The Joint Education Programmes

In addition to the in-house programme, the ITC Faculty offers nine Joint Education Programmes (JEPs) in cooperation with educational organisations around the world. Students in these programmes acquire a recognized UT degree (single degree or double degree) without having to be at the ITC Faculty full-time. The JEPs are tailor-made to fit to the specific demands of students and the rules at the partner institutions. As a result, the JEPs differ significantly in content, organization and structure. A description of each JEP is included in Appendix 5. The panel studied these descriptions and a set of materials on the JEPs (for more details see Appendix 9). It also interviewed staff members and students of one of the JEP-partners of the ITC Faculty, Gadjah Mada University.

All nine JEPs have in common that at least 60% of the programme overlaps with the course content (and related credits) of the in-house programme Geo-Information Science and Earth Observation at the ITC Faculty. JEP students take part of the programme in their home country, part of the programme at the ITC Faculty, and sometimes part of the programme by means of distance education. In June 2012, the Dutch Ministry of Education introduced a rule prescribing that students who wish to get a double degree should take at least 25% of their programme in the Netherlands. The panel ascertained that all nine JEPs comply with this rule.

Generally, JEP students take ITC core modules, domain modules and research orientation, and write a thesis (including a thesis proposal and a thesis defence). Therefore, the findings of the panel about these parts of the programme (see §2.1.1) also apply to the JEPs. During the site visit, the panel questioned students, ITC staff and staff members of Gadjah Mada University Indonesia (one of the JEP partners of the ITC Faculty) on the content and organization of the training programme and thesis supervision, and on the division of labour and responsibilities between the ITC Faculty and JEP partner institutions. Which part of the programme is taken at the ITC Faculty and which part at the partner institution depend on JEP-specific arrangements and individual choices. For example, in the JEP Geo-Information Science and Earth Observation, students follow the core modules at Chang'An University, then come to the ITC Faculty for a year, and then go back home to write their thesis. Chang'An JEP students can choose to extend their stay in the Netherlands until after their thesis defence.

During the site visit, ITC staff explained that the content of core modules and other ITC modules at the partner institutions is equivalent to the modules at the ITC Faculty in terms of learning objectives and module materials. In order to ensure that JEP students abroad and students at the ITC Faculty have the same teaching and learning experience, each JEP has an ITC coordinator. There is regular contact between representatives of the partner institutions and the ITC coordinator. The ITC coordinator, and sometimes also other ITC staff members, visit the partner institution every year. Representatives of Gadjah Mada University confirmed that there is regular contact with the ITC Faculty. They are aware of the fact that the content of the modules at Gadjah Mada University needs to match the content of the modules at the ITC Faculty. There is, however, some freedom for the partner institutions to adapt the content of modules to local situations, to specific cases, or to recent developments. Although it is important that the basic content of the courses at the partner institution is similar to that at the ITC Faculty, the panel agrees that there should also be some room for local variation.

The panel noted that the teaching and learning experience of JEP students abroad is also strengthened by giving all JEP students access to ITC Blackboard after enrolment. Students can check and use module information and materials of the corresponding ITC module and can be involved in the digital discussion environment. In addition, the core module lectures at the ITC Faculty are recorded every year. JEP students abroad have access to these videos. Based on the interview with students and staff from Gadjah Mada University and the available materials at the site visit, the panel is convinced that ITC Faculty is sufficiently in control of the content of the modules at the partner institutions and of the overall teaching and learning experience of JEP students.

The panel learned from conversations with students and staff that the ITC Faculty pays adequate attention to the thesis supervision of JEP students. Thesis preparation is always supervised by an ITC assistant, associate or full professor. Quality and progress assessments are the same for JEP students as for students enrolled in the in-house programme, and take place during the thesis proposal defence, the mid-term progress evaluation and the final thesis defence. If the JEP student is not at the ITC Faculty during the thesis trajectory (or part of it), regular supervision is conducted at a distance. The ITC supervisor has regular contact with local supervisors via Skype. The ITC supervisor is always involved in the mid-term progress evaluation and the final examination. In addition, there is always an ITC staff member present at the partner institution during the final thesis defence.

For more information about quality assurance of the JEPs, please check §2.6.

§2.2 Relation between intended learning outcomes and the curriculum

During the site visit, the panel examined the integration of the intended learning outcomes in the curriculum of the academic degree programme. In the critical reflection, the ITC Faculty provided an overview of the relation between the intended learning outcomes and the specific components of the curriculum. The panel also requested an overview of the learning objectives of all modules within the academic master's degree programme.

According to the panel, there is a solid link between the high-level learning outcomes and the programme. Most learning outcomes are addressed in several modules. A good example is learning outcome 3: modelling is part of the core courses, but is also addressed in almost all domain modules. The same holds true for learning outcome 7. Students learn to analyse scientific domain problems, and to develop scientific solutions for them, in the domain modules. The research module builds upon these skills and develops them to a more advanced level.

In order to ensure that the specialisations within the academic master's programme pay adequate attention to all intended learning outcomes, the panel also studied the lower level learning outcomes of the modules. In several samples, it related these learning objectives to the content and structure of modules. It observed that the learning objectives of the modules have a high level of detail. They are well-matched to the high-level learning outcomes and the specifics of the domain specialisation, and are sufficiently addressed. The modules within the programme have a logical sequence and build upon each other, thereby ensuring that all intended learning outcomes are achieved at the right level. In conclusion, the panel is convinced that all learning outcomes are addressed in the programme, regardless of the selected domain specialisation.

§2.3 Didactic concept, teaching formats

Education at the ITC Faculty focusses on individuals in different stages of their academic or professional life and is based on the philosophy of 'lifelong learning'(see §1.2). For the ITC Faculty, creating an attitude of 'lifelong learning' is an integral part of its didactical concept: graduates 'should be able to adapt themselves to the ongoing changes in society and be able to deal with new technologies and knowledge'. As a result of this view, the academic degree programme aims to gradually hand over the control of the learning process to the students. Teachers take the role of advisors, tutors and coaches, and educate students to take the lead in their own learning process.

The panel established that 'lifelong learning' and increasing independence are reflected in the set-up of the programme in a number of ways. First, students are expected to take the lead in designing their own learning programme. In the MSc pre-proposal, students should present the ITC Faculty with an informed choice for the advanced courses, the research projects and their thesis topic. Second, the number of contact hours and the teaching formats of the programme show a gradual intensification of independent learning. In Blocks 1 and 2, the average number of contact hours per week is 18.8, and students have numerous lectures and supervised practicals. In Block 3, the average number of contact hours is much lower (8 per week). In this block, students work more on individual assignments and group projects. In Block 4 students work individually on their thesis. Thesis supervision is arranged on an individual level.

Other important didactic principles of the ITC Faculty are 'blended learning', 'the international classroom', and the 'ethically aware engineer and academic'.

At the ITC Faculty 'blended learning' means facilitating students to study abroad for shorter periods of time and to study at home using modern computer technology. The master degree programmes blend different forms of education (face-to-face, distance education, or a mix of these two), locations (at home, at partner institutes, or in the ITC building) and options in the study sequence and the mode of study. Blended learning and the exchange of students between locations are supported by a modular system of education and modern computer technology. During the panel conversation, students explained that this structure and modern computer technology enable them to come to the ITC Faculty for part of the programme and to benefit from the expertise at the ITC Faculty through distance education when doing the other part of the programme in their home country. Even though the modular system requires more discipline than other systems (see §2.4), students highly appreciate it. According to the panel, blended learning is evident in, and an important prerequisite for, the Joint Education Programmes. Blended learning is also present in the in-house programme, but here it could be strengthened further. For example, the ITC Faculty could benefit more from the available expertise at partner institutions by stimulating them to set up distance learning education (e.g. discussion boards or video lectures) for in-house students on specific topics or regional cases.

The principle of 'the international classroom' is about creating an environment in which students with different cultural backgrounds work together and share cases and experiences. The panel extensively discussed about the international classroom with students, staff and alumni. It concluded that group work and discussion are essential to this principle. Students have many guided discussions in the core modules and do a lot of group work in the domain-related parts of the degree programme. The ITC Faculty actively takes into account the diversity in international backgrounds of students in the student group composition,

therewith creating a multicultural learning environment. During the site visit, students confirmed that they are actively encouraged to reflect on their own situation and to bring in their own experiences and cases during group discussions and assignments. In their opinion, this enriches the discussions in the classroom. The panel concludes that 'the international classroom' is an important asset of studying at the ITC Faculty.

The principle of the 'ethically aware engineer and academic' starts from the idea that professionals in the field should be aware of the ethical aspects of their work and take them into account in every problem that is to be solved. In the educational programme, ethical issues are addressed during discussions, case studies and projects. Within the context of less developed countries, these aspects could include issues, for example, around war and peace, balance of power, and improvement of the lot of the poor. The panel supports the integration of this principle in the programme's teaching. Ethical awareness is important for all engineers and academics in the field, but especially for the international student population at the ITC Faculty.

The panel concludes that the didactic principles of the ITC Faculty are well integrated. They are relevant to the content of the programme and the student population, and have a strong connection with its mission (see §1.2). At the moment, the didactic principles of the ITC Faculty have not yet been streamlined with the didactic principles and vision on education of The University of Twente. The panel advises the ITC Faculty and the university to work on this in the near future.

§2.4 Intake and feasibility

§2.4.1 Intake

As stated in the critical reflection, the programme recruits students from different nationalities. The vast majority of the participants in the programme originate from countries outside Europe. Although there have been some fluctuations, the intake has remained relatively stable between 2007 (208 students) and 2013 (206 students). In the same period, the number of JEP students within the total intake has increased from 68 in 2007 to 94 in 2013.

The panel investigated the intake and considers it to be adequate. From the interviews with students, it became clear that they greatly value the diversity of the student body. Although they argued that the differences in educational and cultural background sometimes lead to difficulties in communication, they also explained that they learn how to bridge communication problems as a result.

The academic and the professional master's programme have the same entry requirements. The reason for this is that the Dutch professional bachelor has no equivalent in the countries where ITC students come from. All applicants (in-house and JEP) should have a bachelor's degree from a recognized university in a discipline related to one of the course domains. A completed undergraduate degree with a minimum GPA requirement of a BSc/BA, or 3.0 or higher, or lower second class honours is compulsory. In addition, students have to demonstrate an IELTS score of 6.0, a TOEFL score of TPB 500 or IBT 80, or a Cambridge ESOL CAE-C from an approved and internationally recognized language testing centre. Nationals from a number of specified countries are exempt from an English test. The panel considers the admission criteria of the ITC Faculty to be adequate.

The student body of both the academic and professional master's programme is very diverse. The panel investigated what measures are taken to deal with different entry levels and

expectations. It learned that the introductory period and the core courses deal with this. In the introductory period, students learn how things work at the ITC Faculty; in the core courses, the programme manages expectations about educational approaches and the role of the teacher. The core modules of the programme are the same for all students and familiarize them with aspects of the student-centered learning environment at the ITC Faculty, such as group discussion and group work. In addition, core modules are used for remedial teaching in terms of knowledge, professional experience, and/or academic skills. During the panel conversation, some students complained that as a result of the remedial teaching in the core courses, not all information in these courses is relevant for them. Other students were happy about the core modules because they close knowledge gaps and ensure that everybody in the programme has a sound knowledge base before starting the domain modules. The panel is convinced that the core modules are necessary to tackle the great variety of entry levels of incoming students. It agrees with the programme management that the core courses are the most suitable moment for this. Each core module includes additional advanced assignments for students who are ahead of the rest.

§2.4.2 Feasibility
The study load of the programme is 118 EC. The University of Twente uses a standard of 28.8 hours per EC. Using this basic rule, a three-week ITC module has a study load equal to five EC. The panel concludes that the academic degree programme is challenging; students have to complete their master's programme within 18 months from the starting date of the programme. The critical reflection explains that the reason for choosing an 18-month period for the programme is that most students are already employed and/or come to the ITC Faculty with a scholarship. Institutes and companies feel reluctant to allow their employees to go abroad for a long period of time, and scholarships do not allow for the funding of holidays, hence leading to the absence of a summer break.

During the site visit the panel talked with students, alumni, teachers and programme management about the feasibility of the programme. Students and alumni indicated that the workload is high, but doable if you work hard. Discipline and time management are vital, because the modular structure of the programme is intense and does not allow for any slack. Students would like to have more breaks, but they also appreciate the fact that they can finish the programme in a relatively short period of time. They are highly motivated to finish the programme before going home and spend a lot of time on their studies. Some students indicated that they would not have been able to enrol if the programme took more than 18 months. The panel understands the decision of the programme management to maintain a programme duration of 18 months.

The panel found that the programme management is aware of the high workload and has taken a lot of measures to increase the feasibility of the programme. It has for example introduced a fixed Wednesday afternoon period for self-study, catch-up moments during the core modules for finalizing exercises and assignments and reflection, and a catch-up week between the blocks. In addition, more balance has been created in study load among modules. The panel concludes the programme is demanding but feasible. The programme management is actively monitoring the workload and is urged by the panel to continue doing so. It is also advisable to introduce more short breaks or short periods for self-study within the first part of the programme. At the moment, this part of the programme is quite intensive.

§2.5 Teaching staff
The panel focussed on the quality and quantity of the teaching staff in the academic degree programmes.

§2.5.1 Quantity
The student-staff ratio for the academic degree programme is 1:5.3 for the 2012-2014 cohort. During the site visit, the teachers noted that they are satisfied with their workload. Because of the modular structure of the programme, the teaching load is often concentrated in one or two blocks. In other blocks, staff members have time for research or capacity-building activities. According to the panel, the quantity of the teaching staff is adequate.

§2.5.2 Quality
Of the 105 staff members involved in the programme, 15 are professors, 14 are associate professors, 36 are assistant professors, 30 are teachers, 6 are PhD students/researchers, and 4 are skills instructors. The panel assesses the staff composition as adequate. There is an appropriate mix between staff who teach a lot and staff who focus primarily on research or capacity building and have a very specific field of expertise.

All staff members of the ITC Faculty have to comply with university requirements for didactical skills and English proficiency (CEF C2). At the moment, 55% of all staff have achieved the University Teaching Qualification. All other staff members are either in the process of achieving the University Teaching Qualifications or are exempted (an exception exists for those with over twenty years of teaching experience). Currently, 60% of all staff members comply with the English language requirement of the university. All other staff members are either in the process of achieving the University Teaching Qualification (or are exempted) or completing remedial training in English language skills.

The programme management provided the panel with CVs of all ITC staff members and a list summarizing their specialisation areas, membership of research schools and professional organizations, and their participation in international research projects and consultancy. The panel found that the ITC staff is enthusiastic, involved both in research and the professional field, and has ample expertise on a wide range of topics in the field. A lot of staff are involved in international projects or consultancies and are members of international research schools or professional bodies.

The panel is pleased with the overall quality of the teaching staff.

§2.6 Programme-specific quality assurance
The panel investigated the general programme-specific quality assurance of the degree programmes (§2.6.1) as well as of the JEPs (§2.6.2)

§2.6.1 General programme-specific quality assurance
There is one Programme Committee (PC) for the academic and professional master's programme, including the JEPs. The PC consists of eight members, four students from different domains and programmes and four staff members from the ITC Faculty. During the site visit, the panel discussed the programme-specific quality control at the ITC Faculty with representatives of the PC. The panel was also given access to minutes of the PC, results of block evaluations, outcomes of a student survey (2012-2014 cohort) and outcomes of an alumni survery.

The panel ascertained that the ITC Faculty evaluates the quality of the courses in its degree programmes on a regular basis. Regular evaluations are performed at the end of every block, making use of a standard evaluation form. In addition, module coordinators are requested to

supply a report on their module and propose changes to the Course Director. Along with the block evaluations, there is an end-of-course evaluation to assess the main aspects of the education provision and the coherence between modules. The outcomes of these evaluations are analysed, discussed and verified with staff and students. In conclusion, the course director writes an annual report, which is discussed on the domain and the scientific department level. The final report, including recommendations for modifications, is sent to the PC and the Education Director of the faculty. The critical reflection included a clear overview of the system for internal quality assurance at ITC, taking the Plan-Do-Check-Act cycle as a point of departure.

The PC has a defined role within the system for internal quality assurance and meets regularly. It assesses the final report provided by the Education Director. Upon receipt of the report, members of the PC discuss the summaries of the evaluations and the related recommendations for modifications. In case of serious issues, members of the PC also consult the underlying evaluation. During the panel conversation, PC members explained that they also provide the Education Director with unsolicited advice. Last year, for example, the PC discussed complaints from students about the study load and provided the Education Director with recommendations about measures for study load reduction.

Students have an important role to play within the PC. The panel found that student members of the PC are involved in, and selected by, the Student Association Board (SAB). Usually, ITC students go to the SAB if they encounter problems. If necessary, the student members of the PC discuss these issues in the regular PC meetings.

The panel concludes that the faculty evaluates student and staff satisfaction on a regular basis and pays attention to internal quality control of its degree programmes. The panel did note that the PC is not very involved in strategic issues. For instance, the PC was not consulted about the revised learning outcomes of the academic master's programme. When asked why, PC members explained that the PC is still relatively new: it was only established when ITC became part of the University of Twente. As a consequence, the PC is still working on improving its communication lines and establishing its position within the Faculty. The panel empathises with this situation. Nevertheless, it would like to advise the PC to contribute more pro-actively to strategic issues in the future.

§2.6.2 Quality Assurance of the Joint Education Programmes

Education in the JEPs is partly provided by the ITC Faculty (a minimum of 25%) and partly by partner institutions. The panel discussed quality assurance of the JEPs with the Programme Committee (PC), Examination Board (EB), management, staff responsible for international activities and representatives from Gadjah Mada University. The panel ascertained that the JEP modules in Enschede are subject to the regular system of quality control at the ITC Faculty (see §2.6.1). In other words, JEP students take part in block evaluations, and the PC discusses (and advises about) the outcomes of these evaluations. In addition, JEP students are included in the end-of-course evaluation of the ITC Faculty. This end-of-course evaluation assesses the main aspects of the education provision and the coherence between modules, including coherence between modules taken at the ITC Faculty and at partner institutions.

The partners assess JEP education at their institutions using their own control system. PC members explained that they have regular contact with programme committees (or equivalent bodies) at the partner institutions to discuss the outcomes of these assessments and to evaluate if ITC standards still apply. Furthermore, each JEP has an ITC coordinator. This

coordinator has regular contact with the partner institution to ensure that the content of core modules and other ITC modules at the partner institutions is equivalent to the modules at ITC (see §2.1.2). The content of the JEP programme is also tested by the Examination Board (see below).

The panel studied several documents and agreements about the quality assurance of JEPs, such as JEP working guidelines, JEP business agreements, and descriptions of local quality assurance and accreditation procedures. The panel established that clear agreements have been set up with JEP partners concerning quality assurance. If the rules for quality assurance differ between the partners, the strictest rules for quality assurance always apply. This principle is commended by the panel.

In addition, all nine JEPs are involved in a rigorous evaluation process. At the start of each JEP, a JEP implementation plan is prepared. This plan outlines the relation between the content of a single or double degree programme and the corresponding programme in ITC. The currently running JEPs are all working on the basis of exemption. As part of the internal quality assurance process and at the request of the Examination Board, a check is being introduced to assess the level of similarity in content, as well as the level and mode of assessment. The similarity in content is one of the criteria that determine the required period of stay at the ITC Faculty. The Examination Board check is repeated every three years. As a follow-up of the check, an improvement plan is developed that describes the steps that will be taken to remedy identified problems. If a JEP no longer satisfies the requirements of the ITC Faculty, it is terminated. The panel established that ITC does not shy away from closing a JEP in case of serious issues with the quality or content of the JEP modules at the partner institution. The programme management and a student told the panel that a JEP with a partner institute in Iran has recently been terminated, because the institute in Iran could not live up to ITC quality standards and demands.For more information about checks by the Examination Board on assessment and achieved learning outcomes in the JEPs, please refer to Standard 3.

The panel concludes that the quality assurance of the JEPs is well established. It did note that not all procedures have been formalised and recorded. For instance, the ITC Faculty has a document with working guidelines for the JEPs, but this document has not yet been completed and endorsed by the management. The panel urges the ITC Faculty to make this a priority. In addition, it strongly advises the ITC Faculty to compile one final and formal document including all general agreements, arrangements, working guidelines, procedures and quality criteria for ITC JEPs.

§2.7 Programme-specific services and guidance

The facilities and services of the ITC Faculty are geared to the international student body of the programmes. They are linked to the delivery of education, the provision of a pleasant and stable living environment for international students, and guidance.

The panel investigated the programme-specific services during a tour of the building. It found that the educational facilities include modern computer facilities and wireless internet throughout the ITC building and in the ITC International Hotel (see below). The ITC laptop programme ensures that all students have a laptop with the required settings and software, and the library possesses a large number of books and journals. All students, including the JEP students at partner institutions, have digital access to the full ITC and central UT journal collection (including ScienceDirect) and a range of scientific e-books. In addition, all students have access to ITC-Blackboard and to 'My Students', a digital application for students to

select free module choices in Blocks 3 and 4. The ITC building also contains a well-equipped GeoScience laboratory for education and research activities, sufficient classrooms, and several places where students can work alone or in small groups. The panel is impressed by the available facilities. Students appreciate the fact that the ITC Faculty has its own building. There they are less anonymous than at the UT campus and really feel part of ITC's international student body.

ITC students are accommodated in the ITC International Hotel. As a rule, all students stay in this hotel. The main ITC building also hosts arestaurant offering lunch and a 'Bureau Education and Research Support' (BOOZ). BOOZ supports students during their stay at ITC. BOOZ services include matters like residence permits, social and cultural aspects, consular affairs and student information. Students get help with financial aspects from the Financial and Economic Affairs Department, and a general practitioner group is on hand for those who need medical counselling. Last but not least, all students can become members of the Student Association Board (SAB). The SAB organizes social, cultural and sports activities for students and is represented on the Faculty Council and the Programme Committee.

The panel questioned students and alumni about the services and guidance for international students. It established that the students are very satisfied. They appreciate having a clear first port of call for all questions with BOOZ. In general, BOOZ officers refer students to the right person or institution if they are not able to help them personally. According to the students, staff members are also very accessible in case of course-related questions. The rooms in the ITC International Hotel are well equipped. Although most students value the hotel, some students would like to have the freedom to find their own accommodation in Enschede. Also, some students would like the opening hours of the restaurant to be less restricted. Overall, however, the panel is impressed and is of the opinion that the ITC Faculty offers very good facilities for the education of international students in the field of Geo-Information Science and Earth Observation.

§2.8 Criteria and standards of the Assessment framework for the assessment of internationalisation

§2.8.1 Curriculum

The content and structure of the curriculum enable the achievement of the intended international and intercultural learning outcomes

For a schematic overview of the curriculum of the in-house programme and the JEPs, please refer to Appendices 4, 5 and 6. For a detailed description of the programme, please see §2.1.

The panel studied the content and the structure of the curriculum in more detail from the perspective of the vision on internationalisation of the ITC Faculty and the intended international and intercultural learning outcomes of the programme. It established from module descriptions, the overview with lower level learning outcomes, and discussions with students and staff that a focus on real-world issues and a comparative orientation are essential components of the curriculum of the academic degree programme. Many modules in the programme pay attention to the discussion of global problems and regional cases from all over the world. The JEP modules at the partner institutions also take real-world issues as their point of departure by discussing relevant regional cases. Students and staff members from Gadjah Mada University, for example, told the panel that although the content of the modules in Indonesia address the same intended learning outcomes, the modules are adjusted to local developments such as the eruption of the Merapi volcano.The international comparative orientation of education in the programme is further strengthened by a study excursion to

companies and organisations in Europe and by the international student composition at the ITC Faculty. While they are in the Netherlands, students bring experiences from their home country into the discussions.

The panel concludes that the curriculum of the academic degree programme teaches students to become more aware of local differences, different development levels in different countries, and the relation between local cases and global problems. It considers this international focus of the curriculum to be relevant and adequate, especially in the light of the capacity-building mission of the ITC Faculty. As has been noted in §1.4.4, the technical content of the programme is of a universal character and has no need for an international component, in the opinion of the panel.

The international and intercultural intended learning outcomes of the programme relate to the development of intercultural professional competencies and communicative skills (to create 'global citizens'). The critical reflection confirms that intercultural competences are discussed at the very beginning of the programme. The introductory period (3EC) includes a brief orientation to Dutch and European aspects, and the core modules and the module on research skills deal with internationally accepted values for carrying out research. The panel established that the development of intercultural skills is first and foremost triggered by the teaching formats of the curriculum. Students in the academic master's degree programme have a lot of guided discussions in the core modules and do a lot of group work in the domain-related parts of the programme. The ITC Faculty actively takes into account the diversity in international backgrounds of students when composing work groups, thereby creating a multicultural learning environment in which students learn how to work in an international team and how to communicate with students from different cultural backgrounds.

The panel concludes that the programme addresses international differences in the state of geo-information technology. The content and structure of the academic degree programme are coherent and match ITC's vision on internationalisation, while enabling students to achieve the intended learning outcomes of the programme. However, there is still an opportunity for the programme to promote internationalisation in a more explicit manner and to make students more aware of its role in the programme. The panel advises the programme management to review the current modules from this perspective.

§2.8.2 Teaching methods
The teaching methods enable the achievement of the intended international and intercultural learning outcomes.

Education at the ITC Faculty is based on the philosophy of 'lifelong learning' and the principles of 'blended learning', 'the international classroom' and the 'ethically aware engineer and academic'. Amongst other things, these entail that academic master's students are taught to adapt themselves to ongoing changes in society; to deal independently with new technologies and knowledge; to work and communicate with students from different cultural backgrounds; and to take control over their own learning process. For a detailed description of the principles and their integration in the academic master's programme, please see §2.3.

The teaching methods of the programme connect with the above-mentioned principles. The critical reflection explains that important teaching methods in the academic degree programme involve: 1. focussing on the relationship between the student's own professional experience and the academically oriented course work; 2. reflection on international case studies; and 3. group work. During group work, a mixture of nationalities is deliberately created by the programme to strengthen international and multicultural discussion and teamwork. Students at the site visit confirmed to the panel that this was indeed the case.

The panel is positive about the teaching methods of the programme, their integration (see §2.8.1) and the resulting learning benefits. Because students work in international groups, reflect on international cases and share experiences from their own professional backgrounds, they become more aware of international differences and have the opportunity to work on their intercultural professional and communicative skills (intended learning outcomes 10 and 11).

§2.8.3 Learning environment

The learning environment is suitable for achieving the intended international and intercultural learning outcomes

The panel found that the ITC Faculty offers students a unique multicultural learning environment:

- The student body of the ITC Faculty is very international (see §2.8.7). The Faculty builds on this international student body with its didactical concept of the 'international classroom'. Students do a lot of group work, and nationalities are deliberately mixed in these groups to help students develop intercultural professional and communicative skills (see §2.8.2);
- The staff are very international, have adequate English language skills, have ample international experience, and are involved in research as well as in capacity-building and the professional field (see §2.8.4 and §2.8.5). Staff contribute to a stimulating learning environment by sharing their expertise and experience with students;
- The ITC Faculty provides special services and facilities for international students, focussing on administrative, financial, technical, social, cultural and personal support. Students are accommodated in the ITC Hotel;
- The ITC Faculty has a worldwide network of contacts with educational institutions and is involved in many international projects. Students benefit from these contacts in many ways. The possibility for international students to enrol in a JEP is only one example.

The panel concludes that the learning environment matches the mission of the ITC Faculty 'to be a gateway for knowledge exchange for individuals and institutes from countries that are economically and/or technologically less developed', and is suitable for achieving the intended international and intercultural learning outcomes.

§2.8.4 Staff composition

The composition of the staff (in quality and quantity) facilitates the achievement of the intended international and intercultural learning outcomes

The critical reflection offers an overview of the quantity of staff. The student-staff ratio for the academic degree programme is 1:5.3 for the 2012-2014 cohort. According to the panel, the quantity of the teaching staff is adequate and appropriate for the curriculum, the teaching methods and the achievement of the intended international and intercultural learning outcomes (see §2.5.1).

The programme management provided the panel with the CVs of all ITC staff members and a list summarizing their areas of specialisation, membership of research schools and professional organizations, and participation in international research projects and consultancy. The panel is positive about the general quality and engagement of the staff. Staff members are enthusiastic, well-informed about recent developments in the field, and have ample expertise (also see §2.5.2 and §2.8.6).

All staff members of the ITC Faculty have to comply with university requirements for didactic skills and English proficiency (CEF C2). At the moment, 55% of staff members has achieved the University Teaching Qualification, and 60% of all staff members complies with the university's English language requirement. All other staff members are either in the process of achieving the University Teaching Qualification (or are exempted) or completing remedial training in English language skills.

The panel found that all ITC lecturing staff followed a three-day workshop on Teaching and Learning in Higher Education before the introduction of the University Teaching Qualification. The 'international classroom' and intercultural communication were topics on one day of that workshop. The University Teaching Qualification does not pay special attention to international and intercultural elements in teaching. Hence, the University of Twente has introduced workshops on intercultural communication for lecturers from October 2014 onwards. Because of the ambitions of the ITC Faculty with regard to internationalisation, the panel would like to advise the ITC Faculty to offer all staff members the opportunity to follow these workshops and/or to offer additional and tailor-made courses on this topic.

§2.8.5 International experience and competence (staff)
Staff members have sufficient international experience, intercultural competences and language skills

The critical reflection includes an overview of the qualifications and international activities of each staff member. The panel studied this overview. It concludes that the staff members have ample international experience. English language proficiency is guaranteed by the university requirement that all staff members are able to communicate at the CEF C2 level.

The panel found that the staff of the ITC Faculty is very international; members come from many international career backgrounds, represent 35 different nationalities, and 23% of staff originates from countries outside the European Union. In addition, many visiting scientists from countries around the world spend periods at the ITC Faculty and contribute to teaching. In the opinion of the panel, there is an adequate mix between staff who teach a lot and staff who focus primarily on research or capacity-building and have a very specific field of expertise. There is ample opportunity for staff members to bring their own experiences into the courses. This contributes to the principle of 'the international classroom' in the sense that not only students, but also staff members with different cultural backgrounds share cases and experiences in their courses (also see §2.3 and §2.8.2). The panel concludes that the quality and the varied international backgrounds of the staff contribute to the international learning environment of the programme and the achievement of the intended international and intercultural learning outcomes.

The mobility of staff members and the further extension of international experiences are stimulated by the multitude of courses offered by the ITC Faculty throughout the world (including JEPs, refresher courses and tailor-made training in international projects). As a

result, ITC lecturing staff travel a lot and gain wide experience with providing education in various international environments and to mixed groups of students across the globe.

§2.8.6 Services provided to staff

The services provided to the staff (e.g. training, facilities, staff exchanges) are in line with the staff composition and facilitate international experiences, intercultural competences and language skills

Many training services are provided to staff at the university level. The University of Twente offers UTQ training, English language training, and workshops on specific topics related to education, including ones on international and intercultural elements of teaching (see §2.8.5). In addition to the services at the university level, the ITC Faculty offers a sabbatical period to its staff. This sabbatical period is part of the employment conditions and provides staff of the ITC Faculty with the opportunity to spend a period of time at an educational institution in another part of the world in order to teach or do research. During the site visit, staff members explained to the panel that the ITC Faculty is a unique employer in the sense that it has a worldwide network of contacts and is involved in many international projects. The sabbatical period supports staff members in exploiting this network for the development of their personal career, but it is also important for the maintenance and expansion of the network of the ITC Faculty.

The panel concludes that staff members are satisfied with the available services. In the panel's opinion, the services are in line with the international experiences, intercultural competences and language skills required for the provision of the academic and professional master's programmes.

§2.8.7 Student group composition

The composition of the student group (diversity of national and cultural backgrounds) is in line with the programme's vision on internationalisation

The critical reflection included an overview of the continental origin of students at the ITC Faculty during the last seven years and an overview of the international origin of alumni from Official Development Assistance (ODA) countries (from 1950 up to 2013). The panel established that the ITC Faculty has a student body that originates from a wide range of countries. Between 2007 and 2013 the number of nationalities at the Faculty fluctuated between 31 and 46. Most students originate from countries in Africa (13 nationalities in 2013) and Asia (10 nationalities in 2013), but the ITC Faculty also attracts students from the Americas, Europe and Australia/Oceania (5, 7 and 1 nationalities, respectively, in 2013). Although the majority of students still come from institutes in developing countries, they also increasingly originate from countries that are different from the traditional developing countries.

The panel is very impressed with the international composition of the student group. It concludes that the ITC Faculty is extremely successful in its mission 'to be a gateway for knowledge exchange for individuals and institutes from countries that are economically and/or technologically less developed'. It is pleased by the fact that the ITC Faculty increasingly attracts students from other countries, because it believes that this adds considerably to the international and intercultural learning experience of students. Even though the panel understands that the primary focus of the ITC Faculty is on capacity-building, it advises the ITC Faculty to look for further opportunities to increase the enrolment of students from countries that are different from traditional developing countries.

§2.8.8 Services provided to students

The services provided to the students (e.g. information provision, counselling, guidance, accommodation, Diploma Supplement) are adequate and in line with the composition of the student group

The critical reflection explains that there are many facilities and services for international students at the ITC Faculty (also see §2.7). International students are accommodated in the ITC International Hotel and follow a compulsory introductory period of 3 EC at the start of the programme. In this period, students are introduced to the Netherlands and to the Faculty ITC. The ITC laptop programme ensures that all international students have a laptop with the required settings and software before they embark on the core courses.

During the programme, students at ITC have access to the ITC library and are provided with wireless internet. In addition, all students (including the JEP students at partner institutions) have digital access to the full ITC and UT journal collection and a range of scientific e-books and have an account for ITC Blackboard. The panel had a tour around the ITC building and noted that it is well equipped. The building contains a GeoScience laboratory for education and research activities, a technical room for the recording of video lectures, a variety of small and large classrooms, and several places where students can work alone or in small groups.

Support for international students in matters like residence permits, social and cultural aspects, consular affairs and student information is arranged by the 'Bureau Education and Research Support' (BOOZ). The BOOZ functions as a first port of call for all questions, and BOOZ officers refer students to the right person if they are not able to help them personally. Students can also go to the Financial and Economic Affairs Department for help with financial aspects, to a general practitioner group for medical counselling, and to the Student Association Board (SAB) with programme-specific complaints. The SAB is represented on the Faculty Council and the Programme Committee and organizes social, cultural and sports activities for students. The panel concludes that the available facilities, services and guidelines match the international composition of the student body at the ITC Faculty and are more than adequate.

Considerations

Considerations with regard to the limited programme assessment

The curriculum of the Geo-Information Science and Earth Observation programme is comprehensive. After studying its various aspects, the panel established that the programme is very well developed and enables students to achieve the intended learning outcomes. According to the panel, the content of the programme is relevant, state-of-the art and at the right level. The six specialisations are clearly defined and connect well to the intended learning outcomes, the expertise at ITC, and the requirements of academics and professionals in the field. At the same time, there is sufficient opportunity for students to adjust the programme to their own interests and preferences. The JEP programmes are clearly defined, well thought out, and comply with Dutch rules and regulations. The ITC Faculty has ample control over the content and level of the parts of the programme that are organised at partner institutions.

Despite the fact that the didactic principles of the ITC Faculty have not yet been streamlined with the didactic principles and educational vision of the University of Twente, the panel concludes that the principles of the ITC Faculty fit well with the mission and the international student population of the programme. The didactic concepts are reflected in the teaching formats and set-up of the programme. The ITC Faculty has very good educational facilities and services for international students. 'Blended learning' is evident in the JEP programmes.

The panel advises the programme management to think about 'blended learning' more in terms of a two-way process and to stimulate partner institutions to contribute to 'blended learning' in the in-house programme.

The panel investigated the intake and the admission criteria and considers them to be adequate. It is enthusiastic about the diversity of the student body. It agrees with students and alumni that the programme is demanding, but feasible. The programme management actively monitors the workload and is urged by the panel to continue doing so. The panel understands the choice of the ITC Faculty to offer a programme that is as short and dense as possible. This is essential for many employed students and students who come to the ITC Faculty with a scholarship.

The panel is convinced that the programme has dedicated, innovative and skilled teaching staff. Because of the ambitions of the ITC Faculty with regard to internationalisation, the panel advises the ITC Faculty to offer staff members additional and tailor-made courses on this topic. The Programme Committee is functioning well, but could be more pro-active on strategic issues in the future. The panel is positive about the internal quality control of the programme. The internal quality assurance of the JEPs is well-organised in practice. The panel recommends the programme management to formalise and record these procedures more consistently in the near future.

Conclusion
Academic master's programme Geo-Information Science and Earth Observation: the committee assesses Standard 2 as **good.**

Considerations with regard to the assessment of internationalisation

The panel determined that the modules in the programme take a comparative viewpoint and link to global issues, recent international developments and relevant international cases. The excursion to companies and organisations in Europe and the international composition of the student body also teach students to become aware of local differences. The development of intercultural competencies and communicative skills is stimulated through guided discussions and group work in international teams. The panel concludes that the content and structure of the academic degree programme match ITC's vision on internationalisation and enable students to achieve the intended learning outcomes of the programme. However, there is still an opportunity for the programme to promote internationalisation in a more explicit manner and to make students more aware of its role in the programme. The panel advises the programme management to review the current modules from this perspective.

Academic master's programme Geo-Information Science and Earth Observation: the committee assesses Criterion 3a (Curriculum) as **satisfactory.**

The teaching methods of the programme focus on multicultural group work, reflection on international case studies, and discussion about the experiences that students bring in from their home country. The panel is positive about the learning benefits of these teaching methods in relation to the intended international and intercultural learning outcomes of the programme.

Academic master's programme Geo-Information Science and Earth Observation: the committee assesses Criterion 3b (Teaching methods) as **good.**

The panel found that the ITC Faculty offers students a unique multicultural learning environment. The organisation of education, facilities and services has been matched to suit the international target group of the ITC Faculty. The benefit of the international student population and the capacity-building mission of the ITC Faculty is that education at this Faculty has an international comparative focus and that students work together in multicultural working groups. The ITC Faculty definitely provides students with a stimulating learning environment. In this specific respect, it can be seen as an international 'best practice'.

Academic master's programme Geo-Information Science and Earth Observation: the committee assesses Criterion 3c (Learning environment) as **excellent.**

The panel established that the content and structure of the academic degree programme are adequate. The teaching methods are appropriate, and the panel is positive about their learning benefits. The combination of a worldwide network of contacts, an international student body, a skilled international staff, a focus on cases and group work, and many special facilities and services for international students provides students with a stimulating multicultural learning environment that can be seen as an international 'best practice'.

Academic master's programme Geo-Information Science and Earth Observation: the committee assesses Standard 3 (Teaching and learning) as **good.**

The panel assesses the quantity and quality of the staff as more than sufficient: the quantity of the staff is adequate; the staff is well-informed about recent developments in the field; it has a lot of expertise; and it is very engaged. All staff members at the ITC Faculty have to comply with university requirements for didactic skills and English language proficiency.

Academic master's programme Geo-Information Science and Earth Observation: the committee assesses Criterion 4a (Staff composition) as **good.**

The staff of the degree programmes is very international and has ample international teaching and research experience. In addition, many visiting scientists from countries throughout the world spend periods at the ITC Faculty and contribute to teaching. English language proficiency is sufficiently guaranteed by the university requirement that all staff members are able to communicate at CEF C2 level. The ITC Faculty offers courses throughout the world. As a consequence, staff members continue to develop and expand their international experience and intercultural competences while they work at the ITC Faculty.

Academic master's programme Geo-Information Science and Earth Observation: the committee assesses Criterion 4b (International compentence and experience) as **good.**

The University of Twente provides many training services. In addition, the ITC Faculty offers its staff a sabbatical period. Staff members are satisfied with the available services. The panel

concludes that the services are sufficient and fit the international ambitions of the programmes.

Academic master's programme Geo-Information Science and Earth Observation: the committee assesses Criterion 4c (Services provided to the staff) as **satisfactory.**

The panel established that the staff of the degree programmes has a lot of expertise in the field, is engaged, and needs to comply with strict university requirements for didactic skills and English language proficiency. The staff of the degree programmes is very international and has ample international experience. Staff members are encouraged to expand their international experience and intercultural competences while they work at the ITC Faculty, and the university provides sufficient training services. The quantity of the staff is adequate for the achievement of the intended learning outcomes.

Academic master's programme Geo-Information Science and Earth Observation: the committee assesses Standard 4 (Staff) as **good.**

The panel is very impressed by the international composition of the student group. It concludes that the ITC Faculty is extremely successful in its mission 'to be a gateway for knowledge exchange for individuals and institutes from countries that are economically and/or technologically less developed'.

Academic master's programme Geo-Information Science and Earth Observation: the committee assesses Criterion 5a (Student group composition) as **excellent.**

The panel established that many facilities and services are available for international students enrolled in a programme at the ITC Faculty. They include support for administrative, financial, technical, social, cultural and personal issues. In the opinion of the panel, the available facilities, services and guidelines match the international composition of the student body at the ITC Faculty and are more than adequate.

Academic master's programme Geo-Information Science and Earth Observation: the committee assesses Criterion 5c (Services provided to students) as **good.**

Standard 3: Assessment and achieved learning outcomes

The programme has an adequate assessment system in place and demonstrates that the intended learning outcomes are achieved.

Explanation:
The level achieved is demonstrated by interim and final tests, final projects and the performance of graduates in actual practice or in post-graduate programmes. The tests and assessments are valid, reliable and transparent to the students.

Findings

This section deals with the assessment system (§3.1) and with the achieved learning outcomes of the programme (§3.2). It also deals with the following criteria of the Assessment framework for the assessment of internationalisation (§3.3): student assessment (criterion 2b, §3.3.1), graduate achievement (criterion 2c, §3.3.2), international experience (criterion 5b, §3.3.4).

§3.1 Assessment system

The panel analysed the assessment system of the programme and focussed on the assessment policy, including the functioning of the Examination Board, the examinations, the thesis procedure, and assessment in the JEPs.

§3.1.1 Assessment policy

The assessment policy of the academic degree programme has been laid down in the Education and Examination Regulations, rules and regulations of the Examination Board, an internal quality assurance document and a test plan demonstrating the relation between modules, module assessments and intended learning outcomes. The Education and Examination Regulations are available for all students on the website of the ITC Faculty and provide an overview of the rules on the organisation, nature, frequency and marking of assessments as well as of the rules on re-sits, the research period and the MSc thesis.

Following the merger with the University of Twente, the ITC Faculty established one Examination Board (EB) for all of its courses, including the academic and professional master's courses and the JEPs. This EB consists of four staff members and is supported by a secretary and an education specialist. The Examination Board will shortly be expanded to include an external member. The panel supports this initiative. During the site visit, the EB explained that it is responsible for the assessment policy and for the safeguarding of the achieved learning outcomes. It also deals with complaints and exemption requests applicable to all examinations in the programme. The EB works according to an annual cycle and writes an annual report that is discussed with the Dean. All documents and correspondence of the EB are archived in the central document management system Decos.

Recently, the EB implemented a procedure to check the quality of individual tests on a regular basis. At the module level, module coordinators are responsible for student assessment. Assessments are prepared in collaboration with the teaching staff in the module. They are marked by examiners (often the module coordinator and lecturing staff) who are appointed by the EB. All examiners should have a University Teaching Qualification or a valid exemption from the UTQ. In addition, the EB organises seminars on the procedures and practices of assessments.

The EB has recently started to analyse the marks per module and to select modules with remarkable results. This was done for the 2010 and 2011 cohorts of both degree programmes, but not for the other cohorts due to difficulties in getting the marks of these cohorts in a reusable format. At the end of 2013, the EB formulated action points with priorities for the next few years. These action points include the collection and analysis of administered tests based on the analysis of results. During the site visit, the Examination Board explained that in the last few years, priority had been given to improving the thesis assessment procedures and checking the marks of theses from the academic master's programme. Differences in marking between domains were disclosed, and any necessary action has been taken. The thesis assessment procedures will be discussed in §3.1.3.

Coherence between the assessments and intended learning outcomes is monitored using a test plan. Each course director (in this case the director of the academic master's degree programme) is responsible for implementing and updating an annual test plan. This test plan has to include a worksheet linking the module learning outcomes to the MSc learning outcomes and a worksheet linking the module assessment to the module learning outcomes.

The panel concludes that the EB is professional and aware of its formal responsibilities. In general, the EB has implemented clear procedures for assessment and control as well as adequate action points for the near future. The follow-up of the control procedures for module assessments still needs work, however. The panel urges the EB to continue on the course it has set, and not only to analyse marks, but also to check all assessments in the programme on a regular basis.

§3.1.2 Examinations
The panel studied exams, the test plan of the master's programme and an overview of assessments in each module. It found that students in the programme are assessed by means of assignments, written exams, papers, group assignments, oral exams and presentations. Most modules include two or more methods of assessment to reflect the multiple intended learning outcomes of the modules. According to the panel, the assessments are sufficiently diverse and match the didactic concept.

§3.1.3 Thesis assessment procedure
Students conclude the programme with an MSc thesis of 40 credits. Upon approval of their thesis proposal, they work on this thesis individually in Block 4. In this block, students have regular meetings with their thesis supervisors and have the opportunity to present preliminary results at a mid-term presentation. Formal assessment of the thesis takes place during the thesis defence at the end of the block.

The final thesis is defended in front of a Thesis Assessment Board (TAB). During the site visit, the EB explained that the TAB is appointed by the EB and always contains one external member from another domain. The chair of the TAB is an expert on the research topic and must be an associate or full professor. In the case of a JEP student, the chair of the TAB is always from the ITC Faculty. This is arranged in the contract agreements with the partner institutions. The panel concludes that the composition of the TAB has been thought out well.

The assessment by the TAB is based on the written thesis and the oral defence. The EB has developed documents and guidelines to be used by the TAB, including a protocol and assessment criteria. The panel studied the documents and guidelines for the TAB and exchanged ideas on them with students, staff members and the EB. In assessing the candidate, TAB members take into account the following assessment criteria: 'scope and

depth', 'methods', 'reporting', 'presentation and defence' and 'process'. TAB members are asked to prepare their marks prior to the defence to assure an independent judgment. After the oral defence, the TAB withdraws to discuss the final mark. At that time, the chairman asks all TAB members for their opinion of the mark. The thesis assessment protocol provides the TAB members with a clear description of the meaning of the possible marks. As soon as the TAB members come to an agreement, the chairman records the results of the examination and a short summary of the argumentation on the 'Result of thesis examination' form. This form is signed by the chairman and the external examiner and sent to the EB. At the end of the oral defence, the chairman communicates the final mark of the thesis and the main argumentation to the candidate. No copy of the 'Result of thesis examination' form is given to the candidate.

The panel concludes that the thesis assessment process is satisfactory. The procedures and guidelines provide TAB members with clear instructions, initial marks are sought from multiple examiners, and an extensive thesis panel discussion takes place before the mark is communicated to the student. Nevertheless, the panel has some concerns about the current design of the thesis assessment process. In its opinion, there are several opportunities to further increase its transparency and quality:

- There are no thesis instructions for students. Although students get general instructions during Block 3 (module 11 Research Skills), the panel feels that the programme needs to provide clearer guidance about what constitutes a successful thesis at the start of the thesis process.

- The assessment criteria in the TAB guidelines are quite general and rather similar for the academic degree programme and the professional master's programme. The panel advises the EB to adjust the assessment criteria to better reflect the different objectives and intended learning outcomes of the two programmes. It suggests orienting the assessment criteria of the academic degree programme more to scientific research, understanding the scientific context of geo-information science and earth observation technologies and their application, and to 'creating new knowledge'. It suggests to focus the criteria of the professional master's programme more on 'organisational aspects', 'project management', 'applying knowledge', 'relevance' and 'entrepreneurship'.

- The traceability of the assessment by the TAB needs to be improved. At the moment, there is no record of assessments by individual TAB members. As a consequence, the EB has no evidence that the TAB members indeed judged the quality of the thesis and the oral defence independently of each other before coming to an agreement on the final mark. The panel suggests that the TAB members fill in separate assessment forms and that these are filed by the EB. The individual assessments need not be shared with the candidate, but candidates should receive a conclusive aggregated mark sheet (see below).

- The panel studied a representative sample of theses from both degree programmes, including the corresponding 'Result of thesis examination' forms. Although the forms of theses with low marks often contain more explanation, the panel noted that few forms say much about strengths and weaknesses. During the site visit, the EB explained that the 'Result of thesis examination' is not given to the candidate. The main argumentation of the final mark is communicated verbally to the candidate by the chairman of the TAB. The panel is of the opinion that this procedure is not transparent enough. Oral feedback can be more difficult to remember and less structured than written feedback. The panel

finds that the programme should provide students with a written mark sheet after the thesis defence. This mark sheet should contain clear argumentation on each criterion.

§3.1.4 Exemptions and assessment in the JEPs
The JEPs are all working on the basis of exemption. Students are exempted from courses that they did not attend in the ITC Faculty on the basis of courses that they have followed at a partner institution. Each JEP has been checked by the Examination Board to assess the level of similarity in content, as well as the level and mode of assessment. The EB repeats its check every three years (see §2.6.2). It deals with requests from students for exemptions. It only approves the actual marks when an analysis of the grading practice has been done less than three years before. The quality of the thesis is double-checked by the ITC supervisor (see §2.1.2.) and the ITC chair of the TAB (see §3.1.3).

§3.2 Achieved learning outcomes
The panel studied a representative sample of theses from the academic degree programme. It was impressed by their overall level and, in general, agreed with the marks given. Most of the selected theses are well constructed, and the majority have a clear focus, logical line of reasoning, and consistent evidence of the conduct of research. All MSc theses reflect an academic master's level. The work demonstrates that students in the academic degree programme achieve the intended learning outcomes and have adequate knowledge of the wider scientific context of their research. The panel did note, however, that the internationalisation component of the theses could be stronger (see §3.3 of this report). The panel would like to suggest that the ITC Faculty demands the students to include a reflective appendix in the thesis. This could be used by students to reflect on the intercultural setting of their research and case study. It would help students to become more aware of the influence of local settings and research cultures on the process and outcomes of scientific research. This could be an essential component of the thesis and could be formatively assessed. A description of what is required in this appendix needs to be included in the thesis guidelines.

Another measure of a programme's quality is the employment record of graduates. From the interviews with alumni and the alumni survey, it became clear that the programme is well connected to the labour market. In general, students are satisfied with the academic level of the programme and the acquired knowledge and skills. The vast majority of graduates (87%) finds employment soon after graduation. Most graduates continue their career in the public or private sector, but they also find PhD positions at the ITC Faculty or at other universities. Many mid-career professionals indicate that the programme helped them to get promoted to a higher position. During the site visit, alumni pointed out that the international learning environment at the ITC Faculty really broadened their understanding of cultural differences. As a consequence, they feel more comfortable about contacting colleagues from other countries for advice.

The panel established that alumni maintain their ties to the programme. Graduates retain their ITC e-mail address, and the faculty informs them on a regular basis about meetings, vacancies, scholarships and symposia. Alumni also receive a hard copy of the quarterly ITC magazine.

Based on the overall level of the theses and the good connection to the labour market, the panel concludes that the learning outcomes are achieved upon graduation.

§3.3 Criteria and standards of the Assessment framework for the assessment of internationalisation

§3.3.1 Student assessment

The methods that are used for the assessment of students are suitable for measuring the achievement of the intended international and intercultural learning outcomes.

The panel studied exams, the test plan of the master's programme and an overview of assessments in each module. It found that students in the programme are assessed by means of assignments, written exams, papers, group assignments, oral exams and presentations (see §3.1.2). The programme management formulated two specific intended learning outcomes for internationalisation. According to them, graduates of the academic degree programme are able to 'operate professionally in a multicultural environment, and act adequately on cultural differences' (LO 10) and to 'express themselves adequately to colleagues of different nationalities' (LO 11) (see §1.4.4).

During the site visit, the panel talked to students and representatives from the EB about the way in which the international and intercultural communicative and professional skills of students are tested. Students told the panel that these skills are very important in doing group assignments and project work, but are often not included in the formal assessment criteria. Representatives from the EB explained that the intended learning outcomes 10 and 11 are relatively new. Until recently, these skills were an asset to studying at the ITC Faculty, but were not part of the formal intended learning outcomes of the degree programmes.

The panel concludes that intercultural and international skills are important in group assignments and project work, but are not formally tested. From the discussion with alumni and the outcomes of alumni surveys, the panel is convinced that graduates achieve the intended learning outcomes 10 and 11 (see §3.3.2). Nevertheless, now that these international skills have become official learning outcomes, the programme should formally guarantee that all students achieve them at a satisfactory level. The panel urges the programme to find a way to adequately test international and intercultural communicative and professional skills.

The curriculum pays a lot of attention to development levels and cases in different countries (see §2.8.1). According to the panel, being aware of the influence of local settings and research cultures on the process and outcomes of scientific research is important in operating in a multicultural environment (LO 10) and in understanding the temporal and social context of Geo-Information science (LO 9). The panel studied a representative sample of theses from the programme to assess the achieved learning outcomes (see §3.2). It was surprised to find that reflection on the intercultural setting of the thesis research is not an explicit part of the thesis. The panel advises the programme management to strengthen the internationalisation component of the thesis by adding a reflective appendix to the thesis addressing the intercultural setting of the thesis research.

§3.3.2 Graduate achievement

The programme can demonstrate that the intended international and intercultural learning outcomes are achieved by its graduates.

Theses are important indicators of graduate achievement, and the panel studied a representative sample of theses from the academic degree programme. The panel established that the overall level of the theses is impressive. In the majority of the selected theses, there is a clear focus, logical line of reasoning, and consistent evidence of the conduct of research. The theses demonstrate that students in the academic degree programme have adequate

knowledge of the wider scientific context of their research, and the panel generally agrees with the grades awarded (see §3.2).

In its assessment of the sample of theses, the panel paid specific attention to the international features of the theses and to the relation between the international and intercultural learning outcomes and their content. It concludes that many theses include international elements. For example, the vast majority of theses focus on a problem in a specific region in the world, some theses are based on international data and international literature, and in some theses the research was conducted in cooperation with foreign organisations and/or abroad. The panel did note, however, that many theses do not include an explicit evaluation of the relevance of the research outcomes in an international context nor of the impact of local settings, cultures and circumstances on the process and outcomes of scientific research (see §3.3.1). The panel would like to suggest that the ITC Faculty demands the students to include a reflective appendix in the thesis.

With regard to learning outcome 10, the panel was impressed by the English language skills of graduates during the site visit, although the picture regarding the theses is somewhat more diverse. It concludes that the programme has adequate admission requirements for English language skills (§2.4.1). In addition, the international student group composition and the fact that all education is offered in English helps students to improve their English language skills further in the course of their studies at the ITC Faculty.

Graduate achievement is also reflected by the employment record of graduates. From the interviews with alumni and the alumni survey, it became clear that the programme is well-connected to the international labour market. The vast majority of graduates (87%) finds employment in their home country or another country soon after graduation. In addition, the majority of the students feels that the international approach and the international learning environment at the ITC Faculty broadened their understanding of cultural differences. As a consequence, they feel more comfortable about contacting colleagues from other countries for advice.

Based on the overall level of the theses and their international character, the English language skills of students and the employability of graduates, the panel concludes that the intended international and intercultural learning outcomes of the programme are achieved upon graduation.

§3.3.3 International experience

The international experience gained by students is adequate and in line with the programme's internationalisation vision

The panel studied the possibilities for students in the academic master's programme to gain international experience. It established that the programme stimulates the development of international experience and international interaction in several ways. First, the international classroom, group work and the international student body and the ITC Hotel (see §2.8.2 and §2.8.7) guarantee that students develop intercultural professional and communicative skills. Second, the programme includes excursions to companies and/or organizations abroad, providing students with the opportunity to broaden their horizon and stimulating international and comparative thinking about specific cases in the academic field. For example, students in the domain Geoinformatics visit research institutes in Germany and Austria and students in the implementation-oriented MSc domains visit organisations (e.g. polder boards and offices of land registry) in Germany and Belgium (see §2.1). Third, the ITC Faculty organises an 'informal' curriculum, including an introduction to culture and

educational practices in the Netherlands and multicultural activities throughout the entire stay of students in the Netherlands.

In this section, special mention should be made of the JEPs. According to the panel, they contribute considerably to the possibility of international students studying at the ITC Faculty and gaining international experience in the first place. The panel would like to note that for most students, staying at the ITC Faculty is in itself an enriching international experience, since the programme solely attracts students from abroad. In this respect, the student body at the ITC Faculty is different from the student body at regular Dutch educational institutions with ambitions in internationalisation.

The panel concludes that the programme adequately teaches students to take an international comparative focus, and facilitates their development of intercultural professional and communicative skills. In contrast to these positive remarks, the panel also noted that contact between the international students and Dutch students is relatively limited because of ITC's primary focus on students from developing countries. Increasing contacts with Dutch students is an opportunity for further improvement with regard to this criterion.

Considerations

Considerations with regard to the limited programme assessment

The committee established that the system of assessment and evaluation is sufficient. The Examination Board (EB) is aware of its responsibilities and has implemented adequate procedures and action points for assessment and control. Procedures for the assessment of JEP students at partner institutions are clearly defined. The forms of examination are varied, match the didactic concept, and have been tailored to the intended learning outcomes of the programme. The thesis assessment process includes clear assessment instructions, multiple examiners and an extensive discussion about the final mark for the thesis. Although the panel is in general satisfied with the system of assessment and evaluation, it encourages the programme management to continue to improve specific aspects of it. The EB needs to continue on its set course to check all assessments in the programme on a regular basis. Furthermore, the programme must increase the transparency of the thesis assessment procedure in more than one respect.

After studying a sample of recent theses, the panel found that graduates of the academic degree programme meet the intended learning outcomes as specified under Standard 1. From the interviews with alumni and the alumni survey, it became clear that the programme is well-connected to the labour market. The vast majority of graduates finds suitable employment soon after graduation.

Conclusion

Academic master's programme Geo-Information Science and Earth Observation: the committee assesses Standard 3 as **satisfactory.**

Considerations with regard to the assessment of internationalisation

The panel concludes that intercultural and international skills (learning outcomes 10 and 11) are not formally tested. It advises the programme to develop more detailed ideas on how to test international and intercultural communicative and professional skills.

Academic master's programme Geo-Information Science and Earth Observation: the committee assesses Criterion 2b (Student assessment) as **unsatisfactory.**

The panel is impressed by the overall level of the theses of the academic degree programme Geo-Information Science and Earth Observation. It found that most theses include international elements and that graduates demonstrate sufficient English language skills. Most graduates are positive about their employability and feel that the international approach and the international learning environment at the ITC Faculty have broadened their understanding of cultural differences.

Academic master's programme Geo-Information Science and Earth Observation: the committee assesses Criterion 2c (Graduate achievement) as **good.**

The panel established that the programme has formulated relevant international and intercultural learning outcomes. These learning outcomes are a clear reflection of the UT vision on internationalisation. At the moment, the international and intercultural learning outcomes of the programme are not assessed explicitly. This is a point for improvement. Nevertheless, the panel is convinced that graduates achieve all of the intended learning outcomes of the programme. The panel is convinced by the overall level of the theses.

Academic master's programme Geo-Information Science and Earth Observation: the committee assesses Standard 2 (Learning outcomes) as **satisfactory.**

The panel concludes that the curriculum (formal and informal) and the learning environment at the ITC Faculty provide students with ample opportunities to gain international experience. Increasing contacts with Dutch students is an opportunity for further improvement with regard to this criterion.

The panel would like to note that staying at the ITC Faculty is in itself an enriching international experience for most students in the programme, since the programme solely attracts students from abroad. In this respect, the student body at the ITC Faculty is different from the student body at regular Dutch educational institutions with ambitions in internationalisation.

Academic master's programme Geo-Information Science and Earth Observation: the committee assesses Criterion 5b (International experience) as **good.**

The panel concludes that the composition of the student group is very international. This matches the ITC Faculty's capacity-building mission. Students have ample opportunity to develop multicultural professional and communicative skills and international experience through the curriculum (formal and informal) and the international learning environment at the ITC Faculty. Important in this respect is the fact that many students come from abroad: for them, staying at the ITC Faculty is already an international experience in itself. While at the ITC Faculty, students can call upon many special facilities and services for administrative, financial, technical, social, cultural and personal support.

Academic master's programme Geo-Information Science and Earth Observation: the committee assesses Standard 5 (Students) as **good.**

General conclusion

Conclusion with regard to the limited programme assessment

The panel assesses Standards 1 and 2 as 'good'. It is enthusiastic about the design of the academic degree programme and the revised intended learning outcomes. In the international context the niche of the programme is clear. According to the panel, the curriculum of the academic degree programme is also well-developed. It contains clearly defined specialisations, but also offers sufficient opportunities for adjustment to the interests of students. The JEP programmes are well thought out, and the ITC Faculty has ample control over the content and level of the parts of the programme that are taken at partner institutions. The intake and admission criteria of the programme are adequate, and the programme is demanding but feasible. The staff of the programme are dedicated and skilled. The panel is positive about the internal quality control of the programme. Although it noted that not all procedures have been formalised and recorded for the JEPs, their internal quality assurance is very well organised in practice. The panel assesses Standard 3 as 'satisfactory'. It established that the system of assessment and evaluation is sufficient, but still needs improvement. Both the quality of the theses and the experiences of alumni show that the intended learning outcomes are achieved. According to the NVAO decision rules, the panel concludes that the overall quality of the academic degree programme is 'satisfactory'.

Conclusion

The committee assesses the *Academic master's programme Geo-Information Science and Earth Observation* as **satisfactory.**

Conclusion with regard to the assessment of internationalisation

The panel assesses Standards 1 and 2 as 'satisfactory'. The academic degree programme Geo-Information Science and Earth Observation has a clear vision on internationalisation. This vision is rooted in the long history of capacity-building of the ITC Faculty. The Faculty has only recently started to think about this vision in an explicit manner, however. Although the vision on internationalisation includes implicit, verifiable objectives, they could be made clearer. The Faculty also needs to work on the development of clear procedures for the evaluation of its vision on internationalisation. The programme developed clear and relevant intended international and intercultural learning outcomes. Although the programme management needs to implement the formal assessment of the intended international and intercultural learning outcomes, the panel is convinced that they are achieved by graduates. The panel assesses Standards 3, 4 and 5 as 'good'. It is very impressed by the overall international learning environment at the ITC Faculty. According to the panel, this learning environment is an international example for other institutions. The positive findings of the panel apply especially to the international student group composition, the benefits of the 'international classroom', the competences and international experience of the staff, the ITC Faculty's worldwide network of contacts, the JEPs, and the available services, facilities and guidance for international students. Although Standards 1 and 2 still leave room for improvement, it therefore deems the overall quality of internationalisation to be 'good'.

The panel issues a favourable opinion about awarding the NVAO distinctive quality feature Internationalisation to the academic degree programme Geo-Information Science and Earth Observation.

The committee assesses the *academic master's programme Geo-Information Science and Earth Observation* as **good.**

II – Professional master's programme

Summary judgement professional master's programme

This report provides an overview of the panel's findings and considerations regarding the professional master's degree programme Geo-Information Science and Earth Observation of the University of Twente. The panel based its judgement on information acquired from the critical reflection, a number of selected GP reports, the interviews held during the site visit, additional reading material which was available during the site visit, and the digital learning environment. It found positive aspects as well as points for improvement. After careful consideration, it concludes that the professional master's programme Geo-Information Science and Earth Observation satisfies the requirements for re-accreditation. In addition, the panel grades the overall quality of 'internationalisation' of the programme as 'good' and advises the NVAO to award the programme a distinctive quality feature internationalisation.

Limited programme assessment

Standard 1
The panel studied the domain-specific framework of reference and finds it clearly formulated. The framework includes an adequate description of the characteristics of the field, developments and requirements and covers the academic and professional master's programme of the ITC Faculty well. The panel is enthusiastic about the general mission of the ITC Faculty to be a gateway for knowledge exchange on Geo-Information Science and Earth Observation for individuals and institutes from countries that are economically and/or technologically less developed. The professional master's programme has a strong technical and vocational focus. It teaches students how to solve problems by using and applying existing knowledge. The panel concludes that there is a clear demand in the international working field for vocational training in the field. However, the programme is also quite unique because only a few countries have a similar dual system of higher education as the Netherlands. Therefore, the long-term sustainability of the programme needs continuous assessment by the ITC Faculty. The panel studied the intended learning outcomes of the programme and judges them to be adequate, well-formulated, and relevant. They clearly meet international requirements with regard to content, level and orientation. Still, the panel feels that it is possible to further improve the intended learning outcomes by explicitly referring to more general competences.

Standard 2
The professional master's programme has a study load of 77 EC, which is spread over twelve months and three blocks. The curriculum of the programme is the same for all students and consists of an introductory period (2 EC) and 15 modules. The modules in the first block deal with the basic principles of Geo-Information, Remote Sensing, the System Earth, Data Integration, the User and Academic Skills. In Block 2, students take eight course modules. They are in-depth modules related to geoinformation technology, applied research system design and development. Block 3 focuses on the Graduation Project (GP). The panel is of the opinion that the curriculum of the professional master's degree programme is coherent and matches the available expertise at the ITC Faculty. The curriculum has a clear professional focus with sufficient attention for applied research. However, its professional profile could be strengthened further by introducing reflection, project management and entrepreneurship in the modules. The panel also recommends to include more training in communication with business organisations and technical report writing in the programme.

Education at the ITC Faculty is based on the philosophy of 'life-long learning'. Other important didactic principles are 'blended learning', 'the international classroom'; and the

'ethically aware engineer and academic'. Although the didactical principles have not yet been streamlined with the didactic concept of the University of Twente, the panel established that they are well integrated in the programme and relevant.

The panel studied the admission criteria and considers them to be adequate. It is enthusiastic about the diversity of the student body: the vast majority of students originates from different continents outside Europe. The intake numbers of the programme are a point for concern, however. The panel has serious doubts about the long-term sustainability of the programme because the international recognition of the diploma is not self-evident. The panel is convinced of the value of the niche of the programme and urges the programme management to develop a stronger marketing strategy. The programme management should also consider options to offer the programme in a format more appealing to international students. The workload of the programme is high, but feasible. The panel understands the choice of the ITC Faculty to offer a programme that is as short and dense as possible. The programme management is actively monitoring the workload and is urged by the panel to continue doing so.

The panel is confident that the programme has a good teaching staff. Nevertheless, it recommends the programme management to encourage more staff to take the University Teaching Qualification and additional courses on internationalisation and the multicultural classroom. The quantity of the teaching staff is adequate. It appreciates the fact that the programme management has recently hired new staff members with a strong professional profile The Programme Committee is functioning well, but could be more pro-active on strategic issues in the future.

Standard 3
Following the merger with the University of Twente, the ITC Faculty established one Examination Board (EB) for all of its courses. This EB works according to an annual cycle and is responsible for the assessment policy and for the safeguarding of the achieved learning outcomes. It also deals with complaints and exemption requests applicable to all examinations. The panel found that the EB is professional and has implemented clear procedures for assessment and control as well as adequate action points for the near future. It urges the EB to continue on the course it has set.

According to the panel, there is sufficient variation in the assessment types and the assessment procedure of the GP report is satisfactory. The GP procedure includes clear assessment instructions, multiple examiners and an extensive discussion about the final mark for the GP. Nevertheless, there are several opportunities to increase the transparency and quality of it further. The panel advises the programme to develop an instruction for students, to further specify the assessment criteria in terms of professional orientation and level, to archive separate assessment forms of the examiners, and to provide students with a written mark sheet after the thesis defence.

The panel read several GP reports. In general, the selected reports are well constructed, have clear objectives and show a logical line of reasoning. The panel assesses the quality of the GP reports as satisfactory. However, it was disappointed about design of some of them. In these reports, the panel would have liked to see more reflection on methods, more consultation of the recent international literature and a more developed problem analysis. In addition, the panel would like to suggest the ITC Faculty to include a reflective appendix in the thesis addressing the intercultural setting of the project. From the interviews with alumni and the

alumni survey, it became clear that the programme is well-connected to the labour market. The vast majority of graduates finds employment soon after graduation.

Due to the satisfactory level of the project reports and the good connection to the labour market, the panel is convinced that the learning outcomes are achieved upon graduation.

The committee assesses the standards from the Assessment framework for limited programme assessments in the following way:

Professional master's programme Geo-Information Science and Earth Observation (professional)

Standard 1: Intended learning outcomes	satisfactory
Standard 2: Teaching-learning environment	satisfactory
Standard 3: Assessment and achieved learning outcomes	satisfactory
General conclusion	satisfactory

Distinctive quality feature internationalisation

Standard 1
The mission of the ITC Faculty is to be a gateway of knowledge exchange in the field for individuals and institutes from countries that are economically and/or technologically less developed. The vision of the ITC Faculty on internationalisation is rooted in, and inherent to, its capacity-building mission. It includes linking up the content of education to relevant real-world problems, teaching students about research and professional practices worldwide, attracting an international student body, and responding to the needs of international students and the international working field. In the panel's opinion, the vision of the ITC Faculty on internationalisation is clear and supported by stakeholders. The link between the ITC and the university vision on internationalisation of global citizenship could be more explicit, however. The same applies to the verifiable objectives of this vision. Although the vision includes implicit and relevant verifiable objectives, they are not explicitly mentioned in a document. The ITC Faculty also needs to develop explicit procedures for the evaluation of this vision. Although there are still opportunities for improvement, the panel assesses the overall quality of this standard as satisfactory. The excellent integration of the capacity-building mission in its vision on the design of its international educational activities and the international reputation of the ITC Faculty are important factors in this decision.

Standard 2
The set of intended learning outcomes of the professional master's programme includes specific learning outcomes for internationalisation. They focus on the ability of students to operate and communicate in a multicultural environment. According to the panel, these learning outcomes are relevant, a clear reflection of the vision on internationalisation of the university and addressed in the programme. However, they are not formally tested at the moment. The panel advises the programme to develop more detailed ideas on how to test international and intercultural skills in the near future. The panel read several project reports. It established that the overall level of the reports is satisfactory. The majority of project reports showed a logical line of reasoning, was adequately constructed, and demonstrated sufficient English language skills. In some reports, the panel would have liked to see more reflection on methods, more consultation of the recent international literature and a better developed problem analysis. Most graduates are positive about their employability and feel

that the international approach and the international learning environment at the ITC Faculty have broadened their understanding of cultural differences.

Standard 3
The panel concludes that the curriculum, the teaching methods and the learning environment of the professional master's programme match the vision on internationalisation of the university and the ITC Faculty, and the intended international and intercultural learning outcomes. The teaching methods of the programme focus on multicultural project work, reflection on international concepts and cases, and discussion about the work experiences that students bring in from their home country. The curriculum reflects this focus: modules discuss concepts and case studies from around the world, students are invited to compare problems and solutions with situations in their home countries, student take excursions to companies and organisations in Europe, and the development of intercultural competencies and communicative skills is stimulated through guided discussions and project work in international teams. In the panel's opinion, the ITC Faculty offers students a unique and stimulating multicultural learning environment. In this specific respect, it can be seen as an international 'best practice'.

Standard 4
The student-staff ratio for the professional master's programme is 1:4.2 for the 2012 courses and 1:6.25 for the 2013 courses. According to the panel the number of teaching staff is adequate. The panel is also positive about their general quality and engagement. The staff is well informed about recent developments in the field. It concludes that the staff of the programme has ample international experience and expertise. Furthermore, sufficient services are in place to facilitate their international experiences, intercultural competences and language skills. In addition, the ITC Faculty offers courses throughout the world. As a consequence, staff members continue to develop and expand their international experience and intercultural competences while they work at the ITC Faculty.

Standard 5
The majority of students at the ITC Faculty come from developing countries. Most of them originate from countries in Africa and Asia, but the ITC Faculty also attracts students from the Americas, Europe, and Australia/Oceania. The panel is very impressed by the international composition of the student group and concludes that the ITC Faculty is extremely successful in its mission 'to be a gateway for knowledge exchange for individuals and institutes from countries that are economically and/or technologically less developed'. According to the panel, students have ample opportunity to develop multicultural professional and communicative skills and international experience through the curriculum (formal and informal) and the international learning environment at the ITC Faculty. Important in this respect is the fact that many students come from abroad: for them, staying at the ITC Faculty is already an international experience in itself. Many services and facilities have been put in place to support international students.

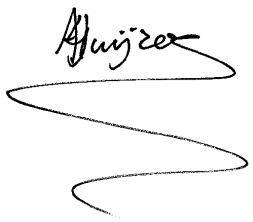
The committee assesses the standards from the NVAO Frameworks for the Assessment of Internationalisation (as of 14 November 2011) as follows:

Standard 1: Vision on Internationalisation	satisfactory
Criterion 1a: Shared Vision	good
Criterion 1b: Verifiable objectives	satisfactory
Criterion 1c: Improvement-oriented evaluations	unsatisfactory

Standard 2: Learning outcomes	satisfactory
Criterion 2a: Intended learning outcomes	satisfactory
Criterion 2b: Student assessment	unsatisfactory
Criterion 2c: Graduate achievement	good
Standard 3: Teaching and learning	good
Criterion 3a: Curriculum	satisfactory
Criterion 3b: Teaching methods	good
Criterion 3c: Learning environment	excellent
Standard 4: Staff	good
Criterion 4a: Staff composition	good
Criterion 4b: International experience and competence	good
Criterion 4c: Services provided to staff	satisfactory
Standard 5: Students	good
Criterion 5a: Student group composition	excellent
Criterion 5b: International experience	good
Criterion 5c: Services provided to students	good
General conclusion	good

The chair and the secretary of the committee hereby declare that all members of the committee have studied this report and that they agree with the judgements laid down in it. They confirm that the assessment has been conducted in accordance with the demands relating to independence.

Date: 23 June 2015



Prof. G. (Gerrit) van Straten
Chair

A.J.(Adrienne) Wieldraaijer-Huijzer, MA
Secretary

Detailed description of the standards from the Assessment framework for limited programme assessments and the Assessment framework for the assessment of internationalisation

Standard 1: Intended learning outcomes

The intended learning outcomes of the programme have been concretised with regard to content, level and orientation; they meet international requirements.

Explanation:
As for level and orientation (bachelor's or master's; professional or academic), the intended learning outcomes fit into the Dutch qualifications framework. In addition, they tie in with the international perspective of the requirements currently set by the professional field and the discipline with regard to the contents of the programme.

Findings

This section deals with the domain-specific framework of the field Geo-Information Science and Earth Observation (§1.1), the profile and mission of the ITC Faculty and the programme (§1.2), and the intended learning outcomes and level of the programme (§1.3). It also deals with the following criteria of the Assessment framework for the assessment of internationalisation (§1.4): shared vision (criterion 1a, §1.4.1), verifiable objectives (criterion 1b, §1.4.2), improvement-oriented evaluations (criterion 1c, §1.4.3), and intended learning outcomes (criterion 2a, §1.4.4).

§1.1 Domain-specific reference framework

The aim of the field of Geo-Information Science and Earth Observation is to understand the system Earth from a geographic and spatial perspective and to advance our knowledge about geophysical and social processes at the Earth's surface. As described in the critical reflection, the field focuses on processes that can be observed by remote-sensing methods and can, in principle, be spatially implemented with deterministic spatial models. The scope of these processes is wide, but all processes have in common that they are of societal relevance, are scientifically interesting, can only be fully understood in a multi-disciplinary context and have a spatial extension.

Specialists in the field of Geo-Information Science and Earth Observation are confronted with rapid professional and technological developments, which pose problems as well as opportunities. Education in this field therefore needs to be able to adapt rapidly to new circumstances. In the last decade, a shift has occurred from stand-alone applications to an Internet-based (networked) environment, and ICT developments allow the browsing of all web resources to extract location-specific information. In addition, the general public has started contributing its knowledge to databases of volunteered geographical information and government organizations have made their Geo-Information available as open-source data. Nowadays, many national and international organizations in the field work in a cooperative setting in which geographic information is obtained from, and provided to, partner organizations and the general public. In these organizations there is an increasing need for highly educated professionals.

The domain-specific framework, as described in the critical reflection, is provided in Appendix 2. The panel studied the domain-specific framework of reference and finds it clearly formulated. The framework provides an adequate description of the international field

of Geo-Information Science and Earth Observation and covers the academic and professional master's programme of the ITC Faculty well. The intended learning outcomes of the programmes have been included in the reference framework. The assessment of the intended learning outcomes will be addressed in §1.3.

§1.2 The profile and mission of the ITC Faculty and the professional programme

The general mission of the ITC Faculty is to be a gateway for knowledge exchange on Geo-Information Science and Earth Observation for individuals and institutes from countries that are economically and/or technologically less developed. The ITC Faculty intends to develop and extend our knowledge of earth observation and geo-information management and to make it available to a broader international public of students and professionals in the field.

The main driving force of the ITC Faculty is capacity-building. The ITC Faculty starts from the idea that geographical information systems and remote sensing tools can be used in solving real-world problems and complex issues. This may, for example, involve determining places at risk for landslides, planning urban infrastructure, analysing food and water security, and designing an effective wildlife management system.

The importance of capacity-building for the ITC Faculty is reflected in the organization of its education. Education is focussed on individuals in different stages of their academic or professional life and starts from the philosophy of 'lifelong learning'. The ITC Faculty offers a large variety of courses, ranging from full programmes to all kinds of short courses. The professional master's programme (77 EC) is one of two full master's programmes offered by the ITC Faculty (the professional master is discussed in section I.). With these programmes the ITC Faculty intends to train professionals in three categories: 1. experts in the field of spatial information handling; 2. users of geoinformation from a variety of application domains; and 3. decision and policy makers. The central goal of both master's programmes at the ITC Faculty is to provide students with knowledge and skills that help them solve problems in their current or future working environment.

The panel fully subscribes to the mission of the ITC Faculty. During the site visit, the panel found that students and alumni recognize and value this mission. Students, alumni and partner institutions talk about the international reputation of the ITC Faculty as an important institution for research and education in the field. In many cases, enrolment is the result of word-of-mouth advertising. The panel agrees that the ITC Faculty has an exceptional profile and a long-standing reputation in the field.

The professional master's programme targets young and mid-career professionals who want to extend their practical knowledge in the field of Geo-Information Science and Earth Observation. At the end of the programme, the graduate is typically an engineer who is capable of analysing geo-technical problems, designing production processes with geospatial data and services, and evaluating performance. During the site visit, the staff of the programme explained that there is a clear difference between the aims and the target group of the academic degree programme and the professional master's programme. The academic degree programme is primarily focused on academic research and the development of new knowledge, while the professional master's programme has a stronger vocational focus. It teaches students how to solve problems by using and applying existing knowledge and is quite technical in nature.

In an international context, the professional master's programme is quite unique; only a few countries have a similar dual system of higher education as the Netherlands. The panel

debated about the professional focus of the programme and the international recognition of the diploma with alumni and students. It established that the reasons for students to embark on the professional master's programme vary. Some students want to improve their technical skills and enrolled in the programme because of its practical orientation; other students could only get a scholarship for twelve months. Those students would have preferred to do the academic degree programme, because the international recognition of an academic diploma is better. In the end, however, most students were happy with their choice because of the technical orientation of the programme. According to them, the professional master's needs explaining in an international context, but this is usually not very difficult because of the good international reputation of the ITC Faculty.

During the site visit, the programme management and staff admitted that the concept of a professional master's programme is not well understood in other parts of the world.This is why the ITC Faculty recently conducted an employers' survey about the future of the programme. The results of this survey show that the academic and professional master's programmes are both valued by employers. Therefore, the ITC Faculty decided to keep the programme and to clearly advertise it as parallel to the academic degree programme, but different in its focus on practical and technical solutions. During the site visit, the panel experienced that the professional master is regarded by some as the second-best programme at ITC, dwarfed by the MSc programme. The panel recommends the programme management to be clear in its marketing strategy about the fact that a professional master's programme in the Dutch system is not necessarily easier than an academic master's programme, but different. Where a scientific master is about knowledge creation, a professional master is about innovation: putting new technology to use in practice.

The panel concludes that there is a clear demand in the international work field for vocational training. The professional programme fills a capacity gap of professionals in organizations in economically and/or technologically less developed countries and suits the capacity-building mission of the ITC Faculty. Nevertheless, the long-term sustainability of the programme needs continuous assessment by the ITC Faculty; enrolment in the programme is low (see §2.4.1), and in an international context, students increasingly prefer to obtain an academic degree.

§1.3 Intended learning outcomes and the level of the programme

An important aim of the professional master's degree programme is to teach students the latest technologies used in Geo-Information Science and Earth Observation and to demonstrate how to apply them in different professional sectors, such as water management, urban planning, land administration, natural resource management, and disaster and natural hazards management. Its emphasis lies on problem-solving and on using and applying existing knowledge. According to the critical reflection, graduates of the professional programme are able to apply and coordinate methods, able to think beyond what is taught, and can synthesize different ideas into new solutions for problems.

Based on the profile, orientation and aims of the programme, the management formulated seven intended learning outcomes (Appendix 3). They have been linked to the Dublin descriptors, which cover the five main requirements for a professional master's programme. In addition, they have been matched to the cognitive levels of the Bloom taxonomy, to ensure that they include all levels of skills revolving around knowledge, comprehension and critical thinking.

The panel investigated the intended learning outcomes of the programme. It concludes that they are sufficient. They are well-formulated, current and relevant. They clearly meet international requirements with regard to content, level and orientation. Still, the panel feels that it is possible to further improve the intended learning outcomes. It recommends that the programme strengthens the position of more general competences such as reflection, project management and entrepreneurship by explicitly referring to these competences in the intended learning outcomes.

During the site visit, the panel debated with the management and the staff about the level of the professional master's programme in comparison with professional bachelor's programmes in the same field offered in the Netherlands. Management and staff explained that the professional master's programme is more intensive and in-depth, and more focussed on complex problem-solving skills. The panel recognizes the programme's analysis, but it feels that these distinctive aspects are not expressed very explicitly in the intended learning outcomes. Therefore, it advises the programme to adapt these learning outcomes accordingly.

§1.4 Criteria and standards of the Assessment framework for the assessment of internationalisation

§1.4.1 Shared vision

The programme has a vision on internationalisation. This vision is supported by stakeholders within and outside the programme

Geo-Information Science and Earth Observation deals with the geophysical and social processes at the Earth's surface. The core aspect of the field is the idea that geographical information systems and remote sensing tools can be used in solving real-world problems and complex issues of a spatial nature. These include global climate change, the effects of El Niño, globalisation of the economy and health epidemiology. Many of the so-called developing countries are confronted with these issues.

Education at the ITC Faculty developed from a mission of capacity-building. The ambition of ITC is to be a gateway for knowledge exchange in the field for individuals and institutes from countries that are economically and/or technologically less developed. The critical reflection states that the programme wants to deliver graduates who 'can function as a change agent in their own country and organisation'.

The panel concludes that a vision on internationalisation is intrinsic to the capacity-building mission and ambitions of the ITC Faculty. According to the critical reflection, the following definition of internationalisation by the expert Jane Knight is at the heart of the educational programmes of ITC: 'integrating an international, intercultural or global dimension into the purpose, functions or delivery of higher education' is at the heart of the educational programmes of ITC. In line with this definition, the content of education at the ITC Faculty links up to relevant 'real-world' problems and teaches students to look beyond their own professional practice and to learn from other practices worldwide. ITC's vision on internationalisation also includes attracting an international student body and responding to the needs of potential students and the international working field by offering different types of education (distance education, short courses, degree programmes, joint programmes, etc.).

The panel found that the vision on internationalisation at ITC is supported by different stakeholders. One of the most important stakeholders is the Dutch government. ITC's mission and vision on internationalisation connect to the ambitions of the Dutch Minister for Foreign Trade and Development Cooperation, and education at ITC is funded with a base

subsidy from the Ministry of Education, Culture and Science. Another important group of stakeholders includes the international partner institutions and organisations, which benefit from and contribute to the Faculty's educational programmes.

The panel concludes that the ITC Faculty has a strong and clear vision on internationalisation that is supported by national and international stakeholders.

In 2010, ITC became part of the University of Twente. The university has embarked on formulating a new strategy (Vision 2020), which includes internationalisation. In this new strategy internationalisation at the UT is defined as 'integrating the international and intercultural dimensions in education, research and the supporting organisation'. Key objectives of internationalisation at the UT are: educating students to become global citizens; increasing international enrolment; and active participation of staff in international networks of education, research and valorisation.

The panel concludes that the ideas of the team about what is required in an international environment have led to clear objectives in the intended learning outcomes. However, the vision as such, and what this means in terms of verifiable objectives, has not been worked out explicitly in a vision document. The panel urges the ITC Faculty to work on one integrated vision on internationalisation to include capacity-building and 'global citizenship' (see §1.4.1) and to take this vision as a starting point in developing unequivocal objectives that can be tested on a regular basis.

§1.4.3 Improvement-oriented evaluations

The vision on internationalisation is evaluated periodically, and this evaluation forms the basis for improvement measures

The panel investigated the evaluation of the vision on internationalisation by the ITC Faculty. It established that the ITC Faculty evaluates the degree programmes on a regular basis (see §2.6). These evaluations include international and internationalisation components, like the quality of the programmes and their relevance and applicability to international students, alumni and employers. According to the panel, the vision on internationalisation itself is not tested on a regular basis. Although the ITC Faculty has a long history of capacity-building and educating international students, it has only recently started to think about its vision on internationalisation explicitly. At the moment, no clear procedures are in place for the evaluation of the vision on internationalisation and its corresponding verifiable objectives.

§1.4.4 Intended learning outcomes

The intended international and intercultural learning outcomes defined by the programme are a clear reflection of its vision on internationalisation.

The professional master's degree programme has seven intended learning outcomes. The complete set of intended learning outcomes is listed in Appendix 3. It includes specific learning outcomes for internationalisation. According to these intended learning outcomes, graduates of the professional master's degree programme are able to 'operate professionally in a multicultural environment, and act adequately on cultural differences' (LO 6) and to 'express themselves adequately to colleagues of different nationalities' (LO 7). In the opinion of the panel, the intended international and intercultural learning outcomes are relevant, well-formulated and a clear reflection of the UT vision on internationalisation because they support students in becoming global citizens. The panel would like to point out that learning outcomes related to international- and intercultural communicative and professional skills are relatively difficult to test (see §3.3.1).

ITC's vision of capacity-building (which is by nature international) is less explicit in the higher level intended learning outcomes addressing the skill-oriented elements of the programme. The panel judges this to be understandable, because geo-information technology and science apply worldwide without cultural differences and has no need for an international component in and of itself. Of course, this does not alter the fact that (inter)national and regional differences in *the state of* technology can be, and indeed are, part of the curriculum and the lower level intended learning outcomes (see §2.8.1).

Considerations

Considerations with regard to the limited programme assessment

The panel studied the domain-specific reference framework, the mission and profile, the level and the intended learning outcomes of the professional master's programme. It found that the domain-specific framework includes an adequate description of the characteristics of the field, developments and requirements. It is enthusiastic about the mission of the ITC Faculty. It concludes that the professional programme fills a capacity gap and is relevant for the working field. However, the long-term sustainability of the programme needs continuous assessment by the ITC Faculty. The panel studied the intended learning outcomes of the programme and judges them to be adequate. They are well-formulated, current and relevant. They clearly meet international requirements with regard to content, level and orientation. The panel therefore assesses the standard as 'satisfactory'. It feels that it is possible to further improve the intended learning outcomes by referring explicitly to more general competences such as reflection, project management and entrepreneurship and by specifying the level of the programme in some more detail.

Conclusion

Professional master's programme Geo-Information Science and Earth Observation: the committee assesses Standard 1 as **satisfactory**

Considerations with regard to the assessment of internationalisation

The panel established that the professional master's programme in Geo-Information Science and Earth Observation has a clear vision on internationalisation. This vision is rooted in, and inherent to, the capacity-building mission of the ITC Faculty and at the heart of all of the ITC Faculty's activities. The ITC Faculty has a long legacy in internationalisation and in working with international students and institutes, and its mission is supported by many national and international stakeholders. The link between the ITC and the UT vision on internationalisation could be more explicit.

Professional master's programme Geo-Information Science and Earth Observation: the committee assesses Criterion 1a (Shared vision) as **good.**

The panel concludes that the vision on internationalisation includes implicit verifiable objectives. These objectives are applicable to the programme and relevant, but not explicitly mentioned in a document. The panel advises the ITC Faculty to develop more explicit verifiable objectives.

Professional master's programme Geo-Information Science and Earth Observation: the committee assesses Criterion 1b (Verifiable objectives) as **satisfactory.**

The ITC Faculty has a long history in capacity-building and educating international students. However, it has only recently started to think explicitly about its vision on internationalisation, as required by the assessment framework for the assessment of internationalisation. The panel found that so far no clear procedures are in place for the improvement-oriented evaluation of the vision of internationalisation.

Professional master's programme Geo-Information Science and Earth Observation: the committee assesses Criterion 1c (Improvement-oriented evaluations) as **unsatisfactory.**

The panel ascertained that the professional master's degree programme has a vision on internationalisation. This vision is actively supported by stakeholders inside and outside the programme and includes implicit verifiable objectives. Although there are still a lot of opportunities for improvement, the panel assesses the overall quality of this standard as satisfactory. The excellent integration of the capacity-building mission in its vision on the design of its international educational activities and the international reputation of the ITC Faculty are crucial factors in this decision.

Professional master's programme Geo-Information Science and Earth Observation: the committee assesses Standard 1 (Vision on Internationalisation) as **satisfactory.**

The panel established that the programme has formulated relevant international and intercultural learning outcomes. These learning outcomes are a clear reflection of the UT vision on internationalisation.

Professional master's programme Geo-Information Science and Earth Observation: the committee assesses Criterion 2a (Intended learning outcomes) as **satisfactory.**

Standard 2: Teaching-learning environment

The curriculum, staff and programme-specific services and facilities enable the incoming students to achieve the intended learning outcomes.

Explanation:
The contents and structure of the curriculum enable the students admitted to achieve the intended learning outcomes. The quality of the staff and of the programme-specific services and facilities is essential to that end. Curriculum, staff, services and facilities constitute a coherent teaching-learning environment for the students.

Findings

This section covers the structure of the curriculum (§2.1) and the relation between the intended learning outcomes and the curriculum (§2.2). It discusses the didactic concept (§2.3), the feasibility of the programme (§2.4), the composition of the staff (§2.5), programme-specific quality assurance (§2.6) and programme-specific facilities (§2.7). It also deals with the following criteria of the Assessment framework for the assessment of internationalisation (§2.8): curriculum (criterion 3a, §2.8.1), teaching methods (criterion 3b, §2.8.2), learning environment (criterion 3c, §2.8.3), staff composition (criterion 4a, §2.8.4), international experience and competence of the staff (criterion 4b, §2.8.5), services provided to the staff (criterion 4c, §2.8.6), student group composition (criterion 5a, §2.8.7), and services provided to students (criterion 5c, §2.8.8).

§2.1 Curriculum

The professional master's programme Geo-Information Science and Earth Observation has a study load of 77 EC, which is spread over twelve months. The programme starts with an introductory period of 2 EC. In this introductory period, all students are introduced to the Netherlands and to how things work at the ITC Faculty. The training programme has a modular structure and is divided into three blocks. The blocks vary in length and are divided into three-week modules amounting to a total of 15 modules.

All professional master students take the same programme. The first block (15 EC, modules 1-3) consists of three core modules dealing with the basic principles of Geo-information, Remote Sensing and the system of Earth. These are the same modules as in the academic degree programme, and are partly used as remedial teaching due to the variation in entry level of the incoming students. In Block 2 (40 EC, modules 4-11) students take eight course modules. They are in-depth modules related to Geo-Information technology, applied research, system design and development. Block 3 (20 EC, modules 12-15) focuses on the graduation project (see below).

All modules in the programme are scheduled consecutively, except for the 'Case Study' and module 11. Module 11 focuses on skills in using a computer programming language. In the second part of this module, students go on a one-week excursion to institutes in the field of Geoinformatics in and outside the Netherlands. The 'Case Study' runs parallel with the course modules. In the 'Case study' students apply the knowledge acquired in the course modules to building a coherent spatial data system. To do so, they need the skills for application building from module 11. For an overview of all courses, see Appendix 3.

In Block 3, students conclude the programme with a Graduation Project (GP). The GP takes two months and results in a report and an oral defence. The report and the defence are assessed by a Graduation Project Assessment Board (GPAB, see §3.1). In the first module of Block 3 (module 12), students are prepared for the GP and learn about information skills, report writing and presenting, and develop the project in more detail. Modules 13-15 address

the GP itself. According to the critical reflection, the aim of the GP is to assess whether the student is competent to conduct a project independently using the knowledge and skills acquired during the previous course modules. During the site visit, staff members explained that the GP is practice-oriented: the project plan deals with a practical problem from an institution or organization. Students can pick a topic/problem for their GP from a list, but are also encouraged to find their own topic. The panel agrees with this view on the GP and advises the programme management to specify the assessment criteria for the GP accordingly. The panel studied a representative sample of GP reports from the professional master's programme. At the moment, the GP reports do not always include a clear justification of the practical problem, nor a description of how the tools and methods are chosen (see Standard 3)

The panel discussed the organisation of the GP with students and established that they are satisfied with it. They would, however, like to learn more about technical report writing and how to communicate with companies during the core modules and module 12. According to the students, they are being introduced more to academic report writing than to technical report writing. During the site visit, staff members agreed with the panel that some attention is paid to technical report writing, but that it would be a good idea to incorporate more on this in the programme.

The panel studied a detailed alumni survey carried out in 2014 and found that the great majority of the alumni consider the content of the programme to be relevant, state-of-the-art and of the right level. Alumni and students are positive about the content of the programme. The panel is of the opinion that the curriculum of the professional master's degree programme is coherent, with a clear development in the level of the modules. The curriculum has a clear professional focus, with sufficient attention for applied research. Students learn to solve practical problems by applying the knowledge and the analytical and applied research skills they have acquired. The course modules reflect current staff expertise and build on the core modules, and the 'Case Study' guarantees that students also apply the theoretical and technical knowledge and skills from the modules. In addition, there are clear, continuous, curricular themes running throughout the programme. Following the recommendations for the intended learning outcomes under Standard 1, the panel advises the programme management to pay more attention to reflection, project management and entrepreneurship in the modules. Practical issues that could be addressed in a professional master Geo-information Science and Earth Observation are 'spatial data infrastructures', 'public-private partnerships and tendering' and 'innovation management'. The programme management could, for example, make project management a more explicit part of the 'Case Study'.

§2.2 Relation between intended learning outcomes and the curriculum

During the site visit, the panel examined the integration of the intended learning outcomes in the curriculum of the professional master's degree programme. In the critical reflection, the ITC Faculty provided an overview of the relation between the intended learning outcomes and the specific components of the curriculum. According to the panel, there is a solid link between the intended learning outcomes and the programme. Most learning outcomes are addressed in several modules. For example, learning outcome 5 ('work in multi-disciplinary teams to contribute to decision making') is addressed in the core modules, in the modules on Application Building and Programming, and in the Case Study, and learning outcome 2 ('use Geo-Information science and earth observation technology to generate, analyse and display spatial data') is addressed in the core modules, the GP and modules 5, 7, 10 and 11. The panel is convinced that all learning outcomes are addressed in the programme.

§2.3 Didactic concept, teaching formats

Education at the ITC Faculty focusses on individuals in different stages of their professional life and is based on the philosophy of 'lifelong learning'(see §1.2). For the ITC Faculty creating an attitude of 'lifelong learning' is an integral part of its didactical concept: graduates 'should be able to adapt themselves to the ongoing changes in society and be able to deal with new technologies and knowledge'. The critical reflection states that, as a result of this view, the professional master's programme prepares students to become autonomous learners and stimulates critical thinking, discussions, case studies, teamwork and an independent work attitude. During the whole programme, teachers take the role of advisors, tutors and coaches and educate students to take the lead in their own learning process.

The panel established that 'lifelong learning' and increasing independence are reflected in the set-up of the professional programme in several ways. The teaching formats and work forms confirm that discussion, teamwork and independent work are integral parts of the programme. For example, the 'Case Study' includes the application and analysis of knowledge, discussion and working in a multi-disciplinary team, while the GP is conducted independently with a minimum of supervision. The ambition to stimulate independent work is also reflected in the decrease in the number of contact hours during the programme. In Blocks 1 and 2, the average number of contact hours per week is 19.6. In these blocks, students attend numerous lectures and supervised and unsupervised practicals. In Block 3, the average number of contact hours is much lower (2.9 per week). In this block, students work on their GP, and supervision is arranged on an individual level.

Other didactic principles of the ITC Faculty are: 'blended learning', 'the international classroom', and the 'ethical aware engineer'.

At the ITC Faculty 'blended learning' means facilitating students to study abroad for shorter periods of time and to study at home using modern computer technology. According to the panel, blended learning could be strengthened further in the professional master's degree programme and in the in-house programme of the academic degree programme. The ITC Faculty could, for example, benefit more from the expertise of the partner institutions involved in the JEPs of the academic master's degree programme, by stimulating them to set up distance learning education on specific topics or regional cases (e.g. discussion boards or video lectures) for all students at the ITC Faculty.

The principle of 'the international classroom' is about creating an environment in which students with different cultural backgrounds work together and share cases and experiences. The panel extensively discussed about the international classroom with students, staff and alumni. It concluded that group work and discussion are essential to this principle. Students have many of guided discussions in the core modules and do a lot of group work in the course modules. The ITC Faculty actively takes into account the diversity in international backgrounds of students in the student group composition, therewith creating a multicultural learning environment. During the site visit, students confirmed that they are actively encouraged to reflect on their own situation and to bring in their own experiences and cases during group discussions and assignments. In their opinion, this enriches the discussions in the classroom. The panel concludes that 'the international classroom' is an important asset of studying at the ITC Faculty.

The principle of the 'ethically aware engineer' starts from the idea that professionals in the field should be aware of the ethical aspects of their work and take them into account in every problem that is to be solved. In the educational programme, ethical issues are addressed

during discussions, case studies and projects. Within the context of less developed countries, these aspects could include, for example, issues around war and peace, balance of power and improvement of the lot of the poor. The panel supports the integration of this principle in the programme's teaching. Ethical awareness is important for all engineers and academics in the field, but especially for the international student population at the ITC Faculty.

The panel concludes that the philosophy of 'lifelong learning', the 'international classroom' and the 'ethically aware engineer' of the ITC Faculty are well integrated in the professional master's degree programme, but 'blended learning' could be strengthened. The didactical concepts of the ITC Faculty are relevant to the content of the professional master's programme and the student population, and have a strong connection with the mission of the Faculty (see §1.2). At the moment, the didactical principles of the ITC Faculty have not yet been streamlined with the didactic principles and vision on education of the University of Twente. The panel advices the ITC Faculty and the university to work on this in the near future.

§2.4 Intake and feasibility

§2.4.1 Intake
As stated in the critical reflection, the programme recruits students from different nationalities. The vast majority of the participants in the programme originate from countries outside Europe. From the interviews with students, it became clear that they consider the international student population an important asset to studying at the ITC Faculty. Although students argued that the differences in educational and cultural background sometimes lead to difficulties in communication, they also explained that they learn how to bridge communication problems as a result.

Although there have been some fluctuations, the intake has remained relatively stable between 2007 (16 students) and 2013 (12 students). The panel concludes that the intake of the professional programme is low and the long-term sustainability of the programme a point of concern. As has already been stated under Standard 1, the international recognition of the diploma of the programme is not self-evident. Students in the professional master's degree programme told the panel that they would prefer to obtain an academic degree at the end of the programme. According to them, the fact that the programme does not lead to an MSc degree might be an important reason for its low intake, even if there is a clear demand in the international working field for vocational training, and even if students value the technical and practical focus of the programme. The panel is convinced of the value of the niche of the programme. It therefore urges the ITC Faculty to develop a stronger marketing strategy for the professional master's degree programme as soon as possible. In addition, the sustainability of the programme and options to offer the programme in a more appealing format need continuous consideration.

The academic and the professional master's programme have the same entry requirements. The reason for this is that the Dutch professional bachelor has no equivalent in the countries where ITC students come from. All applicants (academic and professional master's programme) should have a bachelor degree from a recognized university in a discipline related to the domain. A completed undergraduate degree with a minimum GPA requirement of a BSc/BA or 3.0 or higher or lower Second Class is compulsory. In addition, students have to demonstrate an IELTS score of 6.0, a TOEFL score of TPB 500 or IBT 80, or a Cambridge ESOL CAE-C from an approved and internationally recognized language testing

centre. Nationals from a number of specified countries are exempt from an English test. The panel considers the admission criteria of the ITC Faculty to be adequate.

The student body of both the academic and professional master's programme is very diverse. The panel investigated what measures are taken to deal with different entry levels and expectations. It learned that the introductory period and the core courses deal with this. In the introductory period, students learn how things work at the ITC Faculty; in the core courses, the programme manages expectations about educational approaches and the role of the teacher. The core modules of programme are the same for all students and familiarize students with aspects of the student-centered learning environment at the ITC Faculty, such as group discussion and group work. In addition, core modules are used for remedial teaching in terms of knowledge, and professional experience and/or academic skills. During the panel conversation, some students complained that as a result of the remedial teaching in the core courses not all information in these courses is relevant for them. Other students were happy about the core modules because they close knowledge gaps and ensure that everybody in the programme has a sound knowledge base before starting the course modules. The panel is convinced that the core modules are necessary to tackle the great variety of entry levels of incoming students. It agrees with the programme management that the core courses are the most suitable moment for this. Each core module includes additional advanced assignments for students who are ahead of the rest.

§2.4.2 Feasibility
The study load of the programme is 77 EC. The University of Twente uses a standard of 28 hours per EC. Using this basic rule a three-week ITC module (with a total study load of 144 hours, or 48 hours per week) has a study load equal to five EC. The panel concludes that the professional master's degree programme is challenging and tightly tailored; students have to complete their master's programme within 12 months from the starting date of the programme. The critical reflection explains that the reason for choosing a 12-month period for the programme is that most students are already employed and/or come to the ITC Faculty with a scholarship. Institutes and companies feel reluctant to allow their employees to go abroad for a long period of time, and scholarships do not allow for the funding of holidays, hence leading to the absence of a summer break.

During the site visit the panel talked with students, alumni, teachers and programme management about the feasibility of the programme. Students and alumni indicated that the workload is high, but doable if you work hard. Discipline and time management are vital, because the modular structure of the programme is intense and does not allow for any slack time. Students would like to have more breaks, but they also appreciate the fact that they can finish the programme in a relatively short period of time. They are highly motivated to finish the programme before going home and spend a lot of time on their studies. Some students indicated that they would not have been able to enrol if the programme took more than 12 months. The panel understands the decision of the programme management to maintain a programme duration of 12 months.

The panel found that the programme management is aware of the high workload and has taken a lot of measures to increase the feasibility of the programme. It has for example introduced a fixed Wednesday afternoon period for self-study, catch-up moments during the core modules for finalizing exercises and assignments and reflection, and a catch-up week between the blocks. In addition, more balance has been created in study load among modules. The panel concludes the programme is demanding but feasible. The programme management is actively monitoring the workload and is urged by the panel to continue doing so. It is also

advisable to introduce more short breaks, or short periods for self-study, within the first part of the programme.

§2.5 Teaching staff
The panel focussed on the quality and quantity of the teaching staff in the professional master's programme.

§2.5.1 Quantity
The student-staff ratio for the professional master's programme is 1:4.2 for the 2012 courses and 1:6.25 for the 2013 courses. During the site visit, teachers noted that they are satisfied with their workload. Because of the modular structure of the programme, teaching load is often concentrated in one or two blocks. In other blocks, staff members have time for research or capacity-building activities. According to the panel, the quantity of the teaching staff is adequate.

§2.5.2 Quality
The programme is provided by 21 staff members, which the panel assesses as adequate. The staff consists of experienced teachers, mid-career academics and professionals, and young academics working on their PhD project. Staff members have different fields of expertise and come from professional as well as more academic backgrounds. The panel appreciates the fact that the programme management has recently hired new staff members with a strong professional profile. According to the panel, this is an important prerequisite for a professional master's programme.

All staff members of the University of Twente have to comply with university requirements for didactical skills and English proficiency (CEF C2). At the moment, 71% of the staff in the programme complies with the English language requirement of the university; 44% has acquired the University Teaching Qualification or are exempted (an exception exists for those with over twenty years of teaching experience). The critical reflection explains that the professional master's programme does not yet comply with university standards for the University Teaching Qualification (UTQ) because ITC only joined the university in 2010. The panel urges the programme management to raise the number of staff with a UTQ in the near future.

The programme management provided the panel with CVs of all ITC staff members and a list summarizing their specialisation areas, membership of research schools and professional organizations and their participation in international research projects and consultancy. The panel found that the ITC staff is enthusiastic, involved both in research and the professional field, and has ample expertise on a wide range of topics in the field. A lot of staff are involved in international projects or consultancies and are members of international research schools or professional bodies.

The panel is pleased with the overall quality of the teaching staff.

§2.6 Programme-specific quality assurance
The panel investigated the general programme-specific quality assurance of the degree programmes.

§2.6.1 General programme-specific quality assurance
There is one Programme Committee (PC) for the academic and professional master's programme. The PC consists of eight members, four (international) students from different

domains and programmes and four staff members from the ITC Faculty. During the site visit, the panel discussed the programme-specific quality control at the ITC Faculty with representatives of the PC. The panel was also given access to minutes of the PC, results of block evaluations, outcomes of a student survey (2012-2014 cohort) and outcomes of an alumni survey.

The panel ascertained that the ITC Faculty evaluates the quality of the courses in its degree programmes on a regular basis. Regular evaluations are performed at the end of every block, making use of a standard evaluation form. In addition, module coordinator are requested to supply a report on their module and propose changes to the Course Director. Along with the block evaluations, there is an end-of-course evaluation to assess the main aspects of the education provision and the coherence between modules. The outcomes of these evaluations are analysed, discussed and verified with staff and students. In conclusion, the course director writes an annual report which is discussed on the domain and the scientific department level. The final report, including recommendations for modifications is sent to the PC and the Education Director of the Faculty. The critical reflection included a clear overview of the system for internal quality assurance at the ITC Faculty, taking the Plan-Do-Check-Act cycle as a point of departure. The panel established that quality assurance activities and the recommendations of the assessment panel in 2006 have led to actions strengthening the professional profile of the programme, such as the re-examination of web technology elements in the programme and the further development of professional skills in module 12. As mentioned earlier, the assessment panel advises the programme to continue on this course by implementing more reflection, project management and entrepreneurship in the modules.

The PC has a defined role within the system for internal quality assurance and meets regularly. It assesses the final report provided by the Education Director. Upon receipt of the report, members of the PC discuss the summaries of the evaluations and the related recommendations for modifications. In case of serious issues, members of the PC also consult the underlying evaluation. During the panel conversation, PC members explained that they also provide the Education Director with unsolicited advice. Last year, for example, the PC discussed complaints from students about the study load and provided the Education Director with recommendations about measures for study load reduction.

Students have an important role to play within the PC. The panel found that student members of the PC are involved in, and selected by, the Student Association Board (SAB). Usually, ITC students go to the SAB if they encounter problems. If necessary, the student members of the PC discuss these issues in the regular PC meetings.

The panel concludes that the faculty evaluates student and staff satisfaction on a regular basis and pays attention to internal quality control of its degree programmes. The panel did, however, notice that the PC is not very involved in strategic issues. For instance, the PC was not consulted about revised learning outcomes of the professional master's programme. Upon When asked why, PC members explained that the PC is still relatively new: it was only established when ITC became part of the University of Twente. As a consequence, the PC is still working on improving its communication lines and establishing its position within the Faculty. The panel empathises with this situation. Nevertheless, it would like to advise the PC to contribute more pro-active to strategic issues in the future, such as the advised revision of the intended learning outcomes of the professional master's programme (addressed in Standard 1).

§2.7 Programme-specific services and guidance

The facilities and services of the ITC Faculty are geared to the international student body of the programmes. They are linked to the delivery of education, the provision of a pleasant and stable living environment for international students and guidance.

The panel investigated the programme-specific services during a tour of the building. It found that the educational facilities include modern computer facilities and wireless internet throughout the ITC building and in the ITC International Hotel (see below). The ITC laptop programme ensures that all students have a laptop with the required settings and software, and the library possesses a large number of books and journals. All students have digital access to the full ITC and central UT journal collection (including ScienceDirect) and a range of scientific e-books. The ITC building also contains a well-equipped GeoScience laboratory for education and research activities, sufficient classrooms and several places where students can work alone or in small groups. The panel is impressed by the available facilities. Students appreciate the fact that the ITC Faculty has its own building. There they are less anonymous than at the UT campus and really feel part of ITC's international student body.

ITC students are accommodated in the ITC International Hotel. As a rule, all students stay in this hotel. The main ITC building also hosts arestaurant offering lunch and a 'Bureau Education and Research Support' (BOOZ). BOOZ supports students during their stay at ITC. BOOZ-services include matters like residence permits, social and cultural aspects, consular affairs and student information. Student get help with financial aspects from the Financial and Economic Affairs Department and a general practitioner group is on hand for those who need medical counselling. Last but not least, all students can become members of the Student Association Board (SAB). The SAB organizes social, cultural and sports activities for students and are represented on the Faculty Council and the Programme Committee.

The panel questioned students and alumni about the services and guidance for international students. It established that the students are very satisfied. They appreciate having a clear first port of call for all questions with BOOZ. In general, BOOZ officers refer students to the right person or institution if they are not able to help them personally. According to the students, staff members are also very accessible in case of course-related questions. The rooms in the ITC International Hotel are well equipped. Although most students value the hotel, some students would like to have the freedom to find their own accommodation in Enschede. Also, some students would like the opening hours of the restaurant to be less restricted. Overall, however, the panel is impressed and is of the opinion that the ITC Faculty offers very good facilities for the education of international students in the field of Geo-Information Science and Earth Observation.

§2.8 Criteria and standards of the Assessment framework for the assessment of internationalisation

§2.8.1 Curriculum

The content and structure of the curriculum enable the achievement of the intended international and intercultural learning outcomes

For a schematic overview of the curriculum of the professional master's programme, please refer to Appendices 4, 5 and 6. For a detailed description of the programme, please see §2.1.

The panel studied the content and the structure of the curriculum in more detail from the perspective of the vision on internationalisation of the ITC Faculty and the intended international and intercultural learning outcomes of the programme. It established from module descriptions and discussions with students and staff that a focus on real-world problems and their solutions and a comparative orientation are essential components of the curriculum of the professional master's programme. Many modules in the programme combine a focus on theory and concepts with a practical problem-solving approach: concepts and case studies from around the world are discussed, and students are invited to critically reflect on and compare problems and solutions with the situation in their respective home countries (also see §2.8.2).

The focus of the curriculum on real-world international problems and solutions and its comparative orientation are also reflected in the one-week excursion that students follow as part of module 11. During this excursion students visit companies and organisations in the field of Geoinformatics in Europe. In the critical reflection, it is explained that the central goal of this excursion is to teach students about practical solutions developed by NGOs, businesses, companies and organisations in Europe, to trigger students to ask critical questions, and to stimulate them to bring in their own local experience point of view.

The panel concludes that the curriculum of the professional master's programme teaches students to become more aware of local differences and of different development levels in different countries. It considers the problem-oriented and international focus of the curriculum to be relevant and adequate, especially in the light of the capacity-building mission of ITC. As has been noted in §1.4.4 the technical content of the programme is of a universal character and has no need for an international component, in the opinion of the panel.

The international and intercultural intended learning outcomes of the programme relate to the development of intercultural professional competencies and communicative skills (to create 'global citizens'). The critical reflection confirms that intercultural competences are discussed at the very beginning of the programme. The introductory period (3EC) includes a brief orientation to Dutch and European aspects and the above-mentioned excursion introduces students to the international professional field. The panel established that the development of intercultural skills is first and foremost triggered by the teaching formats of the curriculum. Students in the professional master's degree programme have a lot of guided discussions in the core modules and do a lot of project work in the course modules and during the 'Case Study'.

The panel concludes that the professional master's degree programme makes links to real-world problems and international cases. The content and structure of the professional master's programme are coherent and match ITC's vision on internationalisation, while enabling students to achieve the intended learning outcomes of the programme. However, there is still an opportunity for the programme to promote internationalisation in a more explicit manner and to make students more aware of its role in the programme. The panel advises the programme management to review the current modules from this perspective.

§2.8.2 Teaching methods

The teaching methods enable the achievement of the intended international and intercultural learning outcomes.

Education at the ITC Faculty is based on the philosophy of 'lifelong learning', and from the principles of 'blended learning', 'the international classroom' and the 'ethically aware engineer'. Amongst other things, these entail that professional master's students are taught to adapt themselves to ongoing changes in society; to become independent learners; and to work and communicate with people from different cultural backgrounds. For a detailed description of the principles and their integration in the professional master's programme, please see §2.3.

The teaching methods of the programme connect with the above-mentioned principles. The critical reflection explains that important didactic elements for the professional master's degree programme are: 1. linking to the students' work experience and stimulating students to exchange their experiences; 2. reflection on concepts and case studies from around the world; and 3. stimulating teamwork as well as independent critical thinking. During team work, a mixture of nationalities is deliberately created by the programme to strengthen international and multicultural discussion and teamwork. Students at the site visit confirmed to the panel that this was indeed the case.

The panel is positive about the teaching methods of the programme, their integration (see §2.8.1) and the resulting learning benefits. Because students work in international groups, reflect on international concepts and cases and share experiences from their own professional backgrounds, they become more aware of international differences and have the opportunity to work on their intercultural professional and communicative skills (intended learning outcome 6 and 7).

§2.8.3 Learning environment

The learning environment is suitable for achieving the intended international and intercultural learingen outcomes

The panel found that the ITC Faculty offers students a unique multicultural learning environment:

- The student body of the ITC Faculty is very international (see §2.8.7). The Faculty builds on this international student body with its didactical concept of the 'international classroom'. Students do a lot of group work, and nationalities are deliberately mixed in these groups to help students develop intercultural professional and communicative skills (see §2.8.2);
- The staff are very international, have adequate English language skills, have ample international experience, and are involved in research as well as in capacity-building and the professional field (see §2.8.4 and §2.8.5). Staff contribute to a stimulating learning environment by sharing their expertise and experience with students;
- The ITC Faculty provides special services and facilities for international students, focussing on administrative, financial, technical, social, cultural and personal support to international students. Students are accommodated in the ITC Hotel;
- The ITC Faculty has a worldwide network of contacts with educational institutions and is involved in many international projects. Students benefit from these contacts in many ways.

The panel concludes that the learning environment matches the mission of the ITC Faculty 'to be a gateway for knowledge exchange for individuals and institutes from countries that are economically and/or technologically less developed', and is suitable for achieving the intended international and intercultural learning outcomes.

§2.8.4 Staff composition

The composition of the staff (in quality and quantity) facilitates the achievement of the intended international and intercultural learning outcomes

The critical reflection offers an overview of the quantity of staff. The student-staff ratio for the professional master's programme is 1:4.2 for the 2012 courses and 1:6.25 for the 2013 courses. According to the panel, the quantity of the teaching staff adequate and appropriate for the curriculum, the teaching methods and the achievement of the intended international and intercultural learning outcomes (see §2.5.1).

The programme management provided the panel with the CVs of all ITC staff members and a list summarizing their areas of specialisation, membership of research schools and professional organizations and participation in international research projects and consultancy. The panel is positive about the general quality and engagement of the staff. Staff members are enthusiastic and well-informed about recent developments in the field (also see §2.5.2 and §2.8.6).

All staff members of the ITC Faculty have to comply with university requirements for didactic skills and English proficiency (CEF C2). At the moment, 55% of all staff has achieved the University Teaching Qualification, and 60% of all staff members complies with the university's English language requirement. All other staff members are either in the process of achieving the University Teaching Qualification (or are exempted) or completing remedial training in English language skills.

The panel found that all ITC lecturing staff followed a three-day workshop on Teaching and Learning in Higher Education before the introduction of the University Teaching Qualification. The 'international classroom' and intercultural communication were topics on one day of that workshop. The University Teaching Qualification does not pay special attention to international and intercultural elements in teaching. Hence the University of Twente has introduced workshops on intercultural communication for lecturers from October 2014 onwards. Because of the ambitions of the ITC Faculty with regard to internationalisation, the panel would like to advise the ITC Faculty to offer all staff members the opportunity to follow these workshops and/or to offer additional and tailor-made courses on this topic.

§2.8.5 International experience and competence (of the staff)

Staff members have sufficient international experience, intercultural competences and language skills

The critical reflection includes an overview of the qualifications and international activities of each staff member. The panel studied this overview. It concludes that the staff members have ample international experience. English language proficiency is guaranteed by the university requirement that all staff members are able to communicate at the CEF C2 level.

The panel found that the staff of the ITC Faculty is very international; members come from many international career backgrounds, represent 35 different nationalities and 19% of staff originate from countries outside the European Union. In addition, many visiting scientists from countries around the world spend periods at the ITC Faculty and contribute to teaching. In the opinion of the panel there is an adequate mix between staff who teach a lot and staff who focus primarily on research or capacity-building and have a very specific field of expertise. There is ample opportunity for staff members to bring in their own experiences into the courses. This contributes to the principle of 'the international classroom' in the sense that not only students, but also staff members with different cultural backgrounds

share cases and experiences in their courses (also see §2.3 and §2.8.2). The panel concludes that the quality and the varied international backgrounds of the staff contribute to the international learning environment of the programme and the achievement of the intended international and intercultural learning outcomes.

The mobility of staff members and the further extension of international experiences are stimulated by the multitude of courses offered by the ITC Faculty throughout the world (including JEPs, refresher courses and tailor-made training in international projects). As a result, ITC lecturing staff travel a lot and gain wide experience with providing education in various international environments and to mixed groups of students across the globe.

§2.8.6 Services provided to staff

The services provided to the staff (e.g. training, facilities, staff exchanges) are in line with the staff composition and facilitate international experiences, intercultural competences and language skills

Many training services to staff are provided to staff at the university level. The University of Twente offers UTQ training, English language training and workshops on specific topics related to education, including ones on international and intercultural elements of teaching (see §2.8.5). In addition to the services at the university level, the ITC Faculty offers a sabbatical period to its staff. This sabbatical period is part of the employment conditions and provides staff of the ITC Faculty with the opportunity to spend a period of time at an education institution in another part of the world in order to teach or do research. During the site visit, staff members explained to the panel that the ITC Faculty is a unique employer in the sense that it has a worldwide network of contacts and is involved in many international projects. The sabbatical period supports staff members in exploiting this network for the development of their personal career, but it is also important for the maintenance and expansion of the network of the ITC Faculty.

The panel concludes that staff members are satisfied with the available services. In the panel's opinion, the services are in line with the international experiences, intercultural competences and language skills required for the provision of the academic and professional master's programme.

§2.8.7 Student group composition

The composition of the student group (diversity of national and cultural backgrounds) is in line with the programme's vision on internationalisation

The critical reflection included an overview of the continental origin of students at the ITC Faculty during the last seven years and an overview of the international origin of alumni (from 1950 up to 2013) from Official Development Assistance (ODA) countries. The panel established that the ITC Faculty has a student body that originates from a wide range of countries. Between 2007 and 2013 the number of nationalities at the Faculty fluctuated between 31 and 46. Most students originate from countries in Africa (13 nationalities in 2013) and Asia (10 nationalities in 2013), but the ITC Faculty also attracts students from the Americas, Europe and Australia/Oceania (5, 7 and 1 nationalities, respectively, in 2013). Although the majority of students still come from institutes in developing countries, they also increasingly originate from countries that are different from the traditional developing countries.

The panel is very impressed with the international composition of the student group. It concludes that the ITC Faculty is extremely successful in its mission 'to be a gateway for knowledge exchange for individuals and institutes from countries that are economically and/or technologically less developed'. It is pleased by the fact that the ITC Faculty increasingly attracts students from other countries, because it believes that this adds considerably to the international and intercultural learning experience of students. Even though the panel understands that the primary focus of the ITC Faculty is on capacity-building, it advises the ITC Faculty to look for further opportunities to increase the enrolment of students from countries that are different from traditional developing countries.

§2.8.8 Services provided to students

The services provided to the students (e.g. information provision, counselling, guidance, accommodation, Diploma Supplement) are adequate and in line with the composition of the student group

The critical reflection explains that there are many facilities and services for international students at the ITC Faculty (also see §2.7). International students are accommodated in the ITC International Hotel and follow a compulsory introductory period of 2 EC at the start of the programme. In this period, students are introduced to the Netherlands and to how things work at the ITC Faculty. The ITC laptop programme ensures that all international students have a laptop with the required settings and software before they embark on the core courses.

During the programme students at the ITC Faculty have access to the ITC library and are provided with wireless internet. In addition, all students have digital access the full ITC and UT journal collection and a range of scientific e-books and have an account for ITC Blackboard. The panel had a tour around the ITC building and noted that it is well equipped. The building contains a GeoScience laboratory for education and research activities, a technical room for the recording of video lectures, a variety of small and large classrooms and several places where students can work alone or in small groups.

Support for international students in matters like residence permits, social and cultural aspects, consular affairs and student information is arranged by the 'Bureau Education and Research Support' (BOOZ). The BOOZ functions as a first port of call for all questions and BOOZ officers refer students to the right person if they are not able to help them personally. Students can also go to the Financial and Economic Affairs Department for help with financial aspects, to a general practitioner group for medical counselling and to the Student Association Board (SAB) with programme-specific complaints. The SAB is represented on the Faculty Council and the Programme Committee and organizes social, cultural and sports activities for students. The panel concludes that the available facilities, services and guidelines match the international composition of the student body at the ITC Faculty and are more than adequate.

Considerations

Considerations with regard to the limited programme assessment

After studying the various aspects of the curriculum of the professional master's programme, the panel established that the programme is coherent, with a clear development in the level of the modules. It matches the available expertise at the ITC Faculty and enables students to achieve the intended learning outcomes. Its professional profile could be strengthened further by introducing reflection, project management and entrepreneurship in the modules. The

panel also recommends incorporating more on communication with business organisations and technical report writing in the programme.

Despite the fact that the didactic principles of the ITC Faculty have not yet been streamlined with the didactic concept of the University of Twente (but should be), the panel concludes that the principles of the ITC Faculty fit well with the mission and the international student population of the programme. The didactic concepts are reflected in the teaching formats and set-up of the programme. The ITC Faculty has very good educational facilities and services for international students. The panel advises the programme management to think about 'blended learning' more in terms of a two-wayprocess and to stimulate partner institutions to contribute to 'blended learning', by stimulating them to set up distance learning education on specific topics or regional cases (e.g. discussion boards or video lectures) for all students at ITC, including those from the professional master's programme.

The panel investigated the admission criteria of the professional master's programme and considers them to be adequate. It is enthusiastic about the diversity of the student body of the professional master's programme, but the intake numbers are a point for concern. The panel has serious doubts about the long-term sustainability of the programme because the international recognition of the diploma is not self-evident, and students seem to prefer to enrol in a programme resulting in an MSc degree. The panel is convinced of the value of the niche of the programme and urges the programme management to develop a stronger marketing strategy for the professional master's degree programme. The programme management should also consider options to offer the programme in a format more appealing to international students.

The panel concludes that the professional master's programme is demanding, but feasible. The programme management is actively monitoring the work load and is urged by the panel to continue doing so. The panel understands the choice of the ITC Faculty to offer a programme as short and dense as possible. This is essential for many employed students and students who come to the ITC Faculty with a scholarship.

The panel is convinced that the programme has dedicated, innovative and skilled teaching staff. It appreciates the fact that the programme management has recently hired new staff members with a strong professional profile. Because of the ambitions of the ITC Faculty with regard to internationalisation, the panel advises the ITC Faculty to offer staff members additional and tailor-made courses on this topic. In addition, the number of staff with a UTQ needs to be raised as soon as possible. The Programme Committee is functioning well, but could be more pro-active on strategic issues in the future. The panel is positive about the internal quality control of the programme.

Conclusion
Professional master's programme Geo-Information Science and Earth Observation: the committee assesses Standard 2 as **satisfactory.**

Considerations with regard to the assessment of internationalisation

The panel determined that the modules in the programme take a comparative viewpoint and focus on real-world international problems and their solutions. The one-week excursion to NGOs, businesses, companies and organisations in Europe and the international composition of the student body also teach students to become aware of local differences and different development levels. The development of intercultural competencies and communicative skills is stimulated through guided discussions and project work in international teams. The panel concludes that the content and structure of the programme match the professional profile of the programme and ITC's vision on internationalisation, and enable students to achieve the intended learning outcomes of the programme.

Professional master's programme Geo-Information Science and Earth Observation the committee assesses Criterion 3a (Curriculum) as **satisfactory.**

The teaching methods of the programme focus on multicultural group work, reflection on international concepts and case studies, and discussion about the experiences that students bring in from their home country. The panel is positive about the learning benefits of these teaching methods in relation to the intended international and intercultural learning outcomes of the programme.

Professional master's programme Geo-Information Science and Earth Observation the committee assesses Criterion 3b (Teaching methods) as **good.**

The panel found that the ITC Faculty offers students a unique multicultural learning environment. The organisation of education, facilities and services has been matched to suit the international target group of the ITC Faculty. The benefit of the international student population and the capacity-building mission of the ITC Faculty is that education at this Faculty has an international comparative focus and that students work together in multicultural working groups. The ITC Faculty definitely provides students with a stimulating learning environment. In this specific respect, it can be seen as an international 'best practice'.

Professional master's programme Geo-Information Science and Earth Observation the committee assesses Criterion 3c (Learning environment) as **excellent.**

The panel established that the content and structure of the professional master's programme are adequate. The teaching methods are appropriate and the panel is positive about their learning benefits. The combination of a worldwide network of contacts, an international student body, a skilled staff, a focus on cases and group work, and many special facilities and services for international students provides students with a stimulating multicultural learning environment that can be seen as an international 'best practice'.

Professional master's programme Geo-Information Science and Earth Observation the committee assesses Standard 3 (Teaching and learning) as **good.**

The panel assesses the quantity and quality of the staff as more than sufficient: the quantity of the staff is adequate; the staff is well-informed about recent developments in the field; it has a

lot of expertise; and it is very engaged. All staff members at the ITC Faculty have to comply with university requirements for didactic skills and English language proficiency.

Professional master's programme Geo-Information Science and Earth Observation the committee assesses Criterion 4a (Staff composition) as **good.**

The panel concludes that the staff of the degree programmes is very international and has ample international teaching and research experience. In addition, many visiting scientists from countries throughout the world spend periods at the ITC Faculty and contribute to teaching. English language proficiency is sufficiently guaranteed by the university requirement that all staff members are able to communicate at CEF C2 level. The ITC Faculty offers courses throughout the world. As a consequence, staff members continue to develop and expand their international experience and intercultural competences while they work at the ITC Faculty.

Professional master's programme Geo-Information Science and Earth Observation the committee assesses Criterion 4b (International experience and competence) as **good.**

The University of Twente provides many training services. In addition, the ITC Faculty offers its staff a sabbatical period. Staff members are satisfied with the available services. The panel concludes that the services are sufficient and fit the international ambitions of the programmes.

Professional master's programme Geo-Information Science and Earth Observation the committee assesses Criterion 4c (Services provided to the staff) as **satisfactory.**

The panel established that the staff of the degree programmes has a lot of expertise in the field, is engaged, and needs to comply with strict university requirements for didactic skills and English language proficiency. The staff of the degree programmes is very international and has ample international experience. Staff members are encouraged to expand their international experience and intercultural competences while they work at the ITC Faculty, and the university provides sufficient training services. The quantity of the staff is adequate for the achievement of the intended learning outcomes.

Professional master's programme Geo-Information Science and Earth Observation the committee assesses Standard 4 (Staff) as **good.**

The panel is very impressed by the international composition of the student group. It concludes that the ITC Faculty is extremely successful in its mission 'to be a gateway for knowledge exchange for individuals and institutes from countries that are economically and/or technologically less developed'.

Professional master's programme Geo-Information Science and Earth Observation the committee assesses Criterion 5a (Services provided to students) as **excellent.**

The panel established that many facilities and services are available for international students enrolled in a programme at the ITC Faculty. They include support for administrative,

financial, technical, social, cultural and personal issues. In the opinion of the panel, the available facilities, services and guidelines match the international composition of the student body at the ITC Faculty and are more than adequate.

Professional master's programme Geo-Information Science and Earth Observation the committee assesses Criterion 5c as **good.**

Standard 3: Assessment and achieved learning outcomes

The programme has an adequate assessment system in place and demonstrates that the intended learning outcomes are achieved.

Explanation:
The level achieved is demonstrated by interim and final tests, final projects and the performance of graduates in actual practice or in post-graduate programmes. The tests and assessments are valid, reliable and transparent to the students.

Findings

This section deals with the assessment system (§3.1) and with the achieved learning outcomes of the programme (§3.2). It also deals with the following criteria of the Assessment framework for the assessment of internationalisation (§3.3): student assessment (criterion 2b, §3.3.1), graduate achievement (criterion 2c, §3.3.2), international experience (criterion 5b, §3.3.3).

§3.1 Assessment system

The panel analysed the assessment system of the programme and focussed on the assessment policy, including the functioning of the Examination Board, the examinations, the thesis (Graduation Project Report) procedure.

§3.1.1 Assessment policy

The assessment policy of the professional master's degree programme has been laid down in the Education and Examination Regulations, rules and regulations of the Examination Board, an internal quality assurance document and a test plan demonstrating the relation between modules, module assessments and intended learning outcomes. The Education and Examination Regulations are available for all students on the website of the ITC Faculty and provide an overview of the rules on the organisation, nature, frequency and marking of assessments as well as of the rules on re-sits, the research period and the graduation project.

Following the merger with the University of Twente, the ITC Faculty established one Examination Board (EB) for all of itscourses, including the academic and professional master's courses. The EB consists of four staff members and is supported by a secretary and an education specialist. It will shortly be expanded to include an external member. The panel supports this initiative. During the site visit, the EB explained that it is responsible for the assessment policy and for the safeguarding of the achieved learning outcomes. It also deals with complaints and exemption requests applicable to all examinations in the programme. The EB works according to an annual cycle and writes an annual report that is discussed with the Dean. All documents and correspondence of the EB are archived in the central document management system Decos.

Recently, the EB implemented a procedure to check the quality of individual tests on a regular basis. At the module level, module coordinators are responsible for student assessment. Assessments are prepared in collaboration with the teaching staff in the module. They are marked by examiners (often the module coordinator and lecturing staff) who are appointed by the EB. All examiners should have a University Teaching Qualification or a valid exemption from the UTQ. In addition, the EB organises seminars on the procedures and practices of assessments.

The EB has recently started to analyse the marks per module and to select modules with remarkable results. This was done for the 2010 and 2011 cohorts of both programmes, but not for the other cohorts due to difficulties in getting the marks in a reusable format. At the end of 2013, the EB formulated action points with priorities for the next few years. These action points include the collection and analysis of administered tests based on the analysis of results. During the site visit, the Examination Board explained that in the last few years priority had been given to improving the thesis and GP report assessment procedures and checking the marks of theses from the academic master's programme (see part one of the report). The GP report assessment procedures will be discussed in §3.1.3.

Coherence between the assessments and intended learning outcomes is monitored using a test plan. Each course director (in this case the director of the professional master's programme) is responsible for implementing and updating an annual test plan. This test plan has to include a worksheet linking the module learning outcomes to the learning outcomes of the professional master's programme and a worksheet linking the module assessment to module learning outcomes.

The panel concludes that the EB is professional and aware of its formal responsibilities. In general, the EB has implemented clear procedures for assessment and control as well as adequate action points for the near future. The follow-up of the control procedures for module assessments still needs work, however. The panel urges the EB to continue on the course it has set, and not only to analyse marks, but also to check all assessments in the programme on a regular basis.

§3.1.2 Examinations
The panel studied exams, the test plan of the professional master's programme and an overview of assessments in each module. It found that students in the programme are assessed by means of assignments, written exams, papers, group projects and assignments, case studies, oral exams and presentations. Most modules include two or more methods of assessment to reflect their multiple intended learning outcomes. According to the panel, the assessments are sufficiently diverse and match the didactic concept and the teaching formats of the programme.

§3.1.3 Thesis (Graduation Project) assessment procedure
Students conclude the programme with a Graduation Project (GP). The GP phase consists of two parts. In the first part, students take the 'Advanced topics and research skills' module (module 12, 5 EC). In this module students are prepared for the GP, learn about information skills and report writing, and develop a project proposal for their personal GP. The project proposal is assessed in two stages: 1. the proposal is assessed by the examiner(s) of the module on criteria addressing the competencies and criteria for proposal writing and technical report writing, resulting in the module mark; 2. the proposal is assessed by the supervisor. The supervisor does not grade the proposal but simply approves or disapproves it. Upon approval of the project proposal, students work on their GP individually in the second part of the GP phase. In this part, students have regular meetings with their supervisors.

Formal assessment of the GP takes place during the defence at the end of the block. This assessment is conducted by the Graduation Project Assessment Board (GPAB) and based on the project report, the presentation and the candidate's oral defence. During the site visit, the EB explained that the GPAB is appointed by the EB. The chair of the GPAB is an expert on the topic and has be a PhD holder. The panel concludes that the composition of the GPAB is well-considered.

The EB has developed documents and guidelines to be used by the GPAB, these include a protocol and assessment criteria. The panel studied the documents and guidelines for the GPAB and exchanged ideas on them with students, staff members and the EB. The panel concludes that the GPAB procedures for the assessment of the GP correspond with the procedures of the TAB in the academic master's programme. After the oral defence, the GPAB withdraws to discuss the final mark. At that time, the chairman asks all the members of the GPAB for their opinion of the mark. The GP assessment protocol provides the members of the GPAB with a clear description of the meaning of the possible marks. As soon as the members of the GPAB come to an agreement, the chairman records the results of the examination and a short summary of the argumentation on the 'Result thesis examination' form. This form is signed by the chairman and sent to the EB. At the end of the oral defence, the chairman communicates the final mark of the GP report and the main argumentation to the candidate. No copy of the 'Result thesis examination' form is given to the candidate.

The panel studied a representative sample of GP reports from the professional master's programme (see §3.2). It noted that the design and content of the final products from this programme differ greatly from the MSc theses. During the site visit, the panel exchanged ideas on this with staff members and representatives of the EB. They confirmed that the final products from the professional master's programme indeed cannot be characterised as academic: in the GP reports, the emphasis is not on scientific innovation but on problem-solving. Staff members explained that supervisors clearly communicate to students that the final product is a 'project report' with a practical and technical orientation and not a scientific thesis. The project report focuses on finding a solution to a real-life problem in the field. As a consequence, in its final mark the GPAB also takes into account the participant's competence in the professional field, problem-solving skills and practical orientation.

Although the panel would have liked to have seen greater reflection, better presentation and more on internationalisation in the project reports (see §3.2), it agrees that the focus of the GP reports and the focal points of the GPAB described above are adequate for a professional master's programme and in line with the sample of final products studied by the panel. It was therefore surprised to find that the formal assessment criteria for the GP are very similar for the academic degree programme and the professional master's programme. In assessing the candidate, the assessment criteria of both programmes take into account 'scope and depth', 'methods', 'reporting', 'presentation and defence' and 'process'. Although the panel noted some minor differences (e.g. in placing the research project in either a 'scientific' or a 'professional' context), it believes that the assessment criteria for the GP reports need further specification.

The panel concludes that the EB has put a lot of effort into designing a solid GP assessment procedure. The current assessment procedures are adequate: they provide GPAB members with clear instructions, ensure that initial marks are sought from multiple examiners, and prescribe that an extensive panel discussion takes place before the mark is communicated to the student. Nevertheless, the panel also has some concerns about the current design of the assessment process. In its, there are several opportunities to increase the transparency and quality of it further:

- There is no GP instruction for students. Although students get general instructions in Module 12, the panel feels that the programme needs to provide clearer guidance about what constitutes a successful GP report at the start of the process.

- The assessment criteria in the GPAB protocol are quite general. The criteria for the academic degree programme and the professional master's programme are rather similar. The elaboration of these criteria, however, sufficiently distinguishes between the scientific orientation of the academic degree programme and the professional orientation of the professional master's programme. Still, the panel advises the EB to adjust the assessment criteria to better reflect the different objectives and intended learning outcomes of the two programmes. It suggests focusing the assessment criteria of the academic degree programme more strongly on scientific research, understanding the scientific context of geo-information science and earth observation technologies and their application, and on 'creating new knowledge'. In addition, it recommends to focus the criteria of the professional master's programme more on organisational aspects, project management, applying knowledge, relevance and entrepreneurship. Following the recommendations under Standard 1, these criteria should reflect the distinction between a professional master's programme and a professional bachelor's programme in the field more clearly. In the panel's opinion, for example, a professional master's student is more aware of ongoing research in the field and is able to anticipate on the entire life-cycle of a process (e.g. maintenance of a technological solution, keeping data up to date, accommodating legal requirements, and understanding industry procedures and management).

- The traceability of the assessment by the GPAB needs to be improved. At the moment there is no record of assessments by individual GPAB members. As a consequence, the EB has no evidence that the GPAB members indeed judged the quality of the GP report and the oral defence independently from each other before coming to an agreement on the final mark. The panel suggests that the GPAB members fill in separate assessment forms and that these are filed by the EB. The individual assessments need not be shared with the candidate, but candidates should receive a conclusive aggregated mark sheet (see below).

- The panel studied a representative sample of theses and GP reports from both degree programmes, including the corresponding 'Result of thesis examination' forms. Although the forms of GP reports with low marks often contain more explanation, the panel noted that few forms say much about strengths and weaknesses. During the site visit, the EB explained that the 'Result of thesis examination' is not given to the candidate. The main argumentation of the final mark is communicated verbally to the candidate by the chairman of the GPAB. The panel is of the opinion that this procedure is not transparent enough. Oral feedback can be more difficult to remember and less structured than written feedback. The panel finds that the programme should provide students with a written mark sheet after the GP report defence. This mark sheet should contain clear argumentation on each criterion.

§3.2 Achieved learning outcomes

The panel studied a representative sample of project reports from the professional master's programme. In most cases, the panel agreed with the mark given by the programme staff, but sometimes it would have awarded a slightly lower or higher grade. These deviations can be partly explained by the fact that the oral defence is included in the final judgment of the GPAB. The panel believes that a further specification of the assessment criteria, documenting of a written mark sheet, and archiving of assessments by individual GPAB members (see §3.1) can further improve transparency in, and understanding of, the final marks of the GPAB.

In general, the project reports were well-constructed, had clear objectives and showed a logical line of reasoning. According to the panel, the reports sufficiently demonstrate that students in the professional master's programme actually achieve the intended learning outcomes. Having said that, the panel still sees opportunities for improving the quality of the project reports. The panel felt that the design of some of the reports could have been better. More in particular, the panel recommends the programme to carefully monitor the reflection on methods (for example, on the implication of particular data, software and scale choices), the consultation of recent international literature and the problem analysis, which should not only be relevant, but also provide a reflection on what is to be achieved, for whom and under what boundary conditions. In addition, the panel felt that the context awareness and the international component in the reports could also be improved in some of the reports. For example, a report on a utility information system for gas and electricity distribution was worked out for a Dutch situation, but the choice of the work was motivated by the troubles in Nigeria. One would have expected at least a section to describe what else would be needed to make the method applicable to Nigeria. Because of the international focus of the programme, the panel would like to suggest the ITC Faculty to include a reflective appendix in the GP report. In the GP report, this appendix could be used by students to reflect on the problem they dealt with and the applicability of the solutions in their project report in other settings (organisations, countries, cultures, legal systems).

Another measure of a programme's quality is the employment record of graduates. From the interviews with alumni and the alumni survey, it became clear that the programme is well-connected to the labour market. In general students are satisfied with the level of the programme and the connection of the programme to practice. Almost all graduates (85%) indicate that the programme has helped them in their career, and most students would recommend the programme to their colleagues. During the site visit, alumni pointed out that the international learning environment at the ITC Faculty really broadened their understanding of cultural differences. As a consequence, they feel more comfortable about contacting colleagues from other countries for advice.

The panel established that alumni maintain their ties to the programme. Graduates retain their ITC e-mail address and the faculty informs them on a regular basis about meetings, vacancies, scholarships and symposia. Alumni also receive a hardcopy of the quarterly ITC magazine.

Due to the fact that the project reports sufficienty demonstrate that students in the professional master's programme have achieved the intended learning outcomes and also due to the good connection to the labour market, the panel concludes that the level reached by students at the end of the programme is adequate and sufficient.

§3.3 Criteria and standards of the Assessment framework for the assessment of internationalisation

§3.3.1 Student assessment

The methods that are used for the assessment of students are suitable for measuring the achievement of the intended international and intercultural learning outcomes.

The panel studied exams, the test plan of the master's programme and an overview of assessments in each module. It found that students in the programme are assessed by means of assignments, written exams, papers, group projects and assignments, case studies, oral exams and presentations (see §3.1.2). The programme management formulated two specific intended learning outcomes for internationalisation. According to them, graduates of the professional master's programme are able to 'operate professionally in a multicultural

environment, and act adequately on cultural differences' (LO 6) and to 'express themselves adequately to colleagues of different nationalities' (LO 7) see §1.4.4.

During the site visit, the panel talked to students and representatives from the EB about the way in which the international and intercultural communicative and professional skills of students are tested. Students told the panel that these skills are very important in doing group assignments and project work, but are often not part of the formal assessment criteria. Representatives from the EB explained that the intended learning outcomes 6 and 7 are relatively new. Until recently, these skills were an asset to studying at the ITC Faculty, but were not part of the formal intended learning outcomes of the degree programmes.

The panel established that intercultural and international skills are important in group assignments and project work, but are not formally tested. From the discussion with alumni and the outcomes of alumni surveys, the panel is convinced that graduates achieve the intended learning outcomes 6 and 7 (see §3.3.2). Nevertheless, now that these international skills have become official learning outcomes, the programme should formally guarantee that all students achieve them at a satisfactory level. The panel urges the programme to find a way to adequately test international and intercultural communicative and professional skills.

The curriculum pays a lot of attention to development levels and cases in different countries (see §2.8.1). According to the panel, being aware of the influence of local settings and cultures on the process and outcomes of project work is important in operating professionally in a multicultural environment (LO 6). The panel studied a representative sample of GP reports from the programme to assess the achieved learning outcomes (see §3.2). It was surprised to find that reflection on the intercultural setting of the project is not an explicit part of the report. The panel advises the programme management to strengthen the internationalisation component of the GP report by including a reflectic appendix.

§3.3.2 Graduate achievement
The programme can demonstrate that the intended international and intercultural learning outcomes are achieved by its graduates.

The panel studied a representative sample of GP reports from the professional master's programme. The panel established that the overall level of the GP reports is satisfactory. The majority of the project reports showed a logical line of reasoning and was adequately constructed. In some reports, the panel would have liked to have seen more reflection on methods, more consultation of the recent international literature and a better developed problem analysis (see §3.2).

In its assessment of the sample of GP reports, the panel paid specific attention to the international features of the reports and to the relation between the international and intercultural learning outcomes and their content. While in many reports the motivation of the work nearly always has its roots in foreign problems, the panel concludes that most reports are very technical and practical in nature and do not have a strong explicit international component. According to the panel, this is understandable because of the practical focus of the professional master and the universal nature of technical solutions. Most reports do use international references, work on an international case and/or try to find solutions for foreign organisations. In addition, the panel noted that some of the reports reflect on how the findings and solutions may be applicable in other cases. It recommends that the programme management stimulate this more actively by including an explicit evaluation of the relevance of solutions for other international organisations and of the

impact of local settings and cultures on the process and outcomes of project work in the report (see §3.3.1).

With regard to learning outcome 7, the panel found that the English language skills of students in the reports overall was fit to purpose. It concludes that the programme has adequate admission requirements for English language skills (§2.4.1). In addition, the international student group composition and the fact that all education is offered in English helps students to improve their English language skills further in the course of their studies at the ITC Faculty.

Graduate achievement is also reflected by the employment record of graduates. From the interview with alumni and the alumni survey, it became clear that the programme is well-connected to the international labour market. The vast majority of graduates (85%) indicate that the programme has helped them in their career. In addition, the majority of the students feels that the international approach and the international learning environment at the ITC Faculty broadened their understanding of cultural differences. As a consequence, they feel more comfortable about contacting colleagues from other countries for advice.

Due to the overall level of the reports, the English language skills of students and the employability of graduates, the panel concludes that the intended international and intercultural learning outcomes of the programme are achieved upon graduation.

§3.3.3 International experience

The international experience gained by students is adequate and in line with the programme's internationalisation vision

The panel studied the possibilities for students in the professional master's programme to gain international experience. It established that the programme stimulates the development of international experience and international interaction in several ways. First, the international classroom, project work and the international student body and the ITC Hotel (see §2.8.2 and §2.8.7) guarantee that students develop their intercultural professional and communicative skills. Second, the programme includes a study excursion to companies and/or organizations in Europe (see §2.1), providing students with the opportunity to broaden their horizon and stimulating international and comparative thinking about specific concepts and cases. Third, the ITC Faculty organises an 'informal' curriculum, including an introduction to culture and educational practices in Netherlands and multicultural activities throughout the entire stay of students in the Netherlands.

The panel would like to note that for most students staying at the ITC Faculty is in itself an enriching international experience, since the programme solely attracts students from abroad. In this respect, the student body at the ITC Faculty is different from the student body at regular Dutch educational institutions with ambitions in internationalisation.

The panel concludes that the programme adequately teaches students to take an international comparative focus, and facilitates their development of intercultural professional and communicative skills. In contrast to these positive remarks, the panel also noted that contact between the international students and Dutch students is relatively limited because of ITC's primary focus on students from developing countries. Increasing contact with Dutch students is an opportunity for further improvement with regard to this criterion.

Considerations

Considerations with regard to the limited programme assessment

The committee established that the system of assessment and evaluation is sufficient. The Examination Board (EB) is aware of its responsibilities and has implemented adequate procedures and action points for assessment and control. The forms of examination are varied, match the didactic concept and have been tailored to the intended learning outcomes of the programme. The GP assessment process includes clear assessment instructions, multiple examiners and an extensive discussion about the final mark for the GP. Although the panel is in general satisfied with the system of assessment and evaluation, it encourages the programme management to continue to improve specific aspects of it. The EB needs to continue on its set course to check all assessments in the programme on a regular basis. Furthermore, the transparency of the GP assessment procedure has to be improved in more than one respect, and the assessment criteria in the GPAB protocol should be elaborated to better reflect the programme's objectives and intended learning outcomes.

After studying a sample of recent project reports, the panel found that graduates of the professional master's programme achieve the intended learning outcomes as specified under Standard 1. From the interviews with alumni and the alumni survey, it became clear that the programme is well-connected to the labour market.

Conclusion

Professional master's programme Geo-Information Science and Earth Observation: the committee assesses Standard 3 as **satisfactory.**

Considerations with regard to the assessment of internationalisation

The panel concludes that intercultural and international skills (learning outcomes 6 and 7) are not formally tested. It advises the programme to develop more detailed ideas on how to test international- and intercultural communicative and professional skills.

Professional master's programme Geo-Information Science and Earth Observation the committee assesses Criterion 2b (Student assessment) as **unsatisfactory.**

The panel established that the overall level of the GP reports is satisfactory and that graduates demonstrate sufficient English language skills. Most graduates are positive about their employability and feel that the international approach and the international learning environment at the ITC Faculty have broadened their understanding of cultural differences.

Professional master's programme Geo-Information Science and Earth Observation the committee assesses Criterion 2c (Graduate achievement) as **good.**

The panel established that the programme has formulated relevant international and intercultural learning outcomes. These learning outcomes are a clear reflection of the UT vision on internationalisation. At the moment, the international and intercultural learning outcomes of the programme are not assessed explicitly. This is a point for improvement. Nevertheless, the panel is convinced that graduates achieve all of the intended learning outcomes of the programme. The overall level of the GP reports is satisfactory.

Professional master's programme Geo-Information Science and Earth Observation the committee assesses Standard 2 (Learning outcomes) as **satisfactory.**

The panel concludes that the curriculum (formal and informal) and the learning environment at the ITC Faculty provide students with ample opportunities to gain international experience. Increasing contacts with Dutch students is an opportunity for further improvement with regard to this criterion.

The panel would like to note that staying at the ITC Faculty is in itself an enriching international experience for most students in the programme, since the programme solely attracts students from abroad. In this respect, the student body at the ITC Faculty is different from the student body at regular Dutch educational institutions with ambitions in internationalisation.

Professional master's programme Geo-Information Science and Earth Observation the committee assesses Criterion 5b (International experience) as **good.**

The panel concludes that the composition of the student group is very international. This matches the ITC's capacity-building mission. Students have ample opportunity to develop multicultural professional and communicative skills and international experience throughout the curriculum(formal and informal) and the international learning environment at the ITC Faculty. Important in this respect is the fact that many students come from abroad: for them, staying at the ITC Faculty is already an international experience in itself. While at the ITC Faculty, students can call upon many special facilities and services for administrative, financial, technical, social, cultural and personal support.

Professional master's programme Geo-Information Science and Earth Observation the committee assesses Standard 5 (Students) as **good.**

General conclusion

Conclusion with regard to the limited programme assessment

The panel assesses all three standards as 'satisfactory'. It endorses the mission of the ITC Faculty and concludes that the professional master's degree programme fills a capacity gap. Although the intended learning outcomes can be improved by including more general competences and by making the programme's level more explicit, they are well formulated, current and relevant and they meet international requirements with regard to content, level and orientation. According to the panel, the curriculum of the professional master's programme is coherent and enables students to achieve the intended learning outcomes. The professional profile of the programme needs further strengthening by introducing more emphasis on reflection, project management and entrepreneurship in the modules. The panel established that the ITC Faculty has very good educational facilities and services for international students. The admission criteria of the programme are adequate and the programme is demanding but feasible. Intake numbers are, however, a point of concern. The panel advises the programme management to develop a stronger marketing strategy for the programme and to consider more appealing formats for it. Although the Faculty needs to increase the number of staff with a UTQ, the staff of the programme are dedicated and skilled, and the panel is positive about the internal quality care of the programme. According to the panel the system of assessment and evaluation is sufficient, but it can be further improved. Both the quality of the project reports and the experiences of alumni show that the intended learning outcomes are achieved. According to the NVAO decision rules, the panel concludes that the overall quality of the professional master's degree programme is 'satisfactory'.

Conclusion

The committee assesses the *Professional master's programme Geo-Information Science and Earth Observation* as **satisfactory.**

Conclusion with regard to the assessment of internationalisation

The panel assesses Standards 1 and 2 as 'satisfactory'. The professional master's programme Geo-Information Science and Earth Observation has a clear vision on internationalisation. This vision is rooted in the long history of capacity-building of the ITC Faculty. The Faculty has only recently started to think about this vision in an explicit manner, however. Although the vision on internationalisation includes implicit verifiable objectives, they could be made clearer. The Faculty also needs to work on the development of clear procedures for the evaluation of its vision on internationalisation. The programme developed clear and relevant intended international and intercultural learning outcomes. Although the programme management needs to implement formal assessment of the intended international and intercultural learning outcomes, the panel is convinced that they are achieved by graduates. The panel assesses Standard 3, 4 and 5 as 'good'. It is very impressed by the overall international learning environment at the ITC Faculty. According to the panel, this learning environment is an international example for other institutions. The positive findings of the panel apply especially to the international student group composition, the benefits of the 'international classroom', the competences and international experience of the staff, ITC's worldwide network of contacts, and the available services, facilities and guidance for international students. Although Standards 1 and 2 leave room for improvement, it therefore deems the overall quality of internationalisation to be 'good'.

The panel issues a favourable opinion about awarding the NVAO distinctive quality feature Internationalisation to the academic degree programme Geo-Information Science and Earth Observation.

Conclusion
The committee assesses the *Professional master's programme Geo-Information Science and Earth Observation* as **good.**

Appendices

Appendix 1: Curricula vitae of the members of the assessment committee

Gerrit van Straten (chair) is emeritus professor of Measurements, Systems and Control at Wageningen University and part-time technical-scientific consultant via his firm AgrodynamicsSupport. He received his master's degree in Chemical Engineering from Eindhoven Technical University in 1970, and started his professional career at The University of Twente, where he worked in the Sanitary Engineering Group within the Department of Chemical Technology. In 1975 he joined the new Water Quality Management unit, and in 1978 he was invited to the International Institute for Applied Systems Analysis (IIASA), in Laxenburg, Austria. After his return to the Netherlands in 1980, Van Straten was appointed senior lecturer, and later became the leader of the successful group on Environmental Systems Engineering. He received his PhD degree from The University of Twente in 1986 and was appointed full professor at Wageningen University in 1990. He has supervised many PhD students and is the author and editor of several books and proceedings and numerous research papers. Furthermore, he has played a major role in the organisation of regular educational activities as well as of several PhD courses. He served seven years as Editor-in-Chief of *Computers and Electronics in Agriculture* (COMPAG) and was Associate Editor of *Control Engineering Practice* (CEP). He served as Chair of the Measurement and Control Section of the Royal Dutch Institute of Engineers, was a member of the Advisory Board of the Dutch Foundation for Technological Research (STW), and acted as chair (2003-2008) of the IFAC Technical Committee on Control in Agriculture. In 2000, he received the Outstanding Contribution Award of IFAC-CC Life Support Systems.

Prof. I. (Ian) Dowman is emeritus professor of Photogrammetry and Remote Sensing at University College London (UCL). He has a long career in research and teaching on Photogrammetry. After obtaining his PhD at UCL in 1981, his research has mainly been concerned with developing methods with which data obtained from satellites can be used for the compilation of topographic databases. He has given numerous international lectures on this topic, received many grants for his research, and published widely about it in refereed journals. He has also taught and coordinated the successful and internationally recognised MSc course in Remote Sensing and many other courses at UCL, and been involved in short courses in the UK, France, Germany, Chile, Malaysia and China. Between 1997 and 1999, he was Dean of Engineering at UCL. Along with his work as a researcher and lecturer, Dowman was and still is very active in a wide variety of international committees and boards, such as the International Society for Photogrammetry and Remote Sensing (as President from 2004 – 2008), the Committee on Earth Observation Satellites (CEOS) subgroup on Terrain Mapping, and the Scientific Committee of the Organisation European d'Etudes Photogrammetrique Experimentale (OEEPE, now EuroSDR). Finally, he is actively involved in the surveying profession within UK. He was, for example, a member of the Land Surveyors Divisional Council of the Royal Institution of Chartered Surveyors (RICS) for 14 years.

Prof. A. (Alexis) Comber is professor of Geographical Information Science at the University of Leicester. He obtained his PhD in 1997-1998 at the Macaulay Land Use Research Institute and the University of Aberdeen, and is currently the Departmental Programme Director of Taught Post-Graduate Studies, and the Course Director for the MSc in GIS and the MSc in Environmental Informatics at the University of Leister. He undertakes teaching at both undergraduate and postgraduate levels. His research interests focus on Spatial Analysis and Geo-computation, analysis of uncertainty in geographic information and application areas. He has published extensively on these topics in 80 peer-reviewed articles, 39 peer-reviewed conference proceedings, 14 book chapters, 32 conference publications and 7 project reports. He has received several awards and fellowships in Japan. Finally, he is

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M. (Marija) Krūminaitė, BSc, obtained her bachelor's degree in Measurement Engineering from Vilnius Gediminas Technical University (Lithuania) in 2011 and is now a student of the master's programme Geomatics at Delft University of Technology. She has worked for Geovalda, Ltd., Plunge (Lithuania, 2008-2009), Fugro Baltic, Ltd., Vilnius (Lithuania, 2010-2011), and Fugro Weinhold Engineering GmbH (Germany, 2011-2012). Furthermore, she participated in a synthesis project in collaboration with Wuhan University, China.

Appendix 2: Domain-specific reference framework

Domain Specific Reference Framework and the Learning Outcomes of the programmes

1. General

The academic field Geo-information Science and Earth Observation (in short: GI-Science) aims to understand the system Earth from a geographic and spatial perspective. It focuses on advancing the knowledge about geophysical and social processes at the Earth surface. Processes are considered that can be observed by remote-sensing methods and that can, in principle, be spatially implemented with deterministic, spatial models. The scope of GI-Science processes is wide, but these processes have four aspects in common: they are of social relevance, they are scientifically interesting, they can only be fully understood in a multi-disciplinary context and they have a spatial extension. Spatial data quality plays a prominent role. Applications pivot around users who request and share geo-information through a portal that essentially includes an Earth process, skillful geo-information processing, and is related to questions and expectations of current and future users.

The applications presently supported at the ITC Faculty are natural hazards, food and water security, health, safety, effects of demographic changes and urbanization, and decision support systems. Most processes have both a natural component and a component induced by human activities and all processes have their own scales in space and time. They all have causes and driving forces, and in a number of cases they have actors that affect them, as well as those whom they affect. The basic approach is, first, to describe how the processes act; second, to explain how the data are generated; third, to elucidate how these data can be observed with sensors on a remote platform; fourth, to describe how the data can be stored in a geographical information system (GIS); fifth, to describe how models can constructed using these data; and sixth to show how to communicate information and results to users. These six steps to analyze the *system Earth* can be applied to different subsystems. Some of these subsystems are specializations within the ITC domain and are explored in its educational program.

Earth observation

Understanding the natural and socio-economic processes involves observation, exploration, measurement and modeling. This requires spatial and temporal measurements of the physical, chemical, biological and geometrical quantities describing the process. Earth observation by means of remote sensing (RS) is applied and developed in various domains in Earth observation from airborne or space-borne platforms. Earth observation not only relies on RS, but also on sensors that allow us to make *in situ* observations. Using geospatial data, acquisition data from the sensor are obtained that are adequately processed, interpreted and validated. Processing, interpreting and validating require knowledge of the sensing process and yield data that are readily suited for analysis, e.g. in a GIS. Typical products derived from geospatial data include orthophoto maps, "satellite image maps", topographic maps, thematic maps (e.g. land use maps) and land use change statistics.

Geodata processing

Once data have been collected, their processing becomes essential. Geodata processing addresses the research principles upon which GISs are based. Typical geo-related problems to be resolved range from those asking for specific information, through those that result in

specific insight, those that result in general knowledge, to those that require reasoning outside the GI-Sciences domain, e.g. economics and politics.

Modeling

To find answers to these sorts of problems, GI-science simplifies the real world with a model as a simplified representation, description or simulation of a complex reality. One objective of GI-science modeling is to contribute to the solution of geo-related problems and prepare for or support decision-making. For successful modeling in a spatial context, constraints have to be met with respect to data, organization of the process, an (Internet) working environment, functionality to run models and execute spatial analysis is required and dissemination of the results, often including visualization. These elements comprise the data and software part of a GIS.

Integration

To use data collected by Earth observation, data have to be organized such that they can be accessed, queried and integrated. Such data often have to be combined with data obtained by surveying or sampling, and different sensors may have been used. Integration of data is critical before adequate use of data can be made, while the type of user is also important, thereby imposing requirements on integration.

The user

The user of a GIS, within a specific organization, defines the context and rules for capturing, processing and sharing Geoinformation. She/he also defines the role that a GIS plays in the organization as a whole. The user poses both the questions that can be answered in a GI-Science context and interpretation and use of the outcomes. Users and processes have a range of similar characteristics. First, all processes occur on the Earth's surface. Second, the results of those processes, i.e. the spatial patterns, can be observed with sensors described above. Third, the processes differ in their spatial support and dynamics; i.e. all can be investigated at various levels of accuracy, and are preferably monitored by judicious selection of the time step. Finally, most processes involve both a physical component and a social component.

2. Trends and developments

The scientific field showed fast professional and technological developments, confronting us with new problems and opportunities. Several stages of development can be identified:

1. At an early stage the focus was on field survey supported by the use of aerial photography.
2. From the early seventies onwards new remote sensing techniques became available for civil use widening the scope for mapping and environmental monitoring. These new techniques gained a prominent role for spatial data acquisition.
3. In the nineteen eighties, GIS-tools became available and these quickly changed the scene for the processing, analysis and presentation of spatial data. In particular, it became easier to combine and analyze RS data in combination with GIS data and vice versa. This coincided with quantitatively dealing with spatial variation through geo-statistics.
4. In the nineteen nineties the developments in the information and communication technology provided the conditions for GIS technology to evolve into a fully grown independent discipline under the name GI-Science with close connections to computer science, with its roots in the old surveying and mapping disciplines and with wide perspectives for a range of important and timely applications.

5. In the early years of the 21st century the scientific field showed a much more specific consideration for earth processes, scenario studies, while geo-information infrastructures were developed at the corporate level, as well as at local, national and international levels. Moreover, the GI-Science user community is widening to include a greater variety of development agents from public, private and civil society.

6. During the last decade, GI-Science has shifted from typical stand-alone applications to an Internet-based, networked environment. Data, and even certain functions, are offered as on-line geo-services that are part of a wider spatial data infrastructure (SDI). The motto is "collect once---use many times". Organizations within an SDI can be spread widely over several locations. With the development of the Internet, therefore, the functional components of GISs have gradually become available as web-based applications. Much of the functionality is provided by geo-web services, i.e. software programs that act as an intermediate between geographic data(bases) and users on the Web.

7. We are presently witnessing a substantial increase in the amount and types of geo-information that are available to the general public. This development enables new, often location based, applications of geo-information and process based modeling. Already some years ago the general public started contributing its knowledge to databases of volunteered geographical information (VGI), such as OpenStreetMap. More recently governmental organizations stimulate this process by making their geo-information available as open data. The continuing ICT developments nowadays allow the browsing of all web resources (big data) to extract location specific information.

3. Expected qualifications of graduates in Geo-Information Science and Earth Observation

General

For reasons that include efficiency and legislation, many organizations work in a cooperative setting in which geographic information is obtained from, and provided to, partner organizations and the general public. The sharing of spatial data among the various GISs in these organizations is of key importance and aspects of data dissemination, security, copyright and pricing require special attention.

The geo-information community consists increasingly of highly educated professionals. These professionals can be divided into three major categories:

1. Experts in the field of spatial information handling (or specialists in certain aspects of this field),
2. Users of geo-information from a variety of application domains,
3. Decision makers and policy makers, who are developing the required legislation and institutional arrangements.

The educational program aims to train professionals in all of these categories. These professionals should have a proper understanding of the context in which geo-information is produced and used and of the role that the three different types of professionals play in this field. During their education they must learn to understand the different contexts of spatial information production processes and experts from the mapping disciplines should acquire a good understanding of the concepts and tools of geo-information handling.

Master of Science programme

Domain-specific learning outcomes:

- Identify and understand principles, concepts, methods and techniques relevant for geo-information processing and earth observation.
- Analyze problems and cases from a (geo-)spatial perspective.
- Use and design models to simulate (or: study) processes in the system earth with a spatial component.
- Apply principles, concepts, methods and techniques in the context of system earth, the user and an application domain to solve scientific and practical problems.

Scientific learning outcomes:

- Independently design and carry out research in the domain according to acceptable scientific quality standards.
- Analyze issues in an academic manner and formulate judgments based on this.
- Analyze scientific and practical domain problems in a systematic manner and develop scientifically valid solutions for these problems in a societal context.
- Communicate both orally and in writing on findings of research work to specialists and non-specialists.
- Explore the temporal and social context of geo-information science and technology and be able to integrate these insights in his or her scientific work.

Learning outcomes related to internationalization:

- Operate professionally in a multi-cultural environment, and act adequately on cultural differences.
- Express him/herself adequately to colleagues of different nationalities.

General learning outcomes:

- Critically reflect on his/her own and other's work.
- Study in a manner that is largely self-directed and autonomous.

Professional Master programme

- Apply conceptual and operational knowledge to design, improve and manage processes to solve problems encountered in professional practice
- Apply appropriate methods for spatial data collection, verification and acquisition
- Use GI science and earth observation to generate, integrate, analyze and display spatial data
- Select and apply relevant and appropriate methods and models for data analysis and problem solving
- Work in multi-disciplinary teams to contribute to decision making.
- Operate professionally in a multi-cultural environment, and act adequately on cultural differences.
- Express him/herself adequately to colleagues of different nationalities.

4. Requirements of a Master program in Geo-Information Science and earth Observation

Application of GI-science domains cover a crucial and wide variety of fields, including land registration and administration, natural resources management, health, disaster mitigation, water resources management and food security. This implies that specializations (although within an interdisciplinary context) are required for *professionals to keep up-to-date with the latest developments in their field of expertise. Therefore, the ed*ucation of professionals and scientists in GI-science require a careful focus and design of educational programs on methodology and process applications. Not all requirements can be fulfilled by one single program, and thus a coherent family of education streams should facilitate the education of the members of the future GI-Science community. In particular, the rapid technological developments, as well as developments in demand for information, require close interaction between education and research.

A multi-disciplinary approach to problem solving for development purposes is required. Specific advanced modules will be devoted to this, where case studies and simulations are included to strengthen the practical nature of the courses. Fieldwork and statistically sound field data collection is a component to be carried out in areas that reflect problems clearly related to the different knowledge fields within the academic discipline. It aims to equip students to apply all theoretical aspects taught in the course and to give the courses their greatest relevance from the Earth science perspective.

Graduates of a PM course should be highly professionally oriented and should be able to apply the knowledge, methods and techniques. This should be shown in group projects or final individual assignments. Graduates of Master of Science courses should be prepared for future tasks in research and development. For that reason students should work independently on approved research topics.

Finally, study trips should be offered on a regular basis to offer insight into current practices as well as the opportunity to assess the impact and value of GIS and RS technology.

Appendix 3: Intended learning outcomes

MSc Degree Program

Up to the 2013-2015 cohort, the learning outcomes were described at three levels: MSc program learning outcomes, domain specific course learning outcomes and module learning outcomes. The learning outcomes of the cohorts 2011-2013 and 2012-2014 are described in below.

MSc program learning outcomes (up to cohort 2013-2015)

1. Analyse problems encountered in professional practice and develop appropriate methods for studying and/or solving these problems;
2. Apply appropriate methods for collecting, acquiring and verifying spatial data;
3. Use geo-information science and earth observation to generate, integrate, analyse and display spatial data;
4. Evaluate and apply relevant and appropriate methods and models for data analysis and problem solving;
5. Apply research skills to formulate and carry out an independent research project;
6. Communicate and defend findings of thesis work.

Understanding that education is a dynamic process of adjusting content and modality to changing developments in society, as of cohort 2014-2016, the current Learning Outcomes (LOs) were reviewed and described more specifically by categorizing them in domain, scientific, internationalization and general LOs. This new set of LOs was reviewed by an external and international panel of experts. They considered the new LOs sufficiently focused on research and academic skills. This revision is under further development and in a process of implementation. The revised intended learning outcomes are described below.

Revised MSc program learning outcomes

Domain/ Academic field

1. Identify and understand principles, concepts, methods and techniques relevant for Geo-Information processing and earth observation
2. Analyze problems and cases from a (geo-)spatial perspective
3. Use and design models to simulate (or: study) processes in the system earth with a spatial component
4. Apply principles, concepts, methods and techniques in the context of system earth, the user and an application domain to solve scientific and practical problems
5. Independently design and carry out research in the domain according to acceptable scientific quality standards

Scientific

6. Analyse issues in an academic manner and formulate judgments based on this
7. Analyse scientific and practical domain problems in a systematic manner and develop scientifically valid solutions for these problems in a societal context
8. Communicate both orally and in writing on findings of research work to specialists and non-specialists
9. Explore the temporal and social context of geo--information science and technology and be able to integrate these insights in his or her scientific work

Internationalization

10. Operate professionally in a multi-cultural environment, and act adequately on cultural differences
11. Express him/herself adequately to colleagues of different nationalities

General

12. Critically reflect on his/her own and other's work
13. Study in a manner that is largely self-directed and autonomous

Master Degree Program

Intended learning outcomes of the PM program

Knowledge and understanding of the domain at Master level – The graduate is able to:
- Apply appropriate methods for collecting, acquiring and verifying spatial data. - Use geo-information science and earth observation technology to generate, analyze and display spatial data.
Application in the professional context – The graduate is able to:
- Apply conceptual and operational knowledge to design and manage processes to solve problems encountered in professional practice. - Select and apply relevant and appropriate methods and models for data analysis and problem solving.
Social and ethical aspects – The graduate is able to:
- Work in multi-disciplinary teams to contribute to decision making.
International learning outcomes – The graduate is able to:
- Operate professionally in a multi-cultural environment, and act adequately on cultural differences. - Express himself/herself adequately to colleagues of different nationalities.

Appendix 4: Overview of the curricula

MSc Degree Program

Block 1: Core Modules Is the common core of all ITC MSc (and Master) courses. It teaches the basic principles of Remote Sensing and GIS for studying processes in the system earth and its users within a systems-based approach. It is also used for remedial teaching for students with less background in the domain. (module 1-3: 15 EC)

Block 2: Course domain modules Is specific for the different courses within ITC MSc program (AES, GFM, LA, NRM, UPM, WREM). In this block the basic principles of the domain and application of GIS and RS are taught and deepened. Students need to select an MSc thesis topic and write an MSc pre-proposal. AMSc fair is organized to support this, whereas an MSc day was discontinued in 2012. (module 4-10: 35 EC)

Block 3: Research profile /orientation Prepares students for their MSc research by offering learning opportunities on research skills (module 11), advanced topics on specific research methods and tools which the student has to make a choice of (12 and 13), and research themes in which the students work on their final thesis proposal and study state-of-the-art knowledge and research in these themes (14 and 15). (module 11-15: 25 EC)

Block 4: Individual MSc Research The students work individually on their MSc thesis. It is required to have an approved MSc research proposal before entering this block. Formal assessment takes place during proposal defense and the thesis defense and during the thesis writing process the opportunity is given to conduct a mid-term presentation (module 16-23: 40 EC).

The block structure

Block 1 - Core Modules			
P13-EDU-111	GI Science and Earth Observation: a systems-based approach	15.0 EC	
	• GIS, data quality and spatial analyses	5.0 EC	Core module
	• Earth Observation	5.0 EC	Core module
	• Data integration, use and users	5.0 EC	Core module
Block 2 – Domain modules Six domains, see below			
Block 3 – Research Profile			
P14-EDU-103	Research Skills	5.0 EC	Research course
P14-EDU-101	Advanced topic 1 (module 12, see below)	5.0 EC	Advanced course
P14-EDU-102	Advanced topic 2 (module 13, see below)	5.0 EC	Advanced course
P14-EDU-104	Research theme project	5.0 EC	Research course
	MSc Qualifier	5.0 EC	Research course
Block 4 – Research Theme Project Research Theme project, see below			
P14-EDU-105	MSc Research and Thesis writing	40.0 EC	Research

Domain modules in six Domains

Block 2 – Domain modules Applied Earth Sciences Streams: Earth Resources Exploration, Natural Hazards and Disaster Risk Management			
M13-AES-101	Image interpretation and quantitative analysis for earth sciences studies	5.0 EC	Domain course
M14-AES-100/106	Geological systems Advanced analysis and quantitative remote sensing	5.0 EC	Domain course
M14-AES-101/112	Geophysical and geochemical exploration techniques Empirical modeling of hazard processes	5.0 EC	Domain course
M14-AES-102/108	Spectral Geology I Process modeling of natural hazards	5.0 EC	Domain course
M14-AES-103/113	Spectral Geology II Risk Assessment	5.0 EC	Domain course
M14-AES-104/110	Geological data integration Impact assessment in a changing world: the role of geo-information	5.0 EC	Domain course
M14-AES-105/111	Geological Exploration Project Vulnerability in a changing world: reflection on natural hazards, risk and engineering	5.0 EC	Domain course

Block 2 – Domain modules Geo-Informatics			
M13-GFM-129	Databases, mathematics and programming	5.0 EC	Domain course
M14-GFM-100	Principles of spatial data quality	5.0 EC	Domain course
U14-GFM-112	Programming skills	0.0 EC	Domain course
M14-GFM-101	Base data acquisition	5.0 EC	Domain course
M14-GFM-102	Spatial data modeling and processing	5.0 EC	Domain course
M14-GFM-103	Geo-visualization	5.0 EC	Domain course
M14-GFM-104	Image processing	5.0 EC	Domain course
M14-GFM-105	Web technology for GIS and mapping and programming	5.0 EC	Domain course

Block 2 – Domain modules Land Administration			
M13-LA-113	Database and geo-information modeling for land administration	5.0 EC	Domain course
M14-LA-100	Land information systems	5.0 EC	Domain course
M14-LA-101	Data handling technologies	5.0 EC	Domain course
M14-LA-102	Principles of land administration	5.0 EC	Domain course
M14-LA-103	Land policy and land management	5.0 EC	Domain course
M14-LA-104	Business administration and organizational development	5.0 EC	Domain course
M14-LA-105	Land information infrastructure	5.0 EC	Domain course

Block 2 – Domain modules Natural Resources Management			
M13-NRM-117	Introduction to natural resources management	5.0 EC	Domain course
M14-NRM-100	Systems analysis for natural resources management	5.0 EC	Domain course
M14-NRM-101	Geo-information for natural resources management	5.0 EC	Domain course
M14-NRM-102	Mapping of natural resources	5.0 EC	Domain course
M14-NRM-103	Monitoring of natural resources	5.0 EC	Domain course
M14-NRM-104	Causes and impacts of changing resources	5.0 EC	Domain course
M14-NRM-105	Societal response and reflection in natural resources management	5.0 EC	Domain course

Block 2 – Domain modules Urban Planning and Management			
M13-UPM-100	Introduction to urban planning and management	5.0 EC	Domain course
U14-UPM-103	Urban planning and management I – analyzing and monitoring urban dynamics	15.0 EC	Domain course
U14-UPM-104	Urban planning and management II – developing spatial interventions in urban planning and management	15.0 EC	Domain course

Block 2 – Domain modules Water Resources and Environmental Management Streams: Ground water assessment and modeling, Environmental hydrology, Surface hydrology			
M13-WREM-107	Hydrological data handling using GEONETCAST, IDL and programming	5.0 EC	Domain course
U14-WREM-103	EO and quantification of water cycle components - A	10.0 EC	Domain course
U14-WREM-104	EO and quantification of water cycle components - B	10.0 EC	Domain course
U14-WREM-105/106/107	Applied groundwater modeling with emphasis on data integration	10.0 EC	Domain course
	Environmental hydrology for water security		
	Integrated EO and modeling for water resources management with emphasis on surface hydrology		

Elective courses (Advanced topic 1, module 12)

Block 3 – Advanced courses (Elective courses) Module 12			
M14-EOS-100	Laser scanning	5.0 EC	Advanced course
M14-EOS-101	Geo-statistics	5.0 EC	Advanced course
M14-ESA-100	Modeling natural resources degradation	5.0 EC	Advanced course
M14-ESA-101	Spatial data for disaster risk management	5.0 EC	Advanced course
M14-ESA-102	Applied geochemical and environmental monitoring	5.0 EC	Advanced course
M14-ESA-103	Geophysics and 3D geo-visualization of the subsurface	5.0 EC	Advanced course
M14-GIP-100	Geo-visual analytics	5.0 EC	Advanced course
M14-NRS-100	Assessment of the effect of climate change on agro-ecological systems using optical and SAR remote sensing and GIS	5.0 EC	Advanced course
M14-NRS-101	Species distribution modeling (SDM) and climate change impact	5.0 EC	Advanced course
M14-NRS-102	RS/GIS analysis methods to support food and water security studies	5.0 EC	Advanced course
M14-PGM-100	Participatory mapping and GIS	5.0 EC	Advanced course
M14-PGM-101	Analysis of intra-urban, socio-spatial patterns	5.0 EC	Advanced course
M14-PGM-102	Advanced urban land use change and modeling	5.0 EC	Advanced course
M14-PGM-104	Integrated assessment: applying principles of cost-benefit analysis and economics in spatial planning	5.0 EC	Advanced course
M14-WRS-100	HYDROSAT: observing the water cycle from space	5.0 EC	Advanced course
M14-GIP-103	Design and implementation of spatial databases	5.0 EC	Advanced course

Elective courses (Advanced topic 2, module 13)

Block 3 – Advanced courses (Elective courses Module 13			
M14-EOS-102	3D geo-information from imagery	5.0 EC	Advanced course
M14-EOS-103	Advanced image analysis	5.0 EC	Advanced course
M14-EOS-104	Advanced geo-statistics	5.0 EC	Advanced course
M14-ESA-105	Data analysis in earth, water and natural resources studies	5.0 EC	Advanced course
M14-GIP-101	Building infrastructures for geo-information sharing	5.0 EC	Advanced course
M14-GIP-102	Spatial-temporal analytics and modeling	5.0 EC	Advanced course
M14-NRS-103	Strategic environmental assessment and environmental impact assessment applying spatial decision support tools	5.0 EC	Advanced course
M14-NRS-104	Spatial-temporal models for food and water security studies	5.0 EC	Advanced course
M14-PGM-105	Land governance	5.0 EC	Advanced course
M14-PGM-106	Collaborative planning and decision support systems applied in decision rooms	5.0 EC	Advanced course
M14-PGM-107	Urban risks: planning for adaptation	5.0 EC	Advanced course
M14-PGM-108	Sensors, empowerment and accountability	5.0 EC	Advanced course
M14-WRS-101	Water, climate and cities	5.0 EC	Advanced course
M14-WRS-102	Satellite data for integrated water resources assessment and modeling	5.0 EC	Advanced course

Research Theme Projects

Block 3 – Research Theme projects Module 14			
U14-EOS-103	Model characterization and quality assessment	10.0 EC	Research course
U14-ESA-105	Research preparation 4D-earth	10.0 EC	Research course
U14-ESA-106	Regional geological interpretation	10.0 EC	Research course
U14-GIP-104	Geo-data and service provision in crisis situations: supporting UN peace keeping operations	10.0 EC	Research course
U14-NRS-103	Biomass estimation and carbon assessment for climate change research	10.0 EC	Research course
U14-NRS-104	Crop production modeling and monitoring	10.0 EC	Research course
U14-NRS-105	Change detection of vegetation types in Buurserzand area	10.0 EC	Research course
U14-NRS-106	Field data collection and mapping and modeling of rare species distributions	10.0 EC	Research course
U14-PGM-101	PLUS research methods and techniques	10.0 EC	Research course
U14-WRS-111	Research preparation for water cycle and climate studies	10.0 EC	Research course

Master Degree Program

Block 1 - Core Modules			
P13-EDU-111	GI Science and Earth Observation: a systems-based approach	15.0 EC	
	• GIS, data quality and spatial analyses	5.0 EC	Core module
	• Earth Observation	5.0 EC	Core module
	• Data integration, use and users	5.0 EC	Core module

Block 2 – Course Modules			
M13-GFM-129	Databases, mathematics and programming	5.0 EC	Course module
M14-GFM-106	Sensor orientation, DTM and ortho-photo production	5.0 EC	Course module
M14-GFM-107	Spatial data modeling	5.0 EC	Course module
M14-GFM-108	Base mapping from images	5.0 EC	Course module
M14-GFM-109	SDI engineering	5.0 EC	Course module
M140GFM-110	Process modeling, programming and dissemination	5.0 EC	Course module
U14-GFM-116	Dissemination and visualization of geospatial data	5.0 EC	Course module
U14-GFM-114	Programming for application building	2.0 EC	Course module
U14-GFM-115	Application building and programming	0.0 EC	Course module
U14-GFM-118	Application building	3.0 EC	Course module

Block 3 – Graduation Project			
M14-GFM-111	Advanced topics and Master skills	5.0 EC	Graduation project
U14-GFM-119	Graduation project	15.0 EC	Graduation project

Appendix 5: Overview Joint Education Programmes

Overview Joint Education Programmes

Courses offered at ITC	Courses offered as Joint or Distance Education	
DOMAIN NAME	**COURSE NAME**	**LOCATION / MODALITY**
All Domains	Geoinformation Science and Earth Observation	Single, Double Degree (f2f) Chang 'An University Xi'An, China (CAU)
Applied Earth Sciences (AES)	Spatial Planning and Risk Management	Double Degree (f2f) Gadjah Mada University Yogyakarta, Indonesia (UGM)
Geoinformatics (GFM)	Geoinformatics	Single Degree (f2f) Indian Institute for Remote Sensing Dehradun, India (IIRS)
Natural Resource Management (NRM)	GIS for Natural Resource Management	Double Degree (f2f) Kwame Nkrumah University Kumasi, Ghana (KNUST)
	Geo-Information Science and Earth Observation for Natural Resource Management	Double Degree (f2f) Beijing Normal University Beijing, China (BNU)
	Geo-Information Science and Earth Observation for Environmental Modeling and Natural Resource Management	Double Degree (DE) Lund University Lund, Sweden (iGEON)
	Geo-information Science and Earth Observation for Environmental Modeling and Management	Double Degree (f2f) Sweden, Poland, UK, Iceland (GEM)
Urban Planning and Management (UPM)	Development Planning and Infrastructure development	Double Degree (f2f) Technical University Bandung Bandung, Indonesia (ITB)
Land Administration (LA)		
Water Resources and Environmental Management (WREM)	Geo-Information Science and Earth Observation for Water Resources and Environmental Management	Double Degree (f2f) Capital Normal University Beijing, China (CNU)

f2f = face to face education.

Appendix 6: Description of the Joint Education Programmes

JEP 1

Partner: *Capital Normal University (CNU)*
Location: *Beijing, China*
ITC Department: *Water Resources Sciences*

Introduction
Capital Normal University (CNU) is one of the key universities under the guidance of the Ministry of Education in China, emphasizing teacher education and basic learning in both arts and sciences. CNU and ITC are starting their education cooperation with a pilot project to develop a double degree program in the field of water resources and environmental management. The pilot project can, when successful, be expanded to other fields in education, research or projects.

Structure and contents
Students enrolled in the MSc program at CNU can opt for the double degree program with ITC as part of their regular three-year study program in CNU.

Table G1: The structure of the three-year study program at Capital Normal University.

Subject	Period	Time (weeks)	Modules	Place	ECTS
Core modules	Sept-Nov	9	1-3	CNU	15
WREM modules	Dec-June	30	4-13	ITC	50
Research proposal	July-Aug	6	14,15	ITC	10
Research up to mid-term	Sept-Oct	9	16,17,18	ITC	15
Research up to defence	Nov-March	17	19-23	CNU	28

Out of the regular ITC program, the first three modules (the Core modules) are taken at CNU (making use of ITC materials), after which the students move to ITC. The taught modules of the domain as well as the advanced modules, research training and proposal development are followed in ITC. About halfway through the implementation of the thesis research phase, the students transfer back to CNU to complete their thesis and do their defense. The period of stay in ITC is approximately one year.

Quality assurance
The course objectives for the double degree option where CNU students follow the ITC MSc program are the same as for the regular ITC program. The internal quality assurance procedures for ITC and CNU both apply.

JEP 2

Partner: *Beijing Normal University (BNU)*
Location: *Beijing, China*
ITC Department: *Natural Resources Sciences*

Introduction
Capital Normal University (CNU) is one of the key universities under the guidance of the Ministry of Education in China, emphasizing teacher education and basic learning in both arts and sciences. CNU and ITC are starting their education cooperation with a pilot project to develop a double degree program in the field of water resources and environmental management. The pilot project can, when successful, be expanded to other fields in education, research or projects.

Structure and contents
Students enrolled in the MSc program at CNU can opt for the double degree program with ITC as part of their regular three-year study program in CNU.

Table G2: The structure of the three-year study program at Beijing Normal University.

Subject	Period	Time (weeks)	Modules	Place	ECTS
Core modules	Sept-Nov	9	1-3	BNU	15
NRM modules	Dec-June	30	4-13	ITC	50
Research proposal	July-Aug	6	14,15	ITC	10
Research up to mid-term	Sept-Oct	9	16,17,18	ITC	15
Research up to defence	Nov-March	17	19-23	BNU	28

Out of the regular ITC program, the first three modules (the Core modules) are taken at CNU (making use of ITC materials), after which the students move to ITC. The taught modules of the domain as well as the advanced modules, research training and proposal development are followed in ITC. About halfway through the implementation of the thesis research phase the students transfer back to CNU to complete their thesis and do their defense. The period of stay in ITC is approximately one year.

Quality assurance
The course objectives for the double degree option where CNU students follow the ITC MSc program are the same as for the regular ITC program. The internal quality assurance procedures for ITC and CNU both apply.

JEP 3

Partner: *Chang 'An University (CAU)*
Location: *Xi 'An, China*
ITC Department: *All*

Introduction
Chang 'An University is located in the city of Xi'an, Shaanxi Province. It has five campuses (Main, Yanta, Xiaozhai, Weishui and Taibai). It was approved by the State to be one of the universities funded by Project 211, a national program to promote Chinese higher education. The University puts great emphasis on international cooperation and exchanges, and has established cooperative ties with many universities and research institutes worldwide. The joint education program with ITC is hosted by the School of International Education. Initially the joint education program was developed for the Land Administration domain in ITC. After the internal evaluation in 2010 the program was opened up on request of the Chinese partner. Currently, students can chose all of the ITC domains for their study.

Structure and contents
During the first year of the joint course students will perform the course work part of their CAU course. This is the sole responsibility of CAU; ITC is not involved. CAU offers English language lessons to the students in parallel to the modules.

Table G3: The structure of the three-year study program at Chang 'An University.

	CAU course single CAU degree	Joint course double degree	Joint course single ITC degree	Part
	CAU MSc entrance exam	CAU MSc entrance exam		
Year 1	CAU coursework	CAU coursework		A
Year 2	CAU Project work	ITC course work	ITC course work	B
Year 3	CAU Thesis	ITC thesis	ITC thesis	
		CAU thesis		C

The next 18 months leading to an ITC MSc degree focus on the application of geo-information science and earth observation in different application fields (domains). Students study the first nine weeks of the 18 months of the ITC course at CAU. They are taught modules 1-3 on "Principles of geo-information science and earth observation" using ITC materials. During these three modules each student selects one of the ITC domains to continue the study in the Netherlands. The following taught modules of the course are followed in ITC. The students return to China to finish their thesis research about halfway through the thesis phase.

Quality assurance
The course objectives for the double degree option where CAU students follow the ITC MSc program are the same as for the regular ITC program. The internal quality assurance procedures for ITC apply.

JEP 4

Partner: *Indian Institute for Remote Sensing (IIRS)*
Location: *Dehradun, India*
ITC Department: *Geo-Information Processing, Earth Observation Systems*

Introduction
The Indian Institute of Remote Sensing (IIRS in Dehradun, India) has been a long-term partner of ITC for more than 50 years. ITC was involved in the founding of IIRS (in 1966) and its subsequent development towards a centre of expertise in the field of remote sensing and earth observation. Under this close cooperation, IIRS and ITC have worked together on the implementation of joint education programs since 2002. The agreement for implementing the joint education programs have recently been renewed (in 2012).

Structure and contents
The structure of the courses as it is run in IIRS to a great extent follow the same block and module structure as is the case in ITC. The period of study of the IIRS students that is spent in ITC is four modules (module 12 to 15) which represents 20 credits. This is being extended to a longer period of time starting with the next intake in September 2014.

Table G4: The structure of the 18-month study program at the Indian Institute for Remote Sensing.

Modules		Location	ECTS credits	Main respon sibility	Input partner; division of work
1 2 3	Block 1: core modules (1-3) (same as PGD)	IIRS	15	IIRS	ITC: course materials; approval of materials and assessment by ITC module coordinator Joint development of thesis topics by ITC and IIRS scientists. Students choose MSc topics and ITC advanced modules
4 5 6 7 8 9 10	Block 2: domain modules 4-10; differs per domain (same as PGD)		35		
11	Research skills	ITC	5	ITC	
12 13 14 15	Advanced topic Advanced topic Group project Thesis proposal		25		IIRS & ITC supervisors ITC: approval of thesis admission committee and chair
16 17 18 19 20 21 22 23	Thesis period ITC graduation	IIRS	35	IIRS	1st supervisor IIRS 2nd supervisor ITC ITC: approval of TAB (thesis assessment board); chair TAB

In terms of contents, the GFM stream can be considered a copy of the corresponding ITC program with minor differences in exercises and case studies. Modules are regularly updated to reflect changes that are made in ITC and the course mirrors its equivalent in Geo-Informatics in ITC

Quality assurance
The course objectives for the double degree program are similar to those of the ITC MSc Degree program although differences in phrasing may occur. The ITC study guide is taken as a model for the study guide of the joint education program. The internal quality assurance procedures for ITC apply.

JEP 5

Partner: *Gadjah Mada University (UGM)*
Location: *Yogyakarta, Indonesia*
ITC Department: *Earth Systems Analysis*

Introduction
Gadjah Mada University (UGM, Yogyakarta, Indonesia) and ITC have a long history of cooperation that goes back as far as the nineteen sixties. In a Dutch-Indonesian partnership ITC has established the Centre for Remote Sensing and Geographic Information Systems (PUSPIC) at the Faculty of Geography. A close working relationship has existed ever since. In 2005, UGM and ITC together started with the development of a joint curriculum for an MSc degree course on natural hazards, disaster management and spatial planning. After a trial round in 2005 the first official intake was registered in 2006. The first batch of students graduated in 2008.

Structure and contents
UGM and ITC together offer a joint course that leads to two degrees, the ITC Master of Science in Geo-Information Science and Earth Observation (with specialization in Geo-hazards) and the UGM degree entitled Magister in Geo-Information for Spatial Planning and Disaster Risk Management. The program carries a weight of 118 EC (which is equivalent to 41 SKS in the Indonesian credit system) of which 25% is studied in ITC and 75% is studied in UGM. The program is completed during a total period of 18 months (although a 120 EC Magister program in Indonesia normally has a duration of two years); A regular MSc program in Indonesian universities has a duration of two years.
Gadjah Mada University has gone through an institutional audit carried out by BAN-PT (the National Accreditation Board) on behalf of the Indonesian Ministry of Education and Culture. UGM has been accredited as "A" (the highest level on a five-point scale). An audit by BAN-PT of the Magister programs in UGM has resulted in the accreditation of the Environmental Sciences program at level "A". This accreditation is also valid for the double degree program. The program on Disaster Management is currently accredited at level "B".
A study guide, as well as individual module descriptions for the program, is available. The program is taught completely in English. The entry requirements for students have been jointly defined and include ITC's entry requirements. The content of the courses has been compared and it can be concluded that there is a sufficient amount of overlap, reaching at least 70%.

Quality Assurance
The course objectives for the double degree program are similar to those of the ITC MSc Degree program although differences in phrasing occur. The ITC study guide is taken as a model for the descriptions of the modules of the joint education program. The internal quality assurance procedures for ITC apply, in addition to those of UGM.

JEP 6

Partner: *Technical University Bandung (ITB)*
Location: *Bandung, Indonesia*
ITC Department: *Urban and Regional Planning and Geo-Information Management*

Introduction
The Technical University in Bandung, Indonesia (ITB) and ITC have a long history of cooperation that goes back to the nineteen seventies. ITC has been involved in the establishment of the Department of Geodetic Engineering and subsequently ITB and ITC have worked together regularly. Since 2007 ITC has been involved in a program of the School for Architecture, Planning and Policy Development (SAPPK), leading to a double degree. This program is entitled "Development planning and infrastructure development". Student intake fluctuates and ranges between 5 and 10.

Structure and contents
The program carries a weight of 118 EC (which is equivalent to 36 SKS in the Indonesian credit system) and has a total duration of two years. One year of course work is taken in the graduate program on Urban and Regional Planning in Bandung, and the second year is taken in the 18-month MSc Degree course in ITC, specializing in Urban Planning and Management. The subjects taken in the first year lead to exemption for the domain modules that are not followed in ITC. The structure of the second year (spent in ITC) is shown in the figure below.

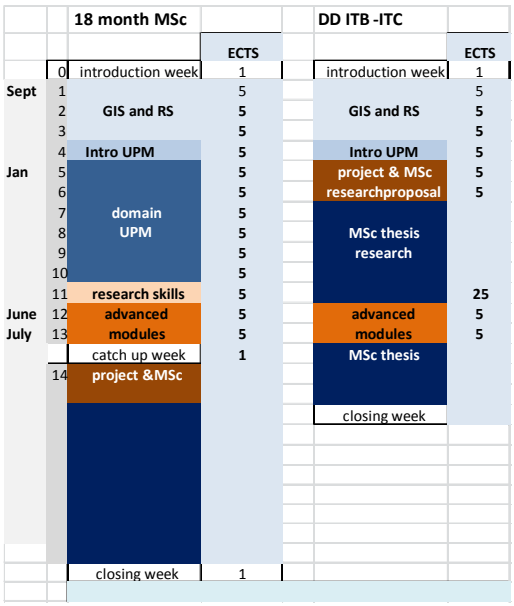

Figure G1: The 2nd year of the course program covering the second year as applied at the JEP in ITB, Bandung.

Quality Assurance
The course objectives for the double degree program are similar to those of the ITC MSc Degree program although differences in phrasing occur. The ITC study guide is taken as a model for the descriptions of the modules of the joint education program. The internal quality assurance procedures for ITC apply, in addition to those of ITB. The ITB degree is

accredited by the Indonesian Accreditation Board (BAN-PT) with an A status; the institutional accreditation of ITB has also led to an A-status.

JEP 7

Partner: *Kwame Nkrumah University of Science and Technology (KNUST)*
Location: *Kumasi, Ghana*
ITC Department: *Natural Resources Sciences*

Introduction
Kwame Nkrumah University of Science and Technology (Kumasi, Ghana) and ITC started working together in offering a joint Master of Science Degree program in 2005. The joint course is a replica of the course on Natural Resources Management that ITC offers in Enschede, with minor differences such as Ghanaian case studies.
KNUST is a regular partner in other activities as well and a very good working relation has been developed over the years.

Structure and contents
The Double Degree program remains very close to the NRM program in ITC in terms of content. The course coordinator KNUST has gradually started implementing the new Core, incorporating it module by module into the local curriculum. A study guide for the program is available. The ITC study guide is taken as a model for the descriptions of the modules of the joint education program. The program is taught completely in English. The entry requirements for students have been jointly defined and include ITC's entry requirements.
The contents of the courses have been compared and it can be concluded that there is a sufficient amount of overlap, reaching a level that is close to 100%. Modules 9 to 15 are followed in ITC and the thesis part is carried out under joint supervision and assessment. Modules 1 to 8 are followed in Ghana but are shaped according to the ITC-NRM study guide.

The Double Degree program with KNUST is almost an exact copy of the course that is running in ITC and it is the only one of its kind that ITC has on the African continent. It is closely related to relevant policy themes of environmental management and food security, although this needs to be made more visible as this will add to the attractiveness of the program.The course is well run and well organized and the quality (be it judged from a distance, based on an interview with the ITC coordinator) is considered good.

Quality Assurance
The course objectives for the double degree program are the same as those of the ITC MSc Degree program. The internal quality assurance procedures for ITC apply, in addition to those of KNUST itself. KNUST has all the appropriate quality assurance measures in place that are modeled after the British system.

JEP 8

Partner: *Lund University*
Location: *Lund, Sweden*
ITC Department: *Natural Resources Sciences*

Introduction
The university of Lund in Sweden and ITC have been working together for a long time in offering joint education programs. This started in the context of the EU-funded Erasmus Mundus program where MSc programs are offered by consortia of European universities. Besides this, the university of Lund and ITC have been active partners in several regional lots of the Erasmus Mundus program.
Together with Lund, ITC offers a Master of Science degree course entitled Geographic Information Science and Earth Observation for Environmental Modeling and Natural Resource Management (iGEON) that is largely based on distance education.

Structure and contents
The program covers a broad spectrum of topics in the field of natural resources and environmental management and in the development and application of state of the art GIS modeling in these fields. The program is flexible to allow students to develop a professional and academic profile based on personal interest. The total length of the program is 120 ECTS (2 years fulltime study), divided over a compulsory part of 55 ECTS (45 at the start of the course and 10 prior to starting on the individual research and thesis), an elective part of 35 ECTS completed by thesis work (30 ECTS). Students can opt for a full-time study program or for part-time study.

Table G5: The structure of the study program applied in the iGEON JEP with the University of Lund.

Programme component and sequence	Semester
Compulsory modules 45 ECTS	Semester 1 and half of semester 2
Electives 35 ECTS (of which 10 should be directly relevant for the thesis)	Semester 2 and half of semester 3
Compulsory 10 ECTS	Semester 3
Thesis 30 ECTS	Semester 4

The individual courses have a duration of three (5 ECTS) to ten (15 ECTS) weeks full-time study. The duration is proportionally longer for students who study part-time. Students that want to qualify for a UT-ITC degree must spend the compulsory portion (i.e. 25% of the curriculum) in ITC.

Quality Assurance
The quality assurance systems of the university of Lund and of ITC apply.

JEP 9

Partner:	*Lund University, University of Southampton, University of Warsaw, University of Reykjavik*
Location:	*Lund, Sweden; Southampton, Great Britain; Warsaw, Poland; Reykjavik, Iceland*
ITC Department:	*Natural Resources Sciences*

Introduction
An MSc course in Geo-information Science and Earth Observation for Environmental Modeling and Management (GEM) is taught by a consortium of five European universities, i.e. University of Twente/ITC, Lund University (Sweden), the University of Southampton (UK), the University of Iceland and the University of Warsaw (Poland). Sydney University (Australia) is an associate partner in the consortium. The course is developed as a double degree program in the context of the EU-funded Erasmus Mundus program.

Structure and contents
The course starts with a first – foundation - year (60 EC). Depending on their background and preference, students, begin their studies either in The Netherlands (UT, ITC Faculty) or in Sweden (Lund University). Those who follow the first year at UT-ITC follow the modules together with students in the domain of Natural Resources Management (NRM). Following this foundation year students can do their second year with any of the other partners, where each of the partners has its own focus in the study program.
Based on the above, there are eight possible streams that students can follow (two 1st year universities and 4 choices of 2nd year university). Five of these eight streams lead to a UT-ITC degree:
1st year in Lund, 2nd year at UT-ITC (1 stream)
1st year at UT-ITC , 2nd year at either Lund or Southampton or Iceland or Warsaw (4 streams).
A detailed comparison between the first-year course modules in Lund and in ITC shows that there is a large degree of equivalence in content.

Quality Assurance
The participating European universities each have their own rules and regulations that govern quality assurance procedures. An inventory of these procedures has been made, and this has shown that quality assurance in all partner universities is ensured in an appropriate manner.

Appendix 7: Quantitative data regarding the programmes

Data on intake, transfers and graduates

MSc Degree Program

Success rates for the period of 2007-2013, divided according to in-house students and students on the JEPs. Note that some JEPs extend over two academic years and that therefore 30 JEP students have not yet finished (see Annex H on the JEP program structure).

Cohort	Course modality	Students enrolled	Students dropped out	Number of students graduated after 18 months	Number of students graduated after extension	Overall efficiency	Graduated Cum Laude
2007	In-house	138	24	100	14	83%	17
	JEP	68	6	62	0	91%	4
2008	In-house	175	24	135	16	86%	9
	JEP	70	5	65	0	93%	3
2009	In-house	167	22	140	5	87%	9
	JEP	77	15	61	1	81%	1
2010	In-house	135	22	102	11	84%	10
	JEP	53	5	46	2	91%	1
2011	In-house	91	7	70	14	92%	5
	JEP	67	7	63	3	90%	1
2012	In-house	96	11	70	11	84%	6
	JEP	57	*Students in progress*				
2013	In-house	114					
	JEP	94					

Master Degree Program

Overall Efficiency 2007-2013 cohorts

Cohort	Students enrolled	Students dropped out	Number of students graduated after 12 months	Number of students graduated after extension	Overall efficiency	Graduated Cum Laude
2007	16	4	12	0	75%	2
2008	13	1	12	0	92%	1
2009	16	2	14	0	88%	1
2010	7	0	7	0	100%	0
2011	13	1	11	1	92%	0
2012	6	2	2	2	67%	0
2013	12	n.a.	n.a.	n.a.	n.a.	n.a.

Teacher-student ratio achieved

MSc Degree Program

Student-staff ratio (2012-2014 cohort at ITC)

	2012-2014
FTE staff involved in MSc teaching	18,14
Number of student years	96
Student-staff ratio (number of students per FTE)	5,3 : 1
Average on Dutch Universities 10:1 (Source OCW / DUO)	

For the calculation of FTE's the official ITC model for time allocation of teaching tasks is used.

Master Degree Program

Student-staff ratio (2012 and 2013 courses)

	2012	2013
FTE staff involved in teaching	1.42	1.92
Number of student years	6.0	12.0
Student-staff ratio (number of students per FTE)	4.2	6.25

For the calculation of FTE's the official ITC model for time allocation of teaching tasks is used.

Average amount of face-to-face instruction per stage of the study programme

MSc Degree Program

Overall efficiency in different phases of the program (2012-2014 cohort at ITC)

Phase	Block 1		Block 2		Block 3		Block 4	
Hours per module	Core		Domain modules		Advanced Topics		Research	
	A	P	A	P	A	P	A	P
Lectures (L)	26	18	28	19	15	10	0	0
Supervised practicals (SP)	32	22	27	19	9	6	0	0
Unsupervised practicals (UP)	14	10	9	6	0	0	0	0
Individual assignments (incl. graduation project) (IA)	0	0	18	13	36	25	142	99
Group assignment (workshops, project, fieldwork, excursions) (GA)	14	10	16	11	26	18	0	0
Self Study (S)	54	38	38	26	45	31	0	0
Overhead (Opening, QH, Exam) (O)	3	2	8	6	13	9	2	1
Average contact hours per week (L+SP)/3	19.3	40	18.3	38	8	17	0	0

A: Average number of hours per module
P: Percentage of hours
The MSc Degree Program has six domains

Master Degree Program

Contact hours in different phases of the program (2013 course)

Phase	**Block 1: Core modules 15 EC**		**Block 2: Domain modules 35 EC**		**Block 3: Graduation project 25 EC**	
Hours per module	**A**	**P**	**A**	**P**	**A**	**P**
Lectures (L)	26.7	18%	32.3	22%	6	4%
Supervised practicals (SP)	32	22%	26.6	19%	2.8	2%
Unsupervised practicals (UP)	15.3	11%	16.6	11%	2.8	2%
Group assignment (GA)	13.3	9%	4	3%	8.4	6%
Individual assignment (IA)	-	-	16.3	11%	100	69%
Self-study (S)	51.7	36%	44.3	31%	23.8	17%
Other (O)	5	4%	4	3%	0.2	0%
Average contact hours per week ((L+SP)/3)	19.6	41%	19.6	41%	2.9	6%

A: Average number of hours per module
P: Percentage of hours
The Master Degree Programme has one domain

Appendix 8: Programme of the site visit

Day 1

12.00 – 12.30	Arrival and short introduction (behind closed doors)	
12.30 – 16.00	Preparatory meeting panel, including lunch 12.30 – 13.15 introduction to assessment frameworks 13.15 – 13.45 preliminary findings critical reflection(s) 13.45 – 14.15 preliminary findings theses 14.15 – 14.45 preliminary findings internationalisation components and JEPs 14.45 – 15.30 studying documentation 15.30 – 16.00 planning the meetings of day 1	
16.00 – 17.00	Meeting with management	• Prof. Dr.ir Tom Veldkamp, Dean of the Faculty • Prof. Dr.ir. Alfred Stein, Portfolio Holder Education, Faculty Management Team • Prof. Dr. Ed Brinksma, Rector Magnificus, University of Twente • Ms. Erna Leurink, Managing Director • Ir. Fred Paats, Education Manager
17.00 – 17.15	Break	
17.15 – 18.00	Meeting with students academic master's programme	<u>Course 2013-2015:</u> • Ms. Khitam Jazi Howash Al Maaitah, GFM (Jordan) • Mr. Jorge Eduardo Morales Maldonado, LA (Guatemala) • Ms. Tingting Wei, UPM (China) • Ms. Nyasha Yvonne Mwendera, NRM (Zimbabwe) <u>Course 2014-2016:</u> • Ms. Johanna Erika Serrano Valdueza, AES (Philippines) • Mr. Kwabena Kingsley Kumah, WREM (Ghana)
18.00 – 18.30	Collecting preliminary findings and preparing the first meeting of day 2	

19.00 – 21.00	Dinner

Day 2

09.00 – 09.30	Programme: set up and explanation video conferencing	
09.30– 10.30	Meeting with students and alumni Professional Master	<u>Alumni Master 2013-2014 via Skype</u> • Kunal Sood (India) • Sujata Budhathoki (Nepal) • Stefano Bartolini (Italy) <u>Master Students 2014-2015</u> • Mr. Carl Sena Afenu (Ghana) • Mr. Matthew James Bruno (USA) • Ms. Esther Namuwaya (Uganda)
10.30 – 10.45	Break	
10.45 – 11.00	Preparing meeting with staff about the master degree programme	
11.00 – 11.45	Meeting with staff about Master programme	• Dr. Corné van Elzakker, Assistant Professor, GIP • Dr. ing. Markus Gerke, Assistant Professor, EOS • Dr. Kourosh Khoshelham, Assistant Professor, EOS • Mr. Ton Mank, Skills trainer, GIP • Dr. ir. Sander Oude Elberink, Assistant Professor, EOS • Dr. Alexei Voinov, Associate Professor, GIP, and coordinator of the PM programme
11.45 – 12.00	Collecting preliminary findings master degree programme	
12.00 – 12.15	Preparing meeting with staff about the academic master's programme	
12.15 – 13.00	Lunch	
13.00 – 13.45	Meeting with staff about academic master's programme	• Dr. Rohan Bennett, Assistant Professor, PGM • Dr. Chris Hecker, Lecturer, ESA • Drs. Henk Kloosterman, Lecturer, NRS • Dr. Chris Mannaerts, Associate Professor, WRS • Prof. Dr. ir. George Vosselman, EOS • Dr. Raul Zurita Milla, Assistant Professor, GIP
13.45 – 14.15	Collecting preliminary findings academic master's programme	
14.15 – 14.45	Tour through the building (including internationalisation facilities)	• Dr. Corné van Elzakker, Assistant Professor, GIP

		• Drs. Marga Koelen, Head Library and information services (B&A) • Ms. Monika Kuffer, MSc, Lecturer, PGM • Ms. Ellen Rijckenberg, Faculty Bureau
14.45 – 15.15	Preparing next meetings day 2	
15.15 – 15.45	Meeting with staff responsible for international activities	• Ms. Thereza van den Boogaard, Student Affairs Officer, BOOZ • Prof. Dr. Menno-Jan Kraak, Coordinator, joint education programme Chang'An University, China • Drs. Tom Loran, Central Course Director and coordinator joint education programmes • Ms. Jacqueline Mol, Course Secretary , BOOZ
15.45 – 16.15	Collecting preliminary findings assessment internationalisation (content and support)	
16.15 – 16.45	Consultation hour / studying documentation	
16.45 – 17.30	Meeting with Programme Committee Education	• Ms. M. Bakecura, MSc NRM • Dr. Ir. Wietske Bijker, Assistant Professor, EOS • Drs. Emile Dopheide, Lecturer, PGM • Mr. Efstratios Krarantelis, MSc AES • Prof. Dr. Menno-Jan Kraak, GIP, chairman
17.30 – 18.00	Meeting with alumni academic master's programme	• Mr. Berhanu Kefale Alemie, 2005 (Ethiopia) • Ms. Adish Khezri, 2007 (Iran) • Mr. Elias Nyandwi, 2008 (Rwanda) • Ms. Lydia Prieto Leon, 2007 (Colombia) • Mr. Dimo Todorovski, 2006 (Macedonia) • Ms. Nobuhe Majozi, 2011 (South Africa)
18.00 – 18.30	Collecting preliminary findings and preparing the first two meetings of day 3	
19.00 – 21.00	Dinner	

Day 3

08.30 – 09.00	Programme: set up and explanation video conferencing	
09.00 – 09.45	Meeting with representatives of international partner institutions - Universitas Gadjah Mada, Yogyakarta, Indonesia (videoconferencing)	• Prof. Dr. Sudibyakto • Dr. Dyah Hizbaron (staf) • Febri Syahri (student) • Andika Candra Ariyanto (student)
09.45 – 10.30	Meeting with Examination Board	• Prof. Mr. Dr. Jaap Zevenbergen, PGM, and chairman • Dr. Yousif Hussin, Associate Professor,

		NRS department • Dr. ir. Rob Lemmens, Assistant Professor, GIP department • Dr. ing. Tom Rientjes, Assistant Professor WRS department
10.30 – 10.45	Break	
10.45 – 11.45	Meeting panel behind closed doors: collecting findings and conclusions prof. Comber* and preparing meeting management	
11.45 – 12.30	Concluding meeting with management (feedback most important findings panel)	• Prof. Dr.ir Tom Veldkamp, Dean of the Faculty • Prof. Dr.ir. Alfred Stein, Portfolio Holder Education, Faculty Management Team • Ms. Erna Leurink, Managing Director • Ir. Fred Paats, Education Manager, Faculty bureau • Drs. Tom Loran, Central Course Director, Faculty Bureau
12.30 – 16.30	Meeting panel behind closed doors, lunch and one hour for each assessment	
16.30	Oral presentation by committee	

* Prof. Comber leaves at 12:45 pm.

Abbreviations:

ESA : Department of Earth Systems Analysis
B&A : Library and archiving/UT
BOOZ : Bureau Education and Research Affairs
EOS : Department of Earth Observation Science
GIP : Department of Geo-information Processing
NRS : Department of Natural Resources
PGM : Department of Urban and Regional Planning and Geo-information Management
WRS : Department of Water Resources

Appendix 9: Theses and documents studied by the committee

Prior to the site visit, the committee studied the theses and GP reports of the students with the following student numbers:

*MSc Degree Program (Theses) **

29740	*31860*
29189	*29441*
28457	*25711*
29793	*29179*
25983	*30832*
28596	*29931*
29125	*31171*
29180	*30812*
31985	*30330*

* The selection includes theses from students in a Joint Education Programme.

Master Degree Program (Graduation Project Reports)

18990	28963
23500	26209
16915	29218
9660	28337
16984	9401
22462	26238
24768	31249
28598	

During the site visit, the committee studied, among other things, the following documents (partly as hard copies, partly via the institute's electronic learning environment):

- UT vision on internationalization 2010-2014
- UT vision on internationalization 2020 (summary)
- Institutional audit education UT 2013
- Strategic plan ITC 2010-2014
- Corporate brochure "Space for global development" , ITC Faculty
- Education brochure ITC Faculty: degree and diploma courses 2015-2016
- ITC research brochure 2014
- Vision on education of the ITC Faculty, 2014
- Vision on internationalization of the ITC Faculty, 2014
- Management structure and organigram of the ITC Faculty, including management of education, 2012
- Internal quality assurance of education of the ITC Faculty, 2014
- Study guides MSc 2011-2013 and 2012-2014
- Study guides Professional Master 2012-2013 and 2013- 2014

- Set-up of the core modules of the MSc and Professional Master programmes at ITC, including external evaluation report 2013
- Assessment policy ITC Faculty, 2013, including testplan MSc (2013-2015) and Professional Master (2013-2014)
- Assessment regulations MSc and Master, 2013 and 2014
- Learning outcomes of MSc and Professional Master programmes, 2013
- Didactic concepts applied in the ITC Faculty, 2013
- Research concepts and skills: the UT/ITC thesis process, 2013
- Working guidelines joint education programmes, 2013-2014
- Admission procedures for students 2014
- Alumni survey 2014
- International teaching experience and CV's of ITC staff 2008-2014
- Study excursions MSc and Master programmes 2013-2014
- MSc theses (20) including assessment forms 2011-2013 and 2012-2014
- Graduation project (20) reports of Professional Master including assessment forms 2012-2013 and 2013-2014
- Instructions of Examination Board for thesis assessment and assessment of graduation projects 2012, 2013 and 2014
- Minutes of the Examination Board and the Programme Committee Education
- Access to the central archive of information on education of ITC within the MSc and PM programme and on JEP-education on the P:/drive of ITC, including information on:
  - Course structure
  - Module documents
  - Student related information such as enrolment in MSc and Professional Master programmes, alumni, and admission procedures
  - Staff related information including international teaching experience, UTQ and English language ability
  - JEP business plans, agreements and implementation plans.
  - Listing of expertise of JEP staff abroad.
  - Description of local accreditation procedures of JEP-partner institutions and accreditation reports by local accreditation organizations.
  - Documents on Quality Assurance of the JEP-partner institutions
  - Reports on evaluations of the education at JEP partners (if available)
- Access to Blackboard
  - Detailed information on all programmes (including JEPs)