MASTER'S PROGRAMME

GEOGRAPHICAL INFORMATION MANAGEMENT AND APPLICATIONS

FACULTY OF GEOSCIENCES

UTRECHT UNIVERSITY

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CONTENTS

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REPORT ON THE MASTER'S PROGRAMME GEOGRAPHICAL INFORMATION MANAGEMENT AND APPLICATIONS OF UTRECHT UNIVERSITY

This report takes the NVAO's Assessment Framework for the Higher Education Accreditation System of the Netherlands for limited programme assessments as a starting point (September 2018).

ADMINISTRATIVE DATA REGARDING THE PROGRAMME

Master's programme Geographical Information Management and Applications

Name of the programme:	Geographical Sciences
International name of the programme:	
CROHO number:	60732
Level of the programme:	master's
Orientation of the programme:	academic
Number of credits:	120 EC
Specialisations or tracks:	-
Location(s):	Utrecht, Delft, Enschede, Wageningen
Mode(s) of study:	full-time, part-time
Language of instruction:	English
Joint programme:	Inter-university programme
partner institutions involved:	TU Delft, University of Twente, Wageningen University
type of degree awarded:	Single degree (Utrecht University)
Submission deadline NVAO:	01/11/2019

The visit of the assessment panel Human Geography and Urban Planning to the Faculty of Geosciences of Utrecht University took place on 21, 22 and 23 May 2019. The judgements in this report refer to the full-time and part-time modes of study, unless otherwise indicated.

The programme's management proposes to change the CROHO programme name, see Standard 1.

ADMINISTRATIVE DATA REGARDING THE INSTITUTION

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

COMPOSITION OF THE ASSESSMENT PANEL

The NVAO has approved the composition of the panel on 11 February 2019. The panel that assessed the master's programme Development Studies consisted of:

- Em. prof. dr. L.J. (Leo) de Haan, emeritus professor of Development Studies at the International Institute of Social Studies (ISS) of Erasmus University Rotterdam [chair];
- Em. prof. dr. C. (Christian) Kesteloot, emeritus professor at the Division of Geography and Tourism of KU Leuven (Belgium);
- Prof. dr. F.J.A. (Frank) Witlox, professor of Economic Geography at the Department of Geography at Ghent University (Belgium);
- Dr. C.J. (Kees-Jan) van Klaveren, senior auditor and data protection officer at Rotterdam University of Applied Sciences;

- Drs. J. (Judith) Borsboom-van Beurden, senior researcher Smart Sustainable Cities at Norwegian University of Science and Technology (NTNU, Norway);
- Dr. L.B.J. (Lianne) van Duinen, project manager at the Council for the Environment and Infrastructure (Rli);
- J. (Jim) Klooster BSc, master's student Economic Geography at University of Groningen [student member].

The panel was supported by dr. M. (Meg) van Bogaert and dr. M.J. (Marijn) Hollestelle, who acted as secretaries.

Due to personal reasons, prof. dr. Frank Witlox was not able to attend the site visit itself. In consultation with the programme and the NVAO, he stayed on as a panel member and read and commented upon the self-evaluation report, a number of theses and the draft reports.

WORKING METHOD OF THE ASSESSMENT PANEL

The master's programme Geographical Information Management and Applications at the Faculty of Geosciences of Utrecht University was part of the cluster assessment Human Geography and Urban Planning. In April and May 2019, the panel assessed nineteen programmes at four universities. The following universities participated in this cluster assessment: University of Amsterdam, University of Groningen, Utrecht University, and Radboud University.

Panel members
The panel consisted of the following members:
- Em. prof. dr. L.J. (Leo) de Haan, emeritus professor of Development Studies, at the International Institute of Social Studies (ISS) of Erasmus University Rotterdam [chair];
- Em. prof. dr. C. (Christian) Kesteloot, emeritus professor at the Division of Geography and Tourism of KU Leuven (Belgium);
- Prof. dr. E.M. (Ellen) van Bueren, professor of Urban Development Management at the Faculty of Architecture and the Built Environment of Delft University of Technology;
- Drs. J. (Judith) Borsboom-van Beurden, senior researcher Smart Sustainable Cities at Norwegian University of Science and Technology (NTNU, Norway);
- Dr. L.B.J. (Lianne) van Duinen, project manager at the Council for the Environment and Infrastructure (Rli);
- Dr. C.J. (Kees-Jan) van Klaveren, senior auditor and data protection officer at Rotterdam University of Applied Sciences;
- Prof. dr. M.A. (Maria) Koelen, professor of Health and Society at Wageningen University & Research;
- Prof. dr. F.J.A. (Frank) Witlox, professor of Economic Geography at the Department of Geography at Ghent University (Belgium);
- J. (Jim) Klooster BSc, master's student Economic Geography at the University of Groningen [student member];
- L. (Lars) Stevenson BSc, bachelor's student Political Science and master's student Comparative Politics, Administration & Society at Radboud University [student member];
- N.J.F. (Niek) Zijlstra, bachelor's student Human Geography and Urban and Regional Planning at the University of Amsterdam [student member];
- Prof. dr. ing. C.M. (Carola) Hein, professor of History of Architecture and Urban Planning at the Faculty of Architecture and the Built Environment of Delft University of Technology [referee assessment University of Groningen].

For each site visit, assessment panel members were selected based on their expertise, availability and independence.

The QANU project manager for the cluster assessment was dr. Irene Conradie. She acted as secretary in the site visit of the University of Amsterdam. In order to assure the consistency of assessment within the cluster, the project manager was present at the panel discussion leading to the preliminary findings at all site visits. All draft reports were checked by QANU. Dr. Meg van Bogaert and drs. Mariette Huisjes, freelance secretaries for QANU, acted as secretaries in the site visit of the University of Groningen. Dr. Meg van Bogaert acted as secretary in the site visits of Utrecht University and Radboud University. Dr. Marijn Hollestelle, employee of QANU, was present at the site visit of Utrecht University, specifically for the ECA assessment report of quality in internationalisation of the master's programme International Development Studies. The project manager and the secretaries regularly discussed the assessment process and outcomes.

Preparation
On 18 February 2019, the panel chair was briefed by the project manager on the tasks and working method of the assessment panel and more specifically his role, as well as use of the assessment framework. A preparatory panel meeting was also organised on 18 February 2019. During this meeting, the panel members received instruction on the tasks and working method and the use of the assessment framework. The panel also discussed the domain specific framework. A schedule for the site visit was composed. Prior to the site visit, representative partners for the various interviews were selected. See Appendix 3 for the final schedule. Before the site visit, the programmes wrote self-evaluation reports of the programmes and sent these to the project manager. She checked these on quality and completeness and sent them to the panel members. The panel members studied the self-evaluation reports and formulated initial questions and remarks, as well as positive aspects of the programmes. The panel also studied a selection of theses and their assessment forms for the programmes. The selection consisted of fifteen theses, based on a provided list of graduates between 2017-2018. A variety of topics and tracks and a diversity of examiners were included in the selection. The project manager and panel chair assured that the distribution of grades in the selection matched the distribution of grades of all available theses.

Site visit
The site visit to Utrecht University took place on 21, 22 and 23 May 2019. Prior to the site visit, the panel discussed its initial findings on the self-evaluation reports and the theses, as well as the division of tasks during the site visit. During the site visit, the panel studied additional materials about the programmes and exams, as well as minutes of the Programme Committee and the Board of Examiners. An overview of these materials can be found in Appendix 4. The panel conducted interviews with representatives of the programmes: students and staff members, the programme's management, alumni and representatives of the Board of Examiners and the Programme Committee. It also offered students and staff members an opportunity for confidential discussion during a consultation hour. No requests for private consultation were received. The panel used the final part of the site visit to discuss its findings in an internal meeting. Afterwards, the panel chair publicly presented the panel's preliminary findings and general observations.

Report
After the site visit, the secretary wrote a draft report based on the panel's findings and submitted it to QANU for peer assessment. Subsequently, the secretary sent the report to the panel. After processing the panel members' feedback, the project manager sent the draft reports to the faculty in order to have these checked for factual irregularities. The project manager discussed the ensuing comments with the panel's chair and changes were implemented accordingly. The report was then finalised and sent to the Faculty of Geosciences and University Board.

Definition of judgements standards
In accordance with the NVAO's Assessment framework for limited programme assessments, the panel used the following definitions for the assessment of the standards:

Generic quality
The quality that, from an international perspective, may reasonably be expected from a higher education Associate Degree, Bachelor's or Master's programme.

Meets the standard
The programme meets the generic quality standard.

Partially meets the standard
The programme meets the generic quality standard to a significant extent, but improvements are required in order to fully meet the standard.

Does not meet the standard
The programme does not meet the generic quality standard.

The panel used the following definitions for the assessment of the programme as a whole:

Positive
The programme meets all the standards.

Conditionally positive
The programme meets standard 1 and partially meets a maximum of two standards, with the imposition of conditions being recommended by the panel.

Negative
In the following situations:

- The programme fails to meet one or more standards;
- The programme partially meets standard 1;
- The programme partially meets one or two standards, without the imposition of conditions being recommended by the panel;
- The programme partially meets three or more standards.

SUMMARY JUDGEMENT

Standard 1: Intended learning outcomes
The master's programme GIMA has a clear profile which is – thanks to the cooperation of four Dutch universities - broad in the way that it includes not only methods and techniques in GI, but also focuses on management on GI and applications in GI. GIMA furthermore aims at developing both academic and professional competencies. The ILOs fit the profile well and are in line with the international requirements regarding the level and orientation of an academic master's programme. The panel concludes that the proposed name Geographical Information Management and Applications (GIMA) is fitting with the aims and content of the programme. It therefore judges positively on the proposed name change.

Standard 2: Teaching-learning environment
According to the panel, the curriculum is well-structured and coherent, with nice alternations of theory and practice in the different modules. The GIMA programme actively links the content of the courses to the societal relevance of geo-information sciences. The quality of the courses is good, and the relation between the course objectives, ILOs and the Dublin descriptors makes it clear that the curriculum enables students to achieve the ILOs. The didactic concept of blended learning combines short periods of intensive teaching (using a variety of teaching methods) with periods of distance learning. This enables mid-career professionals to attend the part-time programme. The panel appreciates the didactic model, which also puts emphasis on professional competencies. Attention to e-learning is adequate, but there is room to improve the interaction with and between students during the distance learning periods. The student population is increasing but, at the same time, becoming more homogeneous. The programme seems to struggle somewhat with the implications of this change. The panel encourages the programme to continue its efforts on increasing the number of mid-career professionals as part-time students. It also recommends developing an explicit strategy to attract more international students, which fits the international perspective of GIMA. The quality of the teaching staff is good, in both teaching and research. The panel was pleased to note that the organisation of GIMA across the four institutes runs smoothly and that the cooperation and collaboration of staff members of the four institutes are remarkably good.

Standard 3: Student assessment
The increased attention paid by the programme and Faculty to a systematic method of assessment and associated quality assurance has led to a good system of assessment. The students are informed about and actively involved in the assessment. The programme uses a wide variety of assessment methods, and the final assessment of a course is always based on multiple assessment moments. The manner in which the thesis is assessed is well organised. The thesis assessment is appropriate, and the assessment by a committee (TEC) assures independent assessment by multiple examiners. The panel pointed out that the limited amount of space provided for written feedback on the assessment forms could be improved. Moreover, the assessment form should clearly show the independent assessment of both examiners. The Board of Examiners and the quality assurance system are functioning properly, and the panel notes that the Board of Examiners has taken important steps in the past period. It concludes that the assessment is sufficiently reliable, valid and transparent.

Standard 4: Achieved learning outcomes
The panel reviewed a random selection of theses that were produced by students of the GIMA programme. It agreed with the grades given by the supervisor and second examiner. Attention paid to the labour market is good, and the employability of the graduates is very high. Based on the selection of master's theses, the alumni survey and interviews with alumni during the site visit, the panel concludes that the students realise the ILOs as formulated by the programme.

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

Master's programme Geographical Information Management and Applications

Standard 1: Intended learning outcomes	meets the standard
Standard 2: Teaching-learning environment	meets the standard
Standard 3: Student assessment	meets the standard
Standard 4: Achieved learning outcomes	meets the standard
General conclusion	positive

The chair, prof. dr. Leo de Haan, and the secretary, dr. Meg van Bogaert, of the panel hereby declare that all panel members have studied this report and that they agree with the judgements laid down in the report. They confirm that the assessment has been conducted in accordance with the demands relating to independence.

Date: 7 October 2019

DESCRIPTION OF THE STANDARDS FROM THE ASSESSMENT FRAMEWORK FOR LIMITED FRAMEWORK ASSESSMENTS

Context
The Faculty of Geosciences has four departments and is one of the seven faculties of Utrecht University (UU). Within the Faculty of Geosciences, the Department of Human Geography and Spatial Planning is responsible for the teaching of various programmes, including the master's programme in Geographical Information Management and Applications (GIMA). The department focuses on research, teaching and outreach related to the Urban Futures research programme, investigating urban issues in the context of an ongoing worldwide trend of increasing urbanisation. The responsibility of coordinating and managing the master's programme GIMA is assigned to the department's Director of Education. The daily management of all master's programmes is carried out by the Education Coordination Team (ECT), composed of the bachelor coordinator, the master coordinator, the education coordinator and chaired by the Director of Education. The ECT is advised on issues pertaining to the programme by the Master Education Committee.

The master's programme GIMA is an inter-university programme. Four partners cooperate equally: Utrecht University (UU), TU Delft (TUD), University of Twente (UT) and Wageningen University (WU). The programme is accredited at UU, and this university also hands out the diploma to graduates. This implies that although four universities are involved in the programme and teaching, the students only register at UU. During the site visit, the panel interviewed teaching staff and module coordinators from all four participating universities. The cooperation between the four partners justifies the existence of some additional organisational units in which each institute participates at the level of the GIMA programme, with similar tasks and responsibilities as their counterparts at the faculty level. Cooperation is implemented in various ways, e.g. by staff members from each university participating in the conduct of the programme, contact days being organised, and the GIMA Programme Director and Secretariat rotating every four years among the partners.

Part-time programme
The master's programme GIMA is offered full-time and part-time. The number of students in the part-time programme is very limited (two students enrolled in 2017, three in 2018). In principle, part-time students follow the same curriculum as full-time students, but at a slower pace. The findings and considerations in this report apply to both part-time and full-time students, unless stated otherwise.

Standard 1: Intended learning outcomes
The intended learning outcomes tie in with the level and orientation of the programme; they are geared to the expectations of the professional field, the discipline, and international requirements.

Findings

Profile and benchmark
In recent decades the world has witnessed intense societal and technological developments resulting in an increase of new types of interrelated flows of people, goods, money and natural environment phenomena. This results in an abundance of data, especially data with a location component. To use such data for problem solving in social and environmental applications, new knowledge and insights are required. Digitisation of many domains, such as cartography, image analysis, geography and navigation has resulted in a new mixed domain of geo-information. This domain operates following the traditional input-processing-output flow, known as the chain of geospatial data handling. The master's programme Geographical Information Management and Applications (GIMA) focusses on certain aspects of this chain, examining the supply of geo-services, methods and techniques and the information demand which is reflected in the structure of the programme. The aim of GIMA is to educate students in such a way that they will be able to make a substantial

contribution to theories and applications for understanding our society by using geo-information. The goal is to provide students with an academic, master's level education in state-of-the-art knowledge, skills and tools of geo-information sciences with an emphasis on both academic and professional competencies. The focus of the programme is on the development of competences needed in several settings: managing geo-information projects, systems and organisations developing innovative applications and performing scientific research. Since its start (2003), GIMA has been a joint programme of four Dutch universities, combining the strengths of each partner. It is not a joint degree, although the GIMA Board is striving to become one as it would do more justice to the design of the programme, with equal input from all four universities.

In the self-evaluation report, the position of the GIMA programme within the domain of geo-information sciences is described. This was recommended by the previous assessment panel. A total of six master's programmes in this domain are offered at Dutch universities, including four programmes offered by the three GIMA partners of Utrecht University. The programmes at technical universities have a strong focus on methods and techniques in Geo Information (GI), while GIMA combines methods and techniques in GI with management using GI and applications in GI. There is one master's programme at the VU University Amsterdam, which focuses on methods and techniques as well as management of GI, like GIMA, but with a different setup (only part-time) and duration (60 instead of 120 ECTS).

According to the panel, the need for the GIMA programme and its identity are well argued. The profile is clear, and the programme is benchmarked against similar programmes in the Netherlands. The panel is of the opinion that the profile indicates that GIMA is a rather technical programme, but without losing sight of its societal relevance. Given the pace of technological and societal developments, GIMA could contemplate paying more attention to the integration of new sources of geospatial information like sensors, actuators, smart meters and cameras, and to the ethics, legislation and regulation of the large-scale use of georeferenced data (protection, ownership, rights on exploitation and GDPR).

Intended learning outcomes
The programme's goals and focus are concretised in 12 intended learning outcomes (ILOs, see Appendix 1) that have been categorised under three headings:

1. domain-specific learning outcomes, which refer to the domain of GI sciences;
2. scientific learning outcomes, which refer to scientific research in this domain;
3. general learning outcomes, which refer to general academic attitudes and skills.

The ILOs are described in accordance with the scientific and professional requirements. The students are trained in the theoretical, methodical, technological and organisational principles of working with GI as well as in the use of modern GI methods and technology in a variety of application fields. An appendix in the self-evaluation report shows the relationship between the Dublin descriptors and the ILOs of the GIMA programme. The panel determined that the ILOs are academically oriented, are of a master's level, and are in line with the profile and focus of the programme. Furthermore, they comply with the Dublin descriptors, and the level of the programme is clearly advanced.

Proposed name change
At the time of the site visit, the programme had only one, English, name registered in CROHO, Geographical Sciences. The programme indicated that this name does not sufficiently reflect its specific focus on geographical information management and applications and is not the name the programme uses in its communication; it expressed the wish to change its name to the one it commonly uses, Geographical Information Management and Applications (GIMA). The panel studied the programme's profile and learned that the focus of the programme is on managing geo-information (GI) projects, systems and organisations; developing innovative applications; and performing scientific research. In the panel's view, the proposed name of the programme is well aligned with the aims, intended learning outcomes and curriculum of the programme.

Considerations
The master's programme GIMA has a clear profile which is – thanks to the cooperation of four Dutch universities - broad in the way that it includes not only methods and techniques in GI, but also focuses on management on GI and applications in GI. GIMA furthermore aims at developing both academic and professional competencies. The ILOs fit the profile well and are in line with the international requirements regarding the level and orientation of an academic master's programme. The panel concludes that the proposed name Geographical Information Management and Applications (GIMA) is fitting with the aims and content of the programme. It therefore judges positively on the proposed name change.

Conclusion
Master's programme Geographical Information Management and Applications: the panel assesses Standard 1 as 'meets the standard'.

Standard 2: Teaching-learning environment
The curriculum, the teaching-learning environment and the quality of the teaching staff enable the incoming students to achieve the intended learning outcomes.

Findings

Curriculum
The 120 EC master's programme GIMA is set up according to an easy understood modular structure (see Appendix 2). It is a blended learning programme, combining intensive contact weeks (at the start and end of each module) with periods of distance learning in between and options for part-time (four years) and full-time (two years) study. The contact weeks take place on a rotating basis in the four institutions. In the first part of the programme, an introduction is followed by six common, compulsory modules (modules 1-6) of 10 EC each. Module 0 (0 EC) is an introduction to the curriculum, the electronic learning environment and tools to facilitate communication during distance learning. The students also present themselves briefly to the group, and social activities are organised to stimulate community building. In addition, the views of the four partners in relation to geo-information sciences are presented, intake interviews are held with each student, and field trips to two GI companies are organised. The six modules include an introductory and an advanced course on each of the three main focus areas in GIMA, which are 1) methods and techniques in geo-information (*Methods and techniques* and *Advanced methods and techniques*), 2) management in relation to geo-information (*Project management* and *Management in organisations*) and 3) applications of geo-information (*Basic applications* and *Advanced applications*). The two modules on techniques and methods provide a basis that is then used for realistic cases in the application modules. The panel is positive about the link to society and the societal relevance of Geo-Information sciences that the programme establishes. Much of the management in the professional field is based on geo-data, and there is substantial policy-related research within the programme. The second part of the programme consists of two individual modules: the *Master's thesis* and *Internship* of 30 EC each. The compulsory internship aims to enable direct experience and contacts with the geo-information professional field.

The Course Catalogue and the GIMA website provide a full overview of the curriculum, including entry requirements for each module. In addition, each module has a Study Guide containing detailed information. An appendix in the self-evaluation report shows the relationship between the ILOs and each of the modules in the curriculum. To maintain coherence across the modules, each module has two coordinators from different partner institutes, and all module coordinators formally meet once a year. Additional informal communications take place throughout the year. With four participating universities, the Programme Committee – which includes staff members from all four universities – also plays an important role in maintaining coherence. The previous assessment panel recommended that the Programme Committee should adopt a more proactive attitude. Throughout the self-

evaluation report the programme indicated that indeed the Programme Committee is actively working on improving the programme. The interview with staff members confirmed this proactive attitude.

The structure of the programme is valued by the students, who indicated that it is well-structured, gives a broad overview of geo-information, and has a good balance between soft skills and technological skills. This is confirmed by the teaching staff and employers. Unfortunately, the structure leaves little room for electives, and the students indicated that they would appreciate having more electives included in the curriculum. Currently, they only have the opportunity to pursue their individual interest by customising the programme. All six modules offer choices regarding individual profiling. Also, the thesis topic and internship organisation are individual choices. The panel appreciates the coherent structure of the programme; the alternation of theory and practice is particularly positive. In order to form a picture of the course content, it had access to the educational material of a number of courses during the site visit (see Appendix 4). The content and level of the courses the panel looked at in more detail are good. An appendix to the self-evaluation report clarifies the connection between the course objectives, the ILOs and the Dublin descriptors. Based on this extensive document, the panel concludes that the courses are aligned with the ILOs.

Master's thesis
In their thesis, the students show their ability to apply and integrate the theoretical knowledge and skills obtained earlier in the programme and demonstrate their ability to conduct independent research. To be able to start on the thesis, at least five modules have to be completed. The individual research project deals with a research question or topic relevant to the present-day practice of geo-information management and application. The research topics are closely related to the research fields of GIMA thesis supervisors, who are all active researchers themselves. Overviews of potential thesis research topics and related supervisors are given on Blackboard and are available in the Course Catalogue. Students can also put forward their own, personal topic as long as the programme can find a supervisor with proper expertise on the subject. All information on the thesis project is provided in the Course Catalogue and on Blackboard. There is also a *Master's thesis* introduction at the end of the first part of the programme, covering an introduction to research skills and thesis writing. Each student has a supervisor and a responsible professor. The selected topic is elaborated into an 'extended research proposal', which includes a problem statement, scientific approach, time planning and other practical aspects. The students give a mid-term presentation at a session during a GIMA contact day, which results in a go or no-go decision. Every GIMA student should also attend at least one more mid-term session and will be appointed to peer-review a fellow students' presentation. After completion of the research and writing of the thesis, the student needs approval of the supervisor and responsible professor to publicly present and defend the thesis.

Internship and professional orientation
The primary objective of the compulsory internship is to provide students with opportunities for professional orientation and competences. It also gives them the chance to experience the relevance of their programme and the choices they have made. To start with the internship, at least five of the six common modules have to be completed. The students are allowed to replace part of the internship to follow one or two master electives (worth a total of 10 EC) within their internship period. The electives have to be relevant and complementary to the GIMA programme. In that case, the internship is worth 20 EC instead of 30 EC. Internships can be done in companies, organisations and research institutes in the Netherlands and abroad. An external internship supervisor is responsible for the day-to-day supervision, he/she must be a GI expert and hold at least an MSc degree. Final choice of the position and approval are done in consultation with the GIMA teacher who acts as the internship supervisor.

Teaching-learning environment

Student population
According to the self-evaluation report, the mixed background of the students is an asset. Particularly in group assignments, the students learn from each other's knowledge and experience. The number

of part-time, often mid-career Dutch professional students was stable during the period of evaluation; on average three part-time students enrol every year. International student numbers have also remained stable at around five students per year. The number of full-time students has increased from 15 in 2012/13 to 47 in 2018/19. This increase can mainly be attributed to an increase in the number of Dutch students who recently graduated from a relevant bachelor's programme. Although the total student numbers have increased, the programme thinks that the trend toward a less diversified student population is to some extent a drawback. In this case, diversity is considered in terms of both cultural background/nationality and career progression (recent bachelor graduates versus mid-career professionals). The programme management is now focussing on increasing diversity by trying to attract more mid-career professionals. For example, the programme is taking part in a pilot project on *Flexible learning* (Flexible Study) for, amongst others, people who want to combine study and work. The panel is satisfied with this approach, given the added value of a diverse student population. It is of the opinion that the programme could develop an explicit strategy to attract more international students. The panel agrees with the programme that it is more difficult to influence the number of "mid-career professional" students because this influx also depends on the willingness of employers to allow their employees to work and study part-time. Nevertheless, an explicit strategy to attract more part-time students would be no luxury.

Didactic approach and teaching methods

The didactic concept used is blended learning, in which intensive contact weeks are alternated with periods of distance learning. The programme is continuously developing new teaching methods that fit distance learning, for example using a virtual classroom and knowledge clips. This concept makes GIMA suitable to accommodate the above-mentioned variety of students: both mid-career professionals and recently graduated bachelors in a relevant field of study, from the Netherlands and abroad. The educational approach applied in GIMA is threefold: 1) active and self-directed learning, progressing from basic to advanced learning with an increasing integration of concepts; 2) theories, methods and tools; and 3) instruction theory is always followed by its application in assignments and projects. Active learning is stimulated by the way in which the blended design is implemented. Each common module starts with three days of intensive contact at one of the institutes, e.g. face-to-face teaching, guest lectures, preparation of cases and an excursion. After these contact days the students work at a distance for a period of twelve weeks. In the six common modules this runs from specific, structured and individual tasks with fixed deadlines (module 1) to less structured and more complex individual and group assignments with sub-tasks on which students cooperate in small teams. During the distance learning period, regular contacts with and among students are maintained via the digital learning environment. Each common module ends with two contact days at a different partner institute from the one at the start, including a final session, guest lectures, student presentations and evaluations.

The panel is of the opinion that GIMA manages to offer a 21st-century teaching programme of high quality. The self-evaluation report convincingly demonstrates the content and coherence of the programme, which are both good. In addition, the panel is also very pleased with the didactic model, such as the approach to project management. The teaching of professional competencies is also taken seriously. Contact hours account for 11% of the total study load, while the remaining hours are for self-study. The panel is of the opinion that it is good that the programme pays attention to e-learning, but it agrees with the statement in the self-evaluation report that there is room for further improvement of (e)contact during the distance learning period. During the self-study periods a lot of group work has to be done. Students consider it to be a good training in project management skills to organise themselves and work on group assignments via Skype.

The increase in number of Dutch full-time students also changes the students' wishes with regard to distance learning. Students indicated in the interview and in the student chapter that they would like to have more frequent contact in person with fellow students (e.g. during group work). According to the panel, the composition of the student population indeed allows for more frequent contact. However, this should be on a voluntary basis to also accommodate part-time students with a professional career. The panel noted some indecisiveness regarding the future direction given the

changing student population and its effects on the teaching-learning environment. Although it understands that the programme makes minor adjustments to accommodate the growing group of full-time students, it is important that the percentage of part-time mid-career students does not become even smaller, in order to guarantee at least a minimum of diversity.

Admission and study ability

Duration to graduation has improved in the evaluation period from an average of 43 to 30 months (including part-time students). In the self-evaluation report the feasibility of finishing GIMA in two years (full-time) is a point of attention. This is mainly related to the planning of the thesis and internship in the second year. A number of measures have been taken to address this, for example writing the internship report during the internship and choosing the thesis topic sooner.

Internationalisation

All modules have been taught in English since the start of the programme in 2003. In the self-evaluation report, internationalisation is described as an important aspect of GIMA. The creation of an international learning environment helps students to gain the international and intercultural skills to function in a globalised labour market and reflects the international orientation of the academic field. The international orientation of the programme also reflects the increasing inflow of international staff. The content of the teaching is linked to relevant global problems and challenges, and the students are taught about research and professional practices worldwide. In some modules additional attention is paid to internationalisation. For example, in module 1 there is a free topic that can be used, for example, for an international MOOC. In module 4 the topic of the paper can also have an international character. This plus the participation of non-Dutch students, although still a small group, provide an atmosphere of a real international classroom. Opportunities for students to go abroad are offered in the thesis research and internship modules. The extensive network of staff members from four universities can help the students find an international position on a research topic of their interest. To support international students, a buddy system was set up. This is appreciated by the international students especially in the first weeks of the programme. The student cohorts also organise themselves into different subgroups and use social media to support each other. According to the panel, GIMA is indeed an international programme for which it is logical that the official teaching language is English.

Teaching staff

An overview of the teaching staff is provided in the self-evaluation report. All of the universities provide staff members who teach in the programme, and the involvement of senior staff members (full and associate professor) is substantial. The majority of staff members hold at least a Basic Teaching Qualification (BKO) or comparable teaching qualification (international). This was recommended by the previous panel, and the percentage of staff holding a BKO has since increased from 40% to 79%. There is a prerequisite of English at C level for teaching staff at three of the four universities (not UU). The students told the panel that the level of English of the teaching staff is good.

With four partner institutes being involved in the programme, a student-staff ratio cannot be provided. The student chapter stated that the teachers are easy to contact and approach and generally respond quickly to questions via e-mail. Students can also make appointments with staff members at one of the institutes. Furthermore, the programme has hired a number of more junior staff members for group supervision to be able to deal with the increased intake of students. The students informed the panel that they are very pleased with the quality of the teaching staff, both regarding didactics and the disciplinary knowledge related to their research.

During annual GIMA Teachers' Meetings, module coordinators, teachers and the Programme Director discuss the results of evaluations, exchange experiences and propose innovations. For example, the virtual classroom and its use during the distance learning period were discussed. The teaching staff told the panel that each partner is participating 25% in the education over the eight modules, each module has two coordinators (from different institutions), and each institute has an equal number of

coordinators. The panel paid specific attention to the cooperation of the four institutes in GIMA. Although the training course deliberately builds in moments for consultation and coordination, it is not possible to discuss programme-related issues informally (at the coffee machine). The discussions with the management and with the teachers showed that the mutual relationship between the four institutes is very good. In addition to formal meetings, staff members regularly meet informally and discuss all kinds of issues. They also indicated that they meet each other outside the GIMA context, and have contact related to their research. The panel found the level of the organisation to be remarkably high, and the coordination and mutual cooperation between the four participating universities are self-evident.

Considerations
According to the panel, the curriculum is well-structured and coherent, with nice alternations of theory and practice in the different modules. The programme actively links the content of the courses to the societal relevance of geo-information sciences. The quality of the courses is good, and the relation between the course objectives, ILOs and the Dublin descriptors makes it clear that the curriculum enables students to achieve the ILOs. The didactic concept of blended learning combines short periods of intensive teaching (using a variety of teaching methods) with periods of distance learning. This enables mid-career professionals to attend the part-time programme. The panel appreciates the didactic model, which also puts emphasis on professional competencies. Attention to e-learning is adequate, but there is room to improve the interaction during the distance learning periods. The student population is increasing but, at the same time, becoming more homogeneous. The programme seems to struggle somewhat with the implications of this change. The panel encourages the programme to continue its efforts on increasing the number of mid-career professionals as part-time students. It also recommends developing an explicit strategy to attract more international students, which fits the international perspective of GIMA. The quality of the teaching staff is good, in both teaching and research. The panel was pleased to note that the organisation of GIMA across the four institutes runs smoothly and that the cooperation and collaboration of staff members of the four institutes are remarkably good.

Conclusion
Master's programme Geographical Information Management and Applications: the panel assesses Standard 2 as 'meets the standard'.

Standard 3: Student assessment
The programme has an adequate system of student assessment in place.

Findings
All master's programmes in the department follow the UU PDCA cycle, and this includes GIMA. In the past period the department systematised and improved the assessment and grading system, which includes the development of an elaborated Assessment Plan. This plan covers the complete implementation of the assessment policy at the curriculum and course level and shows the relationship between the learning objectives of the courses and the ILOs of the programme. The course coordinator is responsible for ensuring that the course is assessed in accordance with the requirements of validity, reliability and transparency. The panel finds that the Assessment Plan, which is filled by the course matrices, provides insight into the assessment of the final attainment levels of the programme. It also appears that all the ILOs in the curriculum are covered and adequately assessed. In line with the Utrecht Education Model, the programmes apply a system of continuous assessment in which all components of the curriculum are assessed. The final grade for a course does not depend on one final exam but involves at least two assessment moments and includes the grades for several types of assessment.

According to the self-evaluation report, there is continuous assessment throughout the programme, and a variety of methods is used. The programme has a total of 37 assessment moments, which is the result of a reduction advocated by the previous assessment panel. This number still seems a lot

to the panel, but both lecturers and students informed the panel that this supports active learning and studying continuously during the distant learning weeks. In the assessment of the first six modules, a combination of individual and group assessment as well as formative and summative assessment is pursued. The panel noticed that in three courses, more than 50% of the final grade is determined by group work. The students informed the panel that the group process is a part of the group work that they appreciate. Although attention is paid to free-riding and the students feel that the programme deals with this in a good way, the individual contributions of a student are not always considered and made explicit in the final assessment. The panel noted that students are asked to reflect as individuals on the assignment and their own role in the group process, but this seems not to be visible in the final grade. It recommends including the individual contributions into the final grade and suggests reconsidering the relative share of group work in summative assessments of courses.

Quality assurance of assessment
The Faculty-wide Board of Examiners plays the role of internal supervisor of the quality of examinations. The Board guarantees the quality of assessment in various ways, such as random checking of the quality of an assessment. GIMA is one of the programmes that is part of the Board and has a lecturer delegated as a member of the committee (currently, a lecturer from the WU). A Committee of Assessment can and does, as a subcommittee of the Board of Examiners, carry out a test analysis on request and submit its conclusions. The selection of courses for which examinations are assessed by the Committee of Assessment is partly random and partly based on lecturer and/or student evaluations. The Director of Education has the overall responsibility to implement and monitor all measures that assure the quality of the programmes, courses and assessments. The panel thinks that the establishment of a Committee of Assessment is a good development and was pleased to notice that this committee is giving advice to the Board of Examiners and considers itself ultimately responsible for assuring the quality of assessment.

Assessment of the master's thesis
The master's thesis is considered the ultimate test of whether a student merits an academic master's degree. The thesis process is broken down into a number of steps, as is the assessment. The research proposal has to be approved by the supervisor and responsible professor, and there is a mid-term presentation that leads to a go or no-go decision. The final step is the presentation and public defence, led by the Thesis Examination Committee (TEC). The TEC consists of a chair, the supervisor and an external reviewer from a GIMA university other than that of the supervisor. Prior to the defence, the external reviewer decides if the work can be defended. The TEC decides on the final grading of the thesis project, which consists of the written thesis (50%), the research process (30%), the graduation presentation (10%) and the discussion (10%). Both students and TEC members are provided with information about the procedure and assessment criteria beforehand, and a standardised grade sheet is used. In the academic year 2019-2020, a rubric will be developed to align grades based on the various assessment criteria. Students and alumni informed the panel that the procedure of assessment is clear to them, regular meetings with the supervisor are informative, and the feedback (both written and oral) is appreciated. The panel is positive about the procedure and is sufficiently convinced that the second examiner provides an independent assessment. It is of the opinion that the thesis assessment process has been designed with a lot of attention for a transparent, valid and reliable assessment. The rubric will be a valuable addition to the assessment process. The panel finds that the students regularly receive extensive oral feedback. It stimulates the programme to continue on this path and also pay explicit attention to the qualitative feedback on the assessment form, which provides a rather limited space for written comments. Nonetheless, it is of the opinion that the independent assessment procedure should be clearly documented, i.e. the thesis assessment form should show the assessment of both examiners. The panel reviewed a sample of the theses and found that, in general, the master theses were validly and reliably assessed. The final grade by the panel was in all cases similar to that on the assessment form (less than one grade difference).

Assessment of the internship
To guarantee a valid, reliable and transparent assessment of the internship, a standard procedure is used. The students have to agree with the supervisor on more specific objectives for the specific workplace assignment. At the end of the internship, the student writes an internship report or peer-reviewed article and a reflection report, accompanied by a summary of the internship activities. Both reports are assessed by the local supervisor and the GIMA supervisor. The GIMA supervisor is formally the examiner and uses the input from the local supervisor to determine the grade. The assessment is based on a rubric.

Considerations
The increased attention paid by the programme and Faculty to a systematic method of assessment and associated quality assurance has led to a good system of assessment. The students are informed about and actively involved in the assessment. The programme uses a wide variety of assessment methods, and the final assessment of a course is always based on multiple assessment moments. The manner in which the thesis is assessed is well organised. The thesis assessment is appropriate, and the assessment by a committee (TEC) assures independent assessment by multiple examiners. The panel pointed out that the limited amount of space provided for written feedback on the assessment forms could be improved. Moreover, the assessment form should clearly show the independent assessment of both examiners. The Board of Examiners and the quality assurance system are functioning properly, and the panel notes that the Board of Examiners has taken important steps in the past period. It concludes that the assessment is sufficiently reliable, valid and transparent.

Conclusion
Master's programme Geographical Information Management and Applications: the panel assesses Standard 3 as 'meets the standard'.

Standard 4: Achieved learning outcomes
The programme demonstrates that the intended learning outcomes are achieved.

Findings

Achieved learning outcomes
Prior to its site visit, the panel studied a sample of 15 recent master's theses. Without exception, they sufficiently demonstrate, in its view, that the graduates have realised the ILOs. According to the self-evaluation report, the students learn to become researchers who are able to independently conduct scientific research during the master's thesis module. A considerable number of GIMA master's theses also result in scientific publications in journals or conference proceedings. The panel was in general impressed by the quality of the theses, specifically those with high grades. Strong points include interesting and relevant topics, overall strong methodology, good writing skills in academic English, research questions embedded in the literature and good command of GIS techniques and tools in general. Points of improvement the panel identified were too strong a focus on application and less on theory, and in a few cases the interpretation of the results leading to a discussion was not strong.

Connection to the labour market
The programme also considers the internship important in highlighting the achieved learning outcomes, more specifically the professional skills. The panel agrees that the internship is a valuable part of the GIMA curriculum. In the programme several avenues of professional orientation are offered in addition to the internship. Company visits and excursions are mainly organised in modules 0 and 2. The students can also make use of the services of the UU Career Services, such as the Career Day and specialised workshops. The GIMA student association organises an annual GIMA Day at which public and private GI organisations present themselves through lectures, workshops and a business fair. In response to feedback from the previous assessment panel, the programme is

establishing an external GIMA Advisory Board with representatives of umbrella organisations who meet every two years to reflect on GIMA. The panel thinks that this is a good idea but wonders if one meeting every two years is sufficient.

In 2015 a survey was carried out among GIMA alumni; the main findings show that it took the majority of alumni less than two months to find an appropriate job in GI applications, GI management or both. About 25% have a job in GI research. Alumni are employed by both governmental/semi-governmental and commercial organisations and abroad. Many graduates are offered a job by their internship provider. The panel is pleased with the attention the programme has paid to preparing the students for the labour market.

Considerations
The panel reviewed a random selection of theses that were produced by students of the GIMA programme. It agreed with the grades given by the supervisor and second examiner. Attention paid to the labour market is good, and the employability of the graduates is very high. Based on the selection of master's theses, the alumni survey and interviews with alumni during the site visit, the panel concludes that the students realise the ILOs as formulated by the programme.

Conclusion
Master's programme Geographical Information Management and Applications: the panel assesses Standard 4 as 'meets the standard'.

GENERAL CONCLUSION

The panel's judgement on standards 1, 2, 3 and 4 for the master's programme Geographical Information Management and Applications (GIMA) at Utrecht University is 'meets the standard'. Therefore, according to the rules of the Accreditation Organisation of the Netherlands and Flanders, the general and final judgement is positive.

Conclusion
The panel assesses the *master's programme Geographical Information Management and Applications* as 'positive'.

APPENDICES

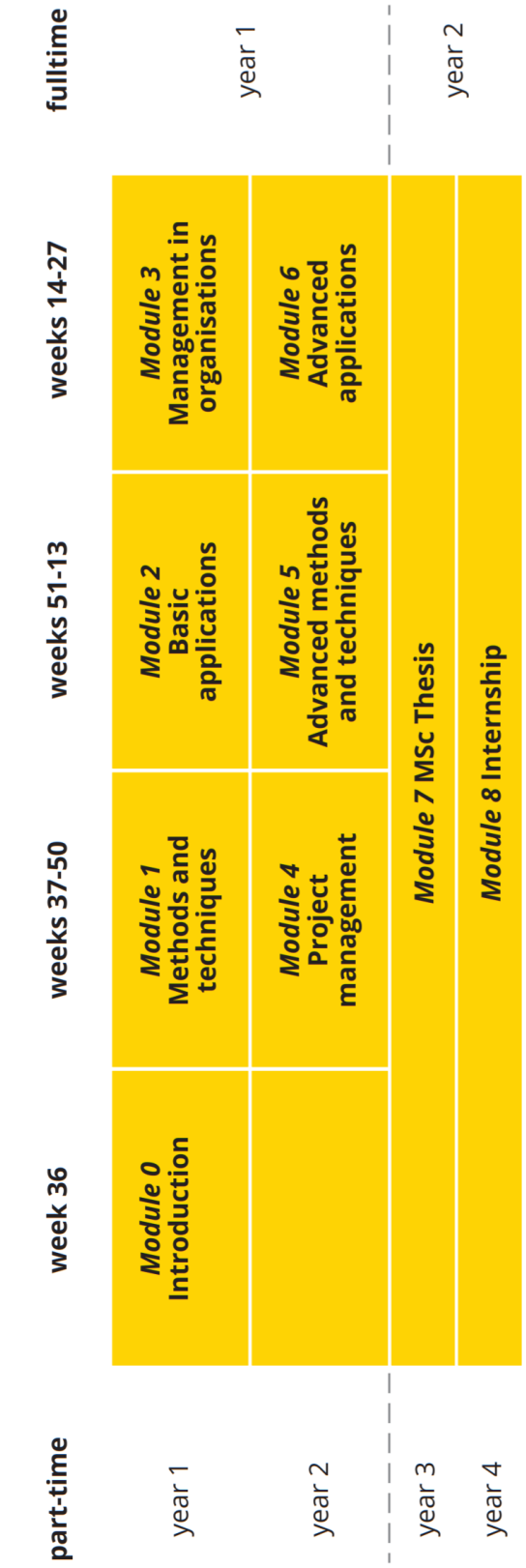
APPENDIX 1: INTENDED LEARNING OUTCOMES

Master's programme GIMA

The graduate possesses competences to	Dublin descriptors: Have knowledge and understanding	Apply knowledge and understanding	Making Judgments	Communication	Learning Skills
DOMAIN SPECIFIC LEARNING OUTCOMES					
1. Identify and understand geo-information concepts, methods and techniques.	XX				
2. Use appropriate concepts, methods and techniques for the management and application of geo-information.	x	XX			
3. Analyse the quality and usability of geo-information processes.	x		XX		
4. Evaluate solutions for societal problems by applying knowledge of geo-information.	x		XX		
5. Design and implement proof-of-concept geo-information-based solutions for societal problems.	x	XX	XX	XX	
SCIENTIFIC LEARNING OUTCOMES					
6. Independently formulate and execute research in accordance with academic standards within the field.		XX	XX		x
7. Communicate clearly (both orally and in writing) with specialists and non-specialists to present and discuss the outcomes of research and design project.				XX	
8. Show awareness of the need to keep in touch with relevant developments within the discipline and is able to recognize, understand and apply new concepts and approaches as they emerge.	XX	XX			XX
9. Demonstrate understanding of the moral and ethical dimensions of scientific research and its applications, and the importance of intellectual integrity.	XX				
GENERAL LEARNING OUTCOMES					
10. Effectively organize, structure and plan phases in multidisciplinary team work.	x	XX	XX	XX	
11. Critically reflect on own performance and results, as well as on those of colleagues.	x		XX	XX	
12. Design and plan a path to study in Geo-Information Science in a manner that is largely self-directed or autonomous.					XX

x Dublin descriptor is represented in the learning outcome
XX Dublin descriptor is strongly represented in the learning outcome

APPENDIX 2: OVERVIEW OF THE CURRICULUM



APPENDIX 3: PROGRAMME OF THE SITE VISIT

DAY 0		**Monday - 20 May 2019**
16:30	18:00	Arrival of panel at the hotel, internal meeting (NVAO assessment framework, preliminary findings, preparation)
18:30	21:00	Dinner (panel meeting)
DAY 1		**Tuesday - 21 May 2019**
08:30	09:00	Arrival of panel / Welcome (optional: with a short presentation at 8:45)
09:00	11:00	Internal meeting (ECA assessment framework, preliminary findings, preparation) and documentation review
11:00	12:30	Meeting with management (all programmes; 15 min. per programme and 15 min. ECA Frameworks, initial findings, preparation)
12:30	14:00	Lunch / internal meeting / consultation hour (13:15-13:45)
14:00	14:45	Meeting with students MSc Development Studies (including PC staff member) - last 15 min. ECA
14:45	15:30	Meeting with teaching staff MSc Development Studies (including PC staff member) - last 15 min. ECA
15:30	16:00	Internal meeting / break
16:00	16:45	Meeting with staff responsible for international(isation) activities
16:45	17:15	Virtual tour through the building (including internationalisation facilities and digital learning environment)
17:15	18:00	Meeting with MSc Development Studies alumni and external stakeholders
18:00	18:30	Collecting preliminary findings
18:30	19:00	Travelling to the restaurant
19:00	21:00	Dinner (panel meeting)
DAY 2		**Wednesday - 22 May 2019**
08:30	09:00	Arrival and preparation
09:00	09:45	Meeting with BSc Sociale Geografie en Planologie students and alumni (including PC student)
09:45	10:30	Meeting with BSc Sociale Geografie en Planologie teaching staff (including PC staff member)
10:30	11:00	Internal meeting
11:00	11:30	Meeting with MSc Human Geography students (including PC student)
11:30	12:00	Meeting with MSc Human Geography teaching staff (including PC staff member)
12:00	12:45	Lunch / internal meeting
12:45	13:15	Meeting with MSc Spatial Planning students (including PC student)
13:15	13:45	Meeting with MSc Spatial Planning teaching staff (including PC staff member)
13:45	15:00	Collecting preliminary findings and preparing the next sessions

15:00	15:30	Meeting with MSc GIMA students (including PC student)
15:30	16:00	Meeting with MSc GIMA teaching staff (including PC staff member)
16:00	16:30	Collecting preliminary findings and internal meeting
16:30	17:30	Meeting with alumni MSc Human Geography, MSc Spatial Planning, MSc GIMA
17:30	18:00	Travelling to the restaurant
18:00	21:00	Dinner (panel meeting)
DAY 3		**Thursday - 23 May 2019**
08:45	9:00	Arrival and preparation
09:00	9:30	Internal meeting
9:30	10:30	Meeting with Board of Examiners and Student Advisers all programmes
10:30	11:00	Internal meeting
11:00	12:00	Final interview with management
12:00	13:45	Lunch and deliberations panel, formulating preliminary findings and conclusions NVAO framework
13:45	14:15	Deliberations panel, formulating preliminary findings and conclusions ECA framework
14:15	14:45	Feedback of preliminary findings and conclusions
14:45	15:00	Break
15:00	16:00	Development dialogue
16:00	16:30	Departure

APPENDIX 4: THESES AND DOCUMENTS STUDIED BY THE PANEL

Prior to the site visit, the panel studied fifteen theses of the master's programme GIMA. Information on the selected theses is available from QANU upon request.

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

1. Orientation to the professional field and alumni
    - Alumni newsletters
    - Arbeidsmarktmonitor
    - Orientation to the professional field by students
2. Bachelor board
    - Meeting documents 2018/17/16
3. Assessment forms bachelor and master
4. Course archive Ba/Ma 2017-2018 & 2018-2019
5. Diverse
    - Handboek Academische Vaardigheden NL-ENG
    - Docentenhandleiding SGPSL 2018-2019 NL-ENG
    - Overzicht bijeenkomsten Broodje Onderwijs 2018-2019
6. Board of Examiners
    - Centrale examencommissie Geowetenschappen
    - Kamer examencommissie SGPL
    - Toetscommissie
    - Regelement examencommissie UGB & GB
7. Kwaliteitszorg
        - Cursusmatrijzen
        - Instellingstoets kwaliteitszorg UU
        - Rapportage toetscommissie
8. Toetsplannen
    - MT Academic School – mastercoördinatoren overleg
    - Vergaderstukken 2018
    - Vergaderstukken 2017
    - Vergaderstukken 2016
9. Nationale Studenten Enquête
    - NSE 2018/17
10. OER 2018-2019 Ba/Ma
11. Onderwijsdag
    - Programma en overige informatie 2019/18/17
12. Opleidingscommissies
13. Stage (intership) Ba/Ma
    - Studiewijzer en formulieren stage bachelor 2018-2019
    - Course manual Internship IDS 2018-2019
    - Course manual Internship Human Geography 2018-2019
    - Course manual Internship Spatial Planning 2018-2019
    - Overzicht stage via Geobaan 2017, 2018