Information Science

Faculty of Science
Radboud University Nijmegen

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This report was finalized on 10 December 2012.

Report on the master's programme Information Science of Radboud University Nijmegen

This report takes the NVAO's Assessment Framework for Limited Programme Assessments as a starting point.

Administrative data regarding the programme

Master's programme Information Science

Name of the programme:	Informatiekunde
CROHO number:	66842
Level of the programme:	master's
Orientation of the programme:	academic
Number of credits:	60 EC
Specializations or tracks:	n/a
Location:	Nijmegen
Mode of study:	full time
Expiration of accreditation:	31 December 2013

The visit of the assessment committee Information Science to the Radboud University took place on September 26 and 27, 2012.

Administrative data regarding the institution

Name of the institution:	Radboud University Nijmegen
Status of the institution:	publicly funded institution
Result institutional quality assurance assessment:	The Radboud University Nijmegen has passed the institutional assessment.

Quantitative data regarding the programme

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

Composition of the assessment committee

The committee that assessed the master's programme Information Science consisted of:

- Prof. E.W. (Egon) Berghout, professor of Information Systems, University of Groningen;
- Prof. W. (Wim) van Grembergen, professor of Information Technology and Business informatics, University of Antwerp;
- H. (Haska) Steltenpohl, BSc, master's student of Information Science, University of Amsterdam.
- Prof. O. (Olga) De Troyer, professor of Computer Science, Vrije Universiteit Brussel;

- Prof. R.J. (Roel) Wieringa (chair), professor of Information Systems, University of Twente.

The committee was supported by Daan de Lange, MA, who acted as secretary.

Appendix 1 contains the CVs of the members of the committee.

Working method of the assessment committee

The assessment of the master's programme in Information Science of Radboud University Nijmegen was part of a cluster assessment of three programmes. The other programmes in this cluster were the bachelor's and master's programme in Information Science of Utrecht University.

Preparation
QANU received the self-evaluation report of the master's programme Information Science in July 2012. After checking its relevance and completeness, the project leader distributed it among the members of the committee, together with additional information about the NVAO's Assessment Framework. The committee members were asked to evaluate the self-evaluation report and the additional documents prior to the site visit and forward their remarks and concerns among committee members.

In addition to the self-assessment report, each committee member received three recent theses. In consultation with the chair, it was decided that the selection of theses should cover the full range of marks given. The committee members also received QANU's checklist for the assessment of theses to ensure that their assessments were comparable. Since the committee had to evaluate a programme leading to a scientific degree (MSc), they paid attention to the scientific level of the theses, requirements, accuracy of judgment by the reviewer and the assessment procedure used.

The project leader drafted a programme for the site visit. This was discussed with the chair of the committee and the coordinator of the programme. As requested by QANU, the coordinator of the programme carefully composed and selected representative panels. Before the site visit, both staff members and students were informed about the opportunity to speak to the committee confidentially during the 'consultation hour', but no requests were received.

Site visit
The site visit took place on September 26 and 27, 2012. On the first day the committee held a preparatory meeting, in which the members were instructed on their task, as well as on the structure of the accreditation system and the NVAO's Assessment Framework for Limited Programme Assessments. The members discussed their findings based on the self-evaluation report. They covered their task, working methods, and the questions and issues to be raised in the interviews with representatives of the programme and other stakeholders. They also studied additional materials made available by the programme, including study material, exams, assignments and other assessments. During the second day, the committee conducted interviews with the programme management, students, staff members, graduates, members of the Education Committee, the Board of Examiners, and student advisors.

After the concluding meeting with the management on the final day of the site visit, the committee members extensively discussed their assessment of the programme and prepared a

preliminary report. The site visit concluded with a presentation of the preliminary findings by the chairman. This presentation consisted of a general assessment and several specific findings and impressions of the programme, as well as some recommendations. The schedule of the site visit is included as Appendix 6.

Report
After the site visit, the secretary produced a draft version of the report on the programme and presented it to the members of the committee. Subsequently, the secretary processed corrections, remarks and suggestions for improvement provided by the committee members to produce the revised report. This was then sent to Radboud University Nijmegen to check for factual errors, inaccuracies and inconsistencies. Comments and suggestions provided were discussed with the chair of the assessment committee and, where necessary, with the other committee members. Based on the committee's decisions to incorporate the comments or not, the secretary compiled the final version of the programme report.

Decision rules
In accordance with the NVAO's Assessment Framework for Limited Programme Assessments (dated November 22, 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 surpasses the current generic quality standards well across its entire spectrum and is regarded as a national/international example.

Summary judgement

This report reflects the assessment of the committee's findings and considerations on the master's programme Information Science of Radboud University Nijmegen. The evaluation is based on information provided in the self-evaluation report, the selected theses, additional documentation provided during the site visit, and interviews conducted with staff, students and graduates of the programme. During its assessment, the committee observed positive aspects as well as ones which could be improved. Taking these aspects into consideration, the committee decided that the programme fulfils the requirements set by the NVAO for accreditation.

Standard 1: Intended learning outcomes
The field of Information Science is concerned with the interaction between information and communication technology on the one hand and their organisational context on the other. It deals with the analysis, design, quality control and support of digital infrastructures in relation to their organizational contexts. The programme uses the term *i-architect* to describe the expertise and academic background information scientists require. Graduates need to be able to make both a valuable theoretical contribution to the development of the field of study and creative and practical contributions to the design and architecture of information systems. The domain-specific reference framework is the 'Information Systems IS2010 Curriculum', a model curriculum which is internationally accepted in the field of Information Science.

Since the final qualifications of the master's programme are directly associated to the IS2010 framework, the committee confirms the international relevance of the programme's goals. It covers the relevant skills and knowledge required by information scientists. The intended learning outcomes also meet the criteria for academic master programmes. They cover the five Dublin-descriptors. Both the scientific and the professional orientation of the programme have been adequately implemented. However, the committee found the intended learning outcomes rather generic. Given the focus and the choices the programme has had to make, one would also expect a more detailed and focused translation from the IS2010 model into intended learning outcomes. The committee recommends that the programme make the choices in the IS2010 model and their motivation more explicit, and indicate more clearly how they are implemented in the curriculum.

Standard 2: Teaching-learning environment
The Information Science programme takes one year, consisting of compulsory courses, a specialisation course, free choice and a 24 EC thesis, which may be combined with an internship. The committee concludes that the curriculum has an adequate scientific orientation and also addresses professional learning outcomes. It found that the level of the courses is adequate, although there seems to be room to intensify the study load. The programme is feasible and enables the students to achieve the final qualifications.

The programme takes the IS2010 model curriculum as a starting point and has made its local choices within that curriculum, focussing on security and architecture. The committee understands the necessity to make these choices, but finds that the current implementation can be improved. The goal of the master's programme in Information Science is to educate students so they can perform a bridging function between IT and organizations. The committee found that the technical side of this bridge is better developed than the business side. The emphasis is currently too much on applications. The theme of enterprise architecture, which is within the scope of the choices made, is not well-integrated, due to the

recent departure of key personnel. The committee recommends paying due attention to the Business Fundamentals of IS 2010.

Most of the research of the involved staff members has a strong computing science character. The committee recommends enhancing the information science character of the staff to secure the profile the programme has described. In this respect, the curriculum could benefit from a more explicit overall (top-down) design. The cohesion of the curriculum could be better explained to staff and students.

The committee compliments the programme on the way it succeeds in bringing in the professional field, for instance in the virtual software company 'GiPHouse'. It appreciates the didactic approach, which does not seem to be part of an overarching concept, but is varied and works well. The small scale of the programme creates an open and creative atmosphere. Furthermore, the committee concluded that the facilities are of a high standard. This also applies to the digital equipment and social facilities. Students are well-supported. Both students and staff are actively involved in the quality control, thus enabling the programme to keep improving itself.

The programme management has shown it can play a proactive role in securing the vitality of the master's programme. It has already taken measures to make good use of the existing opportunities to attract (computing) science students, HBO bachelor students and international students. The committee appreciates the effort that has been put into the premaster's programme and the way it provides the master's programme with students who have the right level. Together with the feasibility of the programme, this has proven to generate good performance rates.

Standard 3: Assessment and achieved learning outcomes
The committee concludes that the programme uses a reasonable mix of assessments, with a balance between theory (written exams) and project work. The assessments match the intended learning outcomes of the courses and have an appropriate level. The programme has improved its assessment procedures and provides students with sufficient supervision during their graduation projects.

The committee assessed the achieved learning outcomes by inspecting a selection of the master theses. The overall level demonstrated that the intended learning outcomes were achieved. In general, the committee agreed with the grades awarded by the supervisors. The committee established, however, that in many cases the thesis subjects were not elaborated to their full scientific potential. This may relate to the fact that most reports focussed on the design of a specific application. The theses also confirmed that the Information Science programme is relatively close to Computing Science. In this respect, the committee feels the programme needs to keep reflecting on what the specific information science character of the programme requires. This also applies to another comment the committee had in connection with the selected theses: in more than one case the presentation was rather sloppy. Literature references, language, documentation and lay-out could be improved. For a programme which presents itself as a bridge between IT and business, this must be considered an important matter.

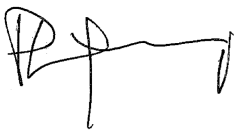
According to the committee, both the average level of the theses it studied and the fact that graduates easily find work within the professional field, demonstrate that the intended level and learning outcomes of the programme are achieved.

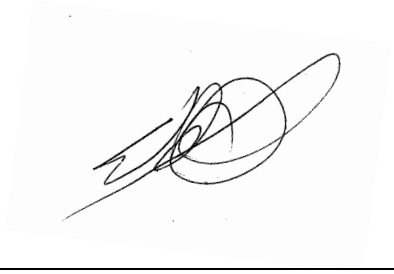
The committee assessed the standards from the Assessment Framework for Limited Programme Assessments in the following way:

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

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 judgments laid down in it. They confirm that the assessment has been conducted in accordance with the demands relating to independence.

Date: 10 December 2012.





Prof. dr. Roel Wieringa

Daan de Lange MA

Description of the standards from the Assessment Framework for Limited Programme Assessments

Organisational context
The Faculty of Science of Radboud University has organized its education into four institutes. The master's programme in Information Science is offered by the Educational Institute for Computing and Information Sciences (OII). Its primary goal is to provide bachelor's and master's programmes in Computer Science and Information Science. According to the self-evaluation report, the programmes reflect a strong connection between education and research. Key to establishing this connection is the thesis project, which forms a significant part of the master's programme and is carried out either in an academic research group or at a company.

Over the past few years, the bachelor's programme in Information Science has had a low intake. Since Radboud University aims at a minimum intake of 20 students a year for each bachelor programme, the university has decided to discontinue the bachelor's programme. This implies that in September 2012 the last cohort of students started this programme. Radboud University asked the committee to assess only the master's programme.

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.

1.1 Findings
The field of Information Science is concerned with the interaction between information and communication technology on the one hand and their organisational context on the other. It deals with the analysis, design, quality control and support of digital infrastructures in relation to their organizational contexts. Based on an analogy of information scientists with architects of physical buildings and infrastructure, the self-evaluation report uses the term *i-architect* to describe the kind of expertise and academic background information scientists require: They need to be able to mediate between different stakeholders of 'digital buildings' (and their possibly conflicting interests), and hence to understand both computer technology and the practical and organizational context in which this technology is to be used. Therefore, the programme aims at educating students to provide a bridge between information technology on one side and the people and organizations on the other.

The programme has elaborated this goal, stating that information scientists:

- Are academically trained graduates with good analytical skills;
- Are able to make essential and relevant abstractions, to compose the corresponding models and to (formally) reason in terms of these models;
- Not only have an eye for the final product but also for the required essential coordination and negotiation processes;
- Are able to come up with creative solutions.

Graduates need to be able to make both a valuable theoretical contribution to the development of the field of study and creative and practical contributions to the design and architecture of information systems. The self-evaluation report states that these 'objectives and goals of the programme meet the (inter)national standards and requirements from the professional working field'. This is substantiated by referring to the domain-specific reference framework, the 'Information Systems IS2010 Curriculum'. This model curriculum was compiled by the Association for Computing Machinery (ACM) and the Association for Information Systems (AIS), which is the world's largest educational and scientific computing society. The IS2010 curriculum classifies the required skills and knowledge as follows:

A) Information systems knowledge and skills (like designing and implementing information systems solutions);
B) Foundational knowledge and skills (like mathematics, analytical thinking and negotiation skills);
C) Domain fundamentals.

It separates seven core courses from career-specific electives (see: Appendix 2). The committee confirms that the IS2010 curriculum is a well-established starting point for the design of a master's programme specializing in information systems.

The programme has concretized its goals into ten learning outcomes, which are derived from the IS2010 framework (see Appendix 3). During the site visit, the programme management stated that learning outcome C-3 of this framework ('Performance evaluation of a within-domain') is not covered, because it is not within the scope of the related research institute of the faculty. The programme covers five of the seven core themes. The theme of Enterprise Architecture is not covered sufficiently, and IS strategy is not covered at all. According to the programme management, choices had to be made in order to translate the model curriculum into a 60 EC curriculum. The committee understands this point of view. The learning outcomes do cover the five Dublin-descriptors, as shown in a table in the self-evaluation report. The committee noted that the learning outcomes of the bachelor's and master's programmes are the same. The difference, according to the programme, is that master students are supposed to realize the learning outcomes at a level which is called 'directing': students learn to perform skills within a given framework independently, whereas bachelor's students do this under supervision. The committee thinks this difference could be elaborated further, but was convinced during the site visit that the programme makes the master's level sufficiently operational (see also Standard 2).

Another theme discussed during the site visit was the profile of the master's programme. According to the management, Information Science has intentionally shifted its focus from 'business' to 'security', thereby positioning itself in relation to other Dutch master's programmes in Information Science. It considers its focus on policy support in the IT security field a unique one. The committee is positive about the programme's focus, but during the site visit critically looked at its specific information science character, which seems to be overshadowed by the computer science character. According to the Association for Information Systems and the committee members, Information System programmes should include Technology, Business Fundamentals, Analytical and Critical Thinking and Interpersonal, Communication and Team Skills (see also: Standard 2). Both staff and alumni stated that graduates' ability to fulfil a bridging function between technological opportunities and business requirements is highly valuated on the labour market. Information scientists should be able not only to design infrastructures, but also to communicate and include their business effects. They claimed the master's programme has this focus and orientation. The

programme has installed a Professional Field Committee to strengthen and coordinate the feedback from the professional field regarding the curriculum. So far, the Professional Field Committee has only met once, but it has shown its commitment by unsuccessfully protesting against the closing down of the bachelor's programme.

1.2 Considerations

The committee confirmed that the IS2010 model curriculum is internationally accepted in the field of Information Science. It covers the relevant skills and knowledge required by information scientists. Since the final qualifications of the master's programme are directly associated to the IS2010 framework, the committee confirms the international relevance of the programme. The intended learning outcomes also meet the criteria for academic master programmes; they are of academic quality and cover the five Dublin-descriptors. Both the scientific and the professional orientation of the programme's goals have been adequately implemented.

Although the intended learning outcomes have a clear connection with the requirements resulting from the domain-specific reference framework, the committee found them rather generic, as they are directly derived from this framework. Given the focus and the choices the programme has had to make, one would also expect a more detailed and focused translation from the domain-specific reference framework into intended learning outcomes. They could have been elaborated further. The committee recommends that the programme make the choices in the IS2010 model and their motivation more explicit, and indicate more clearly how they are implemented in the curriculum.

Overall, the committee established that the level of the intended learning outcomes of the programme matches the master's degree level and the expected generic quality. It therefore assesses Standard 1 as 'satisfactory'.

1.3 Conclusion

Master's programme Information Science: the committee assesses Standard 1 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.

2.1 Findings

This standard describes the findings, considerations and conclusions of the committee regarding the teaching-learning environment. It begins with the contents and structure of the *curriculum*, the *scientific and professional orientation* and the *cohesion of the programme*. After sections on *didactics, student intake, feasibility and performance* and *programme-specific facilities*, the quality and quantity of the *academic staff* are assessed, as well as and *internationalisation*. It concludes with a section on *quality control*.

Curriculum

The Information Science programme takes one year (60 EC), largely consisting of compulsory components, which are the same for all students. The courses are taught in English. The self-evaluation report lists the programme components: compulsory courses (24 EC); a specialisation course (6 EC); free choice (6 EC); and the thesis (24 EC), which may be combined with an internship. The following table contains an overview of the curriculum:

Fall semester				Spring semester			
Code	Course name	ec	Q	Code	Course name	ec	Q
I00152	Research Methods	3	1,2	I00037	ICT and Society 2	3	3
I00153	Security in Organizations	6	1,2				
IMK003	Business Rules Specification and Application	3	2	**Specialisation: one of the following courses**			
IMK004	Reasoning with Computer Support	3	2	I00041	Information Retrieval	6	3,4
IMK005	Architecture and New Challenges	3	1,2	I00035	Foundations of Information Systems	6	3,4
IMK006	Business Process Architecture in Practice	3	1,2	IMC021	System Development Management	6	3,4
	Free choice	6					
	Master Thesis (start)	3			*Master Thesis (cont.)*	21	3,4
	Total amount of ec	30			**Total amount of ec**	30	

Table 1: curriculum overview

Depending on the courses chosen in the specialisation and free choice, a student can specialize in one or more of the following themes:

- Rule-based business execution: the modelling of business applications;
- Security: allow the system to operate in an open environment, e.g. the internet;
- Organizational embedding: business and IT alignment;
- Globalization: learning how to work in an international context.

In order to be able to judge the content and level of the various programme components, the committee studied the available information, like course descriptions in the study guides, course material, assignments, and blackboard sites. The programme uses 'course portfolio's', in which the learning objectives are documented and related to the content and assessment of the course. The committee was able to study all of them and got a good impression of the quality of the courses. It established that the course levels are adequate (although they vary) and sufficiently reflect an academic master's orientation.

The committee noticed that a large part of the curriculum falls into the Technology category of the IS2010 model curriculum. Furthermore, the 'ICT and Society' course (3 EC) is experienced as relatively easy and seems to have a more marginal position within the curriculum. The programme management disagreed with this observation but admitted that the programme has intentionally focused more on technical applications than on IS strategy and management, which is largely left out of the curriculum. During the site visit, the committee discussed this topic in several panel meetings, since IT-management is one of the core themes in the IS2010 model curriculum. At the Radboud University, the curriculum lacks two out of seven Core Courses of IS2010, being, 'Enterprise Architecture' and 'IS Strategy, Management and Acquisition'. These courses contain crucial knowledge and skills for information scientists to meet the chosen profile of 'bridge builders', between IT and

organizations. The programme management stated that it does not have the ambition to expand its staff's expertise in this direction. The emphasis of the curriculum will remain more on the technical side than on the management perspective. Key, according to the programme management, is teaching students how to make abstractions and to translate those into applications. The management explained that for a 60 EC curriculum some of the core courses of the IS2010 curriculum have to be left out. The committee understands the choices made but recommends continuing attention to the balance between technical and business competencies in the curriculum, so that the bridge-building learning objects continue to be achieved.

Some students and alumni thought that management *skills* were sufficiently covered by the curriculum, although not extensively. Graduates stated that the labour market is asking for the kind of expertise the master's programme teaches: requirements engineering, modelling and some management knowledge. When the committee asked alumni about their recommendations to improve the curriculum, they stated that they would add more business process management and communication skills. The courses, in which management skills are taught, are related to the so-called 'GiPHouse' ('integrated practicum'). They are not a major part of the total curriculum (Architecture and New Challenges; Business Process Architecture Practice, both 3 EC), but the committee was very positive about this component. GiPHouse is a virtual software company in which both the managerial roles and the executive roles are carried out by students from Computing Science, Information Science, and Artificial Intelligence. At the end of the Business Process Architecture Practice course, students gained insight into the developments in the field of business process management and the relation to software applications. They have also applied the most recent techniques in order to formulate a state-of-the-art integrated architecture framework. From our observations we conclude that more attention should be paid to business process management in this course.

Scientific and professional orientation
The programme has both a scientific and a professional orientation. Regarding the first, it claims a close interaction between education and research. Students start the curriculum with a Research Methods course. Then they get acquainted with various research fields in the other courses. Some of the courses have assignments in which the students do a small research project in the context of that course. The master thesis is a research assignment that comprises more than one-third of the curriculum. Students demonstrate the ability to analyse a problem in information science and to design a solution for this problem using scientific methods and techniques. It is possible to combine this research with an internship. The self-evaluation report lists three ways in which the programme is linked to the faculty's research activities:

- Conceptual modelling and system specification play an important role in the current curriculum and are based on research in the Institute for Computing and Information Sciences (ICIS). Various advanced forms of modelling are researched in the Model-Based System Development (MBSD) section, and find their way into the master courses. In this context special attention is paid to the process of modelling and system development, for which gamelike procedures (dialogue games) are developed in the Collaborative Modelling Lab, to aid focused conceptualization and communication involving stakeholders who are untrained in formal systems.
- Formal methods are an important focal point of research in ICIS. Supporting these formal methods by computer tools makes them powerful and useful for practical use, also in the area of business rules. The Reasoning with Computer Support course deals with these automated techniques.

- Research in security at ICIS has been widening its scope, from looking mainly at technical ICT matters to also looking at organizational issues and legal aspects. The widening of the education in security has followed suit, with the introduction of the courses Security in Organizations and Law in Cyberspace. Recently, a 'Privacy and Identity Lab' has been opened. This aims to become an expertise centre on the technical, legal and socioeconomic aspects of privacy and identity. According to the self-evaluation report, this will lead to more possibilities for master theses in these areas.

The committee was able to verify that the scientific orientation of the programme is reflected in the way its courses are designed. The education is academic in nature. This was confirmed by the students, especially those who come from vocational programmes through a premaster's programme. They stated that the programme teaches them to reflect on research questions instead of just finding design solutions without justification. Assignments are more open-ended and students are supposed to justify their choices.

The committee is positive about the way the programme aims at embedding its curriculum in research, but is worried about the continuity of this in the future, given recent staff changes. During the site visit, the programme management was able to give examples of research which can claim to be typically 'information science'. One of them was the issue of voting machines and security; another one was 'cookie legislation'. The societal aspect addressed in this kind of research is considered essential for the Information Science curriculum by programme management. The committee agrees with this and recommends ensuring that in a future, security-oriented Information Science curriculum, the implementation of IS2010 guidelines will remain clearly visible, and that staff with the required expertise will be available

The professional orientation of the programme is reflected in various courses in which designing knowledge and skills are being developed. Professors by special appointment enable the programme to keep in direct contact with the organizational practice and give students opportunities to orient themselves to the working field. The programme states that students have to be able to make not only a theoretical but also a practical contribution to Information Science by being able to design an architecture of information systems. Some learning outcomes refer to the creative and professional roles students need to be able to play in a given practical context ('negotiate', 'manage', 'design', 'communicate' etc.). When the committee asked the staff and management how these learning outcomes are made operational, the key word was 'GiPHouse'. In GiPHouse, master's students learn to tackle a practical information system problem in its full scope: not only do they design software, they also think about and manage the whole project. As mentioned before, the committee is positive about this professionally oriented curriculum component, but it established that it makes up only a small part of the curriculum.

Cohesion of the programme

The self-evaluation report does not provide detailed information about the elements that make the programme cohesive. All students follow the same compulsory core programme, which starts with a Research Methods course and culminates in the (individual) graduation project. The various components are intended to strengthen each other. During the site visit, the committee asked the programme management and the educational committee how they would describe the philosophy behind the construction of the curriculum. It was not conceived at a single point in time but has evolved over the years. There are no explicit 'learning lines', but the programme director coordinates the content of the courses and tries

to ensure coherence. Since the programme management is also involved in the bachelor's programmes, a number of master's courses can be linked up well with bachelor's courses.

Staff stated that at the beginning of a course students are explicitly informed about its position within the curriculum and its relation to the other courses Students could not confirm this. In the view of the alumni, only at the end of the programme things fall in place. The committee has the impression that cohesion exists between some courses, coordinated informally by the staff involved, but that there is no overall plan which is implemented in the curriculum. The learning outcomes per course are laid down in the study guide, but the staff stated that they could be used more explicitly and should be updated. They find it difficult to pinpoint the exact development of skills and knowledge in the curriculum. The committee recommends a reconsideration of the overall architecture of the programme, also in view of the planned change to a security emphasis of the programme.

When the curriculum changes, a study group is installed to reflect on its content and design. The educational committee stated that it recently set up a working group which looks at the way the courses are structured and relate to each other. The committee established that all courses do contribute to the realization of the learning outcomes, but that this happens in an implicit manner. Cohesion is ensured by the fact that a small staff takes care of only a small curriculum, and several teachers are involved in more than one course. As recommended above, this bottom-up maintenance of programme structure could be enhanced by a more explicit top-down policy.

Didactics
The programme uses a mix of educational methods:

- **Lectures**: classical teaching format in which the teacher explains the topic. Most compulsory courses use this format
- **Tutorials**: highly interactive format, in which students make exercises under supervision of a staff member, PhD-student or student-assistant.
- **Projects**: students investigate and solve a problem in a small group, while giving an academic argumentation for the chosen solution. This helps them developing the link between the academic material and working life.
- **Practical courses**: GiPHouse is a virtual software company that has been active for about 15 years. In GiPHouse, both the managerial roles and the executive roles are carried out by students from Computing Science, Information Science, and Artificial Intelligence.
- **Response hours**: courses with a staff member aimed at the verification of the understanding by students. The initiative is with the students to ask questions, give comments, etc.
- **Self-study**.

Many of the courses are structured as plenary lectures with practicum classes and self-study. Practicum classes can have a tutorial form, in which students work on exercises while a teacher explains the answers, or a response hour. In addition to this, other courses use project work, where a small group of students works on a larger problem, with less direct supervision from a teacher. This helps the students to learn to plan and cooperate and to apply the knowledge in a more practical setting. The self-evaluation states that the programme strives to reach a balance between these educational methods. The committee established that it has succeeded in doing so. It is very positive about the project work and the number of

assignments students has to take. There is no strict separation between practical and theoretical courses, as there may also be (small) projects in the more theoretical courses.

Students stated that they enjoyed the small scale of the programme: limited group sizes enable staff and students to create an active atmosphere and a lot of interaction. Teachers know what is taught in other courses and students are expected to show initiatives. The course content may vary throughout the years although the same theory is discussed, contemporary cases are used. Students confirmed that they worked with 'real' business cases, for example in the Information Retrieval course. The self-evaluation report also mentions that one of the staff members is a professor by special appointment in the didactics of the exact sciences. He advises in matters relating to improving the teaching methodology. However, there does not seem to be an explicit overall didactic concept.

The committee confirms that the educational methods are adequate for the intended learning outcomes of the programme. They provide an attractive and motivating teaching-learning environment.

Student intake

Appendix 5 of this report contains information about the number of students registered in the programme as well as their performance. The average intake is around 25 students per year, which is less than the master's programme in Computer Science (35). After the closing of the bachelor's programme, the master's programme in Information Science will lose the programme that has provided a steady intake of students. The programme management is confident that it will remain to be able to attract a sufficient number of students from other programmes. The bachelor's programme in Computing Science will incorporate some aspects of the Information Science bachelor's programme, by creating an optional Information Science track, which will allow Computing Science graduates to enter in the Information Science master's programme. Furthermore, a 30 EC minor programme is being designed for science students (bachelors in mathematics, physics, chemistry or biology) that also provides them with access to the master's programme.

The largest part of the intake consists of students with a vocational background (HBO). They enter the Information Science master's programme after completing a premaster. During the site visit the committee received information about the content of the premaster's programme. It confirmed the quality of the premaster's programme, in the sense that those students who manage to finish it (roughly 75 percent) have a very good chance of completing the Information Science master's programme, too. Before entering the premaster programme, students have an individual intake meeting with a staff member. This act as a kind of gatekeeper: roughly a quarter of the students decide not to enter the premaster's programme, but those who do are almost always successful. The self-evaluation report states that the level of the HBO students has changed over the last few years, notably in the area of 'hard skills' (mathematics and theory). This has increased the gap compared with the final qualifications of the academic bachelor's programme. Mathematics is therefore stressed strongly in the premaster. One of the alumni who had entered the master's programme after the premaster was very positive about the extra support he had received to improve his knowledge of mathematics. Depending on the student's deficiencies, the Board of Examiners can approve a personalized premaster's programme. This personal approach starts with a special recruitment day for HBO students, in which every participant meets with a staff member who advises them and discusses the transition programme.

Since the intake in the premaster's programme is likely to drop due to new financial policies, the programme has taken further action to attract students: for excellent HBO-students, the programme will offer a special 30 EC minor at HBO colleges in the region of Nijmegen. This minor will be part of their bachelor's curriculum and will speed up the transition to the university's programme. To attract foreign students, special literature-based programmes are used to prepare them for an intake exam while they are still abroad. The programme management explained that postdoc teachers support these candidates from Nijmegen. Only when they think a candidate has a reasonable chance of passing, the intake exam is organized.

Feasibility and student performance
The programme has a study load of 60 EC, which students have to complete within one year. Not all students succeed in completing their studies within this period, but this should not necessarily be taken as an indication that the programme is not feasible. The average time spent on the programme is just over a year. A complete overview of the students' flow through the programme is given in Appendix 5. The programme distinguishes between students with a bachelor in Information Science, HBO students, and others. The self-evaluation report gives the number of students per graduation cohort along with the average registration time for the master's programme, the average premaster registration time, and the total registration time in months. The figures show that around 55 percent is able to finish the programme within one year, and around 90 percent within two.

One of the topics discussed during the site visit was the feasibility of the programme given the large proportion of HBO students. As mentioned in the previous section, the premaster's programme brings the students at an appropriate level to enter the master. Students and alumni with a HBO background confirmed this, especially referring to the Formal Thinking and Mathematics courses. They stated that they no longer lacked this basic knowledge once they entered the master's programme. The committee established that the level of incoming students is sufficient to prevent problems. The performance of HBO bachelors does not differ significantly from that of academic bachelor students. The combination of students with a vocational background and those with an academic bachelor's degree actually seems to be working out well. Both groups bring their own kind of experience and attitude, which results in a good mix. While the HBO students mostly stay within their own group in the premaster's programme, they integrate very well in the master's programme.

During the panel meetings, the committee asked whether staff and students had noticed any obstacles in the curriculum which might cause unnecessary delay. Apart from some electives (such as Security and Innovations) that can have a large number of students, no problems of this kind were reported. The committee assessed that the average study load of the courses is sufficient and not too high. Most delay occurs as students write their theses. The committee considers the study load of the programme to be feasible.

Programme-specific facilities
In its preparation and during the site visit the committee also assessed the specific facilities the students are provided with. The following elements could be mentioned:

- **Blackboard**. All courses use this digital learning environment. The committee could confirm that the sites work well. Many lectures are video-recorded and offered to the students.
- **Electronic Workshop**. This is a kind of *wiki* environment where students and teachers meet each other. Participants follow and discuss each other's work. The committee established that it is used in several courses, such as Research Methods 2

and Architecture and New Challenges. According to the self-evaluation report, it 'supports the acquisition of higher cognitive skills in a traditional master-apprentice construction'.

- **Master Thesis Lab**. This is both a physical and electronic environment for master thesis students. During the site visit, staff explained that most students write their theses at home.
- **GiPHouse**. As mentioned before, in this course students simulate their own software house. Two rooms are available and especially equipped for this purpose, enabling students to run the projects.
- **SAT solvers**. These are modern tools based on satisfiability that are used to train the students to reason with computer support in a business context.

After the last panel meeting, the committee members were given a tour of the facilities in the Huygens building. Not only could the committee confirm the claims about the quality of the facilities mentioned in the self-evaluation report, it also established that the master's programme is housed in open and friendly environment, facilitating good contact between staff and students.

During the site visit, the committee also had a meeting with the student advisor, who monitors the progress of the students and helps out where required. Whereas HBO students meet with a staff member who can advise them on a personal premaster's programme, contacts with the student advisor mainly depend on the initiative of the individual master's students. Only when delay is evident will the study advisor take the initiative and arrange a meeting. Both students and graduates were positive about the amount of support they received during the master's programme: most teachers are very approachable and willing to give personal advice.

Academic staff

The teaching staff is embedded within the faculty's research, since it mainly consists of employees of the Institute for Computing and Information Sciences. The committee recognizes the quality and international reputation of the staff. All members of the teaching staff have a doctorate degree and a research assignment. Their appointments are evenly divided into education and research fte:

Level	number	fte education	fte research
professor	6	1.1	1.1
associate professor	4	0.8	0.8
assistant professor	4	2.0	2.0
postdoc researcher	1	0.2	0.8

Table 2: Overview of the teaching staff

The self-evaluation report states that due to the fact that the Information Science curriculum is intertwined with the Computing Science curriculum, the student-staff ratio cannot be expressed for Information Science alone. The committee established that the ratio is quite favourable: around 1:20. Without doubt the programme can claim to have enough teachers.

Teachers are required to have their Basic Teaching Qualification (*Basiskwalificatie Onderwijs*, BKO). The Educational Institute is now in the process of having all its teachers obtain the BKO. Teacher training programmes are organized when and where required. Staff members

are encouraged to take refresher courses to maintain their educational skills. During the annual performance review, attention is paid to their educational skills and how they may be developed further. Students were positive about the didactic skills of the staff and even confirmed that less talented teachers are actively improving their skills.

The committee confirms that the staff has adequate expertise to teach the courses in the curriculum. It noted, however, that a number of staff active in Information Science research have left the organization. This creates a potential vulnerability regarding the embedding of the Information Science master's programme in research. The management stated that it does not distinguish too explicitly between computing science and information science, partly because the latter seems to be less popular with students. No teacher is exclusively appointed as an 'information science teacher'. According to the management, there is PhD research that could be labelled typical 'information science'. The committee is of the opinion that the programme would benefit from research dedicated to information science. This would also benefit the alignment with the IS2010 model curriculum components. Some staff members agreed with this observation but emphasised that the current focus on architecture and security is adequate and sufficiently oriented towards information science. The committee finds that the security theme is better embedded in the research organization than enterprise architecture, as intended in the IS 2010 curriculum, and recommends ensuring that the architecture theme also remains well-embedded in the research organization.

Internationalization
The self-evaluation report lists the activities the programme undertakes to stimulate internationalization:

- Students can do their master thesis with one of the preferential partners of the programme: Glasgow, Leuven, Oxford, Uppsala and Zurich.
- There are also arrangements with other foreign universities: Makerere University Uganda, Catholic University College of Ghana, Fiapre Sunyani, Ghana and the Amrita University India, and URFN Natal in Brazil.
- An annual summer camp is organized for highly talented students. This is a cooperation between the Computing and Information Science programmes of the University of Duisburg-Essen and those of Radboud University. The event is sponsored and hosted by Océ Research and Development at Océ headquarters in Venlo.
- Radboud University organizes the intensive programme *Information Foraging* as a special international course. The students are trained for two weeks. The course is aimed at an international audience, in cooperation with other EU universities.
- There is an annual international study trip, which is integrated into the curriculum as an optional course ('ICT in a Different Culture'). In this course students investigate research questions about the use of ICT, the societal impact of ICT technology, or the ICT industry in a visited country on another continent.

During the site visit, the committee asked alumni and students about their experiences with internationalization and doing a master's thesis research abroad. It appeared that only a small number of students actually take the opportunity to study in one of the partner institutes. One of the alumni had done research in Zambia. Students stated, however, that they feel stimulated to gain international experience. They were positive about the ICT in a Different Culture course and the possibility to do a minor abroad.

In addition to providing own master's students with the opportunity to study abroad, the programme aims at attracting international students. The data in the self-evaluation report illustrate that so far only a few international students have entered the programme. Still, all courses are taught in English. According to the students, the level of English of most teachers is good. In their panel meeting the examination committee stated that the programme could do more to stimulate internationalization. They admitted that the Teaching and Examination Regulations should be available in English, too. They will be translated soon.

Quality control
The committee assessed the way the programme checks the quality of its teaching-learning environment and takes measures to improve it when necessary. Students are asked to evaluate the quality of each course and the didactic quality of the teacher. Some teachers organize extra evaluation meetings themselves. The programme committee (*Opleidingscommissie,* OLC, for both the bachelor's and master's programme) meets every month and analyses the outcomes of the evaluations. Findings are sent to the educational director, who processes them and when necessary discusses measures for improvement of problematic courses. He also writes a semester evaluation report and prepares all organizational measures that result from it. Course portfolios are used to determine a scheme for all these elements of the feedback cycle. The self-evaluation report also mentions that study advisors report to the educational director, and that teacher satisfaction is monitored. This is done through appraisal interviews, evaluations and educational conference days (*Onderwijsdagen)*, where teachers meet to discuss educational issues. In their panel meeting, the OLC members were able to mention concrete examples of measures that had been taken to improve the content or scheduling of a course.

The committee established that the quality assurance protocol is an improvement showing that the programme has taken the recommendations made by the previous assessment committee seriously. During the site visit, it found that apart from the official steps in the feedback cycle, there is also an informal culture of critical feedback, which appears to be functioning well. Students feel free to comment on all kinds of aspects of the teaching-learning environment. There is a study association which is actively involved. They also organize lectures and keep in touch with the alumni. The alumni, however, are not regularly consulted by the programme. According to the committee, the programme might benefit from inviting them to give recommendations more regularly.

2.2 Considerations
On the basis of the information given in the self-evaluation report, study guide, the course material studied and the meetings held during the site visit, the committee concludes that the programme provides students with a curriculum that has an adequate scientific orientation and also addresses professional learning outcomes. It found that the level of the courses is adequate, although there seems to be room to intensify the study load. The fact that the programme is embedded in the faculty's research practices facilitates fruitful interaction between education and research, while the contacts with the working field and the use of real world business cases ensure a professional orientation, as well. The committee is enthusiastic about the GiPHouse practical. Overall, students are academically educated in a way that prepares them adequately for the labour market.

The programme takes the IS2010 model curriculum as a starting point and has made its local choices within that curriculum, focussing on security and architecture. The committee understands the necessity to make these choices, but finds that the current implementation can be improved. The theme of enterprise architecture, which is within the scope of the

choices made, is currently not well-integrated in the programme, due to the recent departure of key personnel. The goal of the master's programme in Information Science is to educate students so they can perform a bridging function between IT and organizations. Assessing the curriculum, the committee found that the technical side of the bridge is better developed than the business side. The emphasis is currently too much on applications. The committee is very positive about the courses related to GiPHouse, but it recommends paying due attention to the Business Fundamentals of IS 2010, including such topics as enterprise architecture, identifying and analysing opportunities for IT-enabled organizational improvement and IS strategy.

There is room for improvement in the programme. For example, it was not clear how the Reasoning with Computer Support course contributes to the IS 2010 framework. As stated before, there seems to be room to intensify the study load of other courses. In the same vein, the cohesion of the curriculum could be better explained to staff and students, as has been done for the bachelor's programme.

Most of the research of the involved staff members has a strong computing science character. The committee recommends enhancing the information science character of the staff to secure the profile the programme has described. In this respect, the curriculum could benefit from a more explicit overall (top-down) design. This will not only make clear what scientific expertise is required for the long term, it will also improve the cohesion of all curriculum components.

The committee is positive about the teaching-learning environment. First of all, it compliments the programme on the way it succeeds in bringing in the professional field, not only in GiPHouse, but also in guest lectures, professors by special appointment, the use of real cases and the Professional Field Committee. It recommends adding to this regular input from the alumni, which can be a valuable resource. Secondly, it appreciates the didactic approach, which does not seem to be part of an overarching concept, but is varied and works well. The combination of lectures, projects and practical courses is very stimulating and matches the objectives of the programme. It creates an attractive teaching-learning environment. The small scale of the programme adds to this and creates an open and creative atmosphere. Third, the facilities are of a high standard. This also applies to the digital equipment and social facilities. Students are well-supported: the scientific and didactic abilities of the staff are good, the staff-student ratio is adequate, and teachers are approachable and helpful. Both students and staff are actively involved in the quality control, thus enabling the programme to keep improving itself.

The committee understands that the programme is worried about the intake, since the bachelor's programme in Information Science will be phased out and HBO-intake is likely to drop as well. The programme management has shown it can play a proactive role in securing the vitality of the master's programme. It has already taken measures to make good use of the existing opportunities to attract (computing) science students, HBO bachelor students and international students. The committee appreciates the effort that has been put into the premaster's programme (for instance by the Board of Examiners) and the way it provides the master's programme with students who have the right level. Together with the feasibility of the programme, this has proven to generate good performance rates.

The overall impression of the teaching-learning environment is positive. The programme meets academic requirements, is feasible and enables the students to achieve the final qualifications. The committee found that the programme is able to take action to improve

itself, and urges it to continue doing this in line with the recommendations given above, and given the strategic choices made by programme management, such as focussing on the security aspects of Information Science.

2.3 Conclusion

Master's programme Information Science: the committee assesses Standard 2 as **satisfactory.**

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.

3.1 Findings

The assessment modes for all course components are described in the course descriptions. The committee established that a mix of evaluations, tests and examinations is used. Students are evaluated in a number of different ways to test their knowledge and skills and their application: multiple choice and open questions, essays, self-reflection assessments, papers, and GiPHouse. During the site visit, students confirmed that the assessments were representative and fair. Most courses are evaluated by practical assignments and a written examination at the end. GiPHouse is partly evaluated on the basis of self-assessment, peer feedback, and presentations. The committee checked the quality of the assessments together with its review of the course materials, and established that they matched the expected level.

The self-evaluation report explains that with the start of the 2011-2012 academic year, the Educational Institute for Computing and Information Science has introduced new procedures to monitor the adequacy of testing and assessment. The programme has adopted them. Teachers report on the tests and assessments via a course portfolio. The latter are made accessible to the Board of Education, the programme committee and the Board of Examiners. The Board of Examiners checks the tests and assessments. The committee read about the procedure during the site visit. It can be summarized as follows:

- The learning objectives of each course are documented in the course portfolio.
- Every test that contributes to the final grade is included in the course portfolio, together with a test matrix and a grading model. The test matrix relates the learning objectives to the test.
- Every test is evaluated by a colleague. This is recorded in the course portfolio.
- The student evaluations and the teacher evaluation of the course are included in the course portfolio. They include an evaluation of the testing.
- The course portfolio is accessible to the programme committee, Board of Examiners and Board of Education.
- The Board of Examiners checks the content of the various course portfolio on a regular basis, and also the portfolio of a course if there is a special reason to do so.
- The Board of Examiners appoints a second reader for each thesis and also checks thesis assessments at random.

The committee assessed the achieved learning outcomes by inspecting a selection of the master theses from the two most recent cohorts of the programme. This selection was done at random by the project leader (ensuring that all grades were represented) and the chairman. The committee found that, essentially, the theses were satisfactory. The overall level demonstrated that the intended learning outcomes were achieved. It did not encounter theses that should not have passed. The theses showed a logical structure and clearly explained the methodology used. In general, the committee agreed with the grades awarded by the supervisors.

The committee established, however, that in many cases the thesis subjects were not elaborated to their full scientific potential. In these cases, the theoretical reflection on the research was relatively superficial, and the scientific objective could have been better expressed and accounted for. This may relate to the fact that most reports focussed on the design of a specific application. During the site visit, the committee raised the question of whether there is a tension between the knowledge-oriented and design-oriented learning outcomes of the thesis and whether these two kinds of theses need to be assessed according to different criteria. The programme management stated that the emphasis may differ, but both elements must be part of each thesis. An information problem must be modelled, and this abstraction must be translated back to the application.

The theses confirmed that the Information Science programme is relatively close to Computing Science. In none of the selected theses was social sciences-oriented empirical research methodology used. In this respect, the committee feels the programme needs to keep reflecting on what the specific information science character of the programme requires. This also applies to another comment the committee had in connection with the selected theses: in more than one case the presentation was rather sloppy. Literature references, language, documentation and lay-out could be improved. For a programme which presents itself as a bridge between IT and business, this must be considered an important matter.

During the site visit the committee discussed the thesis assessment with the Board of Examiners, which stated that it has checked the quality systematically for the past three years. A new assessment form has been introduced, on which sixteen elements have to be marked. This makes assessment more transparent, a move applauded by the committee. But the weighing of these criteria, as explained to the committee during the panel meeting, gives room for interpretation, and the transparency about this could be improved further.

The committee asked the alumni how they were supported during their thesis research. They had no complaints: they had felt free to make their own choices but had been guided adequately. Some graduates had done research in a company. The self-evaluation report lists the companies that have hosted students for an internship in the last two years. It claims that the types of activities alumni perform within organizations are in line with the programme's goals and also demonstrate that the learning outcomes are achieved. Companies express that they have a high regard for the information science graduates, notably for their ability to bridge the gap between ICT and the business practice. The committee established that the master's programme does succeed in delivering graduates that perform in professional practice to everyone's satisfaction.

3.2 Considerations

The committee concludes that the programme uses a reasonable mix of assessments, with a balance between theory (written exams) and project work. The assessments match the intended learning outcomes of the courses and have an appropriate level. The programme has

improved its assessment procedures and provides students with sufficient supervision during their graduation projects. According to the committee, both the average level of the theses it studied and the fact that graduates easily find work within the professional field, demonstrate that the intended level and learning outcomes of the programme are achieved.

The content of the theses does confirm, however, that the profile and objectives of the programme regarding the bridging function of information science are much better implemented on the application side than on the other. Project management, enterprise architecture and IS strategy content of the programme could be enhanced.

3.3 Conclusion

Master's programme Information Science: the committee assesses Standard 3 as **satisfactory**.

General conclusion

The committee concludes that the intended learning outcomes of the master's programme have been concretised in terms of content, level and orientation. They meet the international requirements. It also concludes that the content and structure of the curriculum are satisfactory, although the reference framework's model curriculum could be better implemented by paying attention to the organizational side of the IS 2010 curriculum, and the cohesion between the programme components should be made more explicit. The staff and facilities create a coherent and attractive teaching-learning environment for the students. The programme has an adequate assessment system and demonstrates sufficiently that the intended learning outcomes are achieved.

Conclusion

The committee assesses the *master's programme Systems and Control* as **satisfactory**.

APPENDICES

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

Prof. E.W. Berghout EMITA obtained his degree in economics from Tilburg University, his IT Auditing degree from Erasmus University and his PhD in Technical Sciences from Delft University of Technology. He is full professor of Information Systems at the University of Groningen and holds part-time positions at TIAS Business School and Erasmus University. He held a visiting professorship at the London School of Economics and served on the Board of Examiners of the University of Groningen (Chair) and City University Business School. He is President of the Benelux Chapter of the Association for Information Systems (AIS). His research interests are in IT Economics and IT Governance and Control as well as general philosophy and Information Systems. He (co-)authored more than 100 papers and was this year's keynote speaker at the International Conference on Information Systems (IADIS, Berlin).

Prof. Wim Van Grembergen is a full professor at the Economics and Management Faculty of the University of Antwerp and executive professor at the Antwerp Management School. He teaches Information Systems at the bachelor, master and executive level, and conducts research in IT governance, IT strategy, IT performance management and the IT balanced scorecard. Within his IT Alignment and Governance (ITAG) Research Institute, he conducts research for ISACA/ITGI on IT governance and supports the continuous development of COBIT and VAL IT. Currently, he is involved in the development of COBIT5. He is a frequent speaker at academic and professional meetings and conferences and has served in a consulting capacity to a number of firms. He has several publications in leading academic journals and published books on IT governance and the IT balanced scorecard. His most recent book, *Enterprise Governance of IT. Achieving strategic alignment and value*, was published in 2009.

Haska Steltenpohl MSc started working in a nature health shop after his high school. During his work at the shop he developed an interest in computer science and after 7 years decided to start with his Bachelor degree Information sciences at the University of Amsterdam. He completed the degree within three years and continued with the more technical oriented Master Human Centred Multimedia at the before mentioned University. During his Bachelor and Masters degree he worked for the education committee. His main interest lies with the interaction between humans and navigation systems. His thesis "Vibrobelt: a Tactile Navigation Device for Cyclists" included producing and investigating a tactile user navigation interface for cyclists

Prof. O. De Troyer has been full professor of Computer Science and head of the research group Web & Information Systems (WISE) at the Computer Science Department of the Free University of Brussels (Belgium) since 1998. She received a master's degree in Mathematics from the Free University of Brussels in 1979 and a PhD degree in Computer Science from Tilburg University (The Netherlands) in 1993. She held positions at Control Data's Research Lab in Brussels, University of Hasselt (Belgium), and Tilburg University (The Netherlands). Her research focus is on conceptual modelling formalisms, design methodologies, and usability. Over the years, her focus has ranged from Database over Web systems towards Virtual Reality and Serious Gaming. Current research directions include Web Engineering, Educational Games, and Variability Modelling. She has (co-)authored more than 100 papers.

Prof. Roel Wieringa is Chair of Information Systems at the University of Twente. His research interests include the modelling and design of e-business networks, requirements engineering, and research methodology for software engineering and the design sciences. He

has written two books, *Requirements Engineering: Frameworks for Understanding* (Wiley, 1996) and *Design Methods for Reactive Systems: Yourdon, Statemate and the UML* (Morgan Kaufmann, 2003). He was Associate Editor in Chief of *IEEE Software* for the area of requirements engineering from 2004 to 2007. He is on the board of editors of the *Requirements Engineering Journal* and of the *Journal of Software and Systems Modeling*. He has been head of the Computer Science Department of the UT since 2009 and was scientific director of the School for Information and Knowledge Systems (SIKS, www.siks.nl), which provides advanced education to all Dutch PhD students in information and knowledge systems, from 2006 to 2011.

Appendix 2: Intended learning outcomes

IS 2010 Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems

Association for Computing Machinery (ACM)
Association for Information Systems (AIS)

Heikki Topi
Joseph S. Valacich
Ryan T. Wright
Kate M. Kaiser
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Janice C. Sipior
G.J. de Vreede

www.acm.org/education/education/curric_vols/MSIS2006.pdf

EXECUTIVE SUMMARY

IS 2010 is the latest in a series of model curricula for undergraduate degrees in Information Systems. It builds on the foundation formed by this earlier work, but it is a major revision of the curriculum and incorporates several significant new characteristics. IS 2010 is the third collaborative effort by ACM and AIS. Both organizations have worldwide membership, and therefore, IS 2010 includes elements that make it more universally adaptable than its predecessors. IS 2010 is not directly linked to a degree structure in any specific environment but it provides guidance regarding the core content of the curriculum that should be present everywhere and suggestions regarding possible electives and career tracks based on those.

There are several reasons motivating this revision. The work leading to the previous signficant revision, IS'97, took place more than 10 years ago, and in a rapidly changing field this alone is an important reason to re-evaluate the curriculum. There has been a great deal of change in technology and industry practices, including the globalization of IS development processes, introduction of Web technologies, emergence of a new architectural paradigm, widespread utilization of large-scale ERP systems, ubiquitous availability of mobile computing, and broad use of IT control and infrastructure frameworks, such as ITIL and COBIT. This curriculum is also introduced after a period when the interest in studies in Information Systems has significantly declined, and the field is attempting to reverse this trend. This curriculum revision represents an effort to re-evaluate the core principles of the discipline through a very careful specification of the degree learning outcomes. Finally, new social networking technologies made it possible to attempt to include the IS community as broadly as possible.

This revision has four broad key characteristics that have shaped the outcome significantly. First, the curriculum reaches beyond the schools of business and management. Previous versions of the IS curriculum have been targeted to a typical North American business school; this model curriculum is, however, guided by the belief that even though business will likely continue to be the primary domain for Information Systems, the discipline provides expertise that is critically important for an increasing number of domains. Second, the outcome expectations of the curriculum have been very carefully re-evaluated and articulated first in the form of high-level IS capabilities and then in three knowledge and skills categories: IS specific knowledge and skills, foundational knowledge and skills, and domain

fundamentals. Third, the curriculum is structured so that it separates the core of the curriculum from electives with the intent of supporting the concept of career tracks. Finally, the design of this curriculum includes enough flexibility to allow its adoption in a variety of educational system contexts.

The high-level IS capabilities that the curriculum specifies as the highest level outcome expectations are as follows:

- Improving organizational processes
- Exploiting opportunities created by technology innovations
- Understanding and addressing information requirements
- Designing and managing enterprise architecture
- Identifying and evaluating solution and sourcing alternatives
- Securing data and infrastructure, and
- Understanding, managing and controlling IT risks.

These high-level capabilities are translated into knowledge and skills in three categories:

1. IS specific knowledge and skills

a. Identifying and designing opportunities for IT-enabled organizational improvement
b. Analyzing trade-offs
c. Designing and implementing information systems solutions, and
d. Managing ongoing information technology operations

2. Foundational knowledge and skills

a. Leadership and collaboration
b. Communication
c. Negotiation
d. Analytical and critical thinking, including creativity and ethical analysis, and
e. Mathematical foundations

3. Domain fundamentals

a. General models of a domain
b. Key specializations within a domain and
c. Evaluation of performance within a domain.

The curriculum is designed to educate graduates who are prepared to enter the workforce equipped with the knowledge and skills specified in these three categories. As discussed above, it separates the core from career track electives and includes seven core courses:

1) Foundations of Information Systems,
2) Data and Information Management,
3) Enterprise Architecture,
4) IS Project Management,
5) IT Infrastructure,
6) Systems Analysis & Design, and
7) IS Strategy, Management, and Acquisition.

It is not possible to offer a complete collection of career track electives in a model curriculum document, but we include a number of elective course descriptions as examples. Notable

changes in the included courses are as follows: a) application development is no longer included in the core of the curriculum; b) data networking and computer architecture are covered at a higher level of abstraction in an IT Infrastructure course; c) enterprise architecture and IS project management are now part of the core; d) the personal productivity tools course has been removed from the curriculum, and e) the prerequisite structure has been simplified. Notably, both data & information management and systems analysis & design have maintained their central roles in core of the curriculum. In addition to the core curriculum, we provide some examples of possible career tracks and career track electives; in addition, we illustrate the use of the model curriculum in three different academic contexts with varying general degree requirements.

The task force believes that the outcome expectations, structure, and content of the new curriculum make it significantly more broadly applicable than the previous IS model curricula were. We hope that this document demonstrates that Information Systems as a discipline can make significant contributions to a number of domains, including but not limited to business, and that its core areas of expertise are highly valuable and even essential for the best.

Appendix 3: Intended learning outcomes

Doelstellingen en eindtermen van de bachelor- en masteropleiding Informatiekunde Onderwijsinstituut voor Informatica en Informatiekunde Radboud Universiteit,
(1 september 2011)

1. Doelstellingen van de opleidingen

De doelstelling van de Nijmeegse Informatiekunde opleidingen is informatiekundigen op te leiden die de capaciteiten hebben om op het gebied van:

- **Onderzoek:** als onderzoeker in een onderzoeksteam een theoretische bijdrage te leveren aan de ontwikkeling van het eigen vakgebied;
- **Ontwerp en architectuur:** als professional in diverse rollen in een gegeven praktische context een creatieve en praktische bijdrage te leveren aan ontwerp en architectuur van informatiesystemen in hun menselijke, organisatorische, informationele, technologische en systemische context.

2. Eindtermen van de opleidingen

De eindtermen vormen een nadere specificatie van de doelstellingen, en worden uitgedrukt in termen van handelingen waarin de afgestudeerde competent is. De eindtermen van de opleidingen worden hier achtereenvolgens uitgewerkt voor de componenten van het curriculum. Hierbij beschrijven we achtereenvolgens de (deel-)vaardigheid, en de concrete invulling van die vaardigheid in termen van wat de student wordt geacht te kunnen. Bij de invulling zijn we uitgegaan van het raamwerk dat geboden wordt in het IS2010 Curriculum, samengesteld door ACM en AIS.

A *IS knowledge and skills*
Een informatiekundige is na afloop van de studie in staat om:
A-1 Identifying and designing opportunities for IT-enabled organizational improvement:
een evenwichtig pakket van eisen op te kunnen stellen
A-2 Analyzing trade-offs:
met betrekking tot de relaties van een informatiesysteem met haar omgeving en met betrekking tot de relaties tussen de systeemcomponenten onderling;
A-3 Designing and implementing information systems solutions:
een ontwerp van de essentie van een informatiesysteem te maken dat voldoet aan de gestelde eisen;
A-4 Managing ongoing information technology operations:
de daadwerkelijke constructie van een informatiesysteem te begeleiden en te bewaken.

B *Foundational knowledge and skills*
Een informatiekundige is na afloop van de studie in staat om:
B-1 Leadership and collaboration:
de uitvoering van een projectplan te begeleiden;
B-2 Communication:
effectief en op gepaste wijze te communiceren;
B-3 Negotiation:
de noodzakelijke onderhandelingen met de verschillende belanghebbende partijen te voeren;
B-4 Analytical and critical thinking, including creativity and ethical analysis:

op een academisch niveau te werken en te denken, en te reflecteren over de eigen bijdrage;

B-5 Mathematical foundations: een wiskundige onderbouwing te geven.

C *Fundamentals domain*

Een informatiekundige is na afloop van de studie in staat om:

C-1 General models of a domain:
in een gegeven probleemsituatie een voor de informatiekunde relevant domein te:
analyseren;
en de belangrijkste kenmerken van het domein met betrekking tot die probleemsituatie in kaart te brengen in termen van een geschikt model;
door te abstraheren van irrelevante details/aspecten;
het resulterende model te kunnen valideren;
het model als basis te gebruiken om formeel te redeneren over dit domein.

C-2 Key specializations within-domain:
Formeel redeneren: Het model als een basis gebruiken om business rules en constraint problems op te stellen, en hiermee actuele problemen in een organisatie oplossen, gebruikmakend van moderne technologie voor formeel redeneren.
Security: A. de security risico's van een organisatie helder in kaart te brengen en deze te mitigeren met maatregelen zowel van technische als niet-technische aard;
B. de maatregelen te (laten) implementeren;
C. de effectiviteit van de maatregelen te (laten) toetsen;
D. het management systeem periodiek bij te (laten) stellen in dialoog met de directie van de onderneming.

3. Niveau van de doelstellingen en eindtermen in relatie tot de opleidingen

De doelstellingen en eindtermen zoals in de voorgaande secties beschreven gelden voor zowel de bachelor- als masteropleiding informatiekunde. Het verschil tussen de opleidingen uit zich in het niveau waarop de student de in de eindtermen genoemde vaardigheden dient te beheersen. Deze niveaus zijn gekoppeld aan de verschillende fasen van de opleiding, waarbij naast de bachelor- en masterfase ook een propedeuse- en post-graduate-fase kunnen worden onderscheiden.

(a) Belangstellend (propedeuse)
(b) Voorbereidend (bachelor)
(c) Richtinggevend (master)
(d) Kaderscheppend (post-graduate; d.w. 4 à 5 jaar in het vakgebied werkzaam)

Het niveau voor de masteropleiding is richtinggevend. De afgestudeerde masterstudent dient de verworven vaardigheden zelfstandig uit te voeren binnen een gegeven kader, waarbij de student in staat moet zijn zelf de richting te bepalen. In het masterprogramma worden de genoemde vaardigheden toegespitst op de onderwerpen ¸informatiearchitectuur en ¸kwaliteit van informatiesystemen. Aan de hand van deze onderwerpen, en mede afhankelijk van de accenten die een student legt in de keuzecursus(sen) en afstudeerscriptie, kan de relatieve aandacht die aan deze vaardigheden wordt besteed, enigszins variëren.

4. Oriëntatie

De oriëntatie van de opleiding is academisch zoals blijkt uit de beschrijving van de algemene academische kennis en vaardigheden.

Appendix 4: Overview of the curriculum

Fall semester				Spring semester			
Code	Course name	ec	Q	Code	Course name	ec	Q
I00152	Research Methods	3	1,2	I00037	ICT and Society 2	3	3
I00153	Security in Organizations	6	1,2				
IMK003	Business Rules Specification and Application	3	2	**Specialisation: one of the following courses**			
IMK004	Reasoning with Computer Support	3	2	I00041	Information Retrieval	6	3,4
IMK005	Architecture and New Challenges	3	1,2	I00035	Foundations of Information Systems	6	3,4
IMK006	Business Process Architecture in Practice	3	1,2	IMC021	System Development Management	6	3,4
	Free choice	6					
	Master Thesis (start)	3			*Master Thesis (cont.)*	21	3,4
	Total amount of ec	30			**Total amount of ec**	30	

I00152: Research methods

Outline description

How do you get reliable findings concerning subjects that cannot be captured in a mathematical formula, a test tube, or a computer memory? For example, concerning people and organizations: their opinions, attitudes, behaviour, interaction, language, communication? A researcher in the field of information science creates bridges between typical gamma issues (organizational context, documentation) and bèta-issues (exact science, engineering, technology).

Learning outcomes and attainment targets

- Describe the taught methods and techniques, and the relations between them;
- Knowledgably and critically discuss theoretical and practical issues in view of real research cases;
- Skillfully apply at least one of the techniques: make an operational research plan, gather data, analyze data, draw conclusions, present results;
- Relate results to model-based analysis, at the hand of a sound conceptual model of the specific research domain;
- A number of research techniques relevant for information science.

Teaching method(s)

- introductory lectures
- a hands-on project is done (in small groups) in which the students tackle a real bit of research
- personal study counseling
- interviews

Assessment methods

- research group report(and its evolution as observed on the Wiki)
- written test (part multiple choice, part open)

Literature (mandatory(M)/ recommended (R))

Social Research Methods by Alan Bryman (M)

Teacher
S.J.B.A. Hoppenbrouwers

Credits
3

I00153 Security in Organizations

Outline description
Information security deals with the preservation of the confidentiality, integrity and availability of information. Information security is considered to be a 'process' and not a 'product' one can simply buy. The process allows management to ensure that others within their organization are implementing security controls that are effective.

One of the difficulties of the information security process is its multidisciplinary nature: it needs to grasp security requirements from the organization business processes (where the managers typically are not savvy on information security) and to translate them to security controls. These controls can be of various types, including ICT technical or cryptographic. Moreover, the process needs to check that the operational effectiveness of the chosen controls is satisfactory and to adapt the controls (or the surrounding framework leading to the controls) if required.

Within the course this process is explored both from a theoretical and a practical level never loosing sight of the computer science perspective. To this end the course also has several 'hands-on' exercises including conducting a Windows EDP audit, a network audit and a network penetration. The course provides the basic information on information security required by the security officer of an organization, by IT security auditors and by IT security consultants. As information security is still a rapidly evolving topic (some might argue it is even still in its infancy) the course can also provide inspiration for further scientific research.

Learning outcomes and attainment targets
- Learn to control information security risks within an organization in an holistic fashion (procedural, organizational and technical);
- Getting familiar with the leading standards in this area, their shortcomings and practical implementation guidelines;
- To learn to map policies to technical countermeasures and vice versa;
- To learn how to write and enforce security policies;
- To learn some basic techniques in security auditing;
- Getting an idea of the practical aspects of information security;
- Getting inspiration for further scientific research.

Teaching method(s)
- lecture
- personal study counseling
- laboratory course

Assessment methods

exam

Literature (mandatory (M)/ recommended (R))
reader (M)

teachers
K. Kursawe, E. Verheul, E. Poll

Credits
6

IMK003 Business Rules Specification and Application

Outline description
The behaviour of modern day enterprises, as well as society, is largely determined by rules. Examples of such rules are:

- Taxation laws;
- Rules governing the application of mortgages;
- Guidelines guiding doctors in diagnosing patients.

Sometimes these rules reflect laws which one would like to enforce strictly. At other times, they represent best-practices that aim to guide people in performing their work. Collectively one may refer to these rules as business rules.
Business rules constrain/guide the behaviour of businesses/enterprises, both with regard to operational processes as well as change processes. In addition, business rules can be used as requirements for the design and implementation of information systems.
In this course we will investigate several aspects of business rules, in particular what they are (and are not), how to formulate them, how they are linked to implementation, and which underlying theoretical issues are at play.

Learning outcomes and attainment targets
After attending this course, students are able to:

- Position and value BRs as an approach within Information Systems and Enterprise Engineering;
- Position and value various basic techniques and standards concerning BRs;
- Perform basic specifications in some specific languages related to BPM (RuleSpeak, JBOSS);
- Conceive, develop and refine original and well-founded ideas and argumentations concerning various aspects of BRs and their application in enterprises.

Teaching method(s)
- lecture
- laboratory course

Assessment methods
Written exam

Literature (mandatory (M)/ recommended (R))
Business Rules Management and Service Oriente Architecture, a pattern Language by Ian Graham (M)

Teacher
S.J.B.A. Hoppenbrouwers

Credits
3

IMK004 Reasoning with Computer Support

Outline description
Business rules are often informally specified, but to use these rules in a computer, it is needed to formalize these rules and implement them in software.
An approach to deal with this human knowledge is by representing them as so-called production rules, which were introduced in the early 1970s. Production rules usually represent `rules of thumb', but they have been successfully applied for planning and design as well. In this course, we will look at various notions of such production systems, such as different types of rules and modes of reasoning. Practical assignments will lead to the development of a production system based on a number of business rules.
As a second part of the course we consider the problem of finding a solution to a given set of constraints, as they occur in planning and scheduling. For instance, one can think of making a planning of a project consisting of several tasks, under constraints involving available man power, tasks that should be finished before other tasks can start, and so on. Typically, such problems may be algorithmically very hard. However, by modern tools based on satisfiability, formalizations of this kind of problems are often easily solved.

Learning outcomes and attainment targets
- Be able to infer facts from a knowledge base with production rules using various forms of top-down inference;
- Be able to infer facts from a knowledge base with production rules using various forms of bottom-up inference;
- Be able to develop and implement a basic knowledge-based system using a rule engine like CLIPS;
- Be able to decide whether a propositional formula in CNF is satisfiable using unit resolution and binary case analysis;
- Be able to model constraints expressed in natural language, and be able to express these in SAT or SMT formulas;
- Be able to solve concrete problems in the area of planning and scheduling using an SMT tool like yices.

Teaching method(s)
- lecture

- laboratory course

Assessment methods
- a written examination on the theory, and
- two practical assignments

Literature (mandatory (M)/ recommended (R))
Syllabus (M)

teachers
J. Zantema, A.J. Hommersom

Credits
3

IMK005 Architecture and new Challenges

Outline description
In this course we prepare students to be i-architects by working on a state-of-the-art architectural challenge. The course brings the together the more theoretical courses in a constructive context.

Learning outcomes and attainment targets
Being able to make an innovative architectural design for small practical problems.

Teaching method(s)
- lecture
- extensive architecture practicum as part of GipHouse

Assessment methods
Presentation and defense of the results of the GipHouse practicum assignments

Literature (mandatory (M)/ recommended (R))
Software Engineering, A Practitioner's Approach by Roger S. Pressman (M)

Teachers
M.J.C.D. van Eekelen, M. van Vliet

Credits
3

IMK006 Business Process Architecture in Practice

Outline description
This course aims at addressing the main topics which are relevant in the modern process, applications and architecture field. The course has the following four modules:

- Software project management;
- Enterprise resources planning (ERP) systems;

- Business process management and;
- Business process architecture.

In project management the different models for project and program management are treated. We also discuss the relation between business strategy and software program management. In enterprise resource planning, ERP systems are explained and different software implementation methodologies which are specific for the implementation of ERP systems are treated. The relation between business processes and application and the different state-of-the-art methodologies for relating processes and applications are discussed in the module business process management. In the final module we discuss business process architecture and introduce current development like Service Oriented Architecture and Cloud Computing.

Learning outcomes and attainment targets
At the end of the course, students have insight in the developments that the field of business process management and the relation to software applications have undergone and have applied the most recent techniques in order to formulate a state-of-the-art integrated architecture framework.

Teaching method(s)
- lecture
- extensive practicum (GipHouse). This practicum is embedded in the course Architecture and New Challenges

Assessment methods
- written exam (50%)
- a mark given for the case (50%)

Literature (mandatory (M)/ recommended (R))
none

Teachers
M. van Vliet, M.C.J.D. van Eekelen

Credits
3

I00037 ICT and Society 2

Outline description
The course Informatics and Society 2 (Informatica en Samenleving 2) explores cultural and social issues that have been made possible by the development of information technology.

Starting from the concepts of privacy and the relationship between informatics and political decision-making processes, we will move on to examine the changes in our way to look at the world caused by the progresses of information technology. We will analyze among others the cultural meaning of hackerism, the role different ethical frameworks play in discussing technological advances, and the social/ethical/cultural implications of artificial intelligence (AI).

Learning outcomes and attainment targets
The student will:

- be acquainted with a number of philosophical and ethical theories, both in general and applied to his/her object of study;
- be able to recognize the implicit presuppositions in a number of scientific advances of his/her object of study;
- be able to reflect on the normativity of his/her object of study;
- be able to articulate his/her reflection in a number of short papers and a research paper.

Teaching method(s)
lectures

Assessment methods
Students will have to write four short essays and a final term paper. There is no final examination planned.

Literature (mandatory (M)/ recommended (R))
Literature references and reading material will be made available through Blackboard.

Teacher
L. Consoli

Credits
3

I00041 Information Retrieval

Outline description
Finding relevant documents no longer seems to be the major challenge of state-of-the-art search engines. Where recall and precision were major concerns in the early days of their existence, trying to convey information rather than just data seems to be a major concern nowadays. Offering a long list of documents in order of their relevance score is known to be a too simple interface.
In order to improve on this, solid knowledge of the information retrieval problem and its main techniques is imperative. As there are still many questions about the essentials, a strong relation with ongoing research activities is indispensable.
IR (A constructive approach to Information Retrieval) treats the backgrounds of Information Retrieval:

- How do people search for information, and how can this be formalized?
- How do people describe what they mean, and how can we formalize meaning?
- How can these points be combined?

An important application area is the World Wide Web.

Learning outcomes and attainment targets
The goals of the course IR (A constructive approach to Information Retrieval) is that its participants

- are familiar with the base models that are used for Information Retrieval;
- have knowledge of query languages, both syntactically and semantically;
- are familiar with information extraction from documents, inter-document relations and their appreciation;
- have insight and proficiency in design and construction of search engines;
- have insight in interaction techniques to support searchers in their quest for information;
- have some experience with scientific literature in this field.

Teaching method(s)
- lectures
- problem session
- exercises with IR software tools

Assessment methods
- The course is divided in parts, each part is concluded with a test.
- Participants have to choose a topic from the most recent SIGIR conference or conference. These contributions will be centered around special themes in Information Retrieval. The students make an extended summary of the topic chosen, and present this during the lecture. The contributions are peer reviewed by the participants of the course.

Literature (mandatory (M)/ recommended (R))
Introduction to Information Retrieval by C.C. Manning, P. Raghavan, H. Schutze (M)
Lecture notes will be made available via Blackboard

Teachers
Th.P. van der Weide, W. Kraaij

Credits
6

I00035 Foundations of Information Systems

Outline description
In this course we study foundations of information systems in detail. These fundamental aspects will be organized around the notion of model transformation, in particular ***transformation of information models***. We will specify the ***syntax and semantics*** of concrete transformations. This will lead us to a framework for ***reasoning*** about transformations, in which different design strategies can be considered, for example quality-driven design strategies. Our study of foundations has a theoretical nature, but practical cases will also be considered.

Learning outcomes and attainment targets
- transformation of information models
- reasoning about transformations
- optimization of transformations

Teaching method(s)
- lecture
- personal study counseling
- 32 hrs problem session

Assessment methods
- individual student paper
- written examination

Literature (mandatory (M)/ recommended (R))
- The lecture notes (M)
- Instructions for the student paper (M)
- Handbook of data modelling (from 1959 until 2008)(M)
- Suggestions for further reading (R).

Teacher
P. van Bommel

Credits
6

IMC021 System Development Management

Outline description
SDM1 resembles the phase in an IT career in which the project leader takes responsibility for the management of a software development project. Within SDM1 we address the project management aspects of the whole life cycle of a system development project, from definition study through system design, system development and system implementation all the way to the maintenance of a system in an operational environment.

The course consists of a theoretical (2EC) and a (4EC) practical component. The practical component is being carried out within "GiP-House", managing students from the "Software Engineering course. GiP-House closely resembles a real-life modern software house in which the students of this course perform roles as: Project manager, Quality manager, Contract Owner, Public Relations Manager, Director. These roles can be adjusted depending on the specific situation of a given semester (e.g. number of students). All students work, within the management structure of GiP-House, under the supervision of the director, with the aim to create an effective and efficient software house management structure. The managers use, if necessary, (internal or external) experts.

Learning outcomes and attainment targets
The student, at the end of the course, has all the professional skills of an IT project leader

Teaching method(s)
- lecture
- student project as a manager at GIPHouse

Assessment methods

- the quality of the contribution to the management of GiPHouse
- written examination

Literature (mandatory (M)/ recommended (R))
Software Engineering A practitioners Approach: European Adaptation by Roger S. Pressman

Teacher
T.E. Schouten

Credits
6

Appendix 5: Quantitative data regarding the programme

Data on intake, transfers and graduates

Tabel M1.1 **Cohortomvang en onderwijs-herkomst masterinstroom**
M Informatiekunde (66842)
(voltijdse instroom)

Cohortomvang en onderwijs-herkomst masterinstroom						
	Jaar	Eigen universiteit	Andere universiteiten NL	HBO	Buiten HO	Totaal
	Totaal Universiteiten					
	03/ 04	6	0	0	1	7
	04/ 05	10	0	0	0	10
	05/ 06	36	0	2	0	38
	06/ 07	26	0	0	0	26
	07/ 08	45	0	1	0	46
	08/ 09	24	1	1	0	26
	09/ 10	28	0	0	1	29
	10/ 11	18	1	0	2	21
	Per Universiteit					
RUG	03/ 04	0	0	0	1	1
	04/ 05	1	0	0	0	1
	05/ 06	8	0	0	0	8
	06/ 07	1	0	0	0	1
	07/ 08	7	0	0	0	7
	08/ 09	2	1	0	0	3
	09/ 10	9	0	0	0	9
	10/ 11	1	1	0	0	2
RU	03/ 04	6	0	0	0	6
	04/ 05	9	0	0	0	9
	05/ 06	28	0	2	0	30
	06/ 07	25	0	0	0	25
	07/ 08	38	0	1	0	39
	08/ 09	22	0	1	0	23
	09/ 10	19	0	0	1	20
	10/ 11	17	0	0	2	19

Tabel M4.1 **Instroom master**
M Informatiekunde (66842)

		Totaal			Voltijd			Deeltijd/duaal	
	Cohort	Totaal	Mannen	Vrouwen	Totaal	Mannen	Vrouwen	Totaal	Mannen	Vrouwen
	Totaal Universiteiten									
	03/ 04	7	7	0	7	7	0	0	0	0
	04/ 05	10	10	0	10	10	0	0	0	0
	05/ 06	38	34	4	38	34	4	0	0	0
	06/ 07	26	25	1	26	25	1	0	0	0
	07/ 08	46	41	5	46	41	5	0	0	0
	08/ 09	26	23	3	26	23	3	0	0	0
	09/ 10	29	28	1	29	28	1	0	0	0
	10/ 11	21	19	2	21	19	2	0	0	0
	Per Universiteit									
RUG	03/ 04	1	1	0	1	1	0	0	0	0
	04/ 05	1	1	0	1	1	0	0	0	0
	05/ 06	8	6	2	8	6	2	0	0	0
	06/ 07	1	1	0	1	1	0	0	0	0
	07/ 08	7	6	1	7	6	1	0	0	0
	08/ 09	3	2	1	3	2	1	0	0	0
	09/ 10	9	8	1	9	8	1	0	0	0
	10/ 11	2	2	0	2	2	0	0	0	0
RU	03/ 04	6	6	0	6	6	0	0	0	0
	04/ 05	9	9	0	9	9	0	0	0	0
	05/ 06	30	28	2	30	28	2	0	0	0
	06/ 07	25	24	1	25	24	1	0	0	0
	07/ 08	39	35	4	39	35	4	0	0	0
	08/ 09	23	21	2	23	21	2	0	0	0
	09/ 10	20	20	0	20	20	0	0	0	0
	10/ 11	19	17	2	19	17	2	0	0	0

Tabel M3.1 Studieduur masteropleiding naar onderwijs-herkomst
M Informatiekunde (66842)
(voltijdse instroom)

	afstudeer cohort	Eigen universiteit Geslaagd absoluut	Eigen universiteit Duur opl. gemiddeld	Andere universiteit NL Geslaagd absoluut	Andere universiteit NL Duur opl. gemiddeld	HBO Geslaagd absoluut	HBO Duur opl. gemiddeld	Buiten HO Geslaagd absoluut	Buiten HO Duur opl. gemiddeld
			in maanden		in maanden		in maanden		in maanden
	Totaal Universiteiten								
	03/ 04	3	9					1	5
	04/ 05	7	6						
	05/ 06	21	10			2	12		
	06/ 07	27	13						
	07/ 08	27	15						
	08/ 09	31	13						
	09/ 10	25	20						
	10/ 11	23	15					3	13
	Per Universiteit								
RUG	03/ 04							1	5
	05/ 06	3	11						
	06/ 07	4	21						
	07/ 08	6	20						
	08/ 09	2	12						
	09/ 10	2	31						
	10/ 11	4	19						
RU	03/ 04	3	9						
	04/ 05	7	6						
	05/ 06	18	10			2	12		
	06/ 07	23	11						
	07/ 08	21	14						
	08/ 09	29	13						
	09/ 10	23	19						
	10/ 11	19	15					3	13

Tabel M3.3 Instellingsverblijfsduur mastergeslaagden naar onderwijs-herkomst
M Informatiekunde (66842)
(voltijdse instroom)

	afstudeer cohort	Eigen universiteit aantal geslaagd	Eigen universiteit verblijfs-duur (gem)	Andere universiteit NL aantal geslaagd	Andere universiteit NL verblijfs-duur (gem)	HBO aantal geslaagd	HBO verblijfs-duur (gem)	Buiten HO aantal geslaagd	Buiten HO verblijfs-duur (gem)
			in maanden		in maanden		in maanden		in maanden
	Totaal Universiteiten								
	03/ 04	3	21					1	5
	04/ 05	7	31						
	05/ 06	21	41			2	12		
	06/ 07	27	43						
	07/ 08	27	55						
	08/ 09	31	44						
	09/ 10	25	58						
	10/ 11	23	54					3	13
	Per Universiteit								
RUG	03/ 04							1	5
	05/ 06	3	52						
	06/ 07	4	50						
	07/ 08	6	70						
	08/ 09	2	104						
	09/ 10	2	96						
	10/ 11	4	72						
RU	03/ 04	3	21						
	04/ 05	7	31						
	05/ 06	18	39			2	12		
	06/ 07	23	41						
	07/ 08	21	50						
	08/ 09	29	40						
	09/ 10	23	55						
	10/ 11	19	51					3	13

Tabel M5.1 Ingeschrevenen naar onderwijsvorm en geslacht
M Informatiekunde (66842)

		Ingeschrevenen			Voltijdopleiding			Deeltijdopleiding			Duaal		
	Cohort	Totaal	mannen	vrouwen	Totaal	mannen	vrouwen	Totaal	mannen	vrouwen	Totaal	mannen	vrouwen
	Totaal Universiteiten												
	03/ 04	7	7	0	7	7	0	0	0	0	0	0	0
	04/ 05	8	8	0	8	8	0	0	0	0	0	0	0
	05/ 06	24	20	4	24	20	4	0	0	0	0	0	0
	06/ 07	32	30	2	32	30	2	0	0	0	0	0	0
	07/ 08	41	36	5	41	36	5	0	0	0	0	0	0
	08/ 09	47	41	6	47	41	6	0	0	0	0	0	0
	09/ 10	42	38	4	42	38	4	0	0	0	0	0	0
	10/ 11	36	33	3	36	33	3	0	0	0	0	0	0
	11/ 12	35	32	3	35	32	3	0	0	0	0	0	0
	Per Universiteit												
RUG	03/ 04	1	1	0	1	1	0	0	0	0	0	0	0
	04/ 05	1	1	0	1	1	0	0	0	0	0	0	0
	05/ 06	7	5	2	7	5	2	0	0	0	0	0	0
	06/ 07	8	7	1	8	7	1	0	0	0	0	0	0
	07/ 08	7	6	1	7	6	1	0	0	0	0	0	0
	08/ 09	4	3	1	4	3	1	0	0	0	0	0	0
	09/ 10	10	7	3	10	7	3	0	0	0	0	0	0
	10/ 11	9	8	1	9	8	1	0	0	0	0	0	0
	11/ 12	11	10	1	11	10	1	0	0	0	0	0	0
RU	03/ 04	6	6	0	6	6	0	0	0	0	0	0	0
	04/ 05	7	7	0	7	7	0	0	0	0	0	0	0
	05/ 06	17	15	2	17	15	2	0	0	0	0	0	0
	06/ 07	24	23	1	24	23	1	0	0	0	0	0	0
	07/ 08	34	30	4	34	30	4	0	0	0	0	0	0
	08/ 09	43	38	5	43	38	5	0	0	0	0	0	0
	09/ 10	32	31	1	32	31	1	0	0	0	0	0	0
	10/ 11	27	25	2	27	25	2	0	0	0	0	0	0
	11/ 12	24	22	2	24	22	2	0	0	0	0	0	0

In this document we provide an analysis of the flow figures for cohort 03/04 up to and including 10/11. As a basis for this analysis, the VSNU has supplied several tables (see a.o. Tables M1.1, M3.1 and M3.3) which make a distinction between students with a (RU-)bachelor Information Science and students with a vocational background ("HBO-instroom"). However, the data in these tables are incomplete: in particular, the number of HBO-students in the master program Information Science is far greater than these tables suggest. Most likely this is caused by the fact that the HBO-students always start with a transition program consisting of bachelor courses, and until they have completed this transition program they are registered as a bachelor student in our own institution (as of 2011, with OSIRIS, this has changed and they are registered as "Premaster"). Therefore, we have compiled these tables – in particular the ones regarding flow through the master program – again, based on our own data. The data are based on the set of students who graduated between 03/04 and 10/11. We have calculated the number of months they were registered in the master program itself, but also the number of months registered in the preceding phase (bachelor for regular students, and transition program for HBO-students.) This is relevant as sometimes students already complete master courses while still being registered as a bachelor student, and this may affect the duration of registration for the master program. The number of students per graduation cohort is displayed in table 1 below, along with the average registration time for the master program, for the premaster phase, and the total registration time in months. Incidental minor differences with the VSNU-tables are probably due to the measuring point which has been applied to determine the graduation cohort (e.g. September or October).

Graduation-cohort	Total			Own RU Bachelor					HBO-bachelor					Other academic bachelor (RU or non-RU)				Foreign students		
	number	average registration time master (weighted)		number	average registration time master	registration time prior to master	total registration time		number	average registration time master	registration time prior to master	total registration time		number	average registration time master	registration time prior to master		number	average registration time master	registration time prior to master
03/04	3	10							3	10	12	22								
04/05	7	6							6	6	17	23		1	8	n.a.				
05/06	20	10		3	7	53	60		16	10	20	30		1	15	n.a.				
06/07	22	11		7	12	46	58		14	11	18	29		1	7	n.a.				
07/08	22	14		9	13	52	65		13	15	23	38								
08/09	29	14		7	12	64	76		22	14	16	30								
09/10	22	19		8	15	57	72		13	23	19	42		1	9	n.a.				
10/11	23	15		7	15	59	74		12	16	24	40		1	15	n.a.		3*	10*	4*
Total and average	148	12		41	12,3	55,2	67,5		99	13,1	18,6	31,8		5	11			3*	10*	4*

Table 1: Average registration time in months and number of master students, relative to background and graduation cohort (own data)

* Of the foreign students, two entered the master program directly without a transition program; both these students completed the master in 12 months. One foreign student entered the master program after having done a transition program; this student was registered in the premaster phase for 12 months and in the master for 7 months.

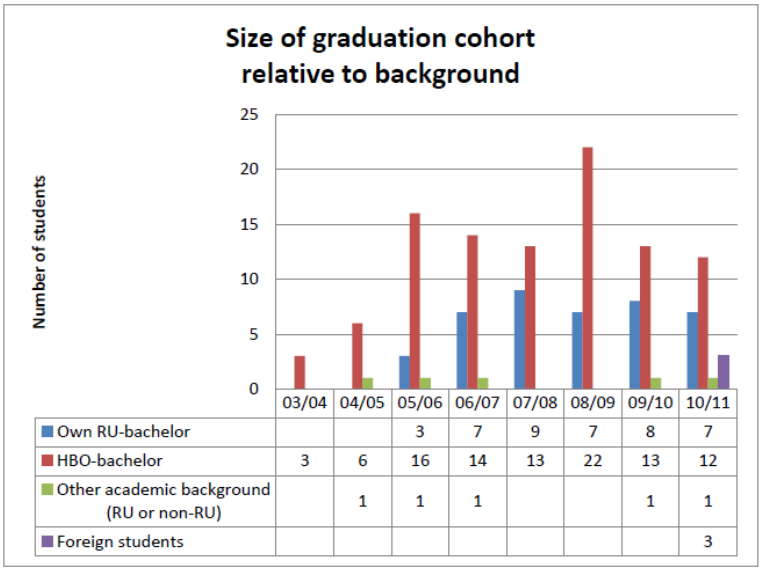

Figure 1a: Size of graduation cohort in relation to their background

The table and figures show that (a) the number of students with a HBO-background is considerably greater than the number of students with a bachelor degree from our own institution, and (b) the average registration time in the master for HBO-students in general is slightly longer than that of students with a RU-bachelor background. Point (a) confirms the attractiveness of the Information science master for students with a HBO-bachelor degree. We believe that the fact that it is a one-year program may be part of this, but also information science itself is very interesting for students with a background in for instance "Bedrijfskundige Informatica".

Point (b), at face value, might give the impression that HBO-students may find the master program a little more difficult than students with a RU-bachelor background. However, this point needs further elaboration. First of all, there is the fact that students with a RU-bachelor background thus far very often did not complete their bachelor program completely before taking master courses already (this will change with the "harde knip" which will be implemented as of 2012). Therefore, the relative registration time for the bachelor program should also be taken into account (we will come back to this below). Second, the numbers in the above table and figure are an ***average*** registration time for the master phase. It could well be that this average is influenced in a negative way by a small number of HBO-students for certain graduation cohorts. In particular, this seems to be the case for graduation cohort 2009.

That the above indeed plays a role is confirmed by the following data, in which we have compiled on the basis of the percentages of students who graduate within a given amount of time.

Graduation cohorts 2003 - 2010	Own RU-bachelor *		HBO-bachelor		Other academic background (RU or non-RU)		Foreign students	
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
Number of months registered in master								
<= 12 months	22	53,7	58	58,6	3	60,0	3	100,0
12 < x <= 24 months	15	36,6	28	28,3	2	40,0	0	0,0
24 < x <= 36 months	4	9,8	10	10,1	0	0,0	0	0,0
36 < x <= 48 months	0	0,0	2	2,0	0	0,0	0	0,0
48 < x <= 60 months	0	0,0	1	1,0	0	0,0	0	0,0
60 < x <= 72 months	0	0,0	0	0,0	0	0,0	0	0,0
> 72 months	0	0,0	0	0,0	0	0,0	0	0,0
Total	41	100,0	99	100,0	5	100,0	3	100,0

Table 2: absolute number and percentage of students graduating within a particular number of months, relative to students' background.
* Own RU-bachelor: including 5 students with a HBO-background who took a full bachelor degree Information Science at the RU.

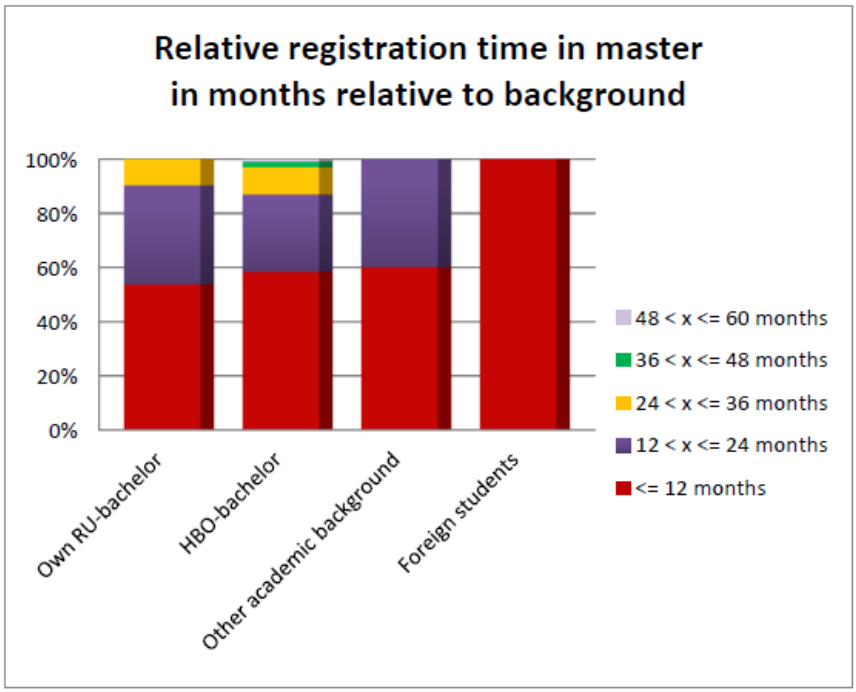

Figure 2a: Relative registration time in the master in months, relative to students' background

Contrary to the impression created by the preceding tables and figures, these data show that in fact a larger percentage of HBO-students graduates within a period of one year (58,6% vs. 53,7%), whereas after two years registration, a slightly larger percentage of regular students has graduated (90,3% vs. 86,9%). Together with the previous data, this would confirm that the averages in table 1 may be influenced in a negative manner by a relatively small number of HBO-students who are registered in the master for two years or more.

Finally, we have looked at the role played by the registration time in the premaster phase (whether bachelor or transition program) in relation to registration time in the master, to see whether this confirms the idea that regular students might be registered in the bachelor program longer while already taking master courses. The following table and figure show the average registration time in the premaster phase. However, it should be noted that it is difficult to relate the *average* registration in the premaster phase to the *average* registration time in the master phase, as the relation occurs in individual students. Therefore, we have also made an overview per student showing the exact registration time in the premaster phase (bachelor or transition program) combined with the exact registration time in the master (see figures 4a and b). For these figures we have excluded students with a different background (HBO-bachelor with full RU-bachelor program, other academic bachelor[1], or foreign students).

1 The figures show that students with another academic background sometimes take less than one year to complete the master program. This is explained by the fact that these students are mostly from other RU-bachelors (in particular, Computing Science or Business Administration) and as such they could already have taken master courses of Information Science before actually being registered as an Information Science student at all.

	Own RU-Bachelor*			HBO-Bachelor	
Graduation cohorts 2003 - 2010	Number	percentage		Number	percentage
<= 12 months	0	0,0		37	37,4
12 < x <= 24 months	1	2,4		46	46,5
24 < x <= 36 months	3	7,3		12	12,1
36 < x <= 48 months	13	31,7		2	2,0
48 < x <= 60 months	12	29,3		1	1,0
60 < x <= 72 months	6	14,6		0	0,0
> 72 months	6	14,6		1	1,0
Total	**41**	**100,0**		**99**	**100,0**

Table 3: Registration time in months in pre-master phase for absolute number and percentage of students, relative to students' background

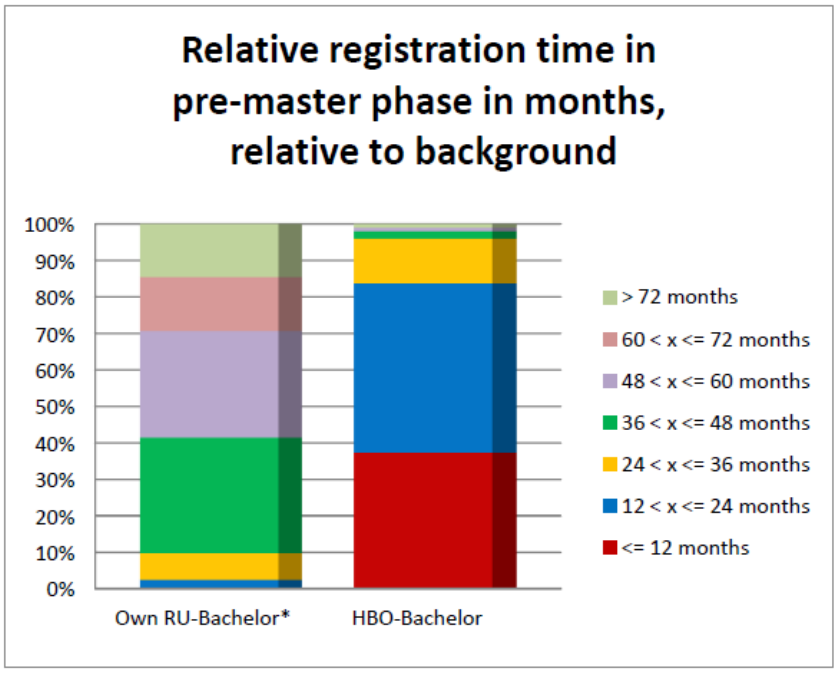

Figure 3a: Relative registration time in the pre-master phase in months, relative to students' background

* Own RU-Bachelor: including 5 students with a HBO-background who took a full bachelor degree at the RU.

Teacher-student ratio achieved

Due to the fact that the Information Science and Computing Science curricula are intertwined, the student-staff ratio cannot be expressed for the Master Information Science alone. Table 2.6 shows the student-staff ratio at the institute level, including all students from Information Science and Computer Science, both Bachelor and Master level.

Year	fte education	# of students	# of students per fte educ.
2010-2011	14.23	280	19.68
2009-2010	15.18	282	18.57
2008-2009	14.12	301	21.31
2007-2008	12.66	300	23.69
2006-2007	13.5	278	20.59
2005-2006	13.67	281	20.55
2004-2005	13.67	248	18.14

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

- In the first semester, the number of contact hours is **20 hours per week**.
- In the second semester there are **9 contact** hours per week for cursory work, and **15 hours** during the whole semester for master thesis supervision.

Appendix 6: Programme of the site visit

PROGRAMMA HERACCREDITATIE MA INFORMATIEKUNDE OP 27 SEPTEMBER 2012

08.30-09.30	COMMISSIELEDEN	Prof. dr. R.J. Wieringa	Voorzitter, Information Systems	Universiteit van Twente
		Prof. dr. W. van Grembergen	Beleidsinformatica	Universiteit Antwerpen
		Prof. dr. O. de Troyer	Web & Information System Engeneering	Vrije Universiteit Brussel
		Prof. dr. E.W. Berghout	Innovation Management & Strategy	Rijksuniversiteit Groningen
		H. Steltenpohl, BSc	Student Human Centered Multimedia	Universiteit van Amsterdam
		Drs. D. de Lange	Secretaris	
	ONDERWIJSMANAGEMENT	Prof. dr. Herman Geuvers	Onderwijsdirecteur	
		Prof. dr. ir. Theo van der Weide	Opleidingscoördinator Informatiekunde	
09.30-10.00	ALUMNI	Carmen Caspers, MSc	Business Projectleider	Coöperatie VGZ UA
		Jos Groenewegen, MSc	Identity and Access Manager	Radboud Universiteit
		Danny Oldenhave, MSc	Business analyst en PhD student	Atos
		Rens van Summeren, MSc	Test Engineer	Equens SE
		Laurens Koot, MSc	Business unit manager R&D	InfoCaster
		Richard Willems, MSc	Adviseur Informatievoorziening	Thorax Informatieprojecten & Advies
10.00-11.00	STUDENTEN	Sander Dorigo	Afgestudeerd hbo-instromer	
		Niek Wolfkamp	Master student vwo-achtergrond	
		Joost Timmermans	Master student vwo-achtergrond	
		Marc Bitter	Master student hbo-instromer	
		Eamonn Cassidy	Master student vwo-achtergrond	
		Daan Schraven	Afgestudeerd hbo-instromer	
		Robbin Janssen	Master student hbo-instromer	
11.15-12.00	DOCENTEN	Dr. Stijn Hoppenbrouwers	Business Rules Specification, Research Methods 2	
		Prof. dr. Marko van Eekelen	Architecture and new Challenges, Business Process Architecture in Practice, System Development Management	
		Dr. Arjen Hommersom	Reasoning with Computer Support	
		Dr. Luca Consoli	Informatics and Society 2	
		Prof. dr. Erik Barendsen	Afstudeerbegeleider	
12.00-12.30	OPLEIDINGSCOMMISSIE	Dr. ir. Erik Poll	Voorzitter opleidingscommissie	
		Dr. Engelbert Hubbers	Docentlid opleidingscommissie	
		Dr. Freek Wiedijk	Docentlid opleidingscommissie	
		Ko Stoffelen	Studentlid opleidingscommissie	
		Patrick Schileffski	Studentlid opleidingscommissie	
		Christiaan Hillen	Studentlid opleidingscommissie	
		Patrick Verleg	Studentlid opleidingscommissie	
		Wouter Geraedts	Studentlid opleidingscommissie	
12.30-13.15	COMMISSIELEDEN	Lunch en inloopspreekuur		
13.15-14.00	EXAMENCOMMISSIE EN STUDIEADVISEUR	Dr. Perry Groot	Studieadviseur	
		Prof. dr. ir. Rinus Plasmeijer	Voorzitter examencommissie	
		Dr. Patrick van Bommel	Lid examencommissie	
		Dr. Theo Schouten	Lid examencommissie	
		Yella Kleijnen	Secretaris examencommissie	
14.00-14.30	COMMISSIELEDEN			
14.30-15.30	COMMISSIELEDEN ONDERWIJSMANAGEMENT	Prof. dr. Herman Geuvers	Onderwijsdirecteur	
		Prof. dr. ir. Theo van der Weide	Opleidingscoördinator Informatiekunde	
		Prof. dr. Lutgarde Buydens	Vicedecaan Onderwijs FNWI	
15.30-17.30	COMMISSIELEDEN	Opstellen bevindingen		
17.30-17.45		Mondelinge rapportage in HG00.307		
17.45-18.15		Borrel in de Zuidstraat		

Appendix 7: Theses and documents studied by the committee

Prior to the site visit, the committee studied the theses with the following numbers:

100IK	112IK	109IK	119IK	116IK
132IK	131IK	145IK	145IK	134IK
140IK	141IK	151IK	138IK	111IK

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):

- Domain-specific reference framework;
- Overview of the curriculum;
- Course dossiers (learning outcomes of the programme; description of the curriculum components method(s), attainment targets, assessment methods, literature mandatory/recommended, teacher and credits);
- Assessment results;
- Teaching and examination regulations;
- Theses assessment procedures;
- Allocated staff with names, positions, scope of appointment, level and expertise;
- Overview of the contacts maintained with the professional field;
- Reports on consultations with relevant committees and bodies;
- Semester evaluation reports, student and teacher evaluations;
- List of theses evaluated by the Board of Examiners in '09-'10 (6), '10-'11 (6), '11-'12 (3);
- Information about the composition of the premaster's programme;
- Draft proposal for minor 'Bedrijfskundige Informatica';
- Elektronische Werkplaats (wiki-environment); websites and Blackboard sites.

Appendix 8: Declarations of independence

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ONAFHANKELIJKHEIDS- EN GEHEIMHOUDINGSVERKLARING

INDIENEN VOORAFGAAND AAN DE OPLEIDINGSBEOORDELING

ONDERGETEKENDE

NAAM: R. J. Wieringa

PRIVÉ ADRES: C. Schefferlaan 30
7545 RZ Enschede

IS ALS DESKUNDIGE / SECRETARIS GEVRAAGD VOOR HET BEOORDELEN VAN DE OPLEIDING:

Master opl. Information Science
Radboud Universiteit Nijmegen

AANGEVRAAGD DOOR DE INSTELLING:

Radboud univ. Nijmegen

VERKLAART HIERBIJ GEEN (FAMILIE)RELATIES OF BANDEN MET BOVENGENOEMDE INSTELLING TE ONDERHOUDEN, ALS PRIVÉPERSOON, ONDERZOEKER / DOCENT, BEROEPSBEOEFENAAR OF ALS ADVISEUR, DIE EEN VOLSTREKT ONAFHANKELIJKE OORDEELSVORMING OVER DE KWALITEIT VAN DE OPLEIDING TEN POSITIEVE OF TEN NEGATIEVE ZOUDEN KUNNEN BEÏNVLOEDEN;

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nederlands - vlaamse accreditatieorganisatie

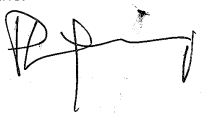
VERKLAART HIERBIJ ZODANIGE RELATIES OF BANDEN MET DE INSTELLING DE AFGELOPEN VIJF JAAR NIET GEHAD TE HEBBEN;

VERKLAART STRIKTE GEHEIMHOUDING TE BETRACHTEN VAN AL HETGEEN IN VERBAND MET DE BEOORDELING AAN HEM/HAAR BEKEND IS GEWORDEN EN WORDT, VOOR ZOVER DE OPLEIDING, DE INSTELLING OF DE NVAO HIER REDELIJKERWIJS AANSPRAAK OP KUNNEN MAKEN.

VERKLAART HIERBIJ OP DE HOOGTE TE ZIJN VAN DE NVAO GEDRAGSCODE.

PLAATS: Nijmegen DATUM: 26/9/2012

HANDTEKENING:



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ONAFHANKELIJKHEIDS- EN GEHEIMHOUDINGSVERKLARING

INDIENEN VOORAFGAAND AAN DE OPLEIDINGSBEOORDELING

ONDERGETEKENDE

NAAM: PROF. DR. WIM VAN GREMBERGEN

PRIVÉ ADRES: VLASROOTSTRAAT 56
9170 SINT-PAUWELS
BELGIE

IS ALS DESKUNDIGE / SECRETARIS GEVRAAGD VOOR HET BEOORDELEN VAN D
OPLEIDING: INFORMATIEKUNDE
RADBOUD UNIVERSITEIT (MSc)
UNIVERSITEIT UTRECHT (Bsc en MSc)

AANGEVRAAGD DOOR DE INSTELLING:

QANU

VERKLAART HIERBIJ GEEN (FAMILIE)RELATIES OF BANDEN ME
BOVENGENOEMDE INSTELLING TE ONDERHOUDEN, ALS PRIVÉPERSOO
ONDERZOEKER / DOCENT, BEROEPSBEOEFENAAR OF ALS ADVISEUR, DIE EE
VOLSTREKT ONAFHANKELIJKE OORDEELSVORMING OVER DE KWALITEIT VA
DE OPLEIDING TEN POSITIEVE OF TEN NEGATIEVE ZOUDEN KUNNE
BEÏNVLOEDEN;

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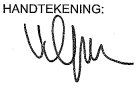
VERKLAART HIERBIJ OP DE HOOGTE TE ZIJN VAN DE NVAO GEDRAGSCODE.

PLAATS: Sint-Pauwels DATUM: 20 augustus 2012

HANDTEKENING:



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ONAFHANKELIJKHEIDS- EN GEHEIMHOUDINGSVERKLARING

INDIENEN VOORAFGAAND AAN DE OPLEIDINGSBEOORDELING

ONDERGETEKENDE

NAAM: DE TROYER, OLGA

PRIVÉ ADRES: GROTSTRAAT 45
2990 WUUSTWEZEL
BELGIË

IS ALS DESKUNDIGE / ~~SECRETARIS~~ GEVRAAGD VOOR HET BEOORDELEN VAN DE OPLEIDING:

INFORMATIEKUNDE RU en UU

AANGEVRAAGD DOOR DE INSTELLING:

Radboud Univ Nijmegen (Msc)
Univ Utrecht (Bsc en Msc)

VERKLAART HIERBIJ GEEN (FAMILIE)RELATIES OF BANDEN MET BOVENGENOEMDE INSTELLING TE ONDERHOUDEN, ALS PRIVÉPERSOON, ONDERZOEKER / DOCENT, BEROEPSBEOEFENAAR OF ALS ADVISEUR, DIE EEN VOLSTREKT ONAFHANKELIJKE OORDEELSVORMING OVER DE KWALITEIT VAN DE OPLEIDING TEN POSITIEVE OF TEN NEGATIEVE ZOUDEN KUNNEN BEÏNVLOEDEN;

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VERKLAART HIERBIJ OP DE HOOGTE TE ZIJN VAN DE NVAO GEDRAGSCODE.

PLAATS: WUUSTWEZEL DATUM: 2/07/2012

HANDTEKENING:

2

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ONAFHANKELIJKHEIDS- EN GEHEIMHOUDINGSVERKLARING

INDIENEN VOORAFGAAND AAN DE OPLEIDINGSBEOORDELING

ONDERGETEKENDE

NAAM:

PRIVÉ ADRES: Prof. dr. E.W. Berghout
Kralingseweg 396
3066 RC Rotterdam
Tel. 010-4558489

IS ALS DESKUNDIGE / SECRETARIS GEVRAAGD VOOR HET BEOORDELEN VAN DE OPLEIDING:

Master Informatiekunde UU, Master Informatiekunde RU,

AANGEVRAAGD DOOR DE INSTELLING:

Radboud Universiteit, Nijmegen
Universiteit Utrecht.

VERKLAART HIERBIJ GEEN (FAMILIE)RELATIES OF BANDEN MET BOVENGENOEMDE INSTELLING TE ONDERHOUDEN, ALS PRIVÉPERSOON, ONDERZOEKER / DOCENT, BEROEPSBEOEFENAAR OF ALS ADVISEUR, DIE EEN VOLSTREKT ONAFHANKELIJKE OORDEELSVORMING OVER DE KWALITEIT VAN DE OPLEIDING TEN POSITIEVE OF TEN NEGATIEVE ZOUDEN KUNNEN BEÏNVLOEDEN;

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VERKLAART STRIKTE GEHEIMHOUDING TE BETRACHTEN VAN AL HETGEEN IN VERBAND MET DE BEOORDELING AAN HEM/HAAR BEKEND IS GEWORDEN EN WORDT, VOOR ZOVER DE OPLEIDING, DE INSTELLING OF DE NVAO HIER REDELIJKERWIJS AANSPRAAK OP KUNNEN MAKEN.

VERKLAART HIERBIJ OP DE HOOGTE TE ZIJN VAN DE NVAO GEDRAGSCODE.

PLAATS: Rotterdam DATUM: 26 september 2012

HANDTEKENING:

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ONAFHANKELIJKHEIDS- EN GEHEIMHOUDINGSVERKLARING

INDIENEN VOORAFGAAND AAN DE OPLEIDINGSBEOORDELING

ONDERGETEKENDE

NAAM: STELTENPOOL, MASLA

PRIVÉ ADRES:

VERDUSSENSTRAAT 5
2018 ANTWERPEN, BELGIE

IS ALS DESKUNDIGE / SECRETARIS GEVRAAGD VOOR HET BEOORDELEN VAN DE OPLEIDING:

INFORMATIEKUNDE RU EN UU

AANGEVRAAGD DOOR DE INSTELLING:

UNIVERSITEIT NIJMEGEN (MASTER)
UTRECHT (BACHELOR EN MASTER)

VERKLAART HIERBIJ GEEN (FAMILIE)RELATIES OF BANDEN MET BOVENGENOEMDE INSTELLING TE ONDERHOUDEN, ALS PRIVÉPERSOON, ONDERZOEKER / DOCENT, BEROEPSBEOEFENAAR OF ALS ADVISEUR, DIE EEN VOLSTREKT ONAFHANKELIJKE OORDEELSVORMING OVER DE KWALITEIT VAN DE OPLEIDING TEN POSITIEVE OF TEN NEGATIEVE ZOUDEN KUNNEN BEÏNVLOEDEN;

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nederlands - vlaamse accreditatieorganisatie

VERKLAART HIERBIJ ZODANIGE RELATIES OF BANDEN MET DE INSTELLING DE AFGELOPEN VIJF JAAR NIET GEHAD TE HEBBEN;

VERKLAART STRIKTE GEHEIMHOUDING TE BETRACHTEN VAN AL HETGEEN IN VERBAND MET DE BEOORDELING AAN HEM/HAAR BEKEND IS GEWORDEN EN WORDT, VOOR ZOVER DE OPLEIDING, DE INSTELLING OF DE NVAO HIER REDELIJKERWIJS AANSPRAAK OP KUNNEN MAKEN.

VERKLAART HIERBIJ OP DE HOOGTE TE ZIJN VAN DE NVAO GEDRAGSCODE.

PLAATS: AMSTERDAM DATUM: 6-7-'12

HANDTEKENING:

S.W. STELTENPOOL

2

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ONAFHANKELIJKHEIDS- EN GEHEIMHOUDINGSVERKLARING

INDIENEN VOORAFGAAND AAN DE OPLEIDINGSBEOORDELING

ONDERGETEKENDE

NAAM: Daan de Lange

PRIVÉ ADRES: Catharijnesingel 56
3511 GE Utrecht

IS ALS DESKUNDIGE / SECRETARIS GEVRAAGD VOOR HET BEOORDELEN VAN DE OPLEIDING:

Informatiekunde UU/RU

AANGEVRAAGD DOOR DE INSTELLING:

Universiteit Utrecht
Radboud Universiteit

VERKLAART HIERBIJ GEEN (FAMILIE)RELATIES OF BANDEN MET BOVENGENOEMDE INSTELLING TE ONDERHOUDEN, ALS PRIVÉPERSOON, ONDERZOEKER / DOCENT, BEROEPSBEOEFENAAR OF ALS ADVISEUR, DIE EEN VOLSTREKT ONAFHANKELIJKE OORDEELSVORMING OVER DE KWALITEIT VAN DE OPLEIDING TEN POSITIEVE OF TEN NEGATIEVE ZOUDEN KUNNEN BEÏNVLOEDEN;

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VERKLAART HIERBIJ ZODANIGE RELATIES OF BANDEN MET DE INSTELLING DE AFGELOPEN VIJF JAAR NIET GEHAD TE HEBBEN;

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VERKLAART HIERBIJ OP DE HOOGTE TE ZIJN VAN DE NVAO GEDRAGSCODE.

PLAATS: Utrecht DATUM: 26 - 9 - 2012

HANDTEKENING:

2