

Assessment report  
Limited Programme Assessment, including Distinctive Quality Feature Entrepreneurship

**Bachelor Science, Business & Innovation**

Vrije Universiteit Amsterdam

*Contents of the report*

1. Executive summary .....	2
2. Assessment process .....	6
3. Overview of the programme.....	8
3.1 Basic information about the programme .....	8
3.2 Main facts about the institution .....	9
3.3 Intended learning outcomes.....	10
3.4 Outline of the curriculum .....	11
4. Overview of assessments.....	12
Programme assessment.....	12
5. Findings, considerations and assessments programme .....	13
5.1 Standard 1: Intended learning outcomes .....	13
5.2 Standard 2: Teaching-learning environment .....	15
5.3 Standard 3: Assessment.....	18
5.4 Standard 4: Achieved learning outcomes .....	20
6. Findings, considerations and assessments Entrepreneurship .....	21
6.1 Standard 1: Entrepreneurship vision and strategy .....	21
6.2 Standard 2: Intended learning outcomes .....	23
6.3 Standard 3: Teaching-learning environment .....	24
6.4 Standard 4: Staff.....	26
6.5 Standard 5: Achieved learning outcomes .....	27
7. Recommendations .....	28
Annex 1: Site visit schedule .....	29
Annex 2: Documents studied .....	31
Annex 3: Final products reviewed.....	32
Annex 4: Assessment panel composition.....	33

## 1. Executive summary

In this executive summary, the panel presents the main considerations which have led to the assessment of the quality of the programme Bachelor Science, Business & Innovation of Vrije Universiteit Amsterdam as well as to the assessment of the Distinctive Quality Feature Entrepreneurship for this programme, which have been assessed according to the applicable NVAO Assessment Frameworks.

### *Programme assessment*

The panel observes programme management has taken up the recommendations made in the previous assessment in 2010. Programme management increased the proportion of courses, specifically designed for this programme, improved the information provided to students, reinforced the research efforts in the science, business and innovation domain and strengthened the international dimension of the programme.

The cooperation between the Faculty of Science, the Faculty of Economics and Business Administration and the Faculty of Social Sciences of Vrije Universiteit Amsterdam is regarded by the panel to be fruitful and productive for this programme.

The panel considers the programme objectives to be valid, as students are taught to link natural sciences, business notions and social sciences and are taught to design valorisation strategies for inventions in natural sciences. The panel approves of the choice to focus on the life and health sciences and energy and sustainability sciences, as this allows to attain depth in the natural sciences field. The panel very much welcomes the domain-specific reference framework, as drafted by management of the Vrije Universiteit, Utrecht University and Eindhoven University of Technology programmes. Through this framework, the programme is linked to international concepts, notions and trends in the innovation sciences domain.

The intended learning outcomes of the programme meet the programme objectives, list the knowledge and skills to be acquired by students adequately and meet the bachelor level. The panel recommends, however, to more explicitly address problem-solving capabilities in the intended learning outcomes. The panel established the learning outcomes to correspond to the domain-specific reference framework.

The Advisory Board is seen by the panel to have added value to the programme, since trends in the professional field are important for the programme.

The admission requirements and admission processes are adequate for this programme.

In the panel's opinion, the curriculum reflects the programme intended learning outcomes adequately, is well designed and addresses all subjects to be expected in this interdisciplinary programme. The panel is very positive about the *Innovation projects*, as these allow students to effectively learn how to cope with interdisciplinary dimensions of this field. The panel recommends to strengthen the research methodology learning track and to address academic skills and the students' progress in that respect more explicitly in the courses. The international dimension of the programme is satisfactory.

The educational principles and the study methods of the programme are appropriate, as is the number of contact hours. The study guidance in the programme meets the requirements. The student success rates are not unfavourable, but may be further increased. The panel advises to make the business courses more challenging. Also, students should be better informed and guided in the selection process of subsequent master programmes.

The panel is positive about the community, having been formed among the lecturers in the programme. The curriculum is discussed on a regular basis by them and the curriculum coherence is ensured. The research track records as well as the educational capabilities of the lecturers are very appropriate.

The panel is positive about the examination and assessment rules and regulations of the programme. The panel ascertained the Examination Committee to have the responsibilities and to work along the lines, as intended by Dutch applicable law. The examination and assessment processes are adequately monitored and the examinations and *Bachelor projects* are regularly inspected. The examination methods are in line with the course contents to be assessed, although the panel suggests limiting the number of multiple-choice examinations. The diversity of examination methods in courses and across courses allows for the assessment of both knowledge and skills, relevant to the programme. The examination and assessment processes of the programme ensure in the panel's view the validity of the examinations and the reliability of the assessments. The panel supports the intention of programme management to draft a comprehensive assessment matrix for the programme.

The processes of supervision and assessment for the *Bachelor project* are elaborate and well managed. The assessment by two examiners leads to reliable assessments. The panel suggests to introduce rubrics scoring models to further improve this assessment. The panel also advises to reconsider the relatively large proportion of the grade attributed to the internship process indicators.

The panel studied examinations of a number of courses in the programme. The panel established these examinations to be of adequate quality and of an appropriate level, meeting the courses' learning goals.

The panel studied a total of fifteen *Bachelor projects* of students in the programme, with a representative distribution of grades. The panel assesses the grades given in most cases to be appropriate and in some cases slightly too high. One of the projects has been assessed by the panel to be just below satisfactory.

The majority of the students proceed with master programmes, as is quite common in the Netherlands. Although the positions the graduates obtained may not entirely be taken as a proof of the programme achieved learning outcomes because these mainly refer to master graduates, the panel is quite positive about the future careers of the students of this bachelor programme. The panel noted the professional field representatives to be quite content about the students' capabilities.

The panel assesses the programme Bachelor Science, Business & Innovation of Vrije Universiteit Amsterdam to be satisfactory and recommends NVAO to grant re-accreditation to this programme.

*Distinctive quality feature Entrepreneurship assessment*

Programme management has acted upon the recommendations, made in the 2012 distinctive quality feature Entrepreneurship external assessment process. Programme management included courses in the curriculum, specifically designed to address entrepreneurship, drafted the domain-specific reference framework to define entrepreneurship and published a journal article, expressing the entrepreneurship vision in the programme.

Programme management expressed their vision on entrepreneurship quite clearly. The panel supports this vision and the three dimensions of entrepreneurship included in it, entrepreneurship as a personal competency, process of entrepreneurship and context of entrepreneurship. The panel feels this vision rests on a rather broad interpretation of the concept of entrepreneurship. Although it is acknowledged entrepreneurship may be approached from different perspectives and programme management has selected one of these perspectives, the panel recommends to introduce more focus in the entrepreneurship vision and to bring this vision more in alignment with the international understanding of the concept of entrepreneurship. The panel considers the support of this vision within and outside of the programme to be adequate. The strategy outlined by programme management is consistent with the vision and leads to a series of distinct objectives, to be pursued in the programme. The regular evaluation processes in the programme include the entrepreneurship vision, strategy and objectives.

The intended learning outcomes of the programme adequately reflect the entrepreneurship vision, strategy and objectives of the programme. The three dimensions of entrepreneurship are covered in the intended learning outcomes. Therefore, the panel considers the knowledge, skills, personal attitudes and personal motivation on entrepreneurship to be addressed in these learning outcomes.

The dimensions of entrepreneurship are included in the curriculum. Some of the disciplinary courses are designed to address entrepreneurship subjects. The *Innovation projects* and *Bachelor project* are geared towards the process and context of entrepreneurship. The *Technology Entrepreneurship* minor also addresses entrepreneurship but this minor is not mandatory. So, not all of the students take this minor. Programme management satisfactorily pays attention to the entrepreneurial competencies and attitudes in the intake and matching procedures. Therefore, students with these qualities are more likely to enter the programme. The educational concept and study methods of the programme are in line with the entrepreneurship contents of the curriculum and promote entrepreneurship as a personal competency on the part of the students. For the panel, the intake procedures, the curriculum and the educational concept and study methods constitute a coherent teaching-learning environment, in which students are enabled to achieve the entrepreneurship intended learning outcomes.

A sizeable number of lecturers in the programme are versed in entrepreneurship theory and have been involved in the professional field of entrepreneurship or still are involved in this field. Two of the lecturers are entrepreneurship researchers. A relatively large number of guest lecturers from industry teach in the courses of the curriculum. Therefore, the panel concludes the staff to be equipped to lecture on entrepreneurship in a meaningful way. The lecturers frequently meet with representatives of the professional field and, therefore, have ample opportunities to keep track of current notions of and recent trends in entrepreneurship.

The entrepreneurship dimensions are adequately assessed in the assessments of the courses and in the assessment of the *Bachelor project*. The panel advises, however, to formulate the entrepreneurship components in the *Bachelor project* assessment more explicitly and to consider requiring students to write a section on entrepreneurship/entrepreneurial behaviour, from their experience throughout the internship or the programme as a whole. The careers of the programme graduates testify to the entrepreneurial characteristics of these graduates. No less than 25 % of the graduates found entrepreneurial positions.

The panel assesses this programme to meet the distinctive quality feature Entrepreneurship requirements and advises NVAO to award this distinctive quality feature to the programme.

Rotterdam, 18 April 2017

Panel chair  
Prof. dr. ir. P.C. de Weerd-Nederhof

Secretary  
drs. W. Vercouteren RC

## 2. Assessment process

Certiked VBI received a request to conduct a limited programme assessment for the re-accreditation of the academic degree programme Bachelor Science, Business & Innovation, including the assessment of the distinctive quality feature Entrepreneurship for this programme. This request was submitted by Vrije Universiteit Amsterdam.

The panel composition was as follows (for more detailed information please refer to Annex 4: Assessment panel composition).

- Prof. dr. ir. P.C. de Weerd-Nederhof, Professor Organizational Studies and Innovation and chair of NIKOS, University of Twente (panel chair);
- Prof. dr. A.M. Bergek, Professor Innovation Systems and Technology Policy, Chalmers University of Technology (panel member);
- Prof. dr. M.S. van Geenhuizen, Professor of Innovation and Innovation Policy in the Urban Economy, Delft University of Technology (panel member);
- J.C. van Campenhout LLB, student pre-master programme in Law, University of Tilburg (student member).

On behalf of Certiked, drs. W. Vercoeteren RC was responsible for the process coordination and for drafting the panel's report. All panel members and the secretary signed a statement of independence and confidentiality.

Certiked requested the approval by NVAO of the proposed panel of experts to conduct this assessment. NVAO have given their approval.

The panel conducted this assessment on the basis of the NVAO Assessment Framework of 19 December 2014 (Staatscourant nr. 36791). For the assessment of the distinctive quality feature Entrepreneurship, the panel proceeded according to the NVAO Assessment Framework of September 2013. The final products or theses studied by the panel were selected in line with the NVAO Guidelines for the assessment of final projects during external assessments of 18 February 2015.

The following procedure was adopted. The panel members studied the documents presented beforehand by programme management, including a number of theses (please refer to Annex 2: Documents studied and Annex 3: Final products reviewed).

Before the date of the site visit, the panel chair and the panel secretary met to discuss the assessment procedures. On 31 January 2017, the panel had a meeting to discuss the preliminary findings concerning the quality of the programme and the distinctive quality feature Entrepreneurship.

During the meeting on 31 January 2017, the findings of the panel members, including those concerning the theses, were discussed. On the basis of the input of the panel, the secretary summarised the questions, which served as a starting point for the discussions with the programme representatives during the site visit.

On 1 February 2017, the panel conducted the site visit at the Vrije Universiteit Amsterdam campus. The site visit was conducted in accordance with the schedule drawn up beforehand (please refer to Annex 1: Site visit schedule). Prior to the site visit, programme management communicated the open office hours to the students in the programme and the staff of the programme. No one called on the panel.

A draft version of this report was finalised by the secretary, having taken into account the information presented as well as the findings and considerations of the panel. The panel members studied the draft report and made a number of changes. Thereupon, the secretary drew up the final report. This report was presented to programme management to be corrected for factual inaccuracies. After having been corrected for these factual inaccuracies, the report was sent to the institution's Board to accompany their requests for re-accreditation and for being awarded the distinctive quality feature Entrepreneurship.

### 3. Overview of the programme

#### 3.1 Basic information about the programme

*Administrative information about the programme:*

Name programme in CROHO: Bachelor Science, Business & Innovation  
 Orientation, level programme: Academic Bachelor  
 Grade: BSc  
 Number of credits: 180.0 EC (three-year programme)  
 Specialisations: Not applicable  
 Location: Amsterdam  
 Mode of study: Full-time  
 Registration in CROHO: 50670

*Administrative information about the institution:*

Name of institution: Vrije Universiteit Amsterdam  
 Status of institution: Government-funded university  
 Institution's quality assurance: Approved

*Quantitative data about the programme*

Cumulative proportion of students who dropped out after one, two or three years (vwo matriculation)

Cohort	2010	2011	2012	2013	2014
Drop-out rate after one year	17 %	11 %	17 %	15 %	22 %
Drop-out rate after two years	23 %	28 %	20 %	18 %	
Drop-out rate after three years	23 %	29 %	26 %		

Cumulative proportion of students who continued their studies in the second year and who completed the programme after three, four, five and six or more years (vwo matriculation)

Cohort	2010	2011	2012	2013	2014
Success rate after three years	24 %	14 %	11 %		
Success rate after four years	58 %	51 %			
Success rate after five years	72 %				
Success rate after six or more years					

Cumulative proportion of students who continued their study in the second year and who completed the programme after three, four, five and six or more years (all students)

Cohort	2010	2011	2012	2013	2014
Success rate after three years	24 %	14 %	11 %		
Success rate after four years	58 %	51 %			
Success rate after five years	74 %				
Success rate after six or more years					

#### Lecturers' qualifications

Qualification	MSc	PhD	BKO*
Percentage of lecturers	100 %	96 %	64 %

\*BKO means having obtained Dutch University Teaching Qualification.

The student-to-staff ratio of the programme is 15 : 1

#### Number of contact hours per week for each of the years of the programme

Year of the programme	Year 1	Year 2	Year 3
Number of contact hours per week	16	16	16

Contact hours in regular weeks are 16 hours per week. For intensive courses, such as innovation projects, lab work and tutorials the number of contact hours is about 25 hours per week. In the second year, the number given applies to the mandatory courses. In the third year, 16 hours is an average, excluding the Bachelor Project.

### 3.2 Main facts about the institution

The degree programme Bachelor Science, Business & Innovation is a programme of the Faculty of Sciences of Vrije Universiteit Amsterdam in collaboration with the Faculty of Economics and Business and the Faculty of Social Sciences of this university.

Vrije Universiteit Amsterdam (VU) was founded in 1880. According to the website, the university aspires to be an open organisation, strongly linked to people and society. For the University, what matters is not just the acquisition of a greater depth of knowledge, but also the pursuit of a wider scope. VU expects students, researchers, PhD candidates and employees to look beyond their own interests and their own field.

The aim of Vrije Universiteit Amsterdam is to offer academic research and education at a high level of ambition, and to encourage free and open ideas and communication. In its own words, VU stands for universal university values such as academic freedom and independence. The basic philosophy of the university is expressed in three core values: responsibility, openness and personal engagement.

The Faculties of Vrije Universiteit Amsterdam are the Faculties of Sciences, Dentistry, Earth and Life Sciences, Economics and Business Administration, Behavioural and Movement Sciences, Humanities, Law, Medicine, Social Sciences and Theology. Nearly 25,000 students are enrolled in the programmes of the university. About 10,000 staff are employed by Vrije Universiteit and the affiliated VU Medical Center.

### 3.3 Intended learning outcomes

The intended learning outcomes of the programme are as follows.

- Graduates of the programme have knowledge and understanding of basic principles of chemistry and pharmaceutical sciences that relate to energy science or life science.
- Graduates of the programme have knowledge and understanding of basic principles of physics that relate to energy science or life science.
- Graduates of the programme have knowledge and understanding of the basic principles of mathematics that are necessary for the understanding of physical, chemical and business processes that relate to energy science or life science.
- Graduates of the programme have knowledge and understanding of business-related basic principles that are necessary in the context of the commercial application of life science or energy science (R&D processes, innovation portfolios, company strategies).
- Graduates of the programme have knowledge and understanding of organisations and organisational behaviour, especially with respect to periods of organisational development or change.
- Graduates of the programme have knowledge and understanding of entrepreneurial and innovation processes and the implementation and integration of scientific innovations in business processes.
- Graduates of the programme have knowledge and understanding of the interdisciplinary domain of the exact sciences, business and social science to be able to progress from this bachelor degree to a master degree or a professional career.
- Graduates of the programme are familiar with research methodologies in the exact and social sciences that relate to life science or energy science.
- Graduates of the programme have developed skills to work on projects, to think in an interdisciplinary manner, to relate to scientific and business information, and to understand the different roles of actors in an innovation process.
- Graduates of the programme have knowledge of relevant data-analysis systems and computer applications and are capable of understanding the potential and limitation of computer models.
- Graduates of the programme are capable of critically reviewing assembled information, research results, professional literature and scientific reports in the exact, business and social sciences that relate to life science or energy science, and are able to judge their applicability.
- Graduates of the programme are able to weigh ethical aspects in the application of science and have an understanding of the importance of their discipline in a broader historical, philosophical and social context.
- Graduates of the programme are capable of presenting, communicating verbally and in writing their understanding of subject matter and outcomes from research and communicating and discussing their knowledge and understanding in a clear and transparent way.
- Graduates of the programme are capable of independent learning and of integrating new expert knowledge and skills in life science or energy science and relevant innovation aspects of the related invention in a context of medium complexity.

### 3.4 Outline of the curriculum

In the table below, the programme curriculum is presented.

Courses	Credits
Essentials of science, business & innovation	6.0 EC
Calculus	6.0 EC
Management and organisation for technological innovation	6.0 EC
Biochemistry	6.0 EC
Innovation project pharmaceuticals	6.0 EC
From molecule to medicine	3.0 EC
Sustainable chemistry	3.0 EC
Organic chemistry	3.0 EC
Physics: mechanics	3.0 EC
Entrepreneurship and innovation	6.0 EC
Physics lab	3.0 EC
Sustainable chemistry: biomass and biofuels	3.0 EC
Innovation project energy	6.0 EC
Academic skills programme	0.0 EC
First year	60.0 EC
Research, design and methodology	3.0 EC
Strategic management of technology and innovation	6.0 EC
Statistics	6.0 EC
Clinical diagnostics and imaging	6.0 EC
Applied computer science	3.0 EC
Innovation project diagnostics and health	6.0 EC
Linear algebra	3.0 EC
Corporate social responsibility and sustainability	6.0 EC
Thermodynamics	3.0 EC
Finance I	6.0 EC
Physics: electricity and magnetism	3.0 EC
Sustainable energy: sun, wind and water	3.0 EC
Innovation project alternative fuels	6.0 EC
Academic skills programme	0.0 EC
Second year	60.0 EC
Minor	30.0 EC
Computer modelling	3.0 EC
Philosophy of science	3.0 EC
Bachelor project	24.0 EC
Academic skills programme	0.0 EC
Third year	60.0 EC
Total credits of programme	180.0 EC

## 4. Overview of assessments

### *Programme assessment*

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

### *Distinctive quality feature Entrepreneurship assessment*

Standard	Assessment
Standard 1. Entrepreneurship vision and strategy	Satisfactory
Standard 2: Intended learning outcomes	Satisfactory
Standard 3: Teaching-learning environment	Satisfactory
Standard 4: Staff	Satisfactory
Standard 5: Achieved learning outcomes	Satisfactory
Distinctive quality feature Entrepreneurship	Satisfactory

## 5. Findings, considerations and assessments programme

### 5.1 Standard 1: Intended learning outcomes

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

#### *Findings*

The programme is a definite interdisciplinary programme, linking knowledge and skills in the natural sciences to insights and understanding of business processes. The objectives of the programme are to educate students to research and design valorisation strategies for technological or natural sciences' inventions and innovations. This requires knowledge and understanding of natural sciences, business and social sciences as well as insight into entrepreneurial and innovation processes. For the natural sciences, programme management decided to specifically address the life and health sciences and energy and sustainability sciences. This allows to achieve the desired depth of knowledge and understanding in the natural sciences.

As is quite common in the Netherlands, students are primarily trained to continue their studies at master level and not so much to enter the labour market. Students may, however, proceed in the latter sense. Graduates of this programme have direct access to the Master Science, Business and Innovation, several specialisations within the Master Business Administration and other master programmes of Vrije Universiteit Amsterdam and other universities in the Netherlands.

Because of the interdisciplinary character of the programme, the programme is offered by the Faculty of Sciences of Vrije Universiteit Amsterdam in cooperation with the Faculty of Economics and Business Administration and the Faculty of Social Sciences of this university. Formal meetings are scheduled yearly. Informally, many meetings take place by participants of the faculties to organise the programme.

In 2016, the domain-specific reference framework for the innovation sciences domain was drafted by programme management of this programme in collaboration with the innovation sciences programmes of University of Utrecht and Eindhoven University of Technology. In this domain-specific reference framework, the international domain of innovation sciences is delineated and research, education and study subjects in this domain are addressed.

Programme management drafted the intended learning outcomes of the programme. These intended learning outcomes (please refer to section 3.3 for an overview) address, among others, the natural sciences, business notions and social sciences knowledge elements and skills, research skills, critical judgment, communication skills and learning skills students ought to have acquired at completion of the programme.

Programme management demonstrated in the form of a table as well as in written text the correspondence of the intended learning outcomes of the programme to the Dublin-descriptors for bachelor programmes. From this table may be deduced the programme intended learning outcomes match these Dublin-descriptors.

For the programme, an Advisory Board with representatives of the professional field has been installed. This board advises programme management on the intended learning outcomes and the curriculum of the programme from the perspective of the professional field. This board has not met recently, however.

#### *Considerations*

The panel is positive about the programme objectives to train students in this interdisciplinary domain and to teach them to link natural sciences, business concepts and notions and social sciences and design valorisation strategies for inventions in natural sciences. In addition, the panel approves of the choice of programme management to focus on the life and health sciences and energy and sustainability sciences, as this indeed allows to attain depth in the natural sciences field.

The cooperation between the Faculty of Sciences, the Faculty of Economics and Business Administration and the Faculty of Social Sciences of Vrije Universiteit Amsterdam is regarded by the panel to be fruitful and productive regarding this programme.

The panel very much welcomes the efforts of management of the Vrije Universiteit, Utrecht University and Eindhoven University of Technology programmes to draft the domain-specific reference framework. Through this framework, the programme is definitely linked to international concepts, notions and trends in the innovation sciences domain.

The panel studied the intended learning outcomes of the programme and observes these to meet the programme objectives, exhibiting, among others, knowledge and understanding of the life sciences and energy sciences, business notions and social sciences and academic skills. The panel recommends to more explicitly address problem-solving capabilities in the intended learning outcomes, since these seem to be underrepresented. The panel established the learning outcomes to correspond to the domain-specific reference framework.

The panel ascertained the intended learning outcomes of the programme to match the Dublin-descriptors for bachelor programmes and, therefore, to meet the requirements of a bachelor level programme.

The Advisory Board is seen by the panel to have added value to the programme, since trends in the professional field are important for the programme.

#### *Assessment of this standard*

These considerations have led the assessment panel to assess standard 1, *Intended learning outcomes* to be satisfactory.

## 5.2 Standard 2: Teaching-learning environment

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

### *Findings*

Programme management consists of the programme director, the programme coordinator, the study advisor and the internship coordinator. Programme management is advised on the programme quality by the Education Committee, composed of an equal number of lecturers and students. The sub-committee Science, Business and Innovation of the Faculty of Science-wide Examination Committee monitors examination and assessment processes and results.

The number of students enrolling in the programme remained more or less stable over the past six years, going from an influx of 66 students in 2010 to 81 students in 2015. The vast majority of the students have as their previous education the Dutch *vwo-diploma*. A very limited number of students come from universities of applied sciences (in Dutch: *hbo*) or come from abroad.

The entry requirements for applicants are the Dutch *vwo-diploma*, with the required level of mathematics (Mathematics B). Applicants older than 21 years, may take the *colloquium doctum* test. Programme management conducts matching activities, such as an intake interview and an individual assignment to attract students interested in this programme.

Programme management presented a table in which the relations between the intended learning outcomes and the curriculum components have been specified. From this table, it may be deduced that all of the intended learning outcomes are addressed in one or more courses.

The curriculum spans three years and is organised along the lines of five distinct learning tracks, these being *Science basics*, *Energy and sustainability*, *Life and health*, *Innovation and entrepreneurship* and *Methodology*. Each of the courses offered in the first two years and some of these offered in the third year, belong to one or more of these learning tracks. These courses are specifically meant to teach students the natural sciences knowledge and skills and the business and social sciences dimensions. Other courses, notably the *Innovation projects*, are more interdisciplinary in nature and are meant to combine knowledge and skills from different tracks. These projects take four weeks with no other courses scheduled in these periods and are meant to train students in going through the process of investigating the market potential of natural sciences or technological innovations. The learning track *Methodology* is present in a number of courses, including natural sciences courses and the *Research, design and methodology* course. The students with whom the panel met, expressed being content with these methodology courses but regarded methodology to be somewhat underrepresented in the curriculum. In each year of the programme, students are trained in academic skills, such as working effectively, close reading of academic literature and writing, presentation and communication skills. The *Academic skills* programme runs parallel to the courses. The credits for this programme are part of the course credits and the assessment is partially included in the courses. In the third year, students are offered a minor. This allows students a degree of choice in the curriculum. The minor *Technology Entrepreneurship* is especially designed to teach students the entrepreneurial dimensions of natural sciences or technological innovations. At the end of the curriculum, students do the *Bachelor project*, this being a research project within a company.

The programme intends to offer students an international perspective. An international study trip is organised, in which 15 % to 20 % of the students participate. About 10 % to 15 % of the students take their minor in the third year abroad. And some students take the *Bachelor project* outside of the Netherlands.

The educational concept of the programme is geared towards enabling students to achieve the intended learning outcomes. Study methods include guest lectures, tutorials, computer and experimental labs, addressing business cases, assignments, oral presentations, poster presentations and interviews with experts. Students may take part in the honours programme of the Faculty of Science. The students with whom the panel met expressed experiencing the curriculum as moderately challenging with the science courses to be quite demanding but the business courses to be relatively easy.

The number of contact hours is about 16 hours per week. In the first year in line with the binding study progress advice, students are to report 42 EC. Students are guided through the programme by the study advisor, who regularly meets with the students to discuss the study progress. The internship coordinator supervises the internship, associated with the *Bachelor project*. The students success rates in the last few years are on average 16 % after three years and on average 55 % after four years.

The lecturers in the programme meet biannually to discuss the contents and the coherence of the curriculum. For each of the learning tracks, coordinators monitor the coherence within the tracks. Lecturers in the tracks meet to discuss the streamlining of the courses and assessment in these tracks.

Lecturers are appointed by the programme director, having consulted with the head of the department of the lecturer. About 28 lecturers are involved in the programme. The lecturers are researchers in their field of study. About 96 % of the lecturers hold a PhD, whereas 64 % of them is in possession of the BKO-certificate, testifying to their capabilities in education.

#### *Considerations*

In the panel's view, the admission requirements and the admission processes are adequate for this programme.

The curriculum reflects all of the intended learning outcomes of the programme adequately and evenly. The panel regards the curriculum to be well designed and to address all of the subjects to be expected in this interdisciplinary programme. This equally applies to the disciplinary subjects in the natural sciences as to subjects of business and the social sciences. The panel recommends to strengthen the research methodology learning track. The panel is very positive about the *Innovation projects*, as these allow students to effectively learn how to cope with the interdisciplinary dimensions. Although the panel approves of the academic skills programme, it is advised by the panel to address academic skills and the students' progress in that respect more explicitly in the courses. The international dimension of the programme is satisfactory.

The educational principles and the study methods of the programme are appropriate. These allow students to acquire disciplinary and interdisciplinary knowledge and skills. The number of contact hours is adequate. The panel recommends to make the business courses more challenging. The study guidance in the programme is regarded by the panel to meet the requirements. The student success rates are not unfavourable, but may be further increased. Having listened to the students in the programme, the panel advises to better inform and guide students in the selection process of subsequent master programmes.

The panel is positive about the science, business and innovation community, which has been formed among the lecturers in the programme. Lecturers coming from the three faculties participate in the programme and work together effectively. They discuss the curriculum on a regular basis and ensure the curriculum coherence. In the panel's view, the research track records of the lecturers are very appropriate for this programme. The same applies to the educational capabilities of the lecturers, as exemplified by the 64 % of lecturers having obtained the BKO-certificate.

*Assessment of this standard*

These considerations have led the assessment panel to assess standard 2, *Teaching-learning environment* to be satisfactory.

### 5.3 Standard 3: Assessment

*The programme has an adequate assessment system in place.*

#### *Findings*

The examinations and assessments of this programme are governed by the Vrije Universiteit Assessment Policy and by the Faculty of Science Assessment Policy, which has been derived from VU Assessment Policy. The examination and assessment rules and regulations of this and the other programmes of the Faculty are in line with these University and Faculty policy statements.

For all of the Faculty of Science programmes, the Faculty Examination Board monitors the examinations and assessments. For this programme, the sub-committee Science, Business and Innovation performs these tasks. This committee inspects on a regular basis a sample of examinations as well as *Bachelor projects*. In addition, examinations are inspected, in case of deviant grade distributions. Examiners are formally appointed by the Examination Board, following the recommendation of the programme director.

Examination methods are quite diverse and include written examinations, individual and group assignments, mid-term or weekly assignments and oral presentations.

To enhance the validity, examinations are prepared by one of the lecturers and is presented to another lecturer for review. The examinations are related to the course goals. To foster the reliability of the assessments, answer models are drafted by the examiners. In the case of written reports, oral presentations or practical assignments, two examiners are involved in the assessments. In most of the courses, multiple examinations are to be taken by the students and the final grade of the courses is a composite grade, this being the weighed outcome of the grades of the course components. Programme management has the intention to draft a comprehensive assessment matrix linking the course examinations to the intended learning outcomes of the programme.

At the end of the programme, students are required to complete their *Bachelor project*. For this project, programme management drafted an elaborate course guide, specifying the requirements, schedule and roles of the student and the supervisors and examiners. The project constitutes 24 EC and takes about four months. Before beginning this project, students present their plan of approach for the project, which is approved by the two examiners, the supervisor and the second assessor. The *Bachelor project* is nearly always conducted within an external organisation in the form of an internship. The programme internship coordinator assists students in finding a suitable internship and monitors the internship process. In the internship organisation, students are guided by the internship coach, who is an employee of this organisation. On the part of the programme, the supervisor guides the student, reviews and gives feedback on intermediate reports. The supervisor visits at least once the internship company and meets with the internship coach. At the end of this process, the two examiners mentioned assess and grade the *Bachelor project* independently. They do so, using an assessment form on which a number of criteria have been listed. When their judgement differs more than 1.0 point, a third examiner is called in to assess the project. The *Bachelor project* is assessed on the basis of the internship process (40 %), the written report (45 %) and the presentation (15 %). All indicators should at least be graded 5.5. If not, then the student has to repair items. This happens in about 20 % of the cases.

### *Considerations*

The panel is positive about the examination and assessment rules and regulations of the programme. They not only conform to the Vrije Universiteit and Faculty of Science policy statements but also address subjects which are relevant for assuring the examinations and assessments quality. These rules and regulations include, among others, measures to assure the examinations' validity, the reliability of assessments and the competencies and expertise of examiners.

The panel ascertained the Examination Committee to have the responsibilities and to work along the lines, as intended by Dutch applicable law. The examination and assessment processes are adequately monitored and the examinations and *Bachelor projects* are regularly inspected.

The panel approves of the examination methods, that programme management has selected. They are in line with the course contents to be assessed. The diversity of examination methods in courses and across courses allows for the assessment of both knowledge and skills, relevant to the programme. The panel suggests, on the other hand, limiting the number of multiple-choice examinations.

The examination and assessment processes of the programme ensure in the panel's view the validity of the examinations and the reliability of the assessments. The panel supports the intention of programme management to draft a comprehensive assessment matrix for the programme.

The panel is positive about the processes of supervision and assessment for the *Bachelor project*, which are very elaborate and well managed. The panel observed at least four qualified supervisors and examiners being involved in these processes, being the internship coordinator, the internship coach, the supervisor and the second examiner. The assessment by two examiners leads to reliable assessments. The panel suggests to introduce rubrics scoring models to further improve this assessment. In addition, the panel recommends to reconsider the relatively large proportion of the grade (40 %) attributed to the internship process indicators, as compared to the output indicators for the written report (45 %) and the presentation (15 %).

### *Assessment of this standard*

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

## 5.4 Standard 4: Achieved learning outcomes

*The programme demonstrates that the intended learning outcomes are achieved.*

### *Findings*

In recent years, the average grade for the *Bachelor projects* as estimations for the learning outcomes achieved by the graduates, was 7.5. About 70 % of the students completed their project on time.

As has been mentioned when discussing standard 1, most of the graduates of the programme do not enter the labour market, but proceed with their studies at master level. The proportion of students doing so is about 95 %. Programme management conducted a survey among graduates of both science, business and innovation bachelor and master programmes in 2015 – 2016. The results of this survey were 25 % of the graduates having entrepreneurial positions, half of them being self-employed, 20 % of the graduates being management consultants, 20 % of them working as specialists in the energy sector, about 15 % of them being specialists in the life sciences and health industry, 10 % working in the financial services industry and another 10 % of them being employed in the information technology sector. The graduates tend to find suitable positions within 4 months after graduation.

The professional field representatives with whom the panel met, expressed being generally very positive about the science, business and innovation bachelor students. In the words of these representatives, these students have science backgrounds, which is very important in the life sciences and energy industries, and show rather strong social skills and entrepreneurial attitudes. These students are very much sought after in for instance the medical and pharmaceutical industries.

### *Considerations*

The panel studied examinations of a number of courses in the programme. The panel established these examinations to be of adequate quality and of an appropriate level, meeting the courses' learning goals.

The panel studied a total of fifteen *Bachelor projects* of students in the programme, with a representative distribution of grades. The panel assesses the grades given in most cases to be appropriate and in some cases slightly too high. In some of the projects, the theoretical part, the research methodology and the conclusion and discussion parts could have been stronger and more elaborate. One of the projects has been assessed by the panel to be just below satisfactory.

The majority of the students proceed with master programmes, as is quite common in the Netherlands. Although the positions the graduates obtained may not entirely be taken as a proof of the programme achieved learning outcomes because these mainly refer to master graduates, the panel is quite positive about the future careers of the students of this bachelor programme. The panel noted the professional field representatives to be quite content about the students' capabilities.

### *Assessment of this standard*

The considerations have led the assessment panel to assess standard 4, *Achieved learning outcomes* to be satisfactory.

## 6. Findings, considerations and assessments Entrepreneurship

### 6.1 Standard 1: Entrepreneurship vision and strategy

*The programme has a clear vision on entrepreneurship, supported by internal and external stakeholders, has an entrepreneurship strategy and objectives and evaluates and improves these.*

#### *Findings*

The entrepreneurship vision in this programme is that natural sciences or technological innovation and valorisation, which are central to this programme, require entrepreneurial capabilities and an entrepreneurial attitude. This vision includes the following three dimensions.

- Entrepreneurship as a personal competency. Innovation and valorisation processes require an entrepreneurial attitude, being an attitude to look for and investigate market opportunities for technological inventions and to commercialise these inventions.
- Process of entrepreneurship. This implies the processes of transformation of ideas, concepts and inventions to innovations and to marketable products. These transformation processes may be regarded to represent the structural dimensions of entrepreneurship.
- Context of entrepreneurship. This means addressing the external circumstances of organisations. Organisations generally operate in the field in which innovation is an important phenomenon. The successes of organisations depend on understanding these external circumstances and acting upon these on time and decisively.

Programme management has established relationships with a substantial number of organisations, some of which have developed into intensive relations. The internships by students are an important vehicle in this respect, allowing frequent meetings between programme management, lecturers and company representatives. These organisations are supportive of the entrepreneurship vision of programme management. Within the programme, a number of lecturers have track records in entrepreneurship. They exemplify the vision on entrepreneurship in the programme.

The strategy of programme management is to train students to investigate and consider the market potential of technological or natural sciences inventions. The objectives in the programme, as derived from the strategy, are to teach students the processes and the context of entrepreneurship and to familiarise them with these concepts and notions in a number of different situations. In addition, programme management intends to educate students in acquiring an entrepreneurial attitude.

The evaluation of the vision, strategy and objectives on entrepreneurship is part of the regular evaluation processes within the programme. The programme is periodically evaluated on a number of criteria and the results of these evaluations may lead to improvements.

### *Considerations*

The panel is of the opinion programme management has expressed their vision on entrepreneurship quite clearly. The panel supports this vision and the three dimensions of entrepreneurship, as explained by programme management. The panel feels the vision on entrepreneurship rests on a rather broad interpretation of the concept of entrepreneurship. Although it is acknowledged entrepreneurship may be approached from different perspectives and programme management has selected one of these perspectives, the panel advises programme management to introduce more focus in the entrepreneurship vision and to bring this vision more in alignment with the international understanding of the concept of entrepreneurship. In doing so, the panel feels programme management may define the concept of entrepreneurship more clearly and may differentiate it more explicitly from the concepts of innovation and valorisation.

The panel considers the support of the entrepreneurship vision within and outside of the programme to be adequate. The representatives of the professional field with whom the panel met, expressed their support of dimensions of the programme management vision on entrepreneurship.

The strategy outlined by programme management is consistent with the vision on entrepreneurship and leads to a series of distinct objectives, to be pursued in the programme. These objectives address the dimensions of the entrepreneurship vision.

The panel observed the regular evaluation processes in the programme to include the entrepreneurship vision, strategy and objectives in the programme.

### *Assessment of this standard*

The considerations have led the assessment panel to assess standard 1, *Entrepreneurship vision and strategy* to be satisfactory.

## 6.2 Standard 2: Intended learning outcomes

*The intended learning outcomes include entrepreneurship objectives, match (inter)national views and include entrepreneurship competencies.*

### *Findings*

Programme management drafted a series of intended learning outcomes for the programme, a number of which refer to the entrepreneurship knowledge, skills and attitude the students are to acquire. These intended learning outcomes are the following.

- Graduates have knowledge and understanding of entrepreneurial and innovation processes and the implementation and integration of scientific innovations in business processes.
- Graduates have developed skills to work on projects, to think in an interdisciplinary manner, to relate to scientific and business information, and to understand the different roles of actors in an innovation process.
- Graduates are capable of critically reviewing assembled information, research results, professional literature and scientific reports in the exact, business and social sciences that relate to life science or energy science, and are able to judge their applicability.
- Graduates are capable of communicating verbally and in writing their understanding of subject matter and outcomes from research and communicating and discussing their knowledge and understanding in a clear and transparent way.

The first intended learning outcome may be said to reflect the process of entrepreneurship, as mentioned in the entrepreneurship vision of the programme. The second learning outcome addresses the context of entrepreneurship. In the last two intended learning outcomes, entrepreneurship as a personal competency is presented. These stipulate students to be able to judge the applicability of research, professional and scientific information and to communicate research outcomes to arrive at, among others, innovation and valorisation. They may be said to constitute attitudes and skills required for entrepreneurship.

### *Considerations*

The panel studied the intended learning outcomes of the programme and established the entrepreneurship vision, strategy and objectives of the programme to be adequately reflected in these intended learning outcomes. The three dimensions of entrepreneurship, as mentioned under standard 1, are covered in the intended learning outcomes. In this sense, knowledge, skills, personal attitudes and personal motivation are addressed in the learning outcomes.

### *Assessment of this standard*

The considerations have led the assessment panel to assess standard 2, *Intended learning outcomes* to be satisfactory.

### 6.3 Standard 3: Teaching-learning environment

*The curriculum, competencies and/or experiences of students, study methods and the teaching-learning environment enable students to achieve the entrepreneurship intended learning outcomes.*

#### *Findings*

The vision, strategy and objectives on entrepreneurship, as expressed under standard 1, are pursued in the curriculum of the programme. Courses, such as *Entrepreneurship & innovation*, *Strategic management of technology and innovation* and *Corporate social responsibility and sustainability* address subjects on entrepreneurship. Literature on entrepreneurship is part of these courses. In the *Innovation projects* as well as in the *Bachelor project*, students are to demonstrate their entrepreneurial capabilities. In these projects, students are to interview organisations with questions about the market potential of products, are to go through the process of entrepreneurship and are to provide advice on the feasibility of the product launching, covering scientific and business aspects. In addition, students are taught to address stakeholders' interests in innovation processes and are equally taught to bridge gaps in case of conflicting interests. This allows students to handle an important part of the context of entrepreneurship. In the *Technology Entrepreneurship Minor*, features of the technology entrepreneur are addressed and students draft science-based business propositions.

Programme management has the express intention to attract students with an interest in entrepreneurship and with entrepreneurial attitudes and competencies. In the programme intake and matching procedures, programme management specifically pays attention to these competencies. From research, programme management knows the programme to attract entrepreneurial students. About 5 % to 10 % of the students entering the programme are acquainted with entrepreneurship or have been active in this respect.

In the *Innovation projects*, the *Bachelor project* and the *Technology Entrepreneurship Minor*, the study methods are tailored to the process of entrepreneurship. Students are trained to go through this process, exploring market possibilities, developing market strategies and drafting business propositions. In this way, the educational concept and study methods in the programme foster the training of students in entrepreneurship.

The intake procedures, the curriculum components mentioned and the educational concept and study methods, together constitute the teaching-learning environment in which vision, strategy and objectives on entrepreneurship may be said to be addressed and to be promoted.

#### *Considerations*

The panel studied the curriculum of the programme and established the dimensions of entrepreneurship to be adequately covered. Some of the disciplinary courses are designed to address entrepreneurship subjects and topics. The *Innovation projects* and the *Bachelor project* are specifically geared towards the process and context of entrepreneurship. The *Technology Entrepreneurship* minor also addresses entrepreneurship dimensions but this minor is not mandatory. So, not all of the students take this minor.

The panel is of the opinion programme management pays attention to the entrepreneurial competencies and attitudes satisfactory in the intake and matching procedures. Therefore, students with these qualities are more likely to enter the programme.

In the panel's view, the educational concept and study methods of the programme are in line with the entrepreneurship contents of the curriculum and promote entrepreneurship as a personal competency on the part of the students.

For the panel, the intake procedures, the curriculum and the educational concept and study methods constitute a coherent teaching-learning environment, in which students are enabled to achieve the entrepreneurship intended learning outcomes.

*Assessment of this standard*

The considerations have led the assessment panel to assess standard 3, *Teaching-learning environment* to be satisfactory.

## 6.4 Standard 4: Staff

*The staff composition, the qualities of staff members and the knowledge of staff members of recent trends in the professional practice are consistent with the teaching of entrepreneurship subjects.*

### *Findings*

Many lecturers in the programme are familiar with entrepreneurship, not only from a theoretical perspective but also from practical experience. A number of them have been or still are active in the professional practice, having worked or still working on entrepreneurial aspects in organisations. A number of lecturers have been involved in start-up companies, which originated out of their research activities. In courses and in the *Innovation projects*, quite a number of guest lecturers present their views on subjects, including entrepreneurship topics.

As has been mentioned, programme management and lecturers maintain relationships with a substantial number of companies in the field of innovation, valorisation and entrepreneurship. The frequent meetings between lecturers and company representatives during the internships and in courses allow lecturers to keep track of recent trends and developments with respect to entrepreneurship subjects and topics.

### *Considerations*

The panel studied the curricula vitae of the lecturers and their track records in the theory and the professional practice of entrepreneurship. From this documentation, it may be derived that a number of lecturers have been involved in the professional field of entrepreneurship or still are involved in this field. In addition, the panel noted that a relatively large number of guest lecturers from industry teach in the various courses of the curriculum. Therefore, the panel concludes the staff to be equipped to lecture on entrepreneurship in a meaningful way.

Having noted the frequent meetings of lecturers with representatives of the professional field, the panel concludes the lecturers being offered ample opportunities to keep abreast of current notions and recent developments with regard to entrepreneurship.

### *Assessment of this standard*

The considerations have led the assessment panel to assess standard 4, *Staff* to be satisfactory.

## 6.5 Standard 5: Achieved learning outcomes

*The examinations and assessments and the careers of the programme graduates demonstrate the entrepreneurship learning outcomes to be achieved.*

### *Findings*

The examinations and assessments of the courses, which address entrepreneurship, reflect the entrepreneurship learning goals and consequently relate to the entrepreneurship intended learning outcomes. This may, among others, be derived from the matrix of the relations between the intended learning outcomes of the programme and the courses in the curriculum, as presented by programme management.

For the *Bachelor project*, a number of criteria regarding entrepreneurship are included in the assessment of the written report as well as in the assessment of the internship process.

As has been mentioned above, the alumni survey conducted by programme management showed 25 % of the graduates of the programme having obtained entrepreneurial positions within or outside of companies, while half of these graduates were self-employed.

### *Considerations*

The panel considers the entrepreneurship dimensions to be adequately assessed in the examinations and assessments of the courses as well as in the assessment of the *Bachelor project*. The panel recommends, however, to phrase the entrepreneurship components in the *Bachelor project* assessment more explicitly. The panel suggests to consider requiring students to write a section on entrepreneurship/entrepreneurial behaviour, as experienced by them throughout their internship or throughout the programme as a whole.

In the panel's view, the careers of the programme graduates testify to the entrepreneurial characteristics of these graduates. No less than 25 % of the graduates found entrepreneurial positions.

### *Assessment of this standard*

The considerations have led the assessment panel to assess standard 5, *Achieved learning outcomes* to be satisfactory.

## 7. Recommendations

In this report, a number of recommendations regarding the programme quality have been listed. For the sake of clarity, these are brought together below. The recommendations are the following.

- To mention problem-solving skills more explicitly in the intended learning outcomes of the programme.
- To strengthen the research methodology learning track in the curriculum.
- To make the business courses in the curriculum more challenging.
- To address the academic skills and the students' progress in that respect more explicitly in the courses.
- To better inform and guide students in the selection process of subsequent master programmes.
- To consider limiting the number of multiple-choice examinations in the programme.
- To introduce the comprehensive assessment matrix for the programme, as programme management is already intending to do.
- To introduce rubrics scoring models to further improve the *Bachelor project* assessment.
- To reconsider the large proportion of the *Bachelor project* grade, attributed to internship process indicators, as compared to the output indicators for the written report and the presentation.

In this report, a number of recommendations regarding the distinctive quality feature Entrepreneurship of the programme have been listed. For the sake of clarity, these are brought together below. The recommendations are the following.

- To introduce more focus in the entrepreneurship vision and to bring this vision more in alignment with the international understanding of the concept of entrepreneurship.
- To formulate the entrepreneurship components in the assessment of the *Bachelor project* more explicitly.
- To consider requiring students to write a section on entrepreneurship/entrepreneurial behaviour, as experienced by them throughout their internship or throughout the programme as a whole.

## Annex 1: Site visit schedule

The site visit was conducted in Amsterdam on 1 February 2017.

- 08.30 h. – 09.30 h.      Arrival panel and documents study (closed session)
- 09.30 h. – 10.00 h.      Dean and programme management  
Prof. dr. N. van Straalen (Education Portfolio Holder, Board of Faculty of Sciences), dr.-ing habil. T. Kielmann (Director of Education, Faculty of Sciences), P. van Hoorn MSc (Programme Director Bachelor Science, Business and Innovation), R. de Crom MSc (Education Portfolio Holder, Board of Faculty of Economics and Business), prof. dr. J. van Stekelenburg (Education Portfolio Holder, Board of Faculty of Social Sciences), prof. dr. ir. B. Bossink (Head of Section Science, Business & Innovation, Programme Director Master Science, Business & Innovation)
- 10.00 h. – 11.00 h.      Programme management and core lecturers  
Prof. dr. I. de Esch (Professor of Biocomputational Chemistry for Drug Innovation, Head of Department Chemistry), dr. R. Wijngaarden (Associate Professor of Condensed Matter Physics), M. de Roos MSc (Programme Coordinator Bachelor Science, Business and Innovation), P. van Hoorn MSc (Programme Director Bachelor Science, Business and Innovation), prof. dr. P. van der Sijde (Professor of Organisation, Entrepreneurship and Organisation), prof. dr. ir. B. Bossink (Head of Section Science, Business & Innovation, Programme Director Master Science, Business & Innovation)
- 11.15 h. – 12.00 h.      Examination Committee  
Dr. J. Dekker (Member Sub-Examination Committee Science, Business & Innovation), dr. I. van Stokkum (Member Sub-Examination Committee Science, Business & Innovation), prof. dr. L. Visscher (Member Examination Committee Faculty of Science, representing Chair)
- 12.00 h. – 13.00 h.      Lunch panel (closed session), open office hours 12.00 h. – 12.30 h.
- 13.00 h. – 14.00 h.      Lecturers and theses examiners  
E. Kroezinga (Internship Coordinator Bachelor Science, Business & Innovation), prof. dr. P. van der Sijde (Professor of Organisation, Entrepreneurship and Technology), prof. dr. ir. H. Berends (Professor of Innovation and Organisation), dr. R. Frese (Assistant Professor of Biophysics), dr. ir. I. Heller (Assistant Professor Science, Business & Innovation), dr. K. Augustijn (Assistant Professor Science, Business & Innovation). Dr. M. Blankesteyn (Assistant Professor Science, Business & Innovation)
- 14.00 h. – 14.45 h.      Students and alumni  
L. Gorka (second year student), S. van Bruchem (third year student), B. Visman (third year student, former Member Education Committee), V. Franken MSc (alumnus, former Board Member Student Association), S. Lopes van den Broek (alumna, formerly in organisation of study trip), J. Scholten (third year student, former Member Education Member), M. Palokaj (second year student, Member Education Committee), B. Singh (third year student, former Board Member Student Association)

- 15.00 h. – 15.45 h. Professional field representatives  
Ir. A. Hecceg (Managing Consultant, Lux Research), R. Spierings MSc (Power Generation Plant Technologist, Shell), ir. G. Hiemstra (Director/Chairman, Van der Meer & Van Tilburg Consultancy), M. Klaasse (Head Operations Control Center, Eneco), ir. M. Wapenaar PDEng (Associate Scientist, Janssen Biologics), dr. J. de Vlieger (Director Business Development, Lygature)
- 15.45 h. – 17.30 h. Deliberations panel (closed session)
- 17.30 h. – 17.45 h. Main findings presented by panel chair to programme management and others

## Annex 2: Documents studied

The panel studied the following documents, presented prior to the site visit

- Critical Reflection Report Limited Programme Assessment Bachelor Science, Business & Innovation
- Critical Reflection Report Distinctive Quality Feature Entrepreneurship Bachelor Science, Business & Innovation
- Domain-specific reference framework
- Curriculum and Learning Tracks
- Education and Examination Regulations (2016 – 2017)
- Overview of Teaching Staff
- Bachelor projects in years 2015, 2016
- Enrolment, drop-out rate, mean study duration, diplomas and success rates
- Student-to-staff ratio
- Teacher qualifications
- Educating the Science Business Professional, abstract
- Advisory Board
- Overview of current job positions held by programme graduates
- Excerpt from alumni survey 2014
- Bachelor project course manual and grading sheets
- Binding Study Results (BSA 2015 – 2016)
- Selection of Minor, Bachelor project or graduate programme abroad
- Results National Student Survey 2016
- Science, Business & Innovation Research Programme
- NVAO quality assessment of VU Amsterdam
- Excerpt from VU Strategic Plan 2015
- Annual report Faculty of Science Examination Board

On the day of the site visit, programme management presented the following documents

- Journal article on programme philosophy
- Course material of a number of selected courses of the programme
- Examinations of a number of selected courses of the programme
- International study trip report
- Curricula vitae core lecturers
- Education Committee annual reports
- Examination Rules and Regulations
- Rubrics Innovation Project
- Plans of approach for Bachelor projects
- Reflection reports, part of Bachelor projects
- Outcomes of Examination Committee theses' reviews
- Course evaluations
- Positions of programme alumni

In addition, the panel was given access to the Blackboard pages of the programme

### **Annex 3: Final products reviewed**

The Bachelor projects of the following fifteen students have been selected for review by the panel

- 1931008
- 2144670
- 2500435
- 1972081
- 2525022
- 2527077
- 2508693
- 2522159
- 2519396
- 2522047
- 2516000
- 2134780
- 2521883
- 2521930
- 2523875

## Annex 4: Assessment panel composition

The assessment panel had the following composition:

- Prof. dr. ir. P.C. de Weerd-Nederhof, Professor Organizational Studies and Innovation and chair of NIKOS, University of Twente (panel chair);
- Prof. dr. A.M. Bergek, Professor Innovation Systems and Technology Policy, Chalmers University of Technology (panel member);
- Prof. dr. M.S. van Geenhuizen, Professor of Innovation and Innovation Policy in the Urban Economy, Delft University of Technology (panel member);
- J.C. van Campenhout LLB, student pre-master programme in Law, University of Tilburg (student member).

Prof. dr. ir. P.C. de Weerd-Nederhof (panel chair)

Mrs. De Weerd is Full Professor Organizational Studies and Innovation and chair of NIKOS, the department of Entrepreneurship, Strategy, Innovation and Marketing of the Faculty Behavioural, Management and Social Sciences of University of Twente. She, also, is the programme director of the Bachelor and Master International Business Management programmes of this University. From 2009 to 2015, she was responsible for setting up the Twente Graduate School. Mrs. De Weerd is, among others, a member of the Board of the International Product Development Management Conference and was until recently a member of the board of KIVI, the Dutch association for engineers.

Prof. dr. A.M. Bergek (panel member)

Mrs. Bergek is Full Professor Innovation Systems and Technology Policy at the Department of Energy and Environment of Chalmers University of Technology in Göteborg, Sweden. Prior to this appointment, she was an assistant and associate professor at the Department of Management and Engineering of Linköping University in Sweden. She published many articles and (parts of) books in her field of expertise, and conducted numerous research projects in this area. Mrs. Bergek holds a number of advisory positions at the Swedish Energy Agency.

Prof. dr. M.S. van Geenhuizen (panel member)

Mrs. Van Geenhuizen is Full Professor of Innovation and Innovation Policy in the Urban Economy at the Faculty of Technology, Policy and Management of Delft University of Technology. She took her doctorate from Erasmus University Rotterdam. Prior to her current appointment, she was, among others, a senior researcher at the Bartlett School of Planning at University College London. Mrs. Van Geenhuizen conducted a substantial number of activities in the Netherlands and abroad with regard to innovation and entrepreneurship. Her current research is mainly on commercialisation and entrepreneurship in sustainable energy and medical/healthcare systems. She has been a lead editor of eight edited volumes on subjects, including innovation, sustainability and knowledge economy, and she has published over 90 articles in peer-reviewed journals.

J.C. van Campenhout LLB (student member)

Mr. Van Campenhout is a student in the pre-master programme in Law at University of Tilburg. Prior to his current study, he completed the Law programme at University of Applied Sciences Avans-Fontys Law School. For this latter programme, he was, among other, a student member and the student chair of the programme committee. Mr. van Campenhout participated in several panels for the accreditation of higher education programmes in the Netherlands.