Research Review
Chemistry, Ecology and Life Sciences

2011-2016

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Preface

The task assigned to the CEL peer review committee by the boards of the University of Amsterdam and the Vrije Universiteit Amsterdam to assess the quality of the performance of 5 institutes and departments was challenging. The circumstances for this assessment were extraordinary, *i.e.* an unusual wide range of scientific disciplines and, so, experts within the panel from different scientific cultures as well as the recent decision to abandon the merger of the institutes of both universities which had such a deep impact on the past performance of the institutes. However, thanks to the availability of well-documented self-evaluations, the pleasant and open discussions during the interviews and the cooperative spirit within the review panel, all members of the committee felt comfortable to adequately discharge their duties and to make a fair and balanced assessment of all institutions considered. The present report has the consent of all members of the committee.
Of great importance for the success of our work was the excellent support of the secretary of the panel, Annemarie Venemans and the logistic support of other staff members of the universities.
We hope that this evaluation will be instrumental to the boards of the universities and faculties as well as the management and staff of the institutes/departments to improve their future performance.

Hans van Veen
Chairman of the committee

1. Introduction

1.1 The scope of the assessment

The boards of the University of Amsterdam, UvA, and the Vrije Universiteit Amsterdam, VUA, have requested an assessment of the research performance of their institutes and departments in the area of Chemistry, Ecology and Life and Pharmaceutical Sciences. For this purpose, a committee of international experts was set up, chaired by Prof Hans van Veen of the Netherlands Institute of Ecology. The assessment comprised the research performance of the period between 2010/2011-2016 in accordance to the guidelines specified in the Dutch Standard Evaluation Protocol for Public Research Organisations, SEP.

The three main assessment criteria defined in the SEP which were quantitatively rated were:

- Research quality
- Relevance to society
- Viability

In the Terms of Reference set by the boards of the universities, the committee was also asked to assess strategic targets and governance and leadership skills; these aspects were included in the 'viability' assessment. Other aspects of the performance of the institutions were assessed qualitatively. These included gender diversity, PhD programs, research integrity as described in the SEP.

The following research units were evaluated:

- Swammerdam Institute of Life Sciences (SILS), UvA
- Van 't Hoff Institute of Molecular Sciences (HIMS), UvA
- Amsterdam Institute for Molecules, Medicines & Systems (AIMMS), VUA
- Institute for Biodiversity and Ecosystems Dynamics (IBED), UvA

Department of Ecological Science (DES), VUA HIMS, AIMMS, IBED and DES were evaluated at the institutional level of the institute/department. Due to its size, SILS was also judged at the cluster level. SILS clusters were:

- Cell and Systems Biology
- Neurosciences
- Molecular Life Sciences

1.2 The Review committee

The review committee consisted of the following members:

- Hans van Veen (chair), Royal Netherlands Academy of Arts and Sciences-Institute of Ecology, Leiden University
- Trine Bilde, Aarhus University, Faculty of Science and Technology, Department of Bioscience (absent during the interviews)
- Robert Sterner, Large Lakes Observatory, University of Minnesota Duluth
- Odile Eisenstein, University Montpellier, Institute Charles Gerhardt, Montpellier

- Gerhard F. Ecker, University of Vienna, Faculty of Life Sciences, Dept. Pharmaceutical Chemistry
- Walter Leitner, RWTH Aachen University, Faculty of Mathematics, Computer Science and Natural Sciences, Dept. Chemistry
- Alain Filloux, Imperial College London, Faculty of Natural Sciences, Dept. of Life Sciences
- Tibor Harkany, Karolinska Institutet, Department of Neuroscience
- Michael Blatt, Glasgow University, Institute for Molecular, Cell and Systems Biology
- Judy Armitage, University of Oxford, Department of Biochemistry

Dr Annemarie Venemans was appointed as the secretary of the committee

All members of the committee signed a declaration and disclosure form to safeguard that the panel members judged without bias, personal preference or personal interest, and the judgment was made without undue influence from the institute, the programs or other stakeholders. Any existing professional relationships between committee members and programs under review were reported. The committee concluded that there was no risk in terms of bias or undue influence.

1.3 Procedures followed by the committee

The committee received detailed documentation consisting of the following parts:

- Terms of References set by the Boards of the universities
- Instructions for the method of the evaluation, including the program of the site visit, proposed by the chair and the secretary of the committee
- The Dutch Standard Evaluation Protocol, SEP, 2015-2021
- Self-evaluation reports of the units under review, including all the information required by the (SEP) with appendices;
- Copies of key publications.

Prior to the committee meeting, each research unit was assigned to two or more experts, who took the lead in the discussions during the site visit. The final assessments were made by the entire committee, based on the documentation provided by the institute and the interviews with the management and staff of the research units. The interviews took place on November 27– 29, 2017. Immediately after the last interview, the committee discussed the rating of all institutions. The drafts for the assessment report were finalized through email exchanges. The final draft was presented to the research units for comments concerning factual inaccuracies. After the responses of the research units the report was finalized.

2. General observations and *recommendations*

Here, the committee provides a number of observations and opinions on a general level. The width of the disciplines considered in this peer review process does not allow for general statements on future developments within the research areas of the units evaluated. That will be specified in the sections in which the evaluation of the performance of the individual institutions is described.

- The committee was asked to assess the performance of the units at the institutes (and for SILS cluster) level. However, UvA and VUA use different definitions for the terms “Institute” and “Department”. Being informed about the differences, this did not affect the work of the committee much, but the evaluation of AIMMS at the institute level was challenging as the institute is, at this moment, only a loose connection of independent departments (see also section 6)
- The committee was impressed by the level of all units considered and rated the research quality “very good” to “excellent”. The panelists encountered some difficulty in the application of the 4-grade rating framework on the aggregated level of the institutes, where teams with different disciplinary backgrounds, seniority, and performances are grouped together in structures that have to fulfill tasks in research as well as in teaching. We have decided to use the general external perception of the institute - which is mainly impacted by the “lighthouse groups” - as the principal criteria for the overall assessment indicating variations in the individual descriptions.
- Also, on the criterion on relevance to society ratings varied between “very good” and “outstanding” contribution to society. Each unit makes a great effort to convey their work to the general public and stakeholders. Yet, there is much to gain both structural as well as in the awareness of students and staff involved.

The committee recommends enlarging the efforts within all units to increase the awareness of all staff, including PhD students, for the importance of adequate contacts with the public and stakeholders and the conveyance of their work

- Related to viability, the committee noticed large differences among the evaluated units. Each unit has been affected by the process of the merger. There is a large variability in the way the units dealt with this process and the recent decision to abandon it. It appeared that some units were more resilient to the overall process and others more fragile. This has led to different perspectives to the future. In all cases, however, the discussions on the merger have led to intensification of the collaboration between the relevant units of both universities.

The committee recommends that the boards of the universities and the faculties involved strongly support the ongoing process of intensified collaborations.

- Generally, there is a coherent strategy for the future, but not in all cases all representatives of the units evaluated, recognized this. The committee finds a clear recognition of the future strategy by all members of the institution vital to a healthy future. When the development of the future strategy and the integration within the institution has come about bottom-up, this has been most successful.

- Research integrity was taken seriously and was rather fairly uniformly organized in each unit. However, it is not yet fully matured, in particular at the point of data storage management.

The committee recommends to uniform and organize the proper storage of data, preferably among both universities.

- All units recognized that there is a serious problem with gender diversity, in particular at the management (with the exception of DES) and senior staff level.
- The tenure track system applied at the universities needs more clarity related to the whole of the career track.

The committee recommends defining the tenure track system better and exploring it better to deal with the problem of gender diversity

- The educational PhD programs were differently organized among the units, but in all cases the committee was of the opinion that the programs were adequate for a proper development of the skills of the PhD students. The duration of the PhD period is much longer than the required four years in all units. The committee noticed that this was not recognized as a major problem by most of the students and the staff, but the committee feels that this may become a serious issue related to chances at the international job market when this period is compared with the PhD periods in other (European) countries.

The committee recommends to continue and intensify the efforts to shorten the PhD period to the required period of four years

3. Quantitative assessment of institutes and research programs

	Quality	Relevance	Viability
SILS	2	2	4
Neurosciences	2	2	-
Molecular Life Sciences	2	2	-
Cell and Systems Biology	2	2	-
HIMS	1	2	3
AIMMS	1	2	1
IBED	1	1	1
DES	1	1	2

4. Swammerdam Institute for Life Sciences (SILS) - University of Amsterdam

Assessments:

	Quality	Relevance	Viability
SILS	2	2	4
Neurosciences	2	2	-
Molecular Life Sciences	2	2	-
Cell and Systems Biology	2	2	-

4.1 Introduction and research area

The mission of SILS encapsulates three research clusters of methodologically connected activities across some of the fastest-growing research disciplines, including plant biology, neuroscience and life and molecular sciences.

Neurosciences
SILS Neurosciences is organized to span from molecules to cognition, a long-used arrangement that can be successful if amalgamation of the groups is adequate. At SILS, neurobiologists focus on molecular, cellular and systems, and cognitive and systems neurosciences, as well as brain plasticity. “Molecular Neuroscience” aims to understand aspects of brain development in health and disease. Congenital origins of late-life neuropsychiatric diseases are emphasized with a focus on dissecting the genetic control of cortical and midbrain development. A lead theme is that adverse early-life experiences can predispose to age-related disorders (Alzheimer’s and Parkinson’s diseases), particularly when affecting insulin signalling and the circadian clock system. Closely matched, the grouping of “Brain plasticity” studies how early postnatal exposure to stress disrupts structural underpinnings of intercellular communication during brain development. “Cognitive and Systems Neuroscience” is concerned with how neuronal networks of the cerebral cortex integrate information to drive specific behaviours. Their aim is to link individual cells’ activity patterns to population coding of information upon visual and auditory stimuli. “Cellular and Systems Neurobiology” pursued cell biology and intracellular signalling in relation to neuronal microcircuit organization and function in epilepsy, schizophrenia and Alzheimer’s disease. An exciting avenue of work relates to interactions (signalling, metabolic coupling) between neurons and astroglia. A strong pharmacology-based cell and circuit neurophysiology approach was emphasized in a national framework addressing the use of cannabinoids.

Molecular Life Sciences (MLS)
Research in the areas of Microbes and Plants within the MLS cluster underpins the global societal and economic environment and defines the ecological systems in which we live. This cluster has grown significantly and has two basic sub-clusters, one centred on microbial analysis of food and food safety, underpinned by proteomics analysis of aspects of microbial and microbial community composition, and the other centred around plant growth and

environmental impact. Scientific activities internal to this cluster are generally centred around topical research themes that represent current global interests and technologies, from plant breeding to food security, and therefore are essential to the research and educational portfolios of any modern university that operates effectively and successfully on an international platform. The cluster includes the proteome research group which is an underpinning technology essential for both the microbiology and plant research programs, and with collaborations across both areas and across to the other Clusters, such as "Molecular Cytology and van Leeuwenhoek centre for advance microscopy" in Cell and Systems Biology (see below).

Cell and Systems Biology (CSB)
Finally, the SILS cluster CSB addresses a number of fundamental questions in microbiology and cell biology while developing cutting edge tools and knowledge bases in microscopy and data analysis. At present, it comprises four sections with very diverse foci, from addressing specific biological questions to developing cutting edge technologies. The "Bacterial Cell Biology and Physiology" section operates within a highly competitive research area investigating composition/structure of the bacterial cell envelope and bacterial cell division. This section uses various bacterial models and this research is clearly aimed at identifying potential new targets for antimicrobials targeting bacterial resistance emerging as a major issue of this century. The "Molecular Cytology and van Leeuwenhoek centre for advance microscopy" is developing unique tools for the international microscopy community (e.g. mScarlet fluorescent protein), essential for detailed analysis of living cells. The section has also developed methods to analyse the organisation of cells in 3D and follow molecular dynamics therein. These developments go far beyond the biological questions asked within the section and are used by the whole cluster and beyond through extensive collaborative efforts. This collaborative aspect and its contribution to fulfilling key needs of modern sciences is also obvious with the section "Biosystems Data analysis" which can apply powerful methods of analysis to a huge variety of biological questions within the cluster and beyond. The cellular organisation and more particularly the dynamic of genome structure and how it affects global gene expression and thus the metabolome is the main remit of the 4th section "Synthetic Systems Biology and Nuclear Organisation". This remit again covers a very broad topic that needs the support of all the methodological power within the cluster and within SILS.

4.2 Research quality

SILS
The research quality at SILS is generally of high calibre across the individual groups in each of the three clusters, as recognised through publications in international journals. There is generally an appropriate balance between established professors with longstanding experience, more senior PIs with very clear profiles and recognized research agendas, and young talents. The successful acquisition of personal grants in the early career stages (Veni, Vidi, ERC), especially in the microbial and plant sciences clusters, is encouraging. There is a recognised tension between fundamental and applied science that is generally well managed. Several of the younger talented PIs appear to have the qualifications necessary to compete successfully at an international level and are encouraged to do so (discussed in more detail below). Overall, the scientific position of SILS is reflected in a healthy scientific

output with a number of publications in top journals in the relevant topic areas, individual grants and recognition on a national and an international level. Within each cluster, SILS is addressing distinct scientific questions. Where the institute does less well is in building any visible benefit from collaborations across the cluster structures, beyond the shared use of technologies.

Neurosciences
The Neuroscience cluster is a legitimate co-existence of four research groups, which are successful on their own rights rather than producing synergistic benefits. The Neuroscience cluster cumulatively produces a significant amount of work with 71% of their articles in the first journal quartile with a "very good" average impact. Their share of top 10% publications in the first journal quartile is 39%, which is above world average. The overall productivity of the Neuroscience cluster is impressive, particularly considering that members often commit significant time (in some cases up to 75%) to teaching. The educational value of this research is also high with 35 completed PhD theses in the past 6 years. Interactions with the UvA medical cluster and with the Amsterdam Neuroscience Network seem to offer platforms for future growth and are endorsed by some quite enthusiastically. Some members of this group are valued internationally, which is shown by *e.g.* network grants (Human Brain Project). Nevertheless, and even if annual output is large, deep mechanistic studies are less well-represented in comparison to more descriptive, symptomatology studies.

There is a sense that the Neuroscience cluster performs less well in its development and/or use of technical innovation (*e.g.* optogenetics, chemogenetics); and their level of external funding reflects this missed opportunity. This shortfall is significant, since it also limits interactions with the cluster of Cell and Systems Biology and imaging, even if some projects rely on advanced imaging and recording tools. The Neuroscience cluster mostly relies on "known-and-tested" approaches, which keep them within the mainstream of this field. Most unfortunately, staff reports suggest that limited advance took place since the mid-term evaluation in terms of facilitating infrastructural (capital) investment. The tools and protocols used certainly carry weight at present and have some "shelf-life" left. Nevertheless, major investment needs to be made to retain SILS Neuroscience's international standing.

A major force behind the slowing of research is that the "Psychobiology" course amassed unprecedented interest from students. Student numbers are so high that faculty intervention was needed to limit them to 220-250 per year. Ensuing teaching commitments clearly drain Neuroscience research staff, their appetite for novelty, challenges and ability to explore new directions. Since this cluster takes by far the heaviest teaching load within SILS, Neuroscience is indispensable for the institute's survival. What is worrying is that their competitiveness will dwindle and unless sizeable investment is made, teaching will threaten the sustainability of research quality and output. Cellular/circuit neurobiology is particularly fragile, given the accelerated pace and volume of international competition. Individual researchers and their immediate groupings represent value for money but need support and motivation to engage within the fundamental discovery activities of the field rather than loosely keeping disease entities as "banners" to appeal to society (and funders). Therefore, coordinated steps need to be urgently taken to increase support, rationalize teaching/research, free-up qualified academic staff to modernize SILS Neuroscience and

facilitate their entry into the era of “circuit-genetics”. If they are able to do so, they should regain momentum and increase their national and international reputation.

Molecular Life Sciences
MLS combines two discrete subgroupings around microbial sciences and plant sciences. Both groupings are cohesive, but there are important overlaps in interests and focus.

Both the Microbial sub-cluster and especially the Plant Science sub-cluster have a substantial footprint in high-ranking publications. The Plant Science sub-cluster has produced a number of highly cited publications in top journals (Current Biology, PNAS, Plant Cell and equivalent) since the mid-term assessment, which marks this grouping as one of the top 10% of research units within the field across the EU. The plant science grouping is well integrated and internationally strong.

The Plant Science sub-cluster benefitted from the failed plans for the universities merger through the acquisition of the Koes/Quattrochhio laboratory with their strengths in plant development and transport, and from the addition of Bouwmeester in the area of hormone biology. The sub-cluster incorporates several highly productive group leaders with very strong international reputations and highly cited, as well as rising stars. They have attracted an ERC consolidator grant

The Microbial sub-cluster benefits from links and research interests both in medical microbiology and in environmental microbiology. The group has strengths in the proteomic technologies underpinning the more basic research. They have attracted very good funding, both NWO and EFRO. Their focus is very applied and they benefitted from new interactions developed during the (now failed) merger between the universities, particularly through the development of collaborations with the VUA groups in the microbiome. There is a strong interest among the sub-cluster members to re-align as a separate unit and continue strengthening those collaborations. It is not clear whether this view is held across the cluster as a whole. There are potential opportunities here for collaborative work with the Plant Science sub-cluster that do not appear to have been followed up.

Cell and Systems Biology
The cluster of Cell and Systems Biology combines four diverse subgroups centred around cell biology. The problems addressed are at very different levels, from detailed analysis of cell structure and biochemistry, through to large scale data analysis. Each subgroup presents substantial research strengths in their respective areas. In the paperwork presented the choice of top papers was a little unusual, as they seemed to be chosen more for the journal than content, as the corresponding author was often not SILS. The members of the clusters have other very good papers that might have better illustrated their breadth.
The Molecular Cytology section has built a very significant international reputation around developments in fluorescence imaging technologies and its applications in cell and molecular biology. The second technologically-driven group is developing tools to analyse the increasing complex area of biological data. They have extremely good funding and both international and industrial collaborations. Both of these groups are involved in internationally recognised development of methodologies essential for modern biological research.

The Systems Biology subgroup has developed a strong reputation through work in metabolic modelling and cellular structural studies. The subgroup focuses on the structure of the genome and its effect of expression and thus the cell metabolome. This requires a combination of modern live cell imaging and large-scale computational analysis. The cluster continues to attract good funding to support their research, which is integrated within broad international research programs and initiatives.

The Cell Biology and Physiology group is a relatively young group investigating key physiological processes across a range of bacteria using a wide range of techniques to identify targets for novel antimicrobials. They have good funding and publications and have increasing invitations to international meetings, suggesting an increasing international profile. There is clear synergy with the groups, which suggests bacteriology will continue to flourish within SILS, in a new direction.

A measure of the standing of the members of the cluster is grants awarded and invitations to international conferences and both of these are very good and show that the senior members of the groups are recognised and doing innovative science. However, it is hard to see what the groups in this cluster have in common other than the use of certain technologies. There remains a sense of resistance within groups of this cluster as to its identity, which may be linked to the internal perceptions of its technical servicing of the other clusters, but also to the great disparity in research focus. Certainly, there are strong technological links to the other clusters that are embodied in several collaborations.
The cluster includes the very good Advanced Microscopy Group who have been producing some exceptional tools for live cell imaging and are active in developing a National and International Centre for imaging. This is an underpinning technology for all of cell biology. It forms a core to any Life Sciences activity, and it is unclear why it should be part of any "Cluster" rather than be part of something like an "*Underpinning Technologies Development Centre*". This would include the Biosystems data analysis grouping, which is doing excellent MS analysis and also using machine learning to produce complex metabolomics analyses. With an extension of the bioinformatics within the group, or the links to the Bioinformatics and MS groups in MLS they could be an outstanding group, developing new technologies while providing an underpinning service.

The Systems Biology sub-cluster is joint with VU. This group is part of a number of large European well-funded consortia developing predictive models of epigenetic control of expression and nuclear organisation. Here again, this is a standalone grouping with little synergy with other sub-clusters but using the underpinning technologies.

While funding is steady, it needs to be maintained in an increasingly difficult climate and the strategy for modifying the directions or identifying new areas to move into through new appointments is not necessarily clear across the cluster.

4.3 Relevance to society

SILS

The life sciences form the core of academic and of much industrial research across the Netherlands. With the life sciences of other universities, SILS therefore is well-placed to contribute to societal needs, addressing environmental and food security, cognition and disease control, and the broader economic welfare of the country. Research within SILS is therefore relevant to the core global challenges for the 21st century articulated by the Global Challenges Research Fund and associated with sustainable food production and environmental mitigations, and human health. Researchers within SILS are focused on fundamental research and parts of SILS are engaged in commercial developments and partnerships that build on this basic research, notably with applications associated with human physiopathology's and microscopical tool development. There is an awareness and case-by-case effort to communicate knowledge across the general public and to support and advise governmental agencies. However, the committee feels that the activity shown by SILS is at the average national outreach level. Even if individuals might engage in field-specific activities, there is limited institute-wide coordination, let alone strategy as to how to bring SILS to the public.

Neurosciences

Clinically relevant end-points for this cluster provide direct relevance to society. This is partly inherent to the nature of Neuroscience research, partly integral to the individual interests of senior staff leading the four Neuroscience groups and is also a clear demand made by funding bodies. Public focus on disease-oriented charities in the Netherlands (Alzheimer's, Huntington's societies, Brain Foundation etc.) facilitates the dissemination of results from SILS. Many of the principal investigators have impeccable records in public engagement through interactions with patient, societies, public lectures, TV appearances, engagements at public days. Lectures at local schools is also on the agenda. Another reassuring avenue, even if more indirect, is the recognition of Neuroscience as a means to address real-life challenges. Particularly interesting is the role of nutritional status (over vs. malnutrition) during pregnancy and childhood. Therefore, existing collaborations with Danone/Nutricia in developmental neuroscience are of substantial value. Finally, access to European citizens through the "Human Brain Project" is significant to translate scientific benchmarks for the general public on how the human brain functions in health and disease. It is encouraging that patent outcome has recently been produced and a process has been initiated to set up a spin-off company.

Molecular Life Sciences

End points for this cluster in agro-industrial and ecological sustainability provide direct relevance to society. This is inherent to the nature of research in both the Microbial and Plant Sciences sub-clusters, and it reflects the individual interests of the staff and, increasingly, of the funding agencies. The strength in the Netherlands of research in these areas provides platforms to disseminate relevant data from SILS. The principal investigators have recognised contributions in public engagement through executive memberships in relevant societies, public lectures, TV appearances, participation at public days. Among the

cluster, staff have developed a number of patents relevant to agro-industry. Lectures at local schools is also on the agenda.

Cell and Systems Biology
Like the MLS cluster, end points for this cluster appear at a variety of levels, provide direct relevance to society, and reflects the individual interests of the staff and funding agencies. The cluster has used these platforms to disseminate relevant data. Among others, the principal investigators have developed a number of spin-off activities, including several technologies relevant to industry as well as to the wider research communities and contribute on a regular basis in public engagement at the university and community levels. In addition to the general relevance of the research, all of which advances our understanding and will have benefits for society, the individual members are very active in presenting their work to the outside community. They have been involved in public lectures and radio programs. They have been involved in Bioart and design competitions and involved in a science night at the NEMO museum. There is an open day every year for the general public and the Systems Biology research has led to a stage play.

4.4 Viability

SILS
As a unit, SILS should stand as a cohesive and central core within biology at UvA. It is, however, an artificial grouping, and has been made more disconnected by the failed cross-universities merger. The time might be ripe to rethink the complete structure, with discussion and agreement of the group heads, to produce a more logical set of departments underpinned by well-supported, cutting-edge, technologies. Nevertheless, the individual clusters within SILS are generally well placed and largely viable in their own rights. The self-evaluation report mentions briefly a future strategy to enlarge the added value of the institute by indicating the most relevant fields of collaboration of the clusters. However, during the interview the individual clusters appear to be pulling in opposite directions, with widely differing expectations, needs and interests. Differing perceptions for the direction of travel within the organisation and the perceptions for management of SILS present an extremely difficult situation. SILS administration presents yet another sense of the direction for the institute that is disconnected from those of many of the cluster staff. This is a problem that must be resolved. An administrative solution is unlikely to be successful unless it engages organically with all the group leaders and grows with cross-platform interactions.

SILS clusters are held together by mainly two things, teaching duties and technical platforms, with lesser contributions to a joint research strategy and shared needs for future development. SILS researchers come across as self-organizing foci for future development, driven by their own and ad-hoc needs more than a structured and balanced faculty, aspiring to and able to deliver major contributions to research for years to come.

The situation in SILS is to some extent due to the fact that this grouping, more than any others, suffered from the failure of the merger. As an institute, they were not intended to survive after the end of this year and had developed a future view where they were in different groupings. Some groups (Subclusters such as Microbiology in Cell Systems Biology) were clearly more affected than others, in particular because they had already moved to

VUA before being brought back to UvA. This had consequences on the dynamic of SILS although it has given rise to new collaborations that may still stand in the future.

As a consequence of the failure of the merger a possible alternative organisation has been proposed. The decision on future subgroupings has not been formally agreed within SILS, and the committee heard different and drastically opposed opinions on the matter. This might for now remain a suggestion from the Director, but one opportunity is to move towards the creation of four clusters. Some groups (Plants and Neuroscience) are potentially self-contained, while others are not at all cohesive. Until this year Plants was grouped in the Molecular Life Sciences with Biobased Economy (basically Food Safety, Mass Spectroscopy and some bacteriology). The clusters make no logical sense and clearly Plant Sciences and the Bacteriologists had been working towards new groupings. This way Plant Sciences would become Green Life Sciences, while the microbiologist from Molecular and Life Sciences could merge with the bacterial groups from Cells and Systems Biology to create a new cluster "Microbiology". There is no obvious reason to enforce false clusters. The individual groups would be much more likely to be increasingly successful if formed into synergistic groups.

When discussing with the individual clusters, it became clear that the restructuring plan provided to the committee had not been the work of the clusters, and the future direction had not been agreed by the members of the clusters. This is particularly sensitive for the "Molecular Life Sciences" and "Cell and Systems Biology" clusters, while the cluster "Neurosciences" is clearly not concerned since it does stand alone with little interaction with other clusters others than technological. It is essential that any restructuring is fully discussed at all levels and any changes fully supported.

Neurosciences
The cluster is under threat from outside, including an increasing debate on legislative changes to eliminate research on animals by 2020, and from within with the success of teaching programs that have led to a large increase in the intake of students interested in psychobiology. Neurosciences maintains a very large component of funding drawn from teaching rather than research and/or research spin-offs. Cumulatively, these trends continue to generate tension that impacts research capacity. The cluster reflects an element of complacency in outlook and does not appear to have taken on board a number of developments in the field over the past decade, even though it is well-placed to benefit from several of the recent advances. There is a need to increase computational strength, some of which might be accommodated within SILS (cluster Cell and Systems Biology). Quite certainly, an attempt should be made to integrate Neuroscience better within SILS since it stands as a monolith rather than an integral player within the institute.

In the wake of the rejected VUA/UvA merger, SILS neurobiologists are not overly concerned about remaining at their present location. This is because staff perceives the present location, availability and integrity of infrastructure as sufficient to perform wet lab-based work. Staff expressed that a number of new collaborations were set up in the reorganization process preceding the failed merger endowed, which might have lasting and positive impact.

Nevertheless, SILS Neurosciences seem to suffer significantly from internal and outside threats and require significant and imminent support at the levels of staffing, infrastructure, threat management and administration.

Molecular Life Sciences
The microbial and plant sciences have weathered the difficulties arising from the failed universities merger well. The cluster nonetheless perceives itself as two, largely separable entities, and the microbial science sub-cluster has expressed aspirations to assemble its own identity that represents stronger links with medical microbiology and the microbiome. The plant science sub-cluster presents a strong and well-integrated set of research groups that is viable and would stand well as a unit on its own. Nonetheless, the group leaders expressed a preference for remaining part of a larger cluster and they see the benefits of cross-platform collaborations for future successes.
The joining of these clusters as a single unit within SILS is less obvious and is largely tied to technologies with few conceptual or research theme overlaps. SILS, like many other areas of UvA and VUA, has suffered to varying degrees from the failure of the merger. The consequences of these events have been to stall a number of developments within the institute and has caused much uncertainty. The Microbial sub-cluster of the Cell and Systems Biology cluster actually moved twice, out and then back into SILS over the past two years and have consequently struggled to recover from the upheaval. Other areas within SILS have faced less upheaval, but the uncertainties that the proposed merger entailed has unquestionably impacted on all areas within the institute.

Cell and Systems Biology
The CSB cluster has benefited to some extent from the failed merger of the universities through an infusion of new infrastructure that supports the cell biology subgroup of the cluster. The subgroup includes strengths of the international reputation in imaging technologies and of the recognition in the area of synthetic systems biology. The bacteriology is also developing in its own right and could take clear directions towards antimicrobial resistance in connection with cell envelope and cell division. There has been mention of further involvement in microbiome research but it was not clear what specific directions would be taken. All subgroups see longer-term needs required to ensure viability. There is no doubt that key elements of these – especially in keeping up-to-date with new technologies and data handling – will need to be addressed within the next half decade.

The cluster is positioned between the other two clusters in a way that should benefit all three. The internal perception, however, is that large portion of the cluster is a service unit for the 'red' and 'green' topics of neurosciences and plant/microbial sciences, respectively, and CSB group leaders are not comfortable in their current section. In the discussion with the heads of the subgroups it was clear that the CSB cluster really does not feel part of SILS, or even integrated across each sub-cluster except by the use of technology. They believe that the individual groups would flourish if the Clusters were disbanded and reorganised. There was the feeling that SILS had never really functioned properly as an integrated grouping, and now, after the failed mergers was even less cohesive. They expressed a desire to eliminate the cluster organisation altogether. From a motivational standpoint for members of this cluster, there could be a strong argument for a realignment, possibly on a group-by-group basis. Indeed, it is obvious that there is little cohesion in the group, despite a

title that suggests there should be connections. It includes bacteriology, stem cells and breast cancer, systems biology and imaging. They surely could be separated into departments without any loss of synergy and allowed to develop (as plants and neuroscience could) underpinned by the technology platforms.

4.5 PhD programs

Overall, the PhD program appears to be secure, although there are some inconsistencies across SILS in how PhDs are managed and supervised. Engagement with research schools presents a problem in adding to this inconsistency. This problem is especially relevant to students in the microbiology research area for which there is no research school in the Netherlands. SILS might consider a common set of standards for supporting PhDs that brings students together – additional to the PhD council – and that could provide opportunities for interactions among students across the institute and ensure no one is left behind. The student council of SILS does provide possibilities for students to discuss and deal with problems but it does not provide the necessary platform for training and education in the area of Life Sciences.

In discussion, it was clear that none of the students with whom the committee spoke had applied to SILS; instead they had all applied to specific supervisors, reflecting the lack of a SILS profile outside of UvA.

4.6 Research integrity

Every PhD student has to attend a mandatory course on scientific integrity. Everyone the committee talked to knew about these courses and they took it seriously.

Students do in general have two supervisors and/or work in groups which makes the problem less likely to arise. However, there was some level of complacency with a view that this was a student problem, while it can occur at all levels in a group. The path to present concerns to a neutral senior academic was not clear to everyone. This should be made clear.

Otherwise, data storage capacity is available but there is no agreed centralized strategy.

4.7 Diversity

During the site visit, the committee also discussed both recruitment and promotion. Some attempts have been made to address the matter although the mechanisms were unclear. It was not obvious whether, when a position became vacant, there is a policy for directly approaching qualified women, or whether it was only at the level of a balanced shortlist. It is clear that women are less likely to think themselves qualified for positions than men and therefore active processes to encourage applications are required.

It was also clear when talking to some groups that it is possible to gain promotion without there being a vacant position. Other groups seemed to think this is not possible, or were

very unclear about the process. This route should be encouraged and should be transparent. In annual discussions line managers should actively encourage researchers to think about their career path.

It was concerning that one postdoc did not seem to have had her full legal maternity leave. The explanation was that the law has changed. Administration needs to find a way around this and ensure full compensation.

SILS has argued that efforts were made in recruiting women, but the flagship woman recruitment, the new chair in plant cell biology (Testerink), is now leaving which does not make a good impression at all, particularly because it was not spontaneously mentioned.

4.7 Conclusion and recommendations

Research at SILS maintains a high calibre within each of the three clusters. All three clusters show good internal community strengths, including in the balance between established professors, more senior PIs and young talents, and in the directions that their research and associated activities have taken

However, there was an obvious mismatch between the paperwork and the presentations which highlighted the lack of coherence across the institute. The committee focused on "highlights" of the individual programs since preparation to this review by SILS staff was ad-hoc, making the committee's goal of a thorough review quite difficult. As it stands, SILS is not really recognized internationally and is simply an umbrella for administering. It could simply be a hands-off administrative “Life Sciences Institute” with a financial administrator and a number of small sub-departments: Microbiology; Plant Sciences; Neuroscience; Cell Biology; Systems Biology and Advanced Technology Development.

In consequence, it is obvious that a major rethink of the SILS organisation is needed, including the heads of not just the clusters but all the sub-clusters plus the Life Science components of the other Institutes being involved. The overriding feeling that comes across is one of a largely dysfunctional institute within which some sub-clusters are doing very well while others are potentially under threat over the next five years.

Restructuring would require a major effort from a managerial perspective and would need transparent communications throughout all the reorganisation process. The SILS director is instrumental in making sure this applies. Dissatisfaction within some quarters is quite worrying, and it is difficult to see how this might be addressed, unless with a ‘bottom up’ engagement of the staff as a whole. The discussion should thus be global and collegially engage all concerned on whether there is a more rational set of groupings. This could increase the profile of UvA by developing critical masses and encourage application for coordinated EU funds. The brainstorming should happen without thinking about finances or teaching; these should be addressed once a logical framework has been developed. SILS will not collapse, because it has a big educational task, but it is not acceptable that the organisation of teaching should be the driver for the future. Moreover, it is difficult to justify demand and existence in a research institution for staff members who commit 50-75% of their time for teaching.

The committee recommends that SILS be reorganized into synergistic rather than historic groupings or be driven by teaching. While it might cause transient problems in reorganizing finances, all the researchers currently engaged in teaching will still be within the university and the courses will not need to change, but the flow of money might be to smaller departments.

As it stands, the problem remains that there is no clear leadership and no consensus on goals. The issue is exacerbated by the fact that, unlike the SWOT analysis of other institutes, that of SILS did not reflect the threats or opportunities. The clusters are good, but not internationally outstanding, and little has changed since the last review making the list in strengths seem complacent, while weaknesses and threats fail to mention the loss of morale following the failed merger. The weaknesses and threats are all external and none internal. It should have been honest and clear sighted and been linked to actions for the future in the rest of the documentation.

Whatever the organisation, and if purely looking at the overall nature of science within SILS, translational promise is high and critical investment will be needed to guarantee this happens.

Some of the legislative agendas (e.g. in vivo experiments) are stricter than usual and this might impact productivity and timeliness. Contingency plans should be made for future legislation with a potentially catastrophic effect on experimental neurobiology. Considering the anticipated time-line of such legislation in the Netherlands, an action plan should pre-empt any fall-out. An added benefit for staff will be the provoked re-think of alternative approaches (e.g. increasing the cross-section of research on tissue organoids that exists in the Institute). If so, an emergency fund will be needed to provide cover for eventualities.

When advertising positions, the management should be proactive in encouraging a wide diversity of applicants and should encourage women to apply for internal promotion (men again are more likely to think they are eligible than women).

Recommendations by the committee:

- Reorganize the institute into synergistic rather than historic groups with transparent communications throughout the process;
- Define a policy with regard to female recruitment;
- Unify policies and support for PhD students across subject areas/disciplines independent of national research schools;
- Be prepared for future legislation with regard to animal experiments.

5. van 't Hoff Institute for Molecular Sciences (HIMS) - University of Amsterdam

Assessments:

	Quality	Relevance	Viability
HIMS	1	2	3

5.1 Introduction and research area

The van't Hoff Institute for Molecular Sciences (HIMS) bundles the activities in Chemistry at the University of Amsterdam (UvA) in a common organisational structure. The science of molecular structures and their transformations is at the centre of our global societal, economic, and ecological system. The research groups in HIMS and their scientific agenda spans this area from computational studies to reaction engineering concepts for sustainable chemical processes, embracing analytical chemistry and molecular photonics. This ensemble develops and uses sophisticated experimental techniques and elaborate molecular calculation and simulation methodologies. The development of fundamental scientific knowledge is fruitfully linked with the development of technical know-how. Therefore, molecular sciences in general play a pivotal role within the research and educational portfolio of modern universities, and HIMS fulfils this part very effectively and successfully at UvA.

5.2 Research quality

HIMS
The research quality at HIMS is of very high caliber, comprising world-leading activities of individual groups in all four research themes. There is a good balance between established professors with longstanding experience, senior PIs with very clear profiles and recognized research agendas, and young talents that show very promising potential for future development. The successful acquisition of a significant number of personal grants in the early career stages (six Veni, five Vidi, two starting ERC grants) is highly encouraging. While HIMS has been successful also in obtaining grants for senior researchers (one Vici and two advanced ERC grants) even more effort could be targeted in the future towards the ERC scheme, as a number of researchers appears to have the necessary qualification to be successful in this competition. One member of HIMS was elected to the Royal Netherlands Academy of Arts and Sciences (KNAW) and the very prestigious ENI Award was offered to a presently retired member. The individual achievements will be discussed in more detail below for the respective "themes".

Overall, the strong scientific position of HIMS is reflected in a highly prolific scientific output with a significant number of publications in the top journals of the fields, as well as through individual grants and prestigious recognitions on national and international levels. In particular, there is an increasingly visible benefit from collaborations within the Institute across the Theme structure. Thus, HIMS is in a good starting position to tackle scientific

questions with a distinct profile and this may help to create the critical mass for the successful acquisition of large-scale coordinated projects.

Theme Analytical Chemistry
Analytical chemistry is one of the core disciplines in chemistry, with new technologies continuously being developed. In this setting, the contributions in the area of two-dimensional and multidimensional liquid chromatography as well as analysis of macromolecules are on an international top level, as reflected by an ERC Advanced Grant. Also, the more theoretical work related to data analysis is highly recognized. The strong connections to the center of Analytical Sciences Amsterdam (CASA), and the Netherlands Forensic Institute (NFI), as well as art-science centers are clear proof of the recognition of high quality.

Theme Computational Chemistry
Combining the research in theoretical and computational chemistry in UvA and VUA creates one of the most attractive centers for this discipline at the world level. The individual researchers (either at UvA or VUA) are very strong but are facing several competitors at the world level if considered isolated. What makes this ensemble remarkable is the diversity of methodologies from quantum mechanical modelling to large-scale simulations. The ability to simulate complex systems on increasing longer time and longer scales give them now access to the representation of observed phenomena in the domain of chemistry, biophysics and material science. The publications in top journals of the discipline as well as high standing general journals are clear proof of the quality of the developments and the interest of the topics to a wide audience. All these efforts make the Amsterdam Centre for Multi-scale Modelling and its associated Training center recognized by the “Centre Européen de calcul atomique et moléculaire” (CECAM) a very attractive place on the international scene.

Theme Molecular Photonics
The group on Molecular Photonics has achieved world recognition in the field of fundamental knowledge and applications of the dynamics of excited state in molecules and nano-sized objects. A rather recent extension to astrochemistry increases even further the impact of this theme. The group publishes in the representative journals of Physical Chemistry, with a very good share of about 20% in top journals like Nature Chem. Nature Comm. JACS, Angew Chem. highlighting the quality of the work. Recognition of the achievements is also illustrated by award lectureships in US and Japan, notably. Enhanced national and international visibilities result from the participation of the group to the Institute for Lasers, Life and Photonics Science (LaserLAbAmsterdam, member of LaserLabEurope), a joint initiative of VU and VU Medical Center. This participation also highlights the importance of the fundamental studies in societally relevant issues such as medicine and healthcare.

Theme Sustainable Chemistry
The Sustainable Chemistry group at HIMS is targeting the principles of chemical transformations with the aim to increase energy efficiency and to reduce potential environmental risks and hazards. The topical field and the prolific research have been recognized by UvA with support of this theme by additional significant resources. Synthetic organic chemistry, organometallic catalysis, and heterogeneous catalysis are the core

disciplines, with a more recent addition on biocatalysis on a tenure track level. The contributions to Organometallic catalysis (coordination chemistry, bio-inspired catalysis, and supramolecular catalysis) are of world-leading quality and the current age structure of the group ensures that this momentum can be continued. In heterogeneous catalysis, the research is internationally very competitive and offers a strong link to industrial applications. The strength in organic synthesis and in particular in (asymmetric) natural product synthesis has been traditionally a very important contributor to the international visibility of the department. There is a significant number of junior staff members in this theme, whose role as independent scientists or staff scientists is, however, not fully clear in all cases. The retirement or part-time retirement of PIs in synthetic organic and organometallic chemistry will have an impact on the research portfolio in the near future.

5.3 Relevance to society

With “Chemistry” being one of the nine top sectors of the Netherlands, HIMS clearly stands at a focal point of societal needs, ecological challenges, and economic welfare in the country. In addition, the research activities at HIMS relate to global challenges such as a changing energy and raw material landscape, a healthy environment, and preservation of our cultural heritage. Researchers in HIMS are engaged in numerous private-public-partnerships (including eleven part-time chairs with major industries) conducting long-term projects that combine basic research with application-oriented development. This ranges from co-developing specific analytical techniques and methodologies with partners from the private sector to the development of catalysts and catalytic methodologies for industrial processes. There is an operational patent strategy for developments with and without external partners (eighteen patents over the evaluation period) and from which several successful examples for the transfer of Intellectual Property rights have resulted. There are also effective mechanisms in place for the generation and support of spin-off companies that have been developed from experience with start-up activities over the years. HIMS also engages in a number of fruitful activities to communicate the importance of molecular sciences for a sustainable future to the general public. These include e.g. public lectures and publications in professional magazines. However, although these activities are definitely very good and the panel acknowledges the difficulties to explain topics such theoretical chemistry and photonics to the general public, HIMS definitely could do more to explain the relevance of its science to a broad audience. Stating that the most important contribution are highly competent and responsible young scientists of course is true but may not be considered as an outstanding contribution. Especially the very interesting work on forensic science, the numerous activities in art-sciences, as well as the image-guided cancer therapy offer fantastic opportunities for societal exploitation.

The theme of *Analytical Chemistry* already achieved well in this direction. For instance, Analytical chemistry houses the Co van Ledden Hulsebosch Center, an interdisciplinary center for forensic science. The work on explosive and illegal fireworks has attracted international attention. The art-science connection exists but seems somewhat underexploited in consideration of the high visibility of Amsterdam in art. It has potential to attract a large audience, which has no direct interest in science and ignores how chemistry can contribute to world heritage and societal issues. *Computational Chemistry* is a fundamental science whose impact on society is indirect but important. Learning the

methods and the limitations of modelling experimental systems could be of great intellectual value and contributes to the education of future leaders. In a more direct way, the increasing collaboration between theoreticians and experimentalists is a benefit for all partners and thus to the society. The *Molecular Photonics* involvement in the LaserLabAmsterdam, a collaboration between UvA, VUA and VU Medical center highlights the impact on societal issues through for instance improved of image-guided cancer therapy. Research on the interaction between light and molecules could contribute to improved imaging. The topics addressed in *Sustainable Chemistry* are of highest significance for environmentally benign production of chemical products, ranging from bulk chemicals to specialized pharmaceuticals. Activities to communicate this message to the general public are in line with expectations. A number of industrial collaborations and initiatives to found spin-off companies are visible indicators of the applicability of the research efforts. The coordinating function of one of the PIs in NIOK (Netherlands Institute of Catalysis Research) brings UVA in a responsible position at the academic/industrial interface.

5.5 Viability

HIMS has seen a very positive development and exhibits today a significantly more coherent framework for chemistry at UvA than in the past. The panel has been very impressed by the strong commitment of the individual PIs to their themes within HIMS as an overarching structure. The research topics and the scientific profile holds potential to foster this development and to continue with a strategic planning for the expansion of strengths and to overcome weaknesses. The impression of the committee was that the definition of the themes was a necessary and very fruitful structuring process.

However, in all information provided to the committee, in the self-evaluation report and during the interview there was an obvious absence of any interest from management in the added value of the institute. Thus, strong leadership and coordination to avoid a scenario of four isolated silos appeared not visible, which might impose significant risks for the overall structure. Also, the committee got the impression that the recruitment policy and career development are left largely, if not entirely, to the four themes as an internal matter. The role of the management team seemed to be defined mainly as an administrative support structure, rather than a decision-making body. It was not clear at what level or in what format strategic planning is discussed across the theme structure and how decisions are reached in case of potential conflicts of interests between them. Building on the now established thematic definition, a corresponding managerial structure (as shown in the response of the director to the draft version of this review) is urgently required to exploit this momentum and to continuously and pro-actively shape the profile of HIMS in a dynamically changing university landscape.

5.5 PhD program

Enthusiastic and committed PhD students have expressed their delight to work in a highly motivating and interdisciplinary environment, which fosters the acquisition of complementary experimental and theoretical competences. The interaction between students and staff is organised through the student council, which is working efficiently. One

should congratulate in particular the student council for its contribution in the establishment of the milestones of the track to PhD, notably by proposing a mini-defence around midway of the targeted four years' period.

The committee has positively noted that also the management team of HIMS has expressed his clear opinion that a thesis should be finished within 48 months, which typically corresponds to the duration of the salary to the student. Enforcing the rule should prevent the drift to long to very long periods (as much as 90 months) observed in the past. To help the student reaching the goal a "Welcome Pack" is given to each student. Together with the student council, a set of milestones has been developed as guidelines for the discussion of the PhD students and their supervisors (typically the promoter and often in addition a senior researcher on a day-to-day basis). In addition, a financial incentive has been introduced to encourage the student to finalize his/her thesis work in the target period. The outcome of these regulations and incentives should be monitored.

5.6 Research integrity

The UvA has guidelines and courses that show that integrity is considered seriously. HIMS has his own line of conduct, which fully agrees with that of the Universities. Training and awareness courses are compulsory to students and post-docs and discussions are regularly organized for all permanent and non-permanent members.

5.7 Diversity

The HIMS scientists listed in the self-evaluation report comprises full-time as well as part-time faculty members. The team includes several researchers from outside the Netherlands and Europe, especially among the younger staff members. There are 6 female scientists out of a total of 46 researchers, corresponding to 13%. At present, female scientists are represented in the group of postdocs, assistant or associate professors only and are not represented on the managerial level. HIMS recognizes that there is indeed a poor gender balance among the staff with no women at the senior level. Their intention is to hire more women than men in the coming years in order to modify the situation at the top level through promotion. While this intention is commendable, it could be enhanced by analysing the criteria for promotion and by some more pro-active action like hiring top female staff. A foundation named beta plus, which could be used for hiring with the purpose to increase diversity was mentioned during the interview. This interesting information indicates how HIMS is concerned about this issue. However, since no information on this foundation is found in the written document, the committee acknowledges it without further comment.

5.8 Conclusion and recommendations

The research quality at HIMS is of very high caliber, comprising world-leading activities of individual groups in all four research themes. The research groups in HIMS and their scientific agenda span the chemical sciences from computational studies to reaction engineering concepts for sustainable chemical processes, embracing analytical chemistry

and molecular photonics. There is a good balance between established professors with longstanding experience, senior PIs with very clear profiles and recognized research agendas, and young talents that show very promising potential for future development. Building on the now established thematic definition, a corresponding managerial structure is urgently required to exploit this momentum and to continuously and pro-actively shape the profile of HIMS in a dynamically changing university landscape.

Recommendations by the committee:

- Implement a managerial structure that balances between operational administration and strategic planning;
- Develop a coherent recruitment strategy for HIMS as a whole, beyond the individual planning of the themes;
- Provide joint service functions or otherwise create synergies for support of HIMS members in the application of personal grants or large-scale projects on European level;
- Monitor and foster the measurements for reduction of PhD times towards the targeted four-year period;
- Increase the exploitation of the numerous research topics most relevant to the general public;
- Increase the visibility of HIMS by including HIMS as affiliation in the publication address.

6. Amsterdam Institute for Molecules, Medicine and Systems (AIMMS) – VU University Amsterdam

Assessments:

	Quality	Relevance	Viability
AIMMS	1	2	1

6.1 Introduction and research area

The Amsterdam Institute for Molecules, Medicines and Systems has been founded in 2010 as one of the Interfaculty Research Institutes at VUA. It comprises in total 18 research groups from the Department of Chemistry & Pharmaceutical Sciences (CPS) from the Faculty of Exact Sciences (FEW), the Department of Molecular Cell Biology (MCB) from the Faculty of Earth & Life Sciences), and the Department of Informatics from FEW (BioInf). Formally, AIMMS consists of two departments (Chemistry and Pharmaceutical Sciences (CPS) and Molecular & Cell Biology (MCB)), which are also subject to this evaluation report. In a well elaborated research strategy, AIMMS aims at an integrated understanding of biological processes and systems as a whole. There is strong expertise in basically all areas linked to the discovery of new medicines, ranging from theoretical chemistry, synthetic and medicinal chemistry, molecular toxicology (CPS), to structural biology, microbiology, cell physiology (MCB), up to bioinformatics and neurobiology. With the very recent addition of the Department of Environment & Health (E&H), AIMMS further strengthens its translational approach from molecules to diseases. Furthermore, this will also strengthen the links to the VU Medical Center.

6.2 Research quality

AIMMS
AIMMS demonstrated a very impressive research portfolio exemplified by excellent output statistics and numerous prestigious personal grants. It comprises 18 research groups clustered in 5 major areas (Molecular Sciences, Computational Sciences, Pharmaceutical Sciences, Life Sciences, and Environment & Health), which cover the whole translational chain from molecule to disease. The committee was impressed by the strong collaborative spirit within AIMMS, which is also exemplified in the fact that the self-evaluation report does not assign the numerous achievements to the two individual departments. Over the evaluation period, scientists received 2 Veni, 4 Vidi, 2 Vici, 6 NWO ECHO, and 3 NWO Aspasia grants. Furthermore, there were one ERC starting grant and one ERC consolidator grant awarded. This demonstrates, that scientific excellence is present across all career stages, from young, very talented PIs up to internationally highly recognised senior researches. What is still missing is an ERC advanced grant, which definitely is within reach considering the outstanding research portfolio of most of the senior PIs (of which at least 6 show an H-index > 50).

Both departments publish in a wide range of journal categories with overall high to excellent relative impact, including publications in Science, Nature Commun., Nature Biotechnol., Nature Rev Drug Discov., Angewandte Chemie, and JACS. In order to even further increase the quality of the scientific output, AIMMS set the target of having at least 2 publications per researcher per year in the Q20% journals of his/her scientific domain.

Department of Chemistry and Pharmaceutical Sciences (CPS)
Traditionally, CPS is known for its world-leading position in GPCR research with focus on histamine receptors. In recent years, the research portfolio has been expanded towards phosphodiesterases and the acetylcholine binding protein. The chemistry groups are heavily engaged in the development of multicomponent reactions, with a focus on green chemistry. The translational value chain is complemented by strong expertise in preclinical toxicology and metabolism. All this is complemented by top level computational approaches. Based on the bibliometric analysis, CPS publishes between 115 to 132 papers per year, with chemistry, physics, and pharmacology & toxicology as top ranked categories. 77% of these publications are in the top quartile of the respective journal ranking. Furthermore, every year between 4% and 6% of the publications belong to the top 1% group in terms of citations. These parameters clearly further demonstrate the outstanding scientific quality of CPS.

Department of Molecular & Cell Biology (MCB)/Bioinformatics group
Also, MCB shows excellent publication records with 45 to 81 publications per year. According to their discipline, biology & biochemistry, microbiology, and plant & animal science are among the top categories. 70% of the publications are in the top quartile with up to 4% belonging to the top 1% cited publications. Specific strengths of MCB are seen in the field of systems approaches, metabolic models, as well as research on tuberculosis and antibiotic drug resistance. Also, in these fields, there are tight interactions with strong informatics groups.

6.3 Relevance to society

Staff members as well as students of AIMMS actively contribute to dissemination of their research to different target groups. This includes interviews in TV and radio, public courses, lectures at schools, debates with politicians, and of course numerous press releases which are targeted to a broader public. In addition, several groups are also running web services for a more specialised target group, such as the 3D-e-Chem Virtual Machine and a set of KNIME nodes for computer-aided drug discovery, and databases for kinases and phosphodiesterases. Finally, AIMMS also developed a valorisation strategy to target economic target groups such as pharmaceutical companies. This resulted in several spin-offs and patents. Notably, CPS appointed a professor for Science Business & Innovation, who contributes to increasing entrepreneurial thinking of the students and organises collaboration events with e.g. large pharmaceutical companies.

However, considering the huge potential that pharmaceutical and microbiological research offers for society, the activities in the area of societal relevance pursued by AIMMS may be considered as very good, but could be improved. Explaining e.g. the need for research in areas such as antimicrobial resistance to the general public is straight forward and of course generates societal impact. For being world leading in this aspect, opinion leadership in areas

such as openness and ethics in pharmaceutical research, targeting rare diseases, or the whole complex of reducing animal experiments (3Rs) needs to be enlarged.

Department of Chemistry & Pharmaceutical Sciences
The main contributions of CPS to societal target groups focus on providing cutting edge tools for scientists. These include the eChem toolbox for computer aided drug discovery, data bases for structure-based drug design in the field of kinases and phosphodiesterases, as well as tool compounds for chemical biology approaches. Outreach to the general public is in line with the general policy of VU, but, as outlined above, could be improved

Department of Molecular & Cell Biology/Bioinformatics group
Members of MCB are very active in communicating the role and importance of microbiologically oriented research to the general public. This is e.g. exemplified by public courses on the microbiome, systems biology, and debates about synthetic biology. Quite some attention was achieved with the work on the microbiology of kisses, which was also announced with a poster at the airport.

6.4 Viability

The Amsterdam Institute for Molecules, Medicines and Systems is one of the Interfaculty Research Institutes at VUA. It resulted of a merger of the Departments of Chemistry & Pharmaceutical Sciences (CPS), Molecular & Cell Biology (MCB), and the Bioinformatics Group (IBI-VUA). In 2017, also the Department of Environment & Health joined. AIMMS is headed by a Management Team composed of a Scientific Director, the heads of the three Departments, and the upcoming Scientific Director. From the very beginning on the Management Team followed a clear strategy towards scientific excellence, which is also exemplified by the termination of two groups in CPS which did not get top scores by international chemistry review committee. As all other institutes, also AIMMS was harmed by the non-merger of the Science Faculties of VUA and UvA, mainly with respect to the enormous waste of time spent for preparing the merger. However, due to its very solid strategy and vision towards a translational chain from molecule to disease, there is no need for reorganising AIMMS due to the non-merger. With the new O2 building, AIMMS is excellently equipped for the near future. The groups will come even more closer together, which is already actively facilitated by e.g. O2 lunches and O2 core facility days.

The only risk for maintaining AIMMS as a world-leading top research institution in the field of life sciences is the financial independency of the departments. Legally, the money provided by the university is directly assigned to the three departments. However, the departments expressed their strong intention to fully merge into one department (working title Chemistry & Molecular Life Sciences), which will mitigate this risk and provide a viable and stable organisational structure.

The management group was very coherent across the different departments, which e.g. is shown by joint selection committees for vacant positions, funds for joint PhD students, and a joint valorisation strategy. Also, the number of staff (204 research staff) and funding is provided on an AIMMS level only. Thus, it is difficult to differentiate the viability for the two (yet) individual departments under evaluation (CPS and MCB). Both department heads

expressed the strong will to merge into one organisational unit. Already now all decisions related to funds and positions, as well as the overall strategy are made in the AIMMS Management Team, which is composed of one director and the three department heads.

6.5 PhD programs

In 2015, AIMMS established a single Graduate School for all AIMMS PhD students, which includes a Training and Supervision Plan. However, although the regular time for pursuing a PhD is 4 years, more than 50% of the students need more than 6 years to graduate. Comparing to international standards, this is too long and should be reduced. The management team is aware of this and started several activities to overcome this problem: (i) a bonus of €1500 for those who submit their thesis within 4 years and 3 months, (ii) instalment of a PhD committee which regularly participates in the meetings of the management team, (iii) midterm evaluation of the thesis progress, and (iv) re-discussion of the publication requirements for PhD theses (2 accepted and 1 submitted manuscript).

Generally, the PhD students like the true collaborative spirit in AIMMS, as it offers them the possibility to work in interdisciplinary teams. Several of them were funded by AIMMS internal grants for joint PhD positions between different research groups. This is seen as an excellent initiative to foster collaboration and to bring different scientific disciplines close together.

6.6 Research integrity

Management, staff, and students are aware of the importance of scientific integrity. Since 2015, every PhD student has to attend a mandatory course on scientific integrity and to sign the code of conduct. In case of conflicts, there are University wide mechanisms in place. In addition, the Director of the Study Program serves as first contact point. With respect to sustainability of data and protocols, several groups are running electronic lab books. The Management Team is also very well aware of the importance of data management and data stewardship and appointed a data manager, who is in charge for development and implementation of an AIMMS wide research data and management plan. This includes concepts for making the data FAIR, testing the viability of new data management technologies, and keeping links to the Amsterdam Data Center.

6.7 Diversity

With respect to nationalities, staff and students at AIMMS show impressive diversity with a total of 42 nationalities working at AIMMS. However, with respect to gender diversity, AIMMS unfortunately shows the same misbalance as observed in comparable institutions throughout Europe. While at the level of technicians, 56% are female, this drops to 12% for staff. The management is fully aware of this issue, and made considerable effort to overcome this misbalance, by e.g actively stimulating careers of female scientists by utilising the NOW-Aspasia program. Furthermore, search committees for new professors include at least two female members (VUA policy). It is strongly advised to make the maximum

possible efforts to recruit top level female scientists for the two vacant positions in order to reach the University wide goal of 25% female scientists in 2020.

6.8 Conclusion and recommendations

The committee was impressed by the true collaborative spirit at all levels at AIMMS, which, together with several top level individual scientists, definitely contributes to the outstanding scientific excellence of AIMMS. Transition from the retiring Scientific Director Nico Vermeulen to his successor is very smooth as Bas Teusink is already also a member of the management board. With respect to branding, AIMMS still suffers a bit from the fact, that several PIs were previously part of LACDR, the Leiden-Amsterdam Center for Drug Research. In addition, not all publications mention AIMMS as affiliation, as the researches are legally still affiliated to the individual departments. However, when the merger of the three departments has been finished and AIMMS is transformed to one organisational unit, this should no longer be a problem.

Recommendations by the committee:

- Merge the departments into one organizational unit as soon as possible;
- Carefully consider if the name again should be changed (from AIMMS to C&MLS); if yes develop a solid communication strategy for branding the new name;
- Further exploit the chair for science business & innovation to fully capitalize on the huge economic opportunities in the life science area;
- Engage even more in IMI projects; considering the excellence of the institution, it could participate in more IMI and H2020 projects;
- Reduce the duration of PhDs;
- Continue to establish AIMMS internal grants for joint PhD projects, because it is an excellent mean for stimulating collaboration;
- Active search for females for new recruitments on all levels;
- Get more engaged in general societal activities related to pharmaceutical research and its ethical implications;
- Continue to actively work on a coherent data management strategy; maybe establish AIMMS wide electronic lab books, which might also foster further collaborations.

7. Institute for Biodiversity and Ecosystem Dynamics (IBED) - University of Amsterdam

Assessments:

	Quality	Relevance	Viability
IBED	1	1	1

7.1 Introduction and research area

The Institute for Biodiversity and Ecosystem Dynamics (IBED) performs ecological and evolutionary research at scales from the individual organism to the globe. Its research contributes new knowledge to society that helps clarify the interconnectedness of nature and the relationship of humans to the ecosystems that support them. IBED was recently reorganized from nine units into four departments: Ecosystem and Landscape Dynamics, Evolutionary and Population Biology, Freshwater and Marine Ecology, and Theoretical and Computational Ecology. A management board consisting of the leaders of these departments, the IBED manager, deputy-director and science officer along with the IBED Director has been formally in operation for less than one year but early signs are that this will provide a very effective structure for guiding the unit. These four departments encompass most of the range of topics in the field of Ecology. Scientific staff number in the 130-160 range.

7.2 Research quality

During this past evaluation period IBED has maintained its excellent record of publishing high quality research products, averaging more than 300 publications per year. An impressive number appear in the most visible interdisciplinary journals and many others appear in the leading journals in ecology. Publications from IBED are selected at a high rate for additional supplementary commentaries, literature highlights, and the like, adding further visibility. IBED scientists have robust international reputations and many are seen as thought leaders in their fields. All four departments published 15 or more papers that fall within the top 1% of published papers in terms of citation impact. The level of this review did not allow for detailed, specific assessments of the individual departments, but it should be noted that the committee did not find there to be a wide range in performance either in terms of research quality or relevance to society among the four departments, and all four contribute significantly to IBED's overall excellent research score. A few comments based on raw bibliographic measures are included here but specific grades made to individual departments were not possible.

Department Ecosystem and Landscape Dynamics
Work in this department has made inroads into our understanding of ecology at the large spatial scale and how Earth and its inhabitants have changed over time. The combination of ecosystem ecology with landscape dynamics and paleoecology is not entirely unique, but there are only a few similar configurations in the world. This arrangement promotes a multi-

faceted understanding of large-scale environmental phenomena. The total number of papers published (301) and numbers of papers in high impact factor journals were somewhat lower than two other IBED departments but still indicative of a highly functioning research unit.

Department Evolutionary and Population Biology
Work of high impact in this group includes studies of evolutionary mechanisms with a particular emphasis on plant-herbivore interactions. The research is highly conceptual with a focus on gaining deeper insights into evolutionary relationships, as well as developing new theory. This department published the greatest number of papers (371) of all four departments and a similar number of papers in high impact factor journals and is clearly contributing to IBED's excellent research activities.

Department Freshwater and Marine Ecology.
Recent developments include the discovery of regime shifts in oxic/anoxic boundaries and effects of rising CO_2 on freshwater and marine ecosystems. Work explores fundamental questions about the functioning of these aquatic systems and complex species dynamics within them. FAME's research output was second highest among the four IBED department in terms of numbers of papers (343) and first in terms of publications in journals of high impact.

Department Theoretical and Computational Ecology
This department focuses on the structure and functioning of ecosystems, encompassing different levels of organisation (individuals, communities…) and their interactions with biotic and abiotic environment. Recent developments have been predictive models of bird migration and of fish populations that have practical applications. By raw bibliographic measures, the TCE department published 70-140 fewer papers (229) during the evaluation period than the other three departments (range 301-371), but a comparable number were published in journals of IF>5.

7.3 Relevance to society

IBED is involved in many activities that connect its scientists to the public, and individuals within the institute view these connections as critical. Specific emphases include climate change, environmental stressors such as contamination and land degradation, food security, water quality, and conservation. These activities include public lectures (those at TEDx and large outdoor festivals especially stand out), contributions to TV documentaries, and an impressive number (>100 during the evaluation period) of publications aimed at general readers. IBED also participates in the applied research consortia Amsterdam Water Science and Amsterdam Green Campus and therefore is contributing to large, socially targeted efforts. As with research quality, the committee is unable to provide specific grades for departments in terms of social relevance, but it is clear that all four departments are contributing significantly to the overall IBED score of excellent in this category.

Department Ecosystem and Landscape Dynamics
Research in this group addresses global change and carbon balance, issues of great social relevance. Excellent engagement with the public occurs through public lectures and through media outlets. Notable too are ways that ELD scientists are engaged with policy makers.

Department Evolutionary and Population Biology
Applied research in this department contributes to food security via means of biological control lessening society's needs for pesticides and GMOs, a potentially direct connection between evolutionary dynamics and social need. Activities also include public lectures and appearances in the media.

Department Freshwater and Marine Ecology
Socially relevant research in this group includes studies exploring the nature of interactions of cyanobacteria, including those, which form harmful algal blooms, and how they interact with light, nutrients, and other aspects of their environment. This work has direct bearing on managing water quality in The Netherlands and elsewhere.

Department Theoretical and Computational Ecology
Work in this department has addressed impacts of offshore wind farms on wildlife and has helped mitigate avian damage to military aviation. The citizen science program *Vogel het uit!* is a highly visible initiative that allows non-scientists a chance to visualize the locations of tracked birds and to contribute their own observations via the VogelHetUit app.

7.4 Viability

IBED's future prospects are excellent. This outlook arises partly from the increasing importance of the subject matter it covers. Addressing questions that are aligned along a "biodiversity – ecosystems" axis will continue to be at the forefront of biological sciences, and bringing theoretical and empirical approaches together, as well as bringing researchers together whose work extends from individuals to the globe is an excellent and forward-looking organizational scheme. Just as important though, IBED is a well-functioning unit with obvious energy input from the youngest to the most senior scientist. Communication within the unit seemed excellent and the vision set by the management team was especially notable. Across all levels of personnel, there is a clear sense of common purpose and an enthusiasm for the work of IBED and its four departments. Indeed, one of the staff said that the reorganization into four departments was "one of best things that could happen to IBED". The reorganization has already increased communication and collaboration among groups. All of these signs point to a high prospect of viability of the unit into the future. A thoughtful strategic plan for 2017-2022 provides an excellent roadmap for the future.

Now that it is certain that the anticipated merger with VUA will not occur and IBED will continue as an institute into the indefinite future, IBED is rightly considering whether there is a need to better "brand" itself to the broader community. Some members of IBED view this as high priority though others do not. As a related issue, IBED perceives that it could expand its communication efforts, especially those that involve social media. There is a relatively new science director at IBED, who, the committee assumes, will provide additional support to these areas and thus expand efforts. Social media is indeed an increasingly important

means of communication and whether IBED is put forward as a public brand, enhanced use of social network platforms can further expand the connections between science and society.

Department Ecosystem and Landscape Dynamics
This department houses perspectives at large spatial scale and long temporal scale. These perspectives will continue to be an important part of science in the future and offer important potential for increased outreach.

Department Evolutionary and Population Biology
This is a thriving area of biology where for instance technical advances in sequencing and -omics approaches have revolutionized the questions that are asked. The prospects of this department are particularly tied to the efforts underway to recruit into an open Full Professorship.

Department Freshwater and Marine Ecology
These two subjects have obvious commonalities and combining the topics into one department enhances those synergies. Water resources are and will continue to be crucial for society.

Department Theoretical and Computational Ecology
Theoretical biology has a long history but computational biology is a newer field and one of growing importance. It is a critical piece of scholarship going into the future.

In addition to the four subject matter departments, IBED has recently created a department-like unit composed of the technical staff, who manage work and sample flow along with PI-level staff. This step of creating a Department of Labs and Infrastructure is a commendable and creative alignment of departmental resources, giving these skilled staff a greater voice in functioning.

7.5 PhD programs

IBED became a member of the PE&RC graduate school in 2016, which strengthened the graduate training network in the unit. Attrition from graduate training is low, only one or two PhD students discontinue their work in any given year. Approximately half of PhD recipients go on to research-oriented careers within one year of their defence. Similar to the other programs the committee reviewed, the time to receiving PhD on average was longer than considered optimal, calling for strategies to better align the expected and real study times for PhD students leading to timely completion. There was a clear awareness of this issue though it was not as clear how strongly the institute was taking corrective action.

7.6 Research integrity

Along with other groups reviewed by this committee, the overall policies of the university provided an important set of guiding documents setting out research integrity policies.

Students are trained in research integrity as part of their coursework. Policies regarding IBED research integrity and data management are taken seriously but are being updated.

7.7 Diversity

IBED recognizes that it has work to do to diversify its academic staff. Gender is a particular priority. As of September 2017, females made up about 1/3 of the assistant professors and there were three associate professors and one full professor. A number of hiring and retention policies are in force that may lead to improvements. Targets (not quotas) have been set; these appear reasonable. It appeared to the review committee that IBED is sincere in its stated goal of increasing diversity and it is taking corrective action.

7.8 Conclusion and recommendations

The review committee had a highly positive impression of IBED's research quality. The commitment of its members to common goals and their sense of community also stood out. The leadership team of IBED is to be commended and the scientists and staff of IBED should feel great pride in their accomplishments. In all important respects, it presents itself as a high functioning group.

Recommendations by the committee:

- Identify and hire a new institute leader to maintain research excellence and a healthy work culture because the current director will leave IBED in 2018;
- Take steps to enhance the incorporation of International Students into IBED activities and culture;
- Set up some anticipated outcomes for new Department of Labs and Infrastructure as well as a timeline to review how this change has worked;
- Make a clear decision as to whether to "brand" the IBED as a unit and if so, consider renaming itself to something more user-friendly.

8. Department of Ecological Science (DES) - VU university Amsterdam

Assessments:

	Quality	Relevance	Viability
DES	1	1	2

8.1 Introduction and research area

The Department of Ecological Science addresses fundamental ecological and evolutionary questions regarding the relationship between biodiversity and ecosystem functioning, in the present context of global changes. The department is a medium size structure (ca 50 persons altogether) organized in two sections: Animal Ecology and Systems Ecology. It embraces a wide range of scales from molecular ecology to ecosystem research and a diversity of ecosystems and makes use of experimental studies in laboratory or climate chambers conditions, field studies and long-term experiments, laboratory analyses and modelling. The research is based in a rigid theoretical framework while also addressing relevant ecological and environmental challenges. The research of this department is relevant in particular to the fields of nature conservancy, contamination of the environment, genetically modified organisms, coastal protection, spatial planning and understanding and predicting the impacts of global change on terrestrial ecosystems biota and functioning.

8.2 Research quality

The department is performing excellent quality research, knowledge driven and innovative, that has produced several breakthrough results in the recent years. They are at the forefront of their discipline internationally. Their research is based on adequate and very good facilities, including long term ecological research sites (LTER's) in the Netherlands, but also in the Falklands, Northern Sweden, Svalbard, Antarctica, where they attract other scientists. They have a wide range of analytical facilities as well as terrestrial mesocosms and a fire laboratory. The research is also founded on a strong network of collaborations.

The department is very prolific with an excellent publication profile, in terms of number of publications in top disciplinary as well as top generalists' journals, with high impact papers. Since 2011 this department published 34 papers that fall within the world's top 1% most cited publications for the same period and from the same research area, which is amazing.

In the period evaluated, the department has attracted a high number of individual grants (Veni, Vidi, Vici, ERC Starting Grant, NWO-Gravitation) at the national and international level, as well as individual marks of recognition (University Chair of Excellence in Research, Heineken Young Scientist Award, ..). The high inter-disciplinarity of the group is undoubtedly attractive to students and post docs.

The two groups, Animal Ecology and Systems Ecology, which were quite separate a few years ago have intensified their interactions, as shown by postdocs hired on shared projects and recent common papers. Microbial ecology was identified as a proper topic needed at the crossing of the two sections and a tenure tracker assistant professor has been hired and actively collaborates with the two groups.

DES is a medium size department and has a rather flat organization. Information seems to be circulating very easily between teams, sections, students, post docs support staff and academics. There is an open atmosphere and shared enthusiasm. There are several thematic group meetings that span within and across the two sections and ensure a lively scientific life in the Department. The management team operates in a transparent and fluid manner. The department is more than the sum of brilliant individuals and there is a strong sense of belonging to a group and a true bottom-up functioning.

8.3 Relevance to society

DES research themes have a high societal relevance per se in the present context of increasing pressures on terrestrial ecosystems and while the research at DES is essentially knowledge and curiosity driven, this group makes an amazing work in conveying their research to the public and interacting with/influencing societal target groups.

Researchers in DES are engaged in outreach activities with quite a success (many TV programs, interviews, lectures at general public festivals, interventions in schools). They are involved in societal debates on nature conservation and climate change and in several committees with societal parties. Their activity had concrete implications in re-shaping the Netherlands' law on nature management, which is a major achievement. Several academics of the department contributed actively to the national research agenda and to the Origins centre.

In terms of application of research, DES is involved in the development of tools for soil contamination assessment based on genomic based approaches and use of Collembola as bio-indicators.

8.4 Viability

DES was strongly involved in the project of merging with UvA's Institute for Biodiversity and Ecosystem Dynamics (IBED), an institute with which they have many common interests, complementarity and on-going research and teaching collaborations. This project was not supported by the universities and led to severe disappointment among the staff. DES plans to continue to collaborate and coordinate their efforts with IBED both in teaching and research. Another project is on its way, namely the merging within VUA of the departments of Ecological Science, Earth Sciences and Institute for Environmental Studies and DES into the Department of Earth, Ecology and Environment (EEE; Triple E). The partners in this new institute have different expertise than IBED. One forecasted advantage is that this big institute will allow to increase the size of student cohorts and thus improve the department budget.

At this moment, DES has a clear identity and good visibility because of the excellence of its research. However, while merging within EEE offers new opportunities, and is identified as such by DES management and staff, it is not obvious that DES visibility will be maintained.

The department has a recruitment plan for academics that is discussed and is transparent to DES staff. They usually succeed in hiring before a senior academic retires, which ensures a smoother transitioning. At present, the priority is to hire a true genomics person and a tenure track position has been secured for this.

Building and lodging conditions are an issue. The group is looking forward moving into a new building – the present building being due to destruction. The demand of DES is to become better geographically united, i.e. in the same corridor, in order to foster interactions among staff and students, scientific exchanges and department coherence. If the forecasted moving into a new building is changed by VUA to renovation of the present building it would be detrimental for DES, in terms of loss of time and disorganization related to the refurbishing process.

In conclusion, the viability of DES per se is very good, because of the quality of the research, the quality of their internal functioning and the importance of the research topics which will not decrease in the future. Furthermore, leaders have strong skills and are very involved. The governance is strong, open and transparent. DES has a clear strategic plan, in terms of management of competences, research orientations, teaching plan and cooperation strategy. However, there are both opportunities and risks for this department associated with the project of merging with a much larger group (Tripple E). The grading given here is meant to raise attention on the future of this department.

8.5 PhD programs

The department changed the way PhD are supported by leaving their former doctoral school SENSE to the Production Ecology & Resource Conservation (PE&RC) graduate school, that is better suited in terms of disciplines for the Department. Students express satisfaction of the PhD training program. The Department has made an effort to reduce the duration of PhDs and succeeded in an average 4 years and 7 months' duration of PhDs, while several of those exceeding the allotted time work only part time within DES. The implementation of strategies to align the expected and real study times for PhD students leading to a reduction of PhD duration should remain an objective for DES as well as for the other Institutes and Departments of VUA.

8.6 Research integrity

Ethics and integrity are part of PhD training. Data storage and management are being organized adequately and follow the guiding documents provided by the University.

8.7 Diversity

As an exception among the evaluated departments at VUA and UvA gender balance is not an issue for DES at professor and management heads level. Management is aware of the under-recruitment of qualified women at the assistant professor level. There is a wide diversity of geographic origins among students. Staff management is explicit, comprising periodic meetings between individuals and tenure track supervision.

8.8 Conclusion and recommendations

DES is a rather small group performing extremely well and producing excellent quality and very high-profile research while achieving an efficient and lively working atmosphere and a sense of community among its members. Although the viability of the group itself is without any doubt, there is a risk of losing strength and visibility when merging within EEE. Also, the future housing of the group was seen as a potential issue by the committee.

Recommendations by the committee:

- To maintain collaborations and complementarity with IBED and coordinate for access to external resources and for recruitment strategy;
- Not to lose identity and not to lose visibility within the future Triple E institute and maintain the quality of interactions within the department.

Appendix A: Curricula vitae of the committee members

Hans van Veen (chair) studied chemistry (microbiology and toxicology) at the VU Amsterdam, where he also received his PhD in 1977. He was a post-doc at the University of Saskatchewan, Canada, and a visiting scientist at the CSIRO Division of Soils in Adelaide, Australia. In 1994 he received the UNESCO-Award for Microbiology. He worked at the Netherlands Agricultural Research Department, DLO, in Wageningen at different institutes. He was the director of the DLO-Research Institute for Plant Protection from 1992 to 1998. In 1993 he was appointed professor of Microbial Ecology at Leiden University. In 1998 he became Director of the NIOO-KNAW-Centre for Terrestrial Ecology and head of the Department of Plant- Micro-organism Interactions. After the merger of the centres for Terrestrial Ecology and Limnology in 2010, he became Head of the Department of Microbial Ecology of NIOO-KNAW. He was an Executive Board member of the International Society for Microbial Ecology and co-founder of The ISME Journal. He retired in 2014 and he was appointed Knight in the Order of the Dutch Lion. His main research interest is in the role of micro-organisms in the functioning of terrestrial ecosystems, including the role of microbes in global change and land use related processes and the regulation of the assemblage of bacterial and fungal communities in soil and, in particular, the rhizosphere.

Judith Armitage was educated at University College London, being awarded a PhD in 1976. She has been based in Oxford since 1985 and was appointed professor in 1996 and is a fellow of Merton College, Oxford. She was the director of the Oxford University Centre for Integrative Systems Biology from 2006-2016. Armitage was elected a Fellow of the Royal Society (FRS) in 2013 and is also a Fellow of the Royal Society of Biology, the American Academy of Microbiology and a Member of EMBO. She is co-editor in chief of Current Opinions in Microbiology. Armitage's research is largely based on bacterial motility and its control by environmental signals, and the mechanisms involved in positioning related large multiprotein complexes during the cell cycle, ensuring balanced responses.

Trine Bilde is a professor of Evolutionary Biology at Aarhus University, Denmark, and Head of Section of Genetics, Ecology and Evolution at the Department of Bioscience. Her research focusses on the evolutionary biology of life history and mating systems, population genetics, and adaptation to environmental change. She is a fellow of the Royal Danish Academy of Sciences and Letters, member of the Scientific advisory board of the Leibniz Institute for Zoo & Wildlife Research, Berlin, and Head of the Evolutionary Panel of Academy of Finland's Research Council of Biosciences and Environment. In addition, she has been a member of the European Comission's evaluation committee for Marie Curie actions since 2007. She is academic editor of the journal Frontiers in Ecology and Evolution.

Mike Blatt obtained a PhD from Stanford University in 1981, completing his doctorate thesis on signalling and intracellular motility while working in the Plant Biology Department of the Carnegie Institution of Washington. He held positions of Lecturer, Reader and Professor of Plant Cell Biology at the University of London, Wye College, and subsequently at Imperial College London. He was elected to the Regius Chair of Botany at Glasgow University in 2001 and to the Royal Society of Edinburgh in 2003. He is a Fellow of the James Hutton Institute and the Royal Society of Biology (UK), a Fellow of the John Simon Guggenheim Memorial Foundation (USA), he holds an Adjuct Professorship at Pennsylvania State University, and

has served on various editorial boards and panels, including those of the BBSRC (UK), CONICYT (Chile), and NASA (USA). He is Editor-in-Chief of the premier international journal Plant Physiology. Mike's research centres on the cell biology and biophysics of membranes, especially in relation to ion channels, their regulation and trafficking, and on stomatal guard cells and plant water relations.

Claire Chenu is a Professor of Soil Sciences at AgroParisTech in Paris area after being an INRA (Institut National de la Recherche Agronomique) for 20 y. Her personal research deals with soil organic matter in soils, its dynamics, stabilization processes explaining carbon storage in soils, interaction with soil structure and carbon sequestration in soils as affected by agricultural practices. She serves in several boards in France, and is Vice-Chair of the CSPNB, an advisory committee on biodiversity and natural heritage to the Minister of Ecology (France). At the international level, she is a member of the steering committee of the Swiss National Science Foundation Research Program on soils, member of the scientific committee of the German Biodiversity observatories, of the advisory committe of the FACCE-JPI and vice chair of the International Scientific and Technical Comittee of the 4 per 1000 initiative-Soils for food and climate. She is co-editor in chief of the journal Soil Biology and Biochemistry.

Gerhard Ecker is Professor of Pharmacoinformatics and Head of the Pharmacoinformatics Research Group at the Department of Pharmaceutical Chemistry, University of Vienna. He also coordinates the research focus "Computational Life Sciences" of the Faculty of Life Sciences. Gerhard received his doctorate in natural sciences from the University of Vienna and performed his post-doctoral training at the group of J. Seydel in Borstel (Germany). His research focuses on computational drug design, with special emphasis on drug-transporter interaction and in silico safety assessment. He coordinated the IMI Open PHACTS project, which created an Open Pharmacological Space by semantic integration of public databases. 2003 – 2009 Gerhard was member of the Senate of the University of Vienna, 2009 – 2011 he served as President of the European Federation for Medicinal Chemistry, and since 2014 he is Vice Dean at the Faculty of Life Sciences.

Odile Eisenstein received her PhD degree in 1977 with Dr. Nguyen Trong Anh and Prof. Lionel Salem from Université Paris-Sud (France). She enters the French National Centre of Scientific Research (CNRS). After a post-doc with Prof. J. D. Dunitz (ETH Zürich) and one with Prof. R. Hoffmann (Cornell, USA), she became head of the Laboratory of Theoretical Chemistry of Université Paris-Sud at Orsay. In 1996, she moved to Université de Montpellier to found a Laboratory of Theoretical Chemistry, which is now integrated in the Institut Charles Gerhardt. She climbed up the levels of the CNRS till the top rank and became Emeritus in 2014. She was invited professor in numerous universities and she holds an adjunct professor position at the University of Oslo (Norway) since 2012. Her main scientific interest is the study chemical reactions mostly related to transition metal complexes with computational methods. She was Editor in Chief of New Journal of Chemistry (1998-2002), a journal co-edited by CNRS and the RSC. She is presently Associate Editor for ACS Catalysis. She is a member of the French Academy of Science and of the International Academy of Quantum Molecular Science. She is also foreign member of the Academy of Science and letters of Norway and of North-West Westphalia.

Alain Filloux received his PhD degree in 1988 from the « Université d'Aix-Marseille » (France). From 1988 to 1993, he stayed at the University of Utrecht, (The Netherlands), initially as a post-doctoral fellow and later appointed as assistant Professor. In 1994, he is recruited at the French National Centre of Scientific Research (CNRS) in Marseille (France), where he is appointed as head of a research unit in 2003. In 2008, he was appointed as Professor in Molecular Microbiology at the Imperial College London (UK) and he is the deputy director of the MRC Centre of Molecular Bacteriology and Infection. In 2013, he is appointed editor in chief for FEMS Microbiology Reviews. The main focus of his research is on bacterial pathogenesis, molecular mechanisms of protein secretion, biofilm formation and regulation of gene expression. The system model he used is the bacterial pathogen Pseudomonas aeruginosa. Filloux was elected as a member of the American Academy of Microbiology in 2017.

Tibor Harkany completed his undergraduate training (M.Sc.) in molecular biology and biotechnology at the University of Szeged, Hungary (1995). He then received his Ph.D. in Medical Sciences from the Semmelweis University in Budapest, Hungary (1999) for his studies on the neurotoxicity of β-amyloid peptides and their relevance to cholinergic neurodegeneration in Alzheimer´s disease. Two post-doctoral fellowship ensued (University of Groningen, the Netherlands (1999-2001), Karolinska Institute (2002-2004), the latter supported by a ´Karolinska Institute postgraduate fellowship in restorative neuroscience´. In 2005, Dr. Harkany formed his independent research group at the Department of Medical Biochemistry & Biophysics of the Karolinska Institute. This year saw him to receive his associate professorship in neuropharmacology. During the period of 2007-2013, Dr. Harkany held the post of SULSA Professor of Cell Biology and 6th Century Chair to the University of Aberdeen, United Kingdom. Since 2011, Dr. Harkany is Professor of Neurobiology at the Karolinska Institute, a position he continues to hold jointly with his appointment at the Medical University of Vienna. On November 1, 2013, Tibor Harkany was appointed as Professor of Molecular Neuroscience and head of the corresponding department at the Center for Brain Research, Medical University of Vienna.

Walter Leitner obtained his doctorate with Prof. Henri Brunner at Regensburg University in 1989 and was a Postdoctoral Fellow with Prof. John M. Brown at the University of Oxford. After some ten years of research within the Max-Planck-Society, he was appointed Chair of Technical Chemistry and Petrochemistry at RWTH Aachen University in 2002. Since October 2017, he is Director for Molecular Catalysis at the Max-Planck-Institute for Chemical Energy Conversion. His research interests are focussed on the molecular and reaction engineering principles of catalysis as related to sustainable chemical processes. He served as the Chairman of the Editorial board of the Journal "Green Chemistry" published by the Royal Society of Chemistry from 2004-2016. The contributions of his research team have received several recognitions including the Otto-Roelen-Medal of DECHEMA (2001), the Wöhler-Award of the German Chemical Society (GDCh, 2009), and the European Sustainable Chemistry Award of EuCheMS (jointly with Prof. J. Klankermayer, 2014).

Robert Sterner has published more than 90 papers and books that together have been cited > 12,000 times. He is one of the founders of the field of Ecological Stochiometry, which seeks to understand how elemental balances and ratios affect organism success, community structure, ecosystem dynamics, and other topics. He has focused mainly on freshwater

plankton but through work with colleagues and students, he has contributed to the literature on microbes, fish, terrestrial plants, and other organisms. He has spent most of his career at the University of Minnesota Twin Cities, serving as the Head of the Department of Ecology, Evolution and Behavior. He also spent 2+ years working at the National Science Foundation in senior management as the Director of the Division of Environmental Biology, where he contributed to the shaping of the NSF funding portfolio and acted as a national spokesperson for environmental research in the U.S. He has done research on the Great Lakes since ~1996 and in 2014, he moved to the University of Minnesota Duluth where he became the Director of the Large Lakes Observatory, the only institution in the U. S. dedicated to the scientific study of all the large lakes on Earth. He is a Fellow the Institute of the Environment at the University of Minnesota and also a Fellow of the Cooperative Institute on Ecosystems and Limnology, which is based in Ann Arbor.

Appendix B: Program of the site visit

Sunday 26 November		
Time	Part	Collocutors
17.00 -	Welcome	Committee and deans
17.15 – 17.45	Meeting deans and committee	Committee and deans
17.45 – 19.00		Committee
19.00 -	Dinner	Committee

Monday 27 November		
Time	Part	Collocutors
09.00 – 09.30	Preparation meeting	Committee
09.30 – 10.15	DES management	Prof.dr. Rien Aerts Prof.dr. Jacintha Ellers Dhr Paul Bijlsma
10.15 – 11.15	DES staff	Prof.dr. Hans Cornelissen Prof.dr. Matty Berg Dr. Kees van Gestel Dr. Joris Koene Dr. Dick Roelofs Dr. James Weedon Dr. Sebastiaan Luyssaert Dr. Wouter Halfwerk Janine Mariën
11.15 – 11.30	Short break	
11.30 – 12.00	DES PhD candidates + postdocs	Milou Huizinga Anouk van ‘t Padje Simon Dupin Mark Lammers Stef Bokhorst Ken Kraaijeveld Victor Armini Caldas
12.00 – 12.30	Preliminary conclusions	
12.30 – 13.00	Questions and topics	
13.00 – 13.30	Lunch committee	
13.30 – 14.00	Transport to ASP	
14.00 – 14.45	HIMS management	Prof.dr.ir. Peter Schoenmakers Prof.dr. Peter Bolhuis Prof.dr. Wybren Jan Buma Prof.dr. Gadi Rothenberg Marcel Bartels M.Sc.
14.45 – 15.45	HIMS staff	Prof.dr. Joost Reek Dr. Tati Fernandez Ibanez Prof.dr. Evert Jan Meijer Dr. Bernd Ensing Prof.dr. Arian van Asten Dr. Michelle Camenzuli Prof.dr. Sander Woutersen Dr. Annemieke Petrignani Michiel Hilbers
15.45 – 16.00	Short break	

16.00 – 16.30	HIMS PhD candidates + postdocs	Wesley Böhmer, M.Sc. Dr. Ties Korstanje Ambuj Tiwari, M.Sc. Dr. Ariana Torres Knoop Karlijn Bezemer, M.Sc. Dr. Suhas Nawada Dina Petrova, M.Sc. Sander Lemmens, M.Sc.
16.30 – 17.00	Preliminary conclusions	
17.00 – 17.30	Questions and topics	
17.30 – 18.00	Transport to restaurant	
18.00	Dinner	Committee

Tuesday 28 November		
Time	Part	Collocutors
08.30 – 09.00	Meeting committee	Committee
09.00 – 09.45	IBED management	Prof. Peter de Ruiter Dr Judy Shamoun-Baranes Dr Monique van Wordragen Amber Heijboer MSc Dr Will Gosling Dr Hans Breeuwer Prof. Jef Huisman Prof. Willem Bouten
09.45 – 10.45	IBED staff	Dr Martijn Egas Dr Astrid Groot Dr Jolanda Verspagen Prof. Pim de Voogt Dr Erik Cammeraat Dr Chrystal McMichael Dr Yael Artzy-Randrup Dr Daniel Kissling Peter Kuperus
10.45 – 11.00	Short break committee	
11.00 – 11.30	IBED PhD candidates + postdocs	Naomi Zweerus MSc Dr Jacques Deere Milo de Baat MSc Jason (Xing) Ji MSc Milan Teunissen van Manen MSc Dr Elly Morriën Elspeth Sage MSc Hanna ten Brink MSc
11.30 – 12.00	Preliminary conclusions	
12.00 – 12.30	Questions and topics	
12.30 – 13.00	Lunch	
13.00 – 13.45	SILS management	Professor Marten Smidt Casper Huijser, PhD Maartje Brink, PhD Professor Leendert Hamoen Timo Breit, PhD Professor Michel Haring

13.45 – 14.45	SILS program 1 staff	Professor Stanley Brul Professor Christa Testerink Martijn Rep, PhD Gertien Smits, PhD Leo de Koning, PhD Francesca Quattrocchio, PhD Petra Bleeker, PhD Han Rauwerda, PhD Richard de Boer
14.45 – 15.45	SILS program 2 staff	Professor Dorus Gadella Professor Age Smilde Mark Hink, PhD Tanneke den Blauwen, PhD Pernette Verschure, PhD Renee van Amerongen, PhD Matteo Barberis, PhD Johan Westerhuis, PhD Jolanda Verheul
15.45 – 16.00	Short break	
16.00 – 17.00	SILS program 3 staff	Professor Paul Lucassen Professor Cyriel Pennartz Aniko Korosi, PhD Umberto Olcese, PhD Natalie Cappaert, PhD Frank Jacobs, PhD Jan Gorter, PhD Lars van der Heide, PhD Lars van Oerthel
17.00 – 17.30	SILS PhD candidates + postdocs	Gerrald Lodewijk, MSc Eva van Meeteren-Naninck, PhD Julien Fiorilli, MSc Katrin Wiese, PhD Stefania Astrologo, MSc Marloes Hoeksema, MSc Ruy Kortbeek, MSc
17.30 – 18.00	Preliminary conclusions	
18.00 – 18.30	Questions and topics	
18.30 – 19.00	Transport to restaurant	
19.00	Dinner	Committee

Wednesday 29 November		
Time	Part	Collocutors
08.30 – 09.00	Meeting committee	Committee
09.00 – 09.45	AIMMS management	prof Nico Vermeulen prof Iwan de Esch prof Holger Lill prof Jacob de Boer prof Bas Teusink dr. Ellen Langemeijer dr. Maartje de Snoo

09.45 – 10.45	AIMMS staff	prof Martine Smit prof Matthias Bickelhaupt prof Govert Somsen prof Pim Leonards dr Edith Houben dr. Sanne Abeln dr. Eelco Ruiter drs. Peter van Hoorn Ing. Elwin Janssen
10.45 – 11.00	short break	
11.00 – 11.30	AIMMS PhD candidates + postdocs	MSc Coco van Boxtel Sandra Ortega Ugalde Maurice Steenhuis Niail McLoughlin Aurelian Zarca Jurgen Haanstra Rob Haselberg
11.30 – 12.00	Preliminary conclusions	
12.00 – 12.30	Questions and topics	
12.30 – 13.30	Lunch	Committee and deans
13.30 – 16.00	Committee meeting first impressions	
16.00 – 16.45	Presentations of first impresssions	
16.45 -	Drinks	

Appendix C.1: Quantitative data – SILS

Table 1A Research staff - SILS

	2011		2012		2013		2014		2015		2016	
	#	fte	#	fte	#	fte	#	fte	#	fte	#	fte
Scientific staff	49	18	52	19	55	19	57	21	56	21	58	21
Post-docs	39	25	41	22	39	21	45	26	48	30	49	29
PhD students	84	47	91	54	106	65	110	70	116	69	112	66
Total research staff	**172**	**90**	**184**	**95**	**200**	**105**	**212**	**117**	**220**	**120**	**219**	**116**
Support staff	48	39	48	37	49	37	59	43	59	45	61	45
Visiting fellows	0	0	0	0	0	0	0	0	0	0	0	0
Total support staff	**48**	**39**	**48**	**37**	**49**	**37**	**59**	**43**	**59**	**45**	**61**	**45**
Total staff	**220**	**129**	**232**	**132**	**249**	**142**	**271**	**161**	**279**	**166**	**280**	**161**

Table 1B Research staff – Cell and Systems Biology

	2011		2012		2013		2014		2015		2016	
	#	fte	#	fte	#	fte	#	fte	#	fte	#	fte
Scientific staff	15	5.5	17	5.7	18	5.9	19	7.3	17	6.3	16	5.9
Post-docs	13	10.8	11	4.7	12	6.9	18	10.8	15	9.3	13	8.0
PhD students	15	7.5	19	13.1	28	15.8	42	26.1	41	22.3	36	22.2
Total research staff	**43**	**23.8**	**47**	**23.6**	**58**	**28.6**	**79**	**44.2**	**73**	**38.0**	**65**	**36.1**
Support staff	12	9.4	13	7.7	10	8.6	13	12.2	14	10.5	15	11.4
Visiting fellows	0	0	0	0	0	0	0	0	0	0	0	0
Total support staff	**12**	**9.4**	**13**	**7.7**	**10**	**8.6**	**13**	**12.2**	**14**	**10.5**	**15**	**11.4**
Total staff	**55**	**33.2**	**60**	**31.3**	**68**	**37.3**	**92**	**56.4**	**87**	**48.5**	**80**	**47.5**

Table 1C Research staff - Neurosciences

	2011		2012		2013		2014		2015		2016	
	#	fte	#	fte	#	fte	#	fte	#	fte	#	fte
Scientific staff	15	4.9	16	6.1	18	6.2	19	6.9	18	7.2	18	7.2
Post-docs	7	3.9	10	6.4	6	3.7	3	2.7	8	4.6	12	6.3
PhD students	32	16.3	29	16.7	30	19.7	31	20.7	32	20.0	30	18.6
Total research staff	**54**	**25.1**	**55**	**29.2**	**54**	**29.6**	**53**	**30.2**	**58**	**31.8**	**60**	**32.1**
Support staff	8	6.5	9	7.7	7	7.0	11	9.4	10	8.5	11	8.0
Visiting fellows	0	0	0	0	0	0	0	0	0	0	0	0
Total support staff	**8**	**6.5**	**9**	**7.7**	**7**	**7**	**11**	**9.4**	**10**	**8.5**	**11**	**8**
Total staff	**62**	**31.5**	**64**	**36.8**	**61**	**36.6**	**64**	**39.7**	**68**	**40.3**	**71**	**40.1**

Table 1D Research staff – Molecular Life Sciences

	2011		2012		2013		2014		2015		2016	
	#	fte	#	fte	#	fte	#	fte	#	fte	#	fte
Scientific staff	19	7.3	19	7.2	19	7	19	6.4	21	7.8	24	8.2
Post-docs	19	10.6	20	10.8	21	10.8	24	12.9	25	16.2	24	14.5
PhD students	37	23	43	24.3	48	29.4	37	23.4	43	26.7	46	25.1
Total research staff	**75**	**40.9**	**82**	**42.3**	**88**	**47.2**	**80**	**42.8**	**89**	**50.6**	**94**	**47.8**
Support staff	28	23.4	26	22	32	21.3	35	21.8	35	26.1	35	25.8
Visiting fellows	0	0	0	0	0	0	0	0	0	0	0	0
Total support staff	**28**	**23.4**	**26**	**22**	**32**	**21.3**	**35**	**21.8**	**35**	**26.1**	**35**	**25.8**
Total staff	**103**	**64.3**	**108**	**64.3**	**120**	**68.5**	**115**	**64.5**	**124**	**76.7**	**129**	**73.7**

Table 2A Funding - SILS

	2011		2012		2013		2014		2015		2016	
Funding:	fte	%	fte	%	fte	%	fte	%	fte	%	fte	%
Direct funding	58	45	58	44	60	42	70	43	72	43	77	48
Research grants	30	23	36	27	38	27	44	27	42	25	36	22
Contract grants	34	27	31	23	33	23	34	21	37	22	35	22
Other	7	6	7	5	11	8	13	8	15	9	13	8
Total funding	**129**	**100**	**132**	**100**	**142**	**100**	**160**	**100**	**166**	**100**	**161**	**100**
Expenditure:	k€	%	k€	%	k€	%	k€	%	k€	%	k€	%
Personnel costs	10,565	53.3	11,822	53.7	12,142	54.8	12,956	55.5	13,815	56.2	13,251	54.0
Other Costs	9,273	46.7	10,212	46.3	10,010	45.2	10,372	44.5	10,772	43.8	11,298	46.0
Total expenditure	**19,838**	**100**	**22,034**	**100**	**22,152**	**100**	**23,328**	**100**	**24,587**	**100**	**24,549**	**100**

Table 2B Funding - Cell and Systems Biology

	2011		2012		2013		2014		2015		2016	
Funding:	fte	%	fte	%	fte	%	fte	%	fte	%	fte	%
Direct funding	13.2	39.9	13.5	43.3	14.7	39.5	21.6	38.4	18.8	38.7	19.1	40.2
Research grants	8.7	26.2	10.1	32.4	12.5	33.4	18.7	33.1	14.4	29.8	12.4	26.2
Contract grants	11.2	33.9	7.6	24.3	10.1	27	13.3	23.6	10.5	21.6	10	21
Other	0	0	0	0	0	0	2.7	4.9	4.8	9.9	6	12.6
Total funding	**33.2**	**100**	**31.3**	**100**	**37.3**	**100**	**56.4**	**100**	**48.5**	**100**	**47.5**	**100**

Table 2C Funding - Neurosciences

	2011		2012		2013		2014		2015		2016	
Funding:	fte	%	fte	%	fte	%	fte	%	fte	%	fte	%
Direct funding	18.1	57.5	18.6	50.5	21.1	57.6	24.4	61.6	26.6	66.4	26.6	66.4
Research grants	7.1	22.6	10.9	29.6	10.4	28.5	9.7	24.5	7.5	18.6	6.3	15.8
Contract grants	6.3	20	7.2	19.5	4.2	11.4	4.8	12	6.2	15	6.9	17.3
Other	0	0	0.2	0.4	0.9	2.5	0.7	1.9	0	0	0.2	0.6
Total funding	**31.5**	**100**	**36.8**	**100**	**36.6**	**100**	**39.7**	**100**	**40.2**	**100**	**40.1**	**100**

Table 2D Funding – Molecular Life Sciences

	2011		2012		2013		2014		2015		2016	
Funding:	fte	%	fte	%	fte	%	fte	%	fte	%	fte	%
Direct funding	26.2	40.6	26.2	40.8	23.9	35.2	23.7	36.7	26.4	34.5	31.2	42.4
Research grants	13.8	21.5	15.3	23.8	15.3	22.6	15.3	23.7	20.1	26.2	17.3	23.5
Contract grants	16.9	26.3	16	24.9	19	28.2	15.9	24.6	20.2	26.3	18	24.4
Other	7.4	11.5	6.7	10.5	10.3	14	9.6	15	10	13.1	7.2	9.7
Total funding	**64.3**	**100**	**64.3**	**100**	**68.5**	**100**	**64.5**	**100**	**76.7**	**100**	**73.7**	**100**

Appendix C.2: Quantitative data – HIMS

Table 1 Research staff

	2011		2012		2013		2014		2015		2016	
	#	fte	#	fte	#	fte	#	fte	#	fte	#	fte
Scientific staff	39	15.4	40	15.5	40	14.9	34	14.9	35	15.5	40	16.6
Post-docs	29	25.8	28	23.0	29	24.3	28	23.0	41	34.6	47	39.6
PhD students	67	49.9	77	56.5	73	53.5	67	49.5	74	53.1	82	58.1
Total research staff	135	91.2	145	95.0	142	92.8	129	87.4	150	103.1	169	114.2
Support staff	23	21.2	23	21.0	21	19.7	22	19.8	21	19.3	21	19.9
Visiting fellows	10	9.4	11	11.0	13	12.4	8	7.6	10	8.5	7	6.2
Total support staff	9	5.7	10	6.5	7	4.9	9	6.5	8	6.1	7	5.9
Total staff	177	127.4	189	133.5	183	129.8	168	121.3	189	137.1	204	146.1

Table 2 Funding

	2011		2012		2013		2014		2015		2016	
Funding:	fte	%	fte	%	fte	%	fte	%	fte	%	fte	%
Direct funding	80	50	81	48	73	45	72	46	85	49	81	44
Research grants	45	28	49	29	54	33	50	32	58	33	72	39
Contract grants	37	23	39	23	37	22	34	22	32	18	31	17
Other	-	-	-	-	-	-	-	-	-	-	-	-
Total funding	**162**	**100**	**170**	**100**	**164**	**100**	**156**	**100**	**175**	**100**	**185**	**100**
Expenditure:	k€	%	k€	%	k€	%	k€	%	k€	%	k€	%
Personnel costs	6,906	48	6,352	46	6,647	45	6,646	49	7,165	50	7,669	50
Other Costs	7,602	52	7,361	54	8,044	55	6,986	51	7,290	50	7,799	50
Total expenditure	**14,508**	**100**	**13,713**	**100**	**14,691**	**100**	**13,632**	**100**	**14,455**	**100**	**15,468**	**100**

Table 3 Main categories of research output

	2011	2012	2013	2014	2015	2016
Refereed articles	180	165	160	150	221	220
Non-refereed articles	6	3	0	2	8	2
Books (chapters)	3	3	8	3	7	5
PhD theses	15	10	15	20	19	16
Conference papers	4	10	9	6	23	15
Professional publications	35	30	44	40	74	47
Patents	3	4	1	2	5	3
Publications aimed at the general public	3	3	0	1	7	2
Other	0	1	0	36	14	18
Total	**249**	**229**	**237**	**260**	**378**	**328**

Table 4 PhD candidates

				Success rates								Total					
Starting year	Enrolment			Graduated t ≤ 4		Graduated t ≤ 5		Graduated t ≤ 6		Graduated t ≤ 7		Graduated		Not yet finished		Discontinued	
	M	F	total	#	%	#	%	#	%	#	%	#	%	#	%	#	%
2008	6	9	**15**	0	-	4	27	8	54	12	80	12	80	0	-	3	20
2009	7	8	**15**	0	-	8	53	11	73	11	73	11	73	0	-	4	27
2010	10	5	**15**	0	-	6	40	13	87	13	87	13	87	1	7	1	7
2011	11	10	**21**	3	14	9	43	13	62	-	-	13	62	4	19	4	19
2012	14	7	**21**	1	5	12	57	-	-	-	-	12	57	8	38	1	5
Total	**48**	**39**	**87**	**4**	**5**	**39**	**45**	**-**	**-**	**-**	**-**	**61**	**70**	**13**	**15**	**13**	**15**

Appendix C.3: Quantitative data – AIMMS

Table 1 Research staff

	2011		2012		2013		2014		2015		2016	
	#	fte	#	fte	#	fte	#	fte	#	fte	#	fte
Scientific staff	46	20,3	51	21.1	55	24.3	58	25.8	50	21.1	51	22.5
Post-docs	49	33.8	53	30.7	51	29.2	52	38	52	30.5	64	41.8
PhD students	66	44.8	75	42.8	73	46.1	74	46.1	97	52.9	89	51.5
Total research staff	**161**	**112**	**179**	**94**	**179**	**100**	**184**	**110**	**199**	**104**	**204**	**116**
Support staff	19,5	15.6	20,5	16.4	19	15.2	18	14.4	20	16	13	10.4
Visiting fellows	12	6	12	6	16	8	17	8.5	26	13.5	30	15
Total support staff	**192,5**	**120.6**	**212**	**116.4**	**214**	**123.2**	**219**	**132.9**	**245**	**133.5**	**247**	**141.4**
Total staff	46	20,3	51	21.1	55	24.3	58	25.8	50	21.1	51	22.5

Table 2 Funding

	2011		2012		2013		2014		2015		2016	
Funding:	fte	%	fte	%	fte	%	fte	%	fte	%	fte	%
Direct funding	51.9	46.3	37.1	39.5	37.7	37.7	38.2	34.7	37.6	36.2	40.1	33.9
Research grants	29.4	26.3	29.1	31	30.5	30.5	40.1	36.5	35.7	34.3	48	40.6
Contract grants	30.4	27.1	27.5	29.3	31.2	31.2	31.5	28.6	31.1	29.9	30.2	25.5
Other	0	0	0	0	0	0	0	0	0	0	0	0
Total funding	**112**	**100**	**94**	**100**	**100**	**100**	**110**	**100**	**104**	**100**	**118**	**100**
Expenditure:	k€	%	k€	%	k€	%	k€	%	k€	%	k€	%
Personnel costs	12,100	72	11,000	65	12,400	72	12,400	66	11,600	69	12,300	70
Other Costs	4,700	28	5,9000	35	4,900	28	6,400	34	5,100	30	5,300	30
Total expenditure	**16,800**	**100**	**16,900**	**100**	**16,300**	**100**	**18,400**	**100**	**16,600**	**100**	**17,700**	**100**

Table 3 Main categories of research output

	2011	2012	2013	2014	2015	2016
Refereed articles	219	253	209	195	214	209
Non-refereed articles	6	7	6	11	5	8
Books	5	1	0	0	1	0
Book chapters	25	5	10	5	7	7
PhD theses	22	20	22	10	20	12
Conference papers	31	15	24	21	22	22
Professional publications	4	3	3	4	9	3
Patents	1	4	0	1	1	1
Publications aimed at the general public	3	3	2	3	1	2
Other	7	11	7	13	15	20
Total	**322**	**318**	**283**	**273**	**297**	**287**

Table 4 PhD candidates

				Success rates								Total					
Starting year	Enrolment			Graduated t ≤ 4		Graduated t ≤ 5		Graduated t ≤ 6		Graduated t ≤ 7		Graduated		Not yet finished		Discontinued	
	M	F	total	#	%	#	%	#	%	#	%	#	%	#	%	#	%
2007	9	6	**15**	2	13	4	27	9	53	11	73	11	73	0	0	4	27
2008	11	10	**21**	1	5	9	43	12	57	16	76	17	81	3	14	1	5
2009	10	9	**19**	2	11	5	26	7	37	13	68	16	84	3	16	0	0
2010	12	3	**15**	2	13	4	27	12	80	12	80	13	87	2	13	0	0
2011	16	8	**24**	2	8	4	17	9	38	10	42	--	--	14	58	0	0
2012	13	10	**23**	3	13	3	13	8	35	--	--	--	--	14	61	1	4
Total	**71**	**46**	**117**	**12**	**11**	**29**	**26**	**57**	**50**	**62**	**66**	**57**	**81**	**36**	**31**	**6**	**5**

Appendix C.4: Quantitative data – IBED

Table 1 Research staff

	2011		2012		2013		2014		2015		2016	
	#	fte	#	fte	#	fte	#	fte	#	fte	#	fte
Scientific staff	56	12.6	59	13.2	62	12.9	65	13.1	61	13.1	60	12.7
Post-docs	21	14.2	22	16.7	33	24.9	24	19.1	31	25.0	31	26.0
PhD students	52	28.3	56	40.9	51	37.5	51	36.6	68	36.0	70	31.8
Total research staff	**129**	**55.2**	**137**	**70.8**	**145**	**75.3**	**140**	**68.8**	**159**	**74.1**	**161**	**70.4**
Support staff	36	18.6	33	17.7	31	19.6	32	18.1	30	18.2	31	20.5
Visiting fellows	1	0.3	1	0.3	1	0.3	1	0.3	2	0.7	4	1.4
Total support staff	**166**	**73.7**	**171**	**88.5**	**178**	**94.9**	**173**	**86.9**	**191**	**92.2**	**196**	**90.9**
Total staff												

Table 2 Funding

	2011		2012		2013		2014		2015		2016	
Funding:	fte	%	fte	%	fte	%	fte	%	fte	%	fte	%
Direct funding	34.9	49	42.5	49	41.1	43	44.5	51	43.7	48	43.3	49
Research grants	17.2	20	20.2	20	23.9	22	17.1	17	22.4	21	18.6	18
Contract grants	12.1	14	15.3	15	20.3	20	18.2	19	18.1	18	20.4	21
Other	10.1	16	11.2	15	11.8	15	9.8	14	9.0	12	9.4	13
Total funding	**74.4**	**100**	**89.2**	**100**	**97.2**	**100**	**89.5**	**100**	**93.1**	**100**	**91.8**	**100**
Expenditure:	M€	%	M€	%	M€	%	M€	%	M€	%	M€	%
Personnel costs	5.6	52	6.2	52	6.6	50	6.3	50	6.6	51	6.7	50
Other Costs	5.2	48	5.7	48	6.6	50	6.3	50	6.3	49	6.7	50
Total expenditure	**10.8**	**100**	**11.9**	**100**	**13.2**	**100**	**12.6**	**100**	**12.9**	**100**	**13.4**	**100**

Table 3 Main categories of research output

	2011	2012	2013	2014	2015	2016
Refereed articles	178	201	248	249	203	219
Non-refereed articles	3	2	4	3	4	5
Books	0	2	2	1	1	1
Book chapters	12	20	13	26	10	11
PhD theses	10	15	12	12	15	21
Conference papers	24	32	21	23	18	8
Professional publications	20	13	11	9	3	9
Publications aimed at the general public	8	10	10	22	10	9
Other	44	44	50	44	13	30
Total	**299**	**339**	**371**	**389**	**277**	**313**

Table 4 PhD candidates

				Success rates								Total					
Starting year	Enrolment			Graduated t ≤ 4		Graduated t ≤ 5		Graduated t ≤ 6		Graduated t ≤ 7		Graduated		Not yet finished		Discontinued	
	M	F	total	#	%	#	%	#	%	#	%	#	%	#	%	#	%
2008	7	4	11	0	0	8	73	10	91	10	91	11	100	0	0	0	0
2009	5	5	10	1	10	4	40	6	60	7	70	7	70	1	10	2	20
2010	7	1	8	0	0	4	50	6	75	7	88	7	88	0	0	1	13
2011	7	7	14	1	7	6	43	10	71			10	71	2	14	2	14
2012	5	2	7	0	0	2	29					2	29	4	57	1	14
Total				**2**	**3**	**24**	**47**	**32**	**75**	**24**	**75**	**37**	**72**				

Appendix C.5: Quantitative data – DES

Table 1 Research staff

	2011		2012		2013		2014		2015		2016	
	#	fte	#	fte	#	fte	#	fte	#	fte	#	fte
Scientific staff	11	3.8	11	3.8	11	3.9	11	3.9	12	3.9	13	5.0
Post-docs	9	4.9	7	5.0	11	6.1	12	7.5	10	7.6	8	5.6
PhD students	22	11.0	10	11.3	18	11.9	22	12.5	19	11.9	15	9.4
Total research staff	42	19.7	38	20.1	40	21.9	45	23.9	41	23.4	36	20.0
Support staff	10	5.0	11	5.0	10	4.9	12	5.6	12	5.9	12	5.9
Total staff	52	24.7	49	25.1	50	26.7	57	29.5	53	29.3	48	25.9

Table 2 Funding

	2011		2012		2013		2014		2015		2016	
Funding:	fte	%	fte	%	fte	%	fte	%	fte	%	fte	%
Direct funding	5.7	26	5.7	25	5.8	24	5.9	20	8.2	28	5.3	22
Research grants	9.7	44	9.7	42	11.9	48	15.3	52	13.0	44	12.5	52
Contract grants	6.7	30	7.5	33	6.9	28	8.4	28	8.1	28	6.3	26
Total funding	**22.1**	**100**	**22.9**	**100**	**24.5**	**100**	**29.6**	**100**	**29.3**	**100**	**24.1**	**100**
Expenditure:	k€	%	k€	%	k€	%	k€	%	k€	%	k€	%
Personnel costs	2,798	82	2,395	80	2,670	90	3,037	83	3,123	84	3,074	83
Other Costs	619	18	604	20	305	10	614	17	600	16	648	17
Total expenditure	**3,417**	**100**	**2,999**	**100**	**2,975**	**100**	**3,651**	**100**	**3,724**	**100**	**3,722**	**100**

Table 3 Main categories of research output

	2011	2012	2013	2014	2015	2016
Refereed articles	77	113	96	138	132	94
Non-refereed articles	2	2	2	1	1	2
Books	1	2	1		1	
Book chapters	2	2	2	6	2	4
PhD theses	7	11	9	5	6	8
Conference papers		1				
Professional publications	9	3	4	1	3	8
Publications aimed at the general public				2	2	3
Other	10	9	7	7	8	5
Total	108	143	121	160	155	124

Table 4 PhD candidates

	Enrolment			Success rates (graduations. cumulative)											
Starting year	Enrolment (male/ female)		Total (M+F)	Graduated in year 4 or earlier		Graduated in year 5 or earlier		Graduated in year 6 or earlier		Graduated in year 7 or earlier		Not yet finished		Discontinued	
	#	#		#	%	#	%	#	%	#	%	#	%	#	%
2007	3	4	7	0	0	4	57	7	100						
2008	4	3	7	1	14	7	100								
2009	1	0	1	0	0	1	100								
2010	1	6	7	3	43	5	71	6	86			1	14		
2011	5	4	9	1	11	4	44	8	89					1	11
2012	2	2	4	-	-	-	-	-	-			4	100		
Total	**16**	**19**	**35**	**5**	**14**	**21**	**60**	**29**	**83**			**5**	**14**	**1**	**3**

Appendix D: Explanation of the SEP scores

Category	Meaning	Research quality	Relevance to society	Viability
1	World leading/ excellent	The research unit has been shown to be one of the few most influential research groups in the world in its particular field	The research unit makes an outstanding contribution to society	The research unit is excellently equipped for the future
2	Very good	The research unit conducts very good. internationally recognised research	The research unit makes a very good contribution to society	The research unit is very well equipped for the future
3	Good	The research unit conducts good research	The research unit makes a good contribution to society	The research unit makes responsible strategic decisions and is therefore well equipped for the future
4	Unsatisfactory	The research unit does not achieve satisfactory results in its field	The research unit does not make a satisfactory contribution to society	The research unit is not adequately equipped for the future