

# Assessment of Research Quality

**Netherlands Institute for Neuroscience (KNAW-NIN)**

**2012-2017**



**May 29 2018**

**Cover image:** Three-dimensionally reconstructed layer 5 pyramidal neuron of the rat neocortex with computer-generated surface representation. Blue; beta-IV spectrin, marking the spatial origin of the spike.  
*Dr M. Hamada, Axonal Signalling group, Netherlands Institute for Neuroscience.*

## Contents

	<b>Page</b>
<b>1. Introduction</b>	
1.1 Background	<b>4</b>
1.2 Members of the assessment committee	<b>4</b>
1.3 Procedures followed	<b>4</b>
1.4 Research unit under assessment: Netherlands Institute for Neuroscience	<b>6</b>
<b>2. Assessment of NIN research</b>	
2.1 Summary of the NIN's strategy and targets	<b>10</b>
2.2 Research quality	<b>11</b>
2.3 Relevance to society	<b>11</b>
2.4 Viability	<b>12</b>
2.5 Summary in numerical scores	<b>14</b>
<b>3. Assessment of PhD programme, research integrity policy, and diversity policy</b>	
3.1 Quality and organisation of PhD programme	<b>15</b>
3.2 Research integrity policy	<b>16</b>
3.3 Diversity and inclusiveness policy	<b>16</b>
<b>4. Recommendations</b>	
4.1 Quality of the research unit	<b>18</b>
4.2 PhD programme	<b>21</b>
4.3 Research integrity	<b>21</b>
4.4 Diversity and inclusiveness	<b>21</b>
<b>Appendices</b>	
1. Short CVs of the members of the assessment committee	<b>22</b>
2. Site visit programme	<b>25</b>
3. Quantitative data on NIN's composition and financing	<b>27</b>
4. Explanation of the categories utilised	<b>28</b>

## 1. Introduction

### 1.1 Background

This report describes the assessment of the quality and relevance of research conducted at the Netherlands Institute for Neuroscience (NIN) in the period 2012-2017. The assessment was performed by an external evaluation committee using the Standard Evaluation Protocol (SEP) 2015-2021. The SEP was drawn up and adopted by the Association of Universities in the Netherlands (VSNU), the Netherlands Organisation for Scientific Research (NWO), and the Royal Netherlands Academy of Arts and Sciences (KNAW). All research conducted at Dutch universities, University Medical Centres (UMCs), and NWO or KNAW institutes is assessed once every six years in accordance with the SEP. The primary aim of SEP assessments is to evaluate the quality and relevance of scientific research and to suggest improvements where necessary. SEP assessments focus on the strategic choices and future prospects of research groups.

Target groups that are served by this assessment include

- **The NIN's researchers** need to know how the quality of the NIN research, its societal relevance, and its strategy are perceived by independent experts and how these elements can be improved.
- **The Board of the KNAW** wishes to track the impact of its research policy.
- **The Dutch government** wants to know the outcomes of assessments in connection with the institution's accountability for expenditure and its own efforts to support an outstanding research system.
- **Society and the private sector** seek to solve a variety of problems using the knowledge that the NIN research delivers.

### 1.2 Members of the assessment committee

The Board of the KNAW has appointed as members of the assessment committee:

- Professor Peter Hagoort, *chair* (Max Planck Institute for Psycholinguistics, the Netherlands),
- Professor Thomas Mrsic Flogel (University College London, UK),
- Professor Kalanit Grill-Spector (Stanford University, USA),
- Professor Peter Strick (University of Pittsburgh, USA),
- Professor Bill Wisden (Imperial College London, UK).

Dr Linda van den Berg (Washoe Life Science Communications) served as the secretary to the assessment committee. Short CVs of the committee members are provided in Appendix 1.

### 1.3 Procedures followed

The assessment committee evaluated the NIN research based on the institute's self-assessment report (which followed the guidelines provided by the SEP) and interviews with a large number of NIN representatives during a site visit in March 2018. The site visit programme is listed in Appendix 2.

Additional reference materials included the previous peer review report, the most recent mid-term assessment report, and several policy documents related to research data management and research integrity. As it formed its judgement, the committee took into account international trends and developments in science and society. In addition, the committee bore in mind the NIN's strategy in formulating its recommendations.

#### *Qualitative and quantitative assessment of the NIN research*

The assessment committee made a qualitative and quantitative judgement of the NIN based on three assessment criteria:

- *research quality*, i.e., contribution to scientific knowledge and scale of research results (scientific publications, instruments and infrastructure produced, and other contributions to science),
- *relevance to society*, i.e., quality, scale, and relevance of contributions (advisory reports for policy, contributions to public debates, etc.) targeting groups that the NIN has itself designated as target groups (the general public, patients & patient organisations, researchers, the national & European government, and industry),
- *viability*, i.e., the strategy that the NIN intends to pursue in the future and the extent to which it can meet its targets in research and society during this period, the governance and leadership skills of NIN's management.

In addition to the written documents and the presentations of the group leaders during the site visit, the committee based its evaluation on visits to the research facilities and on interactions in a series of separate sessions with representatives of the PhDs, the postdocs, structural and honorary group leaders, and the directorate. Furthermore, a poster session gave additional insights into the ongoing research.

#### *Assessment of the NIN's PhD programme*

The assessment committee also considered the supervision and instruction of PhD candidates at the NIN. During the site visit, the committee interviewed eight PhD students who were in varying stages of completing their PhD. This delegation included two PhD student representatives. The committee assumed that these individuals provided opinions that are representative of the group at large. The following topics were considered:

- institutional context of the PhD programme,
- programme content and structure,
- supervision and the effectiveness of programme plans and supervision plans,
- quality assurance,
- guidance of PhD candidates to the job market,
- duration, success rate, exit numbers, and career prospects.

#### *Assessment of the NIN's research integrity and diversity policy*

The committee also considered the NIN's policy on research integrity and the way in which violations of such integrity are prevented. The committee was interested in how the NIN deals with research data, data management, and scientific integrity, and the extent to which a critical pursuit of science occurs at the NIN. In addition, the committee evaluated the NIN's efforts to ensure a diverse staff composition in terms of gender and ethnicity.

#### 1.4 Research unit under assessment: Netherlands Institute for Neuroscience

The Netherlands Institute for Neuroscience (NIN) is one of the 15 research institutes of the KNAW. It was established in 2005 by a merger between the Netherlands Institute for Brain Research and the Netherlands Ophthalmic Research Institute. The NIN performs fundamental research into the functioning of the brain, seeking to understand how neural circuits enable perception and action. Its research bridges studies at the molecular, cellular, and circuit level, up to the systems, behavioural, and social level. At the time of the site visit (March 2018), the NIN consisted of 11 structural research groups (that receive the bulk of their financial support from the NIN) and 6 honorary research groups (that receive limited support from the NIN and also have a research group in another organisation).

##### *Structural groups*

- Dr Valeria Gazzola's **Mechanism of Social Behaviour** group studies the neural substrates of empathy. They investigate the link between vicarious activity, associative learning processes, and prosocial behaviour by combining neuroimaging and neurostimulation techniques.
- Dr Alexander Heimel's **Cortical Structure & Function** group investigates how the cerebral cortex processes information and transforms vision into action, using the mouse visual system as a model.
- Professor Maarten Kamermans' **Retinal Signal Processing** group seeks to quantitatively understand the neural processing of visual stimuli by the retina and relate this to the visual behaviour of the whole animal.
- Professor Christian Keyzers' **Comparative Social Neuroscience** group combines rodent and human data to obtain mechanistic and causal insight into how the brain links sensory input and social behaviour.
- Professor Maarten Kole's **Axonal Signaling** group seeks to functionally identify neuron and glia interactions in subcellular domains of myelinated axons, aiming to understand how the myelin sheath impacts information processing in cortical circuits.
- Professor Christiaan Levelt's **Molecular Visual Plasticity** group studies the regulation of cortical plasticity during development and in adulthood, in health and disease, with a special focus on inhibitory innervation.
- Dr Christian Lohmann's **Synapse and Network Development** group aims to identify fundamental mechanisms that prepare the brain for vision or underlie neurodevelopmental disorders. They focus on how neuronal activity, calcium signalling, and molecular pathways fine-tune synaptic connections in the mouse visual cortex.
- Professor Pieter Roelfsema's **Vision and Cognition** group studies the interactions between different brain areas for vision. They investigate the role of feedforward and feedback processing for vision, visuomotor transformations, and learning.
- Professor Eus van Someren's **Sleep and Cognition** group seeks to understand the vulnerability to, development of, and brain mechanisms of insomnia, and its association with emotion and cognition.
- Professor Joost Verhaagen's **Regeneration of sensorimotor systems** group studies the neuron-intrinsic and extrinsic molecular mechanisms that underlie regenerative failure. They aim to develop ways to promote repair of injured nervous systems.
- Professor Chris de Zeeuw's **Cerebellar Coordination and Cognition** group investigates the role of the cerebellum in sensorimotor integration and cognition. They aim to unravel how cerebellar

processing contributes to motor learning of relatively simple reflex tasks as well as complex preparatory tasks.

#### *Honorary groups*

- Professor Birte Forstmann's **Integrative Model-based Cognitive Neuroscience** group seeks to understand the human subcortex with an integrative model-based neuroscience approach. They study the role of subcortical nuclei in implementing motor, limbic, and cognitive processes.
- Dr Inge Huitinga's **Neuroimmunology** group focuses on the molecular and cellular factors underlying multiple sclerosis. They particularly focus on the role of microglia and the effects of steroids and scavenger receptors on microglia activation and MS lesion development.
- Professor Andries Kalsbeek's **Hypothalamic Integration Mechanisms** group studies hypothalamic systems that control hormone release, energy metabolism, and the sleep-wake rhythm. To unravel the mechanisms of hypothalamic integration, they focus on the hypothalamic biological clock and how it enforces molecular rhythms onto daily physiology and behaviour.
- Professor Susanne La Fleur's **Metabolism and Reward** group aims to understand how rewarding (food) stimuli affect cortico-limbic-hypothalamic circuitry and how nutrient-induced neural changes influence feeding behaviour and glucose metabolism.
- Professor Dick Swaab's **Neuropsychiatric Disorders** group investigates the neurobiological background and possible therapeutic targets of neuropsychiatric disorders including Alzheimer's disease, depression, and narcolepsy. They use post-mortem human brain material and animal models in their studies.
- The **Neuromodulation and Behaviour** group of Dr Ingo Willuhn, in collaboration with Professor Damiaan Denys, studies the neurobiology of habitual and compulsive behaviour, focusing on basal ganglia interactions with cortex and the modulatory roles of dopamine and serotonin in these structures.

#### *Organisation*

The organisational structure of the institute is depicted in Figure 1 on page 9 of this report. During the evaluation period, the Board of the NIN consisted of Professor Pieter Roelfsema (Director), Professor Chris de Zeeuw (Vice Director), and Dr Ronald van der Neut (Managing Director). The Board is advised by an external Scientific Advisory Board consisting of six prominent scientists from different research institutions. The fundamental research unit of the NIN consists of the 17 above-mentioned research groups. Support departments include a financial administration, human resource management, IT facilities, general lab facilities, animal facilities, secretarial support, communication, and the mechatronics department (support for mechanical and electrical projects).

#### *Staff and funding*

In 2017, the NIN research staff represented 87 full-time equivalents (FTE), consisting of 12 FTE senior staff members (professor, associate professor, or assistant professor level), 36 FTE non-tenured staff members (postdoc level), and 39 FTE PhD students. In addition, the institute harboured 70 FTE in support staff members and 8 visiting fellows. Further details about the NIN staff are provided in Table 1 of Appendix 3. Approximately 55% of the NIN funding is direct funding by the government (through the KNAW, including housing and energy costs). The rest of the budget is acquired through grants. Details about NIN's funding are provided in Table 2 of Appendix 3.

### *Facilities*

To support its human brain research, the NIN has founded the Netherlands Brain Bank and co-founded the Spinoza Centre for Neuroimaging. The NIN also harbours a human sleep laboratory, the Netherlands Sleep Register, and advanced facilities to perform single-cell recordings in patients implanted with depth electrodes as part of their epilepsy treatment. To support its animal studies, the NIN harbours a primate brain bank, animal facilities (for research with rhesus monkeys, rats, mice, and zebrafish), a motion lab, and high-end equipment to record the activity of neural circuits in behaving animals (photon microscopes, electrophysiological setups, facilities for chemogenetics and optogenetics, miniscopes).

### *Embedding and collaborations*

The NIN has made long-term investments in expertise and facilities to study brain circuits. As a result, the institute has obtained a hub function in the Netherlands when it comes to fundamental research into circuit function. The NIN collaborates intensively with several Dutch universities and UMCs, in particular those in Amsterdam: the Academic Medical Center (AMC, on whose campus the NIN is housed), University of Amsterdam (UvA), VU University Medical Center (VUmc), and VU University (VU). Strategic collaborations outside Amsterdam include alliances with Erasmus MC (Rotterdam), Utrecht University, and the University of Leiden. A number of these collaborations are formalised through chairs: fourteen NIN group leaders hold chairs at universities or UMCs. In addition to these national alliances, the NIN research groups collaborate with research groups around the world.



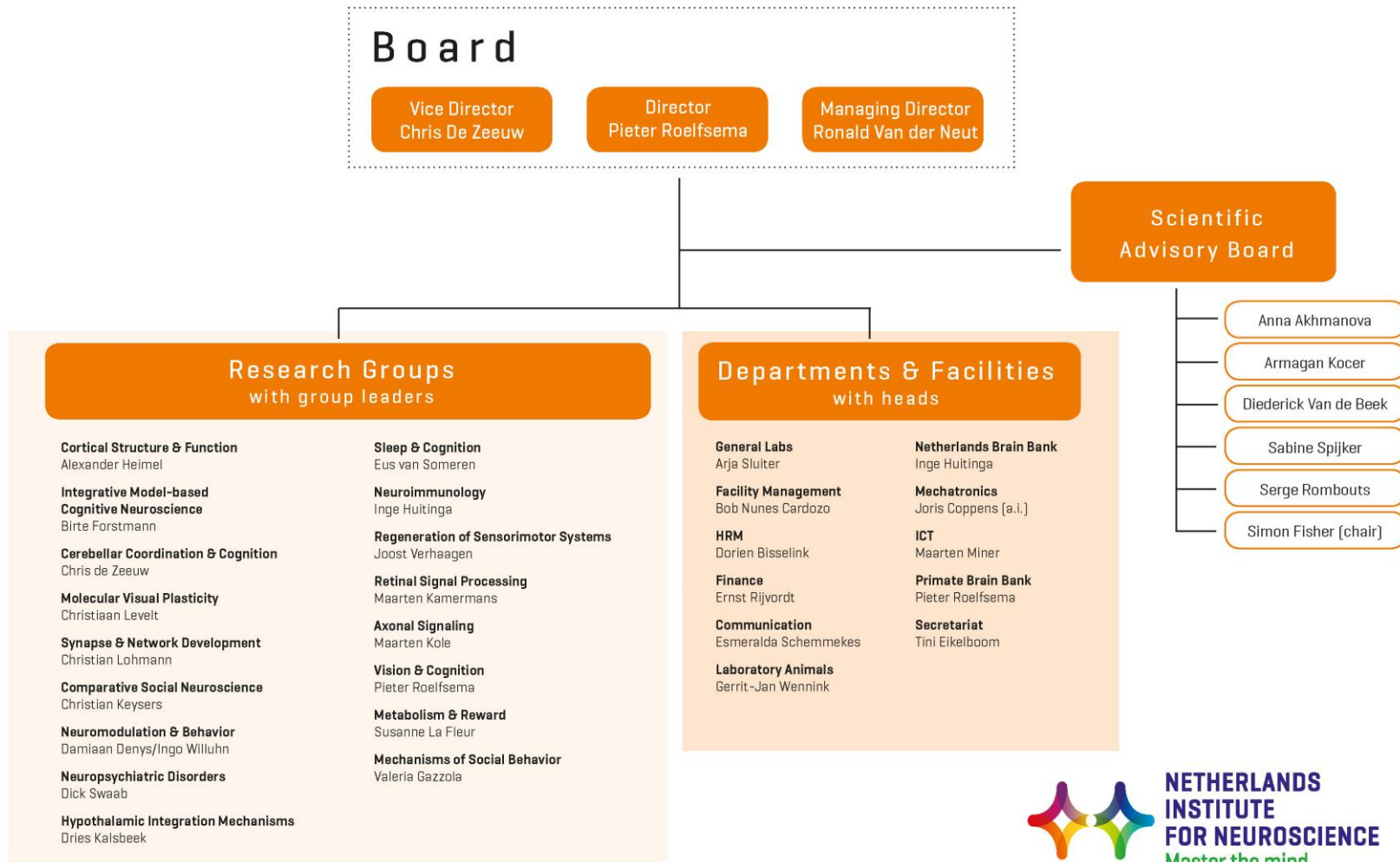


Figure 1: Organisational structure of the NIN in March 2018

## 2. Assessment of NIN research

### 2.1 Summary of the NIN's strategy and targets

The NIN's mission is to explain **how neural circuits enable us to perceive the world and act upon it**. The majority of NIN researchers work on topics related to this mission, using different experimental approaches. The general strategy of the Board is to create an attractive climate for fundamental science by bringing together top researchers in a flat organisation, where principal investigators can influence major decisions and are provided with state-of-the-art facilities and resources. Internal collaborations are actively encouraged and have resulted in joint publications, joint grants, and exchange of technological expertise between the research groups.

The research groups are lean, consisting of 5.5 scientists on average. The Board allocates a lump sum of approximately EUR 139k per year to each of the 11 structural research groups and a somewhat larger contribution to the directorial research groups of Roelfsema and De Zeeuw. Group leaders are expected to triple this lump sum by acquiring external grants. They are responsible for managing their group's financial budget, i.e., they are free to spend it as they like. The group leaders have limited teaching obligations and are strongly involved in all research projects within their groups. They directly supervise PhD students and postdocs to ensure high quality training of young scientists. The institute organises a weekly neuroscience symposium where the researchers present their latest findings. In addition, there are monthly meetings where group leaders exchange new results, methods, and techniques.

The NIN has attracted 7 new groups during the review period. To narrow the institute's focus and to balance the expenses with the available budget, three research groups have left the NIN during the review period. The research topics of the 17 remaining groups form a more coherent research programme that encourages collaboration, expertise exchange, and equipment sharing. The NIN has invested substantially in methods for imaging and electrophysiology of large groups of neurons. To further ensure a healthy financial future, the institute has introduced a 10% overhead on grants.

#### *Strategy for the period 2018-2023*

Important targets for the next six years are:

- It is essential that the NIN improves its housing situation.
- The institute will facilitate the continuation of the Spinoza Centre for Neuroimaging after 2019. The Spinoza Centre opened in 2015 and provides access to 3T and 7T MRI scanning facilities. The NIN has invested substantially in this collaboration between the UvA, VU, VUmc, AMC, and the KNAW.
- The NIN expects to be able to innovate its research programme as a result of the imminent retirement of a number of principal investigators (two in 2023 and two in 2027) and the recent transfer of one research group (of Professor Kessels) to the UvA.

## 2.2 Research quality

The committee is impressed by the NIN's overall research quality, which is **excellent**. The structural research groups in particular perform world-class innovative research that contributes to the institute's mission to explain how circuits of neurons enable us to see the world and act upon it.

The institute is home to top scientists that have been awarded prestigious awards and grants. The staff holds leading positions in international advisory boards, research networks, professional organisations, and evaluation panels. NIN researchers have published many high impact scientific papers over the review period, in journals such as *Neuron*, *Nature*, *Nature* brand journals, and *Science*. A bibliographic analysis of the Centre for Science and Technology Studies of Leiden University revealed that the NIN's mean normalised citation score was 1.6 in the period 2009-2015, meaning that the impact of the publications of the current scientific staff is 1.6-fold the world average. In addition, the analysis revealed that the NIN had a remarkably high visibility level (i.e., share in the top 10% most highly cited publications worldwide) of nearly two times world average. (These figures are based on the bibliometric analysis of 1363 publications with at least one author affiliated to the NIN at the time of publication. The publications appeared in the period 2009-2015 and citations were counted up to 2016.) In conclusion, euro for euro, the NIN achieves significantly more than its competitors in the field.

The NIN harbours world-class research facilities that support the NIN's own outstanding research, but are also available to collaborators, thus further contributing to the advancement of science. For instance, the **Netherlands Brain Bank**, headed by Dr Huitinga, holds tissue samples of more than 4000 autopsies of donors with a variety of neurological or psychiatric disorders and non-demented controls. This provides scientists with a unique opportunity to combine clinical, genetic, gene expression, and neuropathological data. The Netherlands Brain Bank delivers human brain material to 160 academic and 57 for-profit researchers worldwide. The NIN's **non-human primate facility**, headed by Professor Roelfsema, is the only facility for neuroscience research with non-human primates in the Netherlands. The **Netherlands Sleep Registry**, developed by Professor van Someren, constitutes a unique tool for sleep research. It is also used to communicate the progress in sleep research to the general public and acts as a 'utilization of scientific knowledge' platform to other institutions, including the Netherlands Brain Foundation and the Global Council on Brain Health. The NIN has also taken the lead in Europe in developing ultralight miniature fluorescence microscopes (miniscopes) to measure brain activity in free-roaming animals.

The quality and mutual synergy is especially impressive in the structural groups that are closest to the institute's core mission (e.g. de Zeeuw, Roelfsema, Levelt, Lohmann).

## 2.3 Relevance to society

The NIN's research is **highly relevant** to society, in particular for the general public, patients and patient organisations, researchers at other institutes, the Dutch and European government, and industry.

### *General public*

The institute spends an impressive amount of effort on reaching out to the general public to inspire them with the fundamental knowledge it generates. The NIN research has been covered in many TV and radio appearances, newspaper and magazine articles, online publications, and public lectures. In addition, NIN researchers have published case study books and they frequently participate in public outreach events.

### *Patients and patient organisations*

The NIN's fundamental research will lay the foundations for developing treatments and cures for people whose lives are impacted by brain diseases such as visual impairments, Alzheimer's disease, epilepsy, insomnia, depression, addiction, and multiple sclerosis. The committee was particularly charmed by the NESTOR project, which aims to develop a neural implant to give blind individuals rudimentary vision. Another innovative project uses optogenetic stimulation of cerebellar nuclei for the treatment of epilepsy. This project is now proceeding as a clinical trial in epilepsy patients in the Sophia Children's Hospital in Rotterdam (Erasmus MC).

### *Researchers*

The basic research findings of the NIN constitute a great resource for translational researchers and collaborations with UMCs and universities ensure that the NIN's findings are translated into practical applications. The institute also trains the next generation of fundamental neuroscientists, many of which move to other research organisations, applying the knowledge and skills that they acquired at the NIN.

### *Dutch and European government*

During the review period, NIN researchers have advised the Dutch government on health problems related to shift work, animal use, and sleep & brain health. In addition, they have advised national funding agencies, for instance to define topics to be addressed in the Dutch National Research Agenda and its research programme NeuroLabNL. They have advised the European government, amongst other things increasing awareness for brain science and creating a Code of Conduct for European brain banks. At the international level, NIN scientists have contributed to the Global Council of Brain Health and CAR committee on animals in neuroscience.

### *Industry*

Through its collaborations with industry, the NIN research fuels the economy with innovative methods and instruments. For instance, they developed new holders for head fixation in rodents in collaboration with industrial partners such as Blackrock Microsystems and Neurotar, and they designed a 3D printing of electrical recording implants and a 1000 channel connector for use in non-human primates. The NIN also coordinates the consortium NeuroTech-NL within the Top Sectors Life Science & Health and High-Tech Systems & Materials. This consortium aims to generate new invasive brain devices for patients.

## **2.4 Viability**

Overall, the committee rates the NIN's viability as **good**. The committee praises the vision and strategy of the NIN management, but has identified a number of substantial threats to the long-term

sustainability of the institute. The committee's observations are detailed below; recommendations on how to deal with the committee's concerns are provided in Chapter 4.

NIN researchers have performed world-leading research in the period 2012-2017 and they are expected to continue doing so. Most group leaders have managed to triple their lump sum budget with external grants, which is a mark of their excellence and future potential. The NIN's research programme fits into the National Research Agenda, which will guide national research investments in the next years. Professors Roelfsema and De Zeeuw are excellent leaders that are highly appreciated by the other principal investigators. Roelfsema and De Zeeuw create an atmosphere that fosters innovative, collaborative science and they have a clear vision of the institute's future. The lump sum system provides the research group leaders with substantial freedom to determine their own strategy and pursue ambitious projects. The group leaders feel free to discuss concerns and the Board is open to their suggestions.

The NIN has a clear added value in the Dutch and international landscape. One major function of the NIN is to perform research that is independent of the research agendas of the Dutch universities and UMCs, where clinical interests often determine the research agenda. Indeed, the NIN's fundamental research has resulted in major breakthroughs in our understanding of how circuits of neurons enable us to perceive and behave. The focus on neural circuits and the state-of-the-art facilities are unique assets. The institute works on projects of the utmost societal relevance, as was detailed in paragraph 2.3. The combination of the Spinoza Centre, the Dutch Brain Bank, and the non-human primate facility offers unparalleled opportunities to answer the most fascinating research questions. Crucially, the NIN currently is the only place in the Netherlands, and one of the few remaining places in Europe, where non-human primate neuroscience can be performed. The committee is convinced that if NIN continues its mission, it is on an excellent track to become a unique, outstanding institute with high international recognition.

However, the committee has also identified serious threats to the long-term sustainability of the NIN:

- **Housing situation:** The NIN is housed on the AMC campus and the AMC is the institute's landlord. The building is in a relatively poor state of maintenance, does not encourage collaboration, does not have a prominent entrance, and lacks the architectural identity it deserves. In addition, construction work is usually severely delayed as a result of the slow and complex approval process of the AMC. The AMC has recently announced an imminent two-year renovation of the IWO building, in which the majority of the NIN's animal research takes place. The NIN anticipates that this will severely impair the breeding, holding, and training of rodents, dramatically affecting the experimental work. This recent development has made the institute's housing situation a serious, acute problem that urgently needs to be resolved, and is the most substantial threat to its viability.
- **Visibility:** Although the institute has made substantial progress in sharpening its profile and has invested substantially in external communication, its international visibility is still rather low. The committee thinks that improving the visibility and unique 'branding' is crucial for the long-term viability of the NIN.
- **Non-human primate research:** The rhesus monkey research at the NIN is unique, but it has not always been fully supported by KNAW leadership and the AMC in the past. Moreover, societal

support for non-human primate research is not unanimous. To clearly disseminate the importance of this type of research, institutional support from KNAW should be firm.

- **Management:** Although the scientific leadership of the institute is inspirational, the operational management should be substantially improved. For instance, the committee learned that some of the support departments are not sufficiently service-oriented and the internal communication and transparency are not optimal. This decreases the efficiency of the institute.
- **Big data infrastructure:** The NIN seems to lack a proper IT support infrastructure to facilitate data-intensive research, such as computing power, big data storage facilities, and computational expertise. At present, the research groups individually invest in such resources, with some group leaders spending a substantial proportion of their lump sum budget on computing power and some postdocs spending a large amount of their time on data stewardship. Without additional core budget, it is difficult to foresee how this suboptimal situation for a crucial resource can be resolved.

## 2.5 Summary in numerical scores

In line with the qualitative judgements of the NIN research described above, the committee has assigned the NIN to a discrete category for each of the assessment criteria. The four possible categories are excellent (=1), very good (=2), good (=3), and unsatisfactory (=4). The scores are explained in more detail in Appendix 4 of this report.

	<b>Research quality</b>	<b>Relevance to society</b>	<b>Viability</b>
<b>Assessment of the NIN research 2012-2017</b>	1	1	3

### **3. Assessment of PhD programme, research integrity policy, and diversity policy**

#### **3.1 Quality and organisation of the NIN's PhD programme**

##### *Institutional context of the PhD programme*

At the time of the site visit, the NIN was home to approximately 40 PhD students (39.1 FTE, see Appendix 3). The majority of these were enrolled in the Graduate School Neurosciences Amsterdam Rotterdam (ONWAR), which is a joint graduate school of the universities of Amsterdam (VU, VUmc, UvA, AMC), Rotterdam (Erasmus MC), and the NIN. The committee met eight PhD students, including two PhD student representatives. The PhD representatives form a bridge between the students and the Board, organising meetings for the PhD students and joining Board meetings once or twice per year. In addition, the Board has annual plenary meetings with PhD students and postdocs. The interaction between the PhD students seems to have improved since the last peer review as a result of more intensive collaborations between their supervisors. Overall, the committee has the impression that the PhD students at the NIN are satisfied with their training programme.

##### *Quality assurance and supervision*

PhD students and their supervisors create an education plan at the start of a PhD track, summarising the goals of the research project and the plans for education and training. Recently, the NIN has appointed a second supervisor for each PhD student. This person should monitor the student's progress through an annual meeting with the PhD student and supervisor. At the time of the site visit, this measure had yet not been installed in all research groups. However, the new head of HRM Dorien Bisselink, who seems to be highly valued by the PhD students and other employees alike, plans to actively track the enforcement of this protocol. In addition, there is a tutor system within ONWAR, which functions as a back-up for the NIN-based supervision teams in case of problems between supervisor and PhD student.

##### *Programme content and structure*

The ONWAR training programme consists of 405 hours of courses and events, spread over four years. ONWAR offers thematic neuroscience courses as well as general courses (e.g., statistics). The course programme is continuously improved using feedback from the students. In addition, questionnaires are used to gauge the need for new courses. The students can also follow courses at other graduate schools and organisations. Recurrent events include the Swammerdam lectures series and the annual ONWAR PhD student retreat. The latter is organised by the students themselves, helping them to build their own network and acquire organisational skills.

##### *Success rate, duration, and exit numbers*

The committee learned that many PhD students at the NIN take more than five years to graduate. The institute provided the committee with several explanations for this long duration, including ambitious research projects and the pressure exerted by the universities to produce both a large number of papers and high impact papers. The NIN is now implementing a stricter control on the progress of PhD students to enable early detection and intervention in case of imminent delays. In addition, there are ongoing discussions with the universities to reach a better balance between

quality and quantity requirements. The students themselves do not seem to be too worried about the long average duration.

#### *Guidance of PhD candidates to the job market and career prospects*

The NIN, ONWAR, and KNAW regularly organise career events for PhD students to encourage them to think about career prospects well before their graduation. These events introduce the students to relevant companies and academic institutions. The career prospects of NIN PhD graduates seem to be good, with the majority of students rapidly finding employment after graduation. Of all NIN PhD students who graduated between 2011 and 2017, 59% stayed in science. The others went into medicine, industry, and government.

### **3.2 Research integrity policy**

During the site visit, the assessment committee discussed the NIN's research integrity policy with the Board and several research group leaders, postdocs, and PhD students. The NIN has adopted the Netherlands Code of Conduct on Academic Practice as issued by the VSNU, which addresses topics such as honesty and scrupulousness, reliability, verifiability, impartiality, independence, and responsibility. In addition, the institute has adopted the 2005 Advisory Memorandum on Scientific Integrity of the KNAW. The KNAW has a complaint procedure for employees with questions related to scientific integrity. The NIN fosters an open research culture with multiple checks and balances. Early experimental results are shared within the research groups and data that are ready for publication are usually presented at the institute's weekly neuroscience symposium. The institute trains its young researchers to understand dilemmas and temptations regarding research integrity. In addition, it organises events on research integrity, e.g., a presentation by Frans van Lunteren in February 2018.

Although appropriate measures to ensure research integrity are theoretically in place at the NIN, it is the committee's impression that some NIN researchers are insufficiently aware of the procedures and measures. In addition, there is no central confidential advisor within the NIN that people may approach in case of suspected violations of research integrity. This will be discussed more thoroughly in chapter 4.

The committee learned that the NIN has adopted a data protocol. As of 1 January 2018, each NIN researcher needs to comply with this protocol. It describes the responsibilities of NIN researchers in storing and maintaining datasets according to FAIR Data Principles (Findable, Accessible, Interoperable, Reusable). In addition, it dictates that each project has a data management plan. The NIN encourages its researchers to publish raw data. The institute has appointed a data steward that will look into a novel approach for storing and organising data to facilitate data sharing. The NIN aims for 100% of its publications to be open access in 2019 (gold or green road).

### **3.3 Diversity and inclusiveness policy**

The committee learned that the NIN aspires to increase the diversity among its staff, especially at the group leader level. At present, 71% of the postdocs and PhD students at the NIN have a Dutch nationality, 12% have a non-Dutch European nationality, and 18% have a non-European nationality.



All group leaders have a Western European nationality. During the review period, several measures have been taken to increase the institute's ethnic diversity. The NIN actively fosters an environment that is inviting to scientists from abroad, e.g., all written communication is in English and Dutch, most of the meetings are in English, a housing officer helps staff from abroad to find housing in Amsterdam, monthly introductory meetings familiarise newcomers with the institute's rules, and new people are introduced to the NIN community during the weekly NIN symposia.

The institute considers balancing the gender of its staff a priority. At present, approximately 50% of the postdocs and PhD students are female, but only 25% of the group leaders are female. Only one of the *structural* group leaders is a woman. A new position will be advertised soon, encouraging female scientists to apply. This should bring the proportion of female principal investigators to 28%. The institute has organised workshops about bias awareness and bias management in past few years and plans to monitor developments on how to promote diversity.

## 4. Recommendations

### 4.1 Quality of the research unit

#### 1) *Housing situation*

The committee is alarmed that the housing problem that was already signalled by the previous peer review committee has not been resolved. The KNAW assists the NIN in exploring scenarios to improve the housing situation, ranging from extensive renovation to a new building. However, this process is slow and with the imminent renovation of the IWO building, the **housing situation has now become a problem of the highest priority**. The committee is concerned about the unresponsiveness or very slow actions of the landlord (AMC), that clearly does not have the NIN high on the priority list. The committee suggests the following measures:

- A new, architecturally attractive building at an accessible, central location dedicated to the NIN is the preferred solution, as this will help increase the visibility of the institute (see also recommendation 2 below). We refer to the NIOO-KNAW institute in Wageningen as a good example.
- Although housing in the Amsterdam region is the solution of first choice, the KNAW and the NIN are advised to investigate other options as well. These include seriously exploring which other Dutch universities might be interested in housing the NIN on their campus under more optimal conditions than the Amsterdam universities seem to be able to provide in the foreseeable future.
- The complexity of solving the housing situation is further increased by the fact that the NIN director is not directly involved in the negotiations with the relevant stakeholders (UMCs, VU, etc.), but only indirectly through the KNAW headquarters. It is advised that the NIN director gets a more direct mandate for investigating possible solutions.
- In general, the committee is of the opinion that decisions about the housing situation are needed **immediately** to guarantee the viability of the institute in the foreseeable future.

#### 2) *Mission and visibility*

The committee considers a clear focus and identity of importance for the long-term viability of the NIN. During the evaluation period, the institute has improved its focus and cohesiveness by reducing the number of research groups. In addition, it has reformulated its mission: 'to explain how circuits of neurons enable us to see the world and act upon it'. Indeed, the strongest research groups within the NIN are those whose research aligns closely with this mission. The committee encourages the Board of the NIN to further improve the focus of the NIN along this line and

- ensure that new recruitments will seamlessly fit into the mission statement,
- review the position of the honorary groups in light of the mission statement,
- possibly rephrase the mission as 'to explain how circuits of neurons enable us to *perceive* the world and act upon it.'

During the evaluation period, the institute has also worked on its visibility, for instance by developing a new website and by engaging in outreach activities. However, the committee thinks that the visibility of the institute should be further improved, in particular given the complex landscape of neuroscience research in the Amsterdam region. This could be improved by

- further improving the NIN website, in particular increasing the sense of synergy and adding more content for scientists, policy makers, and the general public,
- increasing social media presence,
- ensuring that NIN researchers mention their affiliation when appearing in the media (i.e., several NIN researchers are well-known by the general public, but the public is not aware that these researchers work at the NIN),
- a new, visually attractive building dedicated to the NIN (see recommendation 1 above).
- sponsoring a yearly or bi-yearly symposium that is directly related to the NIN's mission. The symposium should include members of NIN as well as Dutch and international speakers. One should consider publishing the presentations in a journal which is indexed on PubMed,
- sponsoring a yearly distinguished lecture and perhaps an associated award that is given to an individual who has published outstanding research in neuroscience related to NIN. The award and lecture should be international and broadly advertised and well-publicised.

Taken together, these actions are likely to improve the international visibility of the NIN as a world-class neuroscience institute, which will increase its attractiveness to talented researchers and facilitate fund-raising. This will also be a key investment in the long-term future of Dutch neuroscience, with the aim of protecting basic research activities and training the next generation of Dutch neuroscientists.

### *3) Non-human primate research*

The NIN's non-human primate (NHP) facility is the only remaining NHP facility for neuroscience research in the Netherlands. Several committee members visited the facility during the site visit. It is the committee's impression that the facility has taken sufficient measures to maximize the psychological well-being of the rhesus monkeys. The animals receive care that matches or exceeds the standards of the best facilities worldwide. The committee considers research with non-human primates crucial to understanding higher cognitive functions. In line with this, a 2014 KNAW report concluded that NHP brain research will continue to be essential to answer several pressing scientific questions. The same conclusion was formulated in the 2017 SCHEER (Scientific Committee on Health, Environmental and Emerging Risks) report to the European Commission. The research that is currently performed using the NIN's non-human primate facility is world-class and of substantial societal value. For instance, NIN researchers use the NHP facility to develop a neural implant to make blind people see. Taken together, this facility is an essential asset to neuroscience in the Netherlands and abroad. Hence, also in the future it should be supported.

### *4) Operational management*

Although the scientific leadership of the institute is excellent, the operational leadership should be improved. The committee learned that some of the support departments are not sufficiently service-oriented and their communication with the research groups and other support departments is not optimal. More generally, transparency and internal communication with the operational side of the institute are suboptimal. This decreases the efficiency of the institute, with researchers spending unnecessary amounts of time on acquiring the information and resources that they need. The

committee suggests a more proactive policy of the directorate on these matters, with the option of looking for alternatives in the current operational leadership assignments.

The committee has the impression that there is an open atmosphere at the NIN, i.e., group leaders feel free to discuss their concerns and the Board is open to suggestions. However, the group leaders feel that the actual decision-making process is not 100% transparent. In particular, the group leaders would like more feedback on the motivation for certain decisions. It is the committee's opinion that not all decisions need to be democratic and 100% transparency is not always possible. Having said that, there seems to be a need for a more transparent communication about the scientific and managerial decisions.

#### 5) *Big data infrastructure*

The NIN seems to lack a proper IT support infrastructure to facilitate data-intensive research, including computing power, storage facilities, and computational expertise. Investing in such resources will increase the scientific excellence of the institute. Therefore, the committee recommends investing in shared computational services, data storage facilities, computational expertise, etc. This might require additional investments from central resources.

#### 6) *Spinoza Centre*

With the Spinoza Centre in close proximity, the NIN has easy access to the equipment and expertise required for state-of-the-art imaging studies. Although the Spinoza Centre itself is not unique, the combination of the Spinoza Centre with the Netherlands Brain Bank and the non-human primate facility enable the NIN to perform studies that are unquestionably unique in the world. In addition, the centre has substantially contributed to grant acquisition of the NIN: the NIN acquired approximately EUR 11M of funding in part by the availability of 3T and 7T scanning facilities at the Spinoza Centre. In conclusion, the committee values the NIN's involvement in the Spinoza Centre and recommends continuing this relationship.

#### 7) *Netherlands Brain Bank*

The Netherlands Brain Bank is a major international asset that facilitates international collaborations. The committee feels it is important that the Brain Bank will remain affiliated with the NIN.

#### 8) *Open science*

The committee has the impression that the NIN actively encourages its researchers to pursue open science, for instance through sharing research data and publishing in open access journals. However, the institute would benefit from a larger budget to support open data. Thus, the committee recommends allocating funds to this end (see also recommendation 5 above).

### **4.2 PhD programme**

The committee has the impression that the PhD students at the NIN are satisfied. However, many PhD students take more than five years to finish their PhD track at the NIN. The institute has installed measures to limit the duration of PhD tracks and the committee expects that this will pay off. In addition, the PhD students themselves do not seem to complain about the long duration.

Nevertheless, the committee encourages the group leaders to take their responsibility and prevent excessively long durations. At the same time, the committee recognises that some research is difficult as well as labour and time intensive. For example, it may take more than two years to train a non-human primate on a sophisticated behavioural task. Similarly, developing a new technique may require extended periods of trial and error. We do not wish to discourage this type of research and thus acknowledge that the time to complete a task is not as important as the quality of the outcome.

#### **4.3 Research integrity**

Although the NIN has installed several measures to safeguard research integrity, it is the committee's impression that not all NIN researchers are sufficiently aware of these. The committee encourages the institute to make these procedures more visible, including for instance the complaint procedure of the KNAW. It would also be good to appoint an official confidential advisor within the institute.

#### **4.4 Diversity and inclusiveness**

The NIN is keenly aware of the importance of a diverse staff, in terms of gender and ethnicity. The committee supports the NIN in its endeavour to increase the number of female group leaders. The committee encourages the institute to explore additional ways to offer role models for young female researchers, e.g., by inviting female external speakers.

## **Appendix 1.** Short CVs of the members of the assessment committee

### **Professor P. Hagoort** (chairman)

Peter Hagoort is Professor of Cognitive Neuroscience at the Radboud University Nijmegen (the Netherlands). In addition, he is the Director of the Max Planck Institute for Psycholinguistics and the Founding Director of the F.C. Donders Centre for Cognitive Neuroimaging, both in Nijmegen. His research group applies neuroimaging techniques such as ERP, MEG, PET, and fMRI to investigate the language system in the human brain and its impairments in aphasia, dyslexia, and autism. Hagoort received his MSc (Experimental Psychology, *cum laude*) in 1982 and his PhD (Psycholinguistics) in 1990, both from the University of Nijmegen. In the period 1990-2003, he headed the research on the neurocognition of language processing at the Max Planck Institute for Psycholinguistics. In 1999, Hagoort was appointed as Full Professor of Neuropsychology at the University of Nijmegen (later Radboud University Nijmegen) and Director of the F.C. Donders Centre for Cognitive Neuroimaging. In 2006, he became the Director of the Max Planck Institute for Psycholinguistics. Hagoort received several rewards and honours, including the Hendrik Mullerprijs (KNAW, 2003), the Spinoza Prize (NWO, 2005), an honorary doctorate in science of the University of Glasgow (2007), the Heymans Prize (2008), and Officer of the Order of Oranje-Nassau (Dutch Royal House, 2004). He is a member of the KNAW and the Academia Europaea. In 2012, the KNAW awarded his career contribution to cognitive neuroscience with the Academy Professorship Prize. In 2018 he was elected Foreign Associate of the National Academy of Sciences.

### **Professor T. Mrsic-Flogel**

Thomas Mrsic-Flogel is Professor in Neuroscience and Director of the Sainsbury Wellcome Centre for Neural Circuits and Behaviour at University College London (UCL, UK). His research aims to unravel the fundamental principles of neural circuit organisation and how this organisation relates to the computations that support sensory and behavioural function. Mrsic-Flogel obtained his MSc (Neuroscience) in 1997 and his PhD (Neuroscience) in 2001, both from Oxford University (UK). He was a Postdoctoral Research Fellow at the Max Planck Institute of Neurobiology (Martinsried, Germany) in the period 2001-2007. He was a Wellcome Trust Research Fellow and Lecturer at UCL in the period 2007-2013. He then moved to Switzerland to become a Professor of Neuroscience at University of Basel. In 2016, he was appointed as the Director of the Sainsbury Wellcome Centre for Neural Circuits and Behaviour and a Professor of Neuroscience at UCL. A selection of honours and awards that he received include an Alexander von Humboldt Research Fellowship (2003), Wellcome Trust Career Development Fellowship (2007), European Research Council Starting Grant (2008), Wellcome Trust Senior Research Fellowship (2011), and the Larry Katz Prize for Innovative Research in Neuroscience (2015).

### **Professor K. Grill-Spector**

Kalanit Grill-Spector is Professor in Psychology at Department of Psychology and the Stanford Neurosciences Institute (Stanford University, USA). She has an active and diverse laboratory at the Psychology Department of Stanford University, examining how the brain processes and perceives visual information. Grill-Spector obtained her MSc (Computer Science) in 1995 and her PhD (Computer Science and Neurobiology) in 2000, both from the Weizmann Institute of Science (Israel). In the period 1999-2001, she was a postdoctoral fellow in Brain and Cognitive Sciences at the

Department of Brain and Cognitive Sciences of MIT (USA). Next, she joined Stanford University, as an Assistant Professor in 2001. She was appointed to an Associate Professor in 2009 and she was appointed a Full Professor in 2016. She is a member of the Society for Neuroscience, Human Brain Mapping, and Vision Science Society. She has served as an Editor for *NeuroImage* (2005 - 2008), *Journal of Vision* (2008-2012), and *Neuropsychologia* (2016-2017), as well as in NIH and NSF grant reviewing committees. At Stanford University, Grill-Spector is Graduate Program Committee Chair at the Department of Psychology and a Board member of the Center for Cognitive and Neurobiological Imaging. She has received several awards and honours, including the Human Sciences Frontier Fellowship (2000), the Sloan Research Fellowship in Neuroscience (2004), and the Klingenstein Fellowship in Neuroscience (2006).

### **Professor P.L. Strick**

Peter Strick is Professor of Neurobiology at the University of Pittsburgh, School of Medicine (USA). He is interested in four research areas: the generation and control of voluntary movement by the motor areas of the cerebral cortex, the motor and cognitive functions of the basal ganglia and cerebellum, the neural basis for the mind-body connection, and the complex neural networks that comprise the central nervous system. Strick received his BA (Biology, 1968) and PhD (Anatomy, 1972) from the University of Pennsylvania (USA). He was a Staff Fellow at the National Institute of Mental Health (1972-1976) before moving to the Departments of Neurosurgery and Physiology at SUNY-Upstate Medical Centre in New York to become an Assistant Professor (in 1976), Associate Professor (in 1979), and Full Professor (in 1982). In 2000, Strick moved to the University of Pittsburgh to become Co-Director of the Center for the Neural Basis of Cognition and Professor in the Departments of Neurobiology, Neurological Surgery, Physical Medicine & Rehabilitation, and Psychiatry. In 2012, Strick was appointed the Thomas Detre Professor and Chair, Department of Neurobiology, and Co-Director for the Center for Neuroscience at the University of Pittsburgh. Strick also is the founding Scientific Director of the University of Pittsburgh Brain Institute (2014-present). Strick was elected to the American Academy of Arts and Sciences (2004) and to the National Academy of Sciences (2012).

### **Professor W. Wisden**

William Wisden is a Professor in Molecular Neuroscience at Imperial College London (UK). He has intensively studied neurotransmitters receptors (GABA, AMPA, kainate receptors) and more recently became interested in mechanisms of sleep and genetic manipulations of sleep circuitry. Wisden received his BA (Zoology, Natural Sciences) from the University of Cambridge (UK) in 1986 and his PhD from the University of Cambridge & MRC Molecular Neurobiology Unit in 1990. Wisden was an EMBO Long-term Fellow at the University of Heidelberg (Germany, 1990-1992), group leader at the MRC LMB Cambridge (1993-2001), group leader at the University of Heidelberg (2001-2005), and Professor & Chair of Neuroscience at the University of Aberdeen (Scotland). In 2009, he was appointed a Chair at Imperial College London. He is a member of the Advisory Board of the Spemann Graduate School of Biology and Medicine (Freiburg) and the MRC: Neurosciences & Mental Health Board (NMHB) (2012-2016). He was a member of the Wellcome Trust Neuroscience & Mental Health Committee in the period October 2009 - April 2011. Wisden was elected Fellow of the Academy of Medical Sciences in April 2014.

### **Dr L. van den Berg**

Linda van den Berg is an independent science writer and communications consultant with a background in the life sciences. She obtained a MSc (fundamental biomedical sciences, *cum laude*) in 2000 and a PhD (behavioural genetics) in 2006, both from Utrecht University (the Netherlands). In the period 2006-2012, she was a Postdoctoral Researcher at VU University Medical Center (the Netherlands), the Broad Institute of Harvard and MIT (USA), and Leiden University Medical Center (the Netherlands). Since 2012, she has worked as a professional science writer, with a special interest in research quality, research data stewardship, and research infrastructure. Her company Washoe Life Science Communications offers a variety of communication services to academic institutes, patient organisations, and companies. Since 2015, she has served as an independent secretary to several research assessment committees.



## Appendix 2. NIN site visit programme

### MONDAY 12 MARCH

- 17:30 - 18:00 Welcome by Wim van Saarloos (vice-president KNAW)  
18:00 Kick-off dinner

### TUESDAY 13 MARCH\*

**08:30 - 09:30 Preparatory meeting Committee**

09:30 - 10:30 Meeting with Board of Directors and general introduction Pieter Roelfsema

**10:30 - 11:00 Coffee**

11:00 - 11:30 Meeting with Simon Fisher, chair of the Scientific Advisory Board

*Presentation of research teams 1 (in the presence of all group leaders)*

- 11:30 - 11:45 Christian Keysers - Comparative social neuroscience  
11:45 - 12:00 Valeria Gazzola - Mechanisms of social behaviour  
12:00 - 12:15 Eus van Someren - Sleep and Cognition

12:15 - 13:30 Lunch committee with eight PhD students

*Presentation of research teams 2 (in the presence of all group leaders)*

- 13:30 - 13:45 Joost Verhaagen - Neuroregeneration  
13:45 - 14:00 Maarten Kole - Axonal Signaling  
14:00 - 14:15 Inge Huitinga - Neuroimmunology Research

*Presentation of research teams 3 (in the presence of all group leaders)*

- 14:15 - 14:30 Maarten Kamermans - Retinal Signal Processing  
14:30 - 14:45 Alexander Heimel - Cortical Structure and Function  
14:45 - 15:00 Christian Lohmann – Synapse and Network Development

15:00 - 15:30 Interviews with selected group leaders

15:30 - 16:00 Interview with Christiaan Levelt (chair educational program ONWAR research school) and Dorien Bisselink (head HRM)

**16:00 - 17:00 Committee meeting with coffee**

17:00 - 18:30 Visits to the Spinoza Centre for Neuroimaging, Netherlands Brain Bank, Non-human Primate Facility, and Sleep Laboratory.

19:30 - 21:00 Dinner committee with delegation of the institute

\***Bold** = committee only

WEDNESDAY 14 MARCH 14\*

*Presentation of research teams 4 (in the presence of all group leaders)*

08:30 - 08:45 Christiaan Levelt – Molecular Visual Plasticity

08:45 - 09:00 Pieter Roelfsema—Vision and Cognition

09:00 - 09:15 Ingo Willuhn – Neuromodulation and Behavior

*Presentation of research teams 5 (in the presence of all group leaders)*

09:15 - 09:30 Susanne la Fleur– Metabolism and Reward

09:30 - 09:45 Dries Kalsbeek – Hypothalamic Integration Mechanisms

**09:45 - 10:30 Coffee**

*Presentation of research teams 6 (in the presence of all group leaders)*

10:30 - 10:45 Helmut Kessels – Synaptic Plasticity and Behavior

10:45 - 11:00 Dick Swaab– Neuropsychiatric Disorders

11:00 - 11:15 Chris de Zeeuw– Cerebellar Coordination and Cognition

11:15 - 11:45 Interviews with selected group leaders

11:45 - 13:15 Posters PhD students and postdocs

13:15 - 14:45 Lunch committee with eight postdocs

**14:45 - 17:00 Final committee meeting with coffee**

17:00 - 17:30 Presentation preliminary conclusions

\***Bold** = committee only

### Appendix 3. Quantitative data on NIN's composition and financing

**Table 1: NIN Composition in Full Time Equivalents\***

SEP Table D3a – Research at an institutional level.

	2012	2013	2014	2015	2016	2017
<b>Netherlands Institute for Neuroscience</b>						
Tenured staff <sup>1)</sup>	12.7	11.4	16.1	16.2	14.7	11.9
Non-tenured staff <sup>2)</sup>	43.7	35.6	30	27.3	30.4	36.1
PhD-students <sup>3)</sup>	48.8	42	38.6	37.6	37.3	39.1
<b>Total research staff</b>	<b>105.2</b>	<b>89</b>	<b>84.72</b>	<b>81.1</b>	<b>82.4</b>	<b>87.1</b>
Support staff	63.3	70.4	67.5	61.9	65.2	68.8
Visiting fellows	8	7	6	7	8	8
<b>Total staff</b>	<b>176.5</b>	<b>166.4</b>	<b>158.22</b>	<b>150.0</b>	<b>155.6</b>	<b>163.9</b>

SEP Table D3a

Note 1: Comparable with WOPI categories HGL, UHD and U; tenured and non-tenured staff

Note 2: Comparable with WOPI category Onderzoeker, including postdocs

Note 3: Standard PhDs (employed) and Contract PhDs (externally or internally funded, but not employed)

\*Staff numbers were assessed on 31 December in 2012-2016 and on 30 September in 2017.

**Table 2: NIN funding**

Amounts x € 1,000	2012	2013	2014	2015	2016	2017
<b>Netherlands Institute for Neuroscience</b>						
<i>Funding</i>						
Direct funding <sup>1)</sup>	9,057	9,051	8,924	9,045	9,711 <sup>A</sup>	9,751
Research grants <sup>2)</sup>	2,266	3,009	3,438	2,650	2,975	2,836
Contract research <sup>3)</sup>	3,838	3,787	3,500	3,822	3,016	3,469
Other <sup>4)</sup>	967	1,073	993	1,153	1,201	1,499
<b>Total funding</b>	<b>16,128</b>	<b>16,920</b>	<b>16,855</b>	<b>16,670</b>	<b>16,903</b>	<b>17,555</b>
<i>Expenditure</i>						
Personnel costs	10,590	12,923 <sup>B</sup>	9,499	10,014	9,768	10,401
Other costs	5,941	6,255	6,733	5,763	6,429	6,500
<b>Total expenditure</b>	<b>16,531</b>	<b>19,178</b>	<b>16,232</b>	<b>15,777</b>	<b>16,197</b>	<b>16,901</b>

Note 1: Direct funding (basisfinanciering / lump-sum budget)

Note 2: Research grants obtained in national scientific competition (e.g., grants from NWO and KNAW)

Note 3: Research contracts for specific research projects obtained from external organisations, such as industry, government ministries, European organisations and charitable organisations

Note 4: Funds that do not fit into the other categories, e.g. income from the Netherlands Brain Bank

<sup>A</sup> From 2016 onwards, the KNAW added k€ 639 to the yearly lump sum, while charging a virtual rent of the same amount.

<sup>B</sup> Including personnel costs due to reorganisation of 2012.

**Appendix 4.** Explanation of the categories utilised

<b>Category</b>	<b>Meaning</b>	<b>Research quality</b>	<b>Relevance to society</b>	<b>Viability</b>
<b>1</b>	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.
<b>2</b>	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.
<b>3</b>	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.
<b>4</b>	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.

**Source:** Standard Evaluation Protocol 2015 – 2021 Amended version, 2016