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1 Introduction

1.1 The Netherlands System of Quality Assessment of Research

This quality assessment of research is part of the assessment system for all public Dutch university research, as organised by the universities in the Netherlands.

The aims of the assessment system are:
- Improvement of research quality based on an external peer review, including scientific and societal relevance of research, research policy and research management.
- Accountability to the board of the research organisation, and towards funding agencies, government and society at large.

The assessment takes place at the level of research institutes and research programmes. The research institutes submit a description of the results that have been achieved in all contributing research programmes during the previous six years (including quantitative data on staff input, PhD’s, publications, financial resources), a short outline of the mission of the institute, the objective of each individual programme, and developments anticipated in the context of the research profile of the faculty or institute. Important elements of the assessments are the interviews, which the Evaluation Committee conducts with the management and the programme directors, and the visit to the facilities.

This evaluation of the Donders Institute for Brain, Cognition and Behaviour, was commissioned by the Executive Board of the Radboud University Nijmegen.

1.2 The Evaluation Committee

The Evaluation Committee was appointed on 29 November 2012 and consisted of:
- Professor Michael Gazzaniga (Chair), Sage Center for the Study of Mind, University of California, Santa Barbara, California, USA.
- Professor Gary Dell Beckman Institute Urbana, Illinois, USA.
- Professor Ype Elgersma, Erasmus University Rotterdam, The Netherlands.
- Professor Paul Matthews, Imperial College London, London, UK.
- Professor Alice Nieuwboer, KU Leuven, Belgium.
- Professor Kia Nobre, University of Oxford, UK.
- Professor Lars Nyberg, Umea University, Sweden.
- Professor Klaus Obermayer, Technische Universität Berlin, Germany.
• Professor Matthew Lambon Ralph, University of Manchester, UK.
• Professor Pieter Roelfsema, Netherlands Institute for Neurosciences, Amsterdam, The Netherlands.

Dr. Barbara van Balen, QANU, was appointed secretary to the Evaluation Committee.

A short curriculum vitae of each of member is included in Appendix 1.

Independence
All members of the Committee signed a statement of independence to ensure that:
• they would judge without bias, personal preference or personal interest, and
• their judgment is made without undue influence from the institute, the programme or other stakeholders.

1.3 Scope of the Assessment
This assessment covers the research of the Donders Institute for Brain, Cognition and Behaviour. The period of assessment is 2007-2012, and recent developments have been taken into account as much as possible. The Donders Institute was founded in September 2008 following an initiative by leading researchers on Brain, Cognition and Behaviour at Radboud University Nijmegen. The institute spans the research into Brain Cognition and Behaviour of the faculties of Science, Medicine and Social Sciences, as well as the Donders Centre for Cognitive Neuroimaging, formerly called the F.C. Donders Centre for Cognitive Neuroimaging.

The Committee was asked to operate according to the Standard Evaluation Protocol 2009-2015 for Public Research Universities. This Protocol specifies the criteria for the assessment and the information that must be provided to the Committee.

1.4 Data provided to the Committee
The Evaluation Committee has received a detailed self-evaluation report provided by the Donders Institute for Brain, Cognition and Behaviour. For each PI five key publications were specified in the report. The documentation included all the information required by the Protocol.
1.5 Procedures followed by the Committee

The assessment was based on the documentation provided by the Donders Institute for Brain, Cognition and Behaviour, the interviews and the tour of the select facilities. The Institute has organised its research in four themes. These themes are the basis for this assessment. The interviews took place during the site visit on 30 and 31 May 2013. Time was allowed for visits to the experimental and instrumental set-ups and discussions with the Deans of the involved Faculties, the speakers of the research themes, the coordinators of the Graduate School with a representation of the PI groups, with PhDs and Postdocs and with the Board of the Donders Institute. The programme of the site visit is included in Appendix 2.

The Committee members have all read the self-evaluation report. The first and second reviewer of each theme prepared a preliminary assessment of the theme and questions for the interviews with the theme speakers. These preliminary assessments were compiled and given to the members on 28 May 2013, preceding the site visit.

During the internal Committee meeting on the evening of 29 May 2013, preceding the site visit, a number of comments and questions for the institute as well as for each theme were decided upon. The Committee also agreed upon procedural matters and aspects of the assessment as described in the following paragraphs.

The interviews took place during the site visits on 30 and 31 May 2013. The interviews with the management and speakers were conducted by the plenary Committee. The interviews with PI groups were conducted by the first and second reviewers for the themes. A tour of several facilities was conducted on the first day of the visit. The plenary committee discussed the findings of these interviews.

On the second day of the site visit to prepare this report the Committee discussed the results for each theme as well as for the institute at large in order to prepare the report. Afterwards a meeting with the representatives of the University and Institute and interested researchers was arranged, in which the main impressions of the Committee were reported.

A draft version of this report was sent to the Donders Institute for factual corrections and comments. Subsequently the comments were discussed with the Committee Chairman. This led to minor corrections and clarifications. The report was then submitted to the Executive Board of the Radboud University.
1.6 Aspects and Assessment Scale

The Protocol requires the Evaluation Committee to assess the research on four main criteria of the Standard Evaluation Protocol:

- Quality (the level of the research conducted)
- Productivity (relationship between input and output)
- Societal relevance (social, economic and cultural relevance of the research)
- Vitality and feasibility (flexibility, management and leadership)

The ratings used are: Excellent (5); Very good (4); Good (3); Satisfactory (2); Unsatisfactory (1). This five-point scale used in the assessment is described in the Standard Evaluation Protocol as follows:

Excellent (5)  Research is world leading. Researchers are working at the forefront of their field internationally and their research had an important and substantial impact in the field.

Very Good (4)  Research is internationally competitive and makes a significant contribution to the field. Research is considered nationally leading.

Good (3)  Work is competitive at the national level and will probably make a valuable contribution in the international field. Research is considered internationally visible.

Satisfactory (2)  Work adds to our understanding and is solid, but not exciting. Research is nationally visible.

Unsatisfactory (1)  Work that is neither solid nor exciting flawed in the scientific and or technical approach, repetitions of other work, etc.
2 Assessment of the Donders Institute for Brain, Cognition and Behaviour

Director of the institute: Professor Harold Bekkering
Academic staff in 2012: 352.87 fte
Assessment of the institute:

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<thead>
<tr>
<th>Category</th>
<th>Score</th>
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<tr>
<td>Quality</td>
<td>5</td>
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<tr>
<td>Productivity</td>
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<tr>
<td>Societal Relevance</td>
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<td>Vitality and feasibility</td>
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2.1 Mission, goals and research activities

Radboud University Nijmegen has a long tradition in research into brain, cognition and behaviour. It is the mission of the Donders Institute to unite all researchers of the Radboud University doing research in this field together. The overall objective is to perform and enable research ranging from molecule to man with a focus on systems level cognitive neuroscience and to study complex human functions from more than one perspective.

The institute aims to select and attract researchers within four research themes:
- Language and Communication;
- Perception Action, and Control;
- Plasticity and Memory;
- Brain Networks and Neuronal Communication.

In the view of the institute cognitive neuroscience will increasingly become the central focus of all neurosciences. It aims at making an important contribution to this discipline. The institute brings together over 500 scientists and facilitates multi-level research directed at all levels of biological organisation. It encourages translational research to address critical societal questions in medicine, education, technology and safety.

The strategy of the institute is to capitalise on an international visible brand name and create a strong common infrastructure. Furthermore, it fosters a culture conducive to multidisciplinary research and a multidisciplinary training for the next generation of researchers in cognitive neuroscience.
2.2 Quality

The Donders Institute has an excellent international reputation. It made good use of the branding of the former FC Donders Centre. But it is clear that the range of research is now much broader, because the institute combines the three centres (the Donders Centre for Cognition (DCC), the Donders Centre for Cognitive Neuroimaging (DCCN) and the Donders Centre for Neuroscience (DCN)) and has attracted other researchers from the Radboud University who conduct research in the field. The committee was impressed by the stimulating environment created by the Donders Institute. Its creation certainly was a good investment.

The researchers the committee has spoken to, PIs as well as affiliated PIs, reported that there is a huge added value of cooperating in the institute. The collection of researchers has contributed to knowledge in various aspects of brain, cognition and behaviour, in particular with regard to ‘normal’ language functions.

2.2.1 Leadership

The Board of the institute consists of the directors of the three centres (DCC, DCCN and DCN). The Board chairmanship rotates every second year among the three centres, as does the administrative side of the management. In the view of the committee the rotating chairmanship doesn’t impede a shared vision on the mission and goals of the institute. It was very clear that all theme speakers and PIs present themselves as involved and dedicated members of the institute.

Formally the institute is a kind of umbrella structure with no formal responsibilities for resources and career development. In practice the institute helps the involved researchers cooperate successfully, particularly so with regard to interdisciplinary and multidisciplinary research.

2.2.2 Organisation

As stated the Donders Institute is constituted by three University Centres: the Donders Centre for Cognition (DCC) of the Social Science Faculty, the Donders Centre for Neuroimaging (DCCN) and the Donders Centre for Neuroscience (DCN, within the Medical Faculty and the Faculty of Science) combining active participation from Physics, Biology, Psychology, Artificial Intelligence, Basic and Clinical Neuroscience and Neuroimaging. The Donders Institute collaborates on a daily basis with the Max Planck Institute for Psycholinguistics (MPI) and the Centre for Language Studies (CLS), both situated on the Radboud University Campus.

The collaboration among the three Donders Centres and the affiliated institutes contributes greatly to the high quality of the research and the academic reputation of the Donders Institute.
Each research theme is coordinated by a speaker who is appointed for three years with the possibility of an extension. Speakers have, among others, the task to coordinate the monthly theme meetings, to foster the development of the research lines of the theme and to coordinate collaborative funding opportunities. The committee initially felt that theme groups were too large. During the site visit, however, it became clear that the organisation of the research in themes works out very well. The committee is of the opinion that the theme based organisation strengthens the international research profile and increases the impact of the research. The mixed vertical / horizontal organisation into centres and themes is well chosen and enables to flexibly take on new research questions, specifically research topics which require cross-disciplinary interactions.

2.2.3 Academic reputation
The academic reputation of the Donders Institute is excellent. The Institute is very well known in the international academic community. The Institute can rely on a superb brand name and on excellent PIs and top researchers. The committee underlines the vision of the Donders Institute that its quality can be maintained by optimally supporting interdisciplinary collaborations and will continue to be able to attract top researchers.

2.2.4 Resources
The institute provided information on staff levels and funding of the institute in the self-evaluation report.

The committee is impressed by the achievements of the institute in attracting 2nd and 3rd stream money. The institute has been successful with individual grants and projects financed by NWO as well as with individual grants from ERC. Particularly impressive was the receipt of the Gravitation grant, “Language in Interaction”.

The committee toured the Donders laboratories and other research facilities. The research facilities on the campus were judged to be very good. Nevertheless there remain some wishes in this respect. A threat is posed by the limited infrastructure for data processing.

Much of the research uses very large data sets, which require attendant hardware, software, and sufficient technical support.

The committee supports the ambition of the Donders centre to strengthen the links between cognitive studies in humans and complementary approaches at the molecular, cellular and
systems neuroscience levels. To fulfil this ambition, the committee is of the opinion that more support is needed for invasive electrophysiology. A potential concern is the level of service by the central animal laboratory (CDL), which should aim to create an environment that maximally supports the complex experiments that are necessary to understand the neuronal foundations of cognitive function.

The Donders Institute itself has no formal responsibilities for Human and Financial Resources, but the Deans of the involved Faculties assured the committee that there are no obstacles to financing research facilities. The Deans also explained the procedures to be followed for filling vacancies while considering the interests of the Donders Institute. According to the committee, the present organisation and procedures do not guarantee that the needs of the institute will be met, but so far the strategy works well. The committee can also see the advantages to the network or umbrella structure that currently characterises the institute’s organisation; it promotes multidisciplinary research without formal and financial structure. As described in 2.2.1 the rotating chairmanship works very well. However, the committee would advise the Board of the University to finance permanent secretarial support for the Donders Institute to guarantee continuity and ensure that the positive energy of the Institute is not reduced by the administrative burden. A potential vulnerability is that the present spirit of cooperation depends on the willingness of all partners (faculties and centres) to continue their support for the Institute. This support is only partially formalised in the present structure. It is therefore very important that the Donders Institute has influence on new strategic appointments (e.g. the new chairs in neurology and psychiatry).

The inclusion of the Donders Centre for Neuroscience (DCN) of the Medical Faculty and the Faculty of Science) has provided many new opportunities for translational research, and vice versa, the patients can provide new directions for fundamental research. It is unavoidable that the clinicians dedicate a substantial fraction of their time to patient care. The committee encourages the Donders Institute to take all possible measures that can promote fruitful interaction between the clinicians and the more fundamental scientists working in the Institute.

2.2.5 PhD training and supervision
PhD training in the Donders Institute is organised through the Donders Graduate School for Cognitive Neuroscience. The graduate school covers training at master's and PhD level. Up to 2012, 269 PhD theses were published and 250 PhD students are currently enrolled. Training in the Graduate School is organised and closely aligned with the four Donders Institute research themes, which strengthens the visibility of the themes at Master's level. The School
offers a broad range of cognitive neuroscience courses, hands-on practical training and in-depth research experience. The programme is very attractive and well structured.

The institute values the master programme highly and the committee concurs. The continuity between master’s programme, PhD trajectory and the research themes is clearly visible and the three components reinforce each other. The presence of master’s students is stimulating for both the PhD students and the senior researchers. 75% of the master’s student continue with a PhD training. In the second year of their master’s degree programme students are part of a PI group and the students are funded for performing research in this group. In the master programme 280 students have been trained since 2003. The programme has a very low drop out rate of 5%.

The PhD students are a vital part of the research capacity of the Donders Institute and contribute on a high level to the quality of its research. PhD students are involved in teaching for 10% of their time and receive training and education for the same amount during their contract.

During informal discussions the PhD students informed the committee that they are very satisfied with the supervision and training they receive at the Donders Institute. The Graduate School provides a transparent structure and clear responsibilities, at the same time leaving a lot of freedom for the PhD students to formulate their own research questions and build their own reputation. The environment is very stimulating and enables the PhD students to excel. The PhD students also exemplify the multidisciplinary character of the institute having different disciplinary backgrounds.

The success rates of the PhD students as presented in the self-evaluation report can still be improved. The duration of the PhD trajectories seems to have been too long on average. The institute informed the committee that it has started introducing measures to improve the progress of the students in 2009, including a full checkpoint system. At the moment it is too early to see the results.

According to the institute, the students are now closely monitored and seem to be more on track.
2.3 **Productivity**

The output of the Donders Institute as a whole as presented in the self-evaluation report is impressive. Furthermore, as mentioned in 2.2.4, Donders Institute researchers have acquired an extensive amount of funding from public and private resources at national and international levels. The committee was impressed by the number of prestigious personal grants and the grants acquired in collaborative projects. The committee endorses the intention of the Institute to move the funding strategy towards European Union Funding, but would advise to keep an open mind to other possibilities. After all, research themes and focus areas of funds regularly change, which also applies to the EU funds.

The publication policy of the Donders Institute does not encourage an increase in publications, but rather an increase in high quality papers which are published in the upper quartiles of the different fields/sub disciplines. The committee has seen that the publication strategy already had some success. It would furthermore recommend using discipline-normalised citation data for reporting and reviewing. Clearly, the number of publications is sufficient.

2.4 **Societal relevance**

The committee sees Donders Institute first and foremost as a basic research institute, which by producing high level research inherently contributes to societal relevance. The potential societal relevance of the research of Donders Institute could grow even more. Excellence in basic research has far-reaching inherent societal relevance, though sometimes the translational paths are lengthy or hard to predict. Despite this primary focus on basic research, Donders’ researchers reach out significantly – both in extending their research into applied areas within medicine, industry, and education; and in communicating the excitement of basic research to the public. The researchers are cooperating with several organisations, schools and hospitals. It has numerous ties with industry varying from smaller companies manufacturing technical devices to large multinationals. However, these activities could be further expanded and more strategically managed. The research subjects relate to several current societal issues, particularly with regards to an ageing society. In addition, it may be helpful to specifically target studies in several stages of the translational research pipeline.

2.5 **Vitality and feasibility**

It is very clear to the Committee that the Donders Institute has a sound and successful strategy for the future and should be poised to take advantage of opportunities that arise.
Although the institute has a very good name and is internationally well known, the committee feels that the Institute is still to some degree underselling its quality.

The Institute explained to the committee that it is working on improving its gender balance. The figures show that, in particular for the higher level positions, starting with the position of PI, women are clearly underrepresented. Currently only about 10% of the senior research staff positions are filled by women. A better balance can be seen among the aspiring PIs. In contrast, the proportion of female PhD students is 50%. It is good that the Institute has an increased awareness of this situation. A number of instruments have been developed, all of which seem good strategies. The Institute has outlined new procedures and criteria for every new hire. This should improve the likelihood of attracting female top scientists. With regard to these procedures the committee would recommend focussing on career development for aspiring PIs and postdocs. It is not always clear how aspiring PI’s will reach the full PI status, irrespective of gender. In particular the position of a postdoc is very vulnerable and this vulnerability may be unequally affecting women more than men. The committee would recommend offering mentoring support for all beginning researchers, particularly postdocs, e.g. by helping them with grant applications.

The quota set by the institute for job interviews and for filling senior positions (25% female candidates) is on the low side, but the committee agrees with the institute’s management that a realistic achievable quota is preferable.

2.6 Conclusions and recommendations for the institute

2.6.1 General conclusions

The committee assesses the quality of the Donders Institute for Brain, Cognition and Behaviour as excellent. The Institute has an excellent international reputation and several of the PIs are top researchers in their field. The research undertaken has had an important and substantial impact in the international field. The committee is impressed by what has been established in five years time and observed an extraordinary spirit of cooperation within the Institute. The Institute is a very stimulating environment for top researchers as well as for young talents.
2.6.2. **Recommendations**

1. The breadth of the institute is one of its main advantages, but for the long term the committee would recommend finding a balance between breadth and focus.

2. It is crucial for the stability of the Donders as an umbrella organisation that the interests of the Institute are taken into account in the case of new hirings.

3. The Institute should stick to core business of fundamental research whilst collaborating with clinical units. It could incorporate clinical insights in the graduate school program to stimulate fundamental and clinical neuroscience cross-linkage, without detracting from core business.

4. The Institute should develop a more systematic and strategic approach to fostering the interface between basic and clinical research by creating positions that cover all translational levels of research.

5. There should be continued recruitment and fostering of promising young researchers and focus, attention and action taken to increase the number of female PIs at all levels in the Institute.

6. The university should alleviate organisational difficulties in the central animal lab (CDL) that interfere with the research.

7. The interactions between the clinicians and the more fundamental scientists working in the Donders Institute should be encouraged.
3. **Assessments per theme**

The Committee has carried out an assessment at the level of the themes, as defined by the Donders Institute.

Comments that are applicable to all programmes have been made in Chapter 2 (Assessment of the Institute) and are not repeated below.
3.1 Language and Communication

Speaker: Professor James McQueen

Academic staff in 2012: 33.09 fte

Assessment:

- Quality : 5
- Productivity : 5
- Societal Relevance : 3.5
- Vitality and feasibility : 5

The research focuses on the biological and cognitive bases of human language and communication, with a particular focus on how the neural/cognitive systems deal with linguistic variability—variability associated with different languages (including multilingualism), linguistic modalities, and contexts. The three primary objectives of the Language and Communication theme are:

- to understand core language and communicative operations, including processing, learning and development and to determine how they are related to other domains of cognition, including perception, action, memory, attention and social behaviour;
- to determine how the human language faculty is rooted in the ‘language-ready’ human brain;
- to understand the balance between the universality and the variability of language and language processes.

The research is inherently interdisciplinary as it combines the methods of cognitive psychology, cognitive neuroscience, linguistics, education, genetics, acoustics, and computational modelling. The theme members succinctly describe their objective as answering the question “How to build a language machine”.

Additional objectives of the theme stated in the self-evaluation report are:

- to provide a research environment that supports excellent interdisciplinary training in language science;
- to facilitate interaction across the three centres of the Donders Institute and its affiliated institutes;
- to bridge between science and the wider world by seeking ways to apply knowledge to socially important questions.
Quality

When the Language and Communication theme’s central and affiliated researchers are considered as a group, that group is clearly a world leader in the study of the biological and cognitive bases of language. The individual PIs are highly regarded scientists. They are productive and well-funded, and collaborate effectively with one another. Several theme members have received significant prizes and other honours. The recently awarded “Gravitation” grant from the NWO (“Language in Interaction”) testifies to the quality, breadth, and leadership of the LC researchers.

It is difficult to divide up the credit for this theme research between the Donders Institute proper and the affiliated institutes. What is clear, though, is that the Donders Institute has played the major role in transitioning psycholinguistic research (in the Netherlands and beyond) from purely behavioural methods to the methods of cognitive neuroscience. The Language and Communication theme’s multi-level approach to understanding language from genetics to neuroscience to psychology and ultimately to the properties of language itself as characterised in linguistic theory is a signature accomplishment of the theme.

This collection of researchers has contributed to knowledge in various aspects of language (cross-linguistic, computational models, statistical methods, neuroimaging) particularly with regard to ‘normal’ language function. As noted in the self-evaluation report, the group could use some reinforcement in a few areas of language research. This includes language development, developmental language disorders, acquired language disorders (aphasia and dyslexia), etc. These should be considered areas of strategic investment for the future and for strengthening clinical and educational links/collaborations.

The broader set of PIs (direct and affiliated) contains many leading international figures. The group has been very successful in attracting significant grant income, particularly with regard to personal/fellowship awards and seems to be productive in terms of papers per year. The selected, highlighted papers include many appearing in leading international journals with high impact factors.

Productivity

The group’s productivity is impressive. The group has been very productive in terms of journal articles and it was also successful with research income, particularly, personal awards and fellowships.
Societal relevance
Research on language generally has the potential to contribute to health, education, and technology. Although not as main core activity, the Language and Communication group is engaged in both clinical and education collaborations. The committee however feels that future staff and research infrastructure could be invested in energising research that actively interfaces with clinical and educational issues. Such activity does not need to, and should not reduce the Institute’s internationally-leading academic activity. Clinical and education challenges can generate new and important basic science questions. For this to be successful there will need to be investment in the Institute but also effort with regard to facilitating clinical interactions and integration. The committee recommends that the Donders Institute considers recruiting leading players in developmental or acquired disorders research. These efforts could be aided by using the available chairs in neurology and psychiatry to appoint leading clinicians who will facilitate clinical research in this area. The reputation of the Donders Institute should help recruit leading behavioural neurologists, psychiatrists, and other health professionals to UMC.

Vitality and feasibility
The committee has seen a very active and productive Language and Communication theme, which is boosted enormously by the presence and contribution from the Max Planck Institute for Psycholinguistics (MPI) and the Centre for Language Studies (CLS).

The group has been very successful in acquiring research funding. The infrastructure for the theme is strong and the future looks bright. Further diversification of funding opportunities is probably a useful and sensible idea, while the future levels of Dutch and EU research funding are not yet clear. The prospect of a new director at the MPI who specialises in acquisition can be an advantage in this respect.

Conclusions and recommendations for the theme
The Language and Communication theme is a very strong and visible research group. It has a bright future. Language related research has always been at the heart of the internationally very well respected Donders Institute. The theme gains considerably from the presence of the MPI and CLS in the Nijmegen research environment. In the self-evaluation report the theme itself identified some weaknesses and the committee would recommend addressing these especially with regard to language development and disorders. These are key areas for societal value and could open up a broader range of funding opportunities.
As stated above the committee would recommend to:
- consider recruiting leading players in developmental or acquired disorders research;
- diversify funding opportunities;
- attract a young behavioural neurologist interested in language.
3.2 Perception, action and control

Speaker: Toni

Academic staff in 2012: 134.68 fte

Assessment:
- Quality: 4.9
- Productivity: 5
- Societal Relevance: 4.5
- Vitality and feasibility: 4.9

The mission of the Perception, Action and Control (PAC) theme is to understand the causal relationships between neuronal and cognitive mechanisms of perception-action integration in relation to perceptual inference, sensorimotor functions, cognitive control and social interactions. Activities of PAC are geared towards increasing neuroscientific understanding of the control of human action under normal and pathological conditions, with greater emphasis on the former. The researchers address these issues at a system level, but also consider multiple levels of biological organisations, from genes to neuromodulators, from single neurons to brain circuits, from individual organisms to multiple interacting agents. The researchers make use of brain imaging, neurophysiological as well as other brain stimulation techniques to better understand brain-behaviour (including motor, cognitive and emotional aspects of behaviour) and structure-function relationships.

Quality

The committee assesses the quality of the research in the theme as very good to excellent with a high number of very interesting papers that will be cited frequently in the literature and are published in high impact neuroscientific journals. The research is of the highest standard - characterised by a multi-methodological and multi-level approach, benefitting from extensive interaction among a critical mass of high-calibre and internationally recognised researchers. Many researchers within this group are among the top in the world in this area of research and have high prominence. There is a lot of potential in the interplay between studying the normal human function of frontostriatal connectivity in action selection/inhibition and sensory-motor integration and the abnormality of these functions in people with brain dysfunction. Collaboration with clinical neuroscientists will be very beneficial for this group and proves already fruitful. The research reputations of the PIs are excellent, including some fantastic young rising stars in the field. The group includes world-leading scientists.
The management of the research theme seems robust, despite its horizontal democratic structure and the huge size of the group, as financial and human resources are growing (a very impressive growth). The natural organic clustering of collaborations according to common research interests is a strength. The interface between fundamental and translational/clinical research seems healthy and especially strong in the area of Parkinson’s disease.

The research infrastructure – in terms of state-of-the-art equipment and analytical methods – is the very best. Substantial investments have been made to accommodate non-human primate research according to the highest standards.

**Productivity**

The committee can not see how productivity can be improved further. Brain research conducted with the utmost scientific rigour is laborious and time-consuming. The self-evaluation report bears witness of excellent publication output with a substantial increase of the number of peer-reviewed papers. This reflects the growth in PhD students (54-98) and non-tenured staff members (24-59) and indirectly the increase of external grant income. The number of PhDs is adequate in relation to permanent staff levels and senior staff.

**Societal relevance**

The PAC group is active in ecologically validating their research and this is very much appreciated. The Committee even sees a potential to further improve the validation, based on the tight links this theme has with applied clinical research, as is acknowledged in the self-evaluation report.

The core aims of PAC are to understand basic mechanisms of human perception and action. The challenge is to bring society around to understanding the importance of this kind of basic research. PAC is doing very well in bringing its research to bear on some neurological conditions. There still could be more two-way cross-fertilisation with neurology, psychiatry, clinical psychology and rehabilitation (mirroring and action observation). In addition, more could be done to enhance links with education and technology (e.g., brain-computer interface, gaming, and ergonomics). For the clinical topics, such as Parkinson’s disease, auditory prosthesis, and healthcare innovation the societal relevance is obvious. For the more fundamental science the societal relevance is high but could be made more visible.
Vitality and feasibility

The vitality of the group is according to the committee impressive, many of the international stars are relatively young, boding well for the longevity of the success and longevity of this team.

The PAC group has a very good strategy for future work through increasing its within-centre collaborations. Targeting horizon 2020 EU funding is important. While acknowledging that a stronger link with applied clinical collaborators is sought after, it is important not to lose its basic research core business.

There does not seem to be any imminent threat to PAC’s vitality and feasibility. They are well positioned to compete for significant grants based on individual achievements and vision (e.g., ERC fellowships) as well as large-scale collaborative grants. Maintaining state-of-the-art infrastructure and methods is always a challenge, but the Committee sees no reason why PAC would lose their pioneering position here.

Conclusions and recommendations for the theme

The committee got a very good impression of the research done in the theme Perception, action and control. There are clear indications of international excellence and a leading role in neurocognitive science for this group. The link between fundamental and clinical researchers will be very beneficial for future grant applications and there is scope for this to be exploited even more. This strength should also extend to other areas within the PAC group, for instance to mirroring and action observation applications.

Tools for further improvement the committee would recommend are:

1. To define measurable targets of research output and grant income for the next 6 years. This will help strategic planning and focus.
2. To share existing experience within the EU-funding to better plan and target EU-2020 funding.
3. To use the opportunities for collaboration and methodological exchange with other themes and exploit the advantages of multimodal brain research programmes.
4. To create a position for a specialised technician and top level researchers to manage Prime for neuroscience research.
3.3 Plasticity and memory

Speaker: Professor Barbara Franke

Academic staff in 2012: 118.15 fte

Assessment:
- Quality : 4.5
- Productivity : 5
- Societal Relevance : 4.5
- Vitality and feasibility : 4.5

The Plasticity and Memory theme aims to increase the understanding of neuroplasticity and long term processes of change in the neural systems mainly in the cognitive domain. Both normal and abnormal cognitive function is studied not only at the systems level but also at genetic and molecular/cellular levels. The mission is to find out how neuroplasticity supports neurodevelopment, adaptation to external and internal challenges, as well as abilities of learning and memory. Multidisciplinarity and interdisciplinarity are core principles of research.

Research is organised into 3 sub-themes: (a) development, (b) adaptation, (c) learning and memory. In the first sub-theme, research into neurodevelopmental disorders (notably ADHD) is a strong area. Genetic research is integrated with animal, neuroimaging, and neuropsychological research. Researchers collaborate within international consortia. For the second sub-theme, adaptation in stress-related psychiatric disorders is a key activity. The work has implications for healthcare improvement. In the sub-theme learning and memory, both animal and human (imaging) studies are strong ingredients, and integration across levels is emphasised. This sub-theme has relevance for education, ageing and cognitive and motor rehabilitation.

Quality
The quality of the Plasticity and Memory (PM) group is excellent, as indicated by the group's publication output in leading specialised journals as well in general top-level journals. The history of the bigger group constellation is rather short, and after forming their theme the scientists have devoted considerable amounts of time to develop an integrated and fairly well-coherent theme. Indeed, largely, this group forms a robust collaborative network involving strong basic scientists, clinical neuroscientists, as well as regularly engaging PIs from other themes. As one example of collaborative work that engages many PI groups within the theme, the PM group is engaged in collecting large cohort data sets including behavioural, genetic, and brain-imaging data.
These unique data sets already have contributed greatly to the high quality output of the PM theme. The existing infrastructure is excellent and overall the scientists make good use of the resources. Indeed, it might be argued that a relatively unique aspect of the work is the successful integration across different levels of study. Already, many of the involved PIs qualify as top scientists in their areas, and some can already be said to be among the world-leading scientists in their fields. We see a clear potential for additional PIs to reach this absolute top level within the foreseeable future.

**Productivity**

The Plasticity and Memory theme has been very productive. In total, during the 2007-2012 period, 2201 peer review papers were published. Broken down per PI group this amounts to 110 papers per group over the 6 years period. It should be stressed that several publications were based on large samples (e.g., in the genetics and imaging-genetics areas). In view of the addition of new strong PIs and aspiring PIs to the theme, as well in light of the high success at generating research grants, the high productivity is expected to continue or even increase. We feel that the integration of the excellent aspiring PIs is a key to continued success.

Continued high levels of research activity may bring with it an increased burden on computational and bioinformatics resources. It may therefore be a good investment to recruit persons with top-level expertise in that area. We also see a potential for growth in relation to the animal imaging facility (PRIME). Recruiting one or several PIs to fully exploit the potential of this amazing resource should most likely pay off in increased productivity as well as quality. Perhaps most critically, the Committee was much impressed by the good spirit of scientists in the theme and their dedication to their work. Maintaining that spirit will surely be a key factor to high productivity in the years to come.

**Societal relevance**

Members of this group seem all aware of and engaged with activities to address the societal relevance of their research theme. The basic science undertaken by this group contributes greatly to the understanding of plasticity and memory and this alone has societal relevance. Furthermore, connections are made between different mechanistic levels of understanding and core question are being addressed.
Hence, the outreach of this theme has great potential for valorisation in the diagnostics field (neurogenetics), treatment of pathological groups and translation to the clinical field of medicine, psychology, pharmacology and neurorehabilitation.

The theme of memory in relation to dementia and ageing is very topical and several important links are made with clinical researchers, such as with Olde Rikkert, De Leeuw and Kessels.

Bidding for applied funding and targeting Horizon 2020 can be an attainable goal within this consortium. Already nice examples of findings which inform principles of cognitive training for people with dementia and MCI are coming out of this group. The potential of such translations could be strengthened even more, especially when clinical/cognitive psychologist join this group. Similarly, applications are pending for the field of neuropsychiatry and post-traumatic stress-related disorders and ADHD.

**Vitality and feasibility**

Maybe because of its “relatively young age” this group has great vitality with many young PIs and aspiring PIs as group members. Despite its young age, the management of this group is showing signs of maturity as witnessed by recruiting specific research expertise, driven by strategic choices. The neurogenetics arm of this group is world-leading, as is the work of Fernandez.

The group is also engaged in collecting large cohort data sets, which is branching out in prospective study designs and this could be strengthened even more. Excellent promise for gaining research income in Horizon 2020 is present, especially given the breadth of the expertise and research undertaken in memory training and the plasticity domain by this group.

The PM group seems to have a sensible view on its performance and future strategy. The research culture in this group seems vibrant as well as very robust. Since there is no strong history in plasticity and memory, and since this theme spans the entire breadth from functional genetics to neuroscience, there is a potential risk that Theme 3 is spreading too thin. This risk is effectively eliminated by the observation that the collaborations within the theme are all created by a bottom-up approach: the groups collaborate on the basis of existing expertise and strength, and add to this a genuine desire and drive to work together and to build bridges. Hence, the few noticeable gaps in the general flow-chart from gene to brain function (such as electrophysiology) are actually not really a weakness and the committee feels assured that any arising issue can be dealt with effectively from the already established collaborations.
Connecting with the departments of Neurology, Psychiatry and clinical field of psychology seems key and there is appropriate acknowledgement of how this can be targeted and strengthened. It is important that the Donders institute is involved in the appointment of the new heads of Neurology and Psychiatry.

**Conclusions and recommendations for the theme**

The committee has seen a confident and reputable group with a befitting insight into its somewhat weaker points. The future of this group looks bright and it has formulated a clear strategy. The committee would like to add the following recommendations to this strategy:

- Formulate clear and achievable outcomes (publication output) for the next few years to streamline research effort and expertise.
- Greater outreach to clinical psychology and implementation of clinical course in the graduate school.
- Include more learning studies in the research menu of plasticity-memory theme.
- Develop theoretical model of plasticity that stimulates coherence across studies.
- The Donders Institute should be involved in the appointment of the new heads of Neurology and Psychiatry.
### 3.4 Brain Networks and Neuronal Communication

**Speaker:** Professor Ole Jensen  
**Academic staff in 2012:** 80.25 fte  
**Assessment:**  
- Quality : 4.5  
- Productivity : 4.5  
- Societal Relevance : 4  
- Vitality and feasibility : 4.5

Brain Network and Neuronal Communication, derives its scientific agenda from the insight that “cognition and behaviour needs to be understood at the level of dynamic network interactions involving several brain regions” and that “pathologies in neural communication may underlie neurological and psychiatric disorders”. The scientific vision is broad rather than specific, but it is highly topical and the focus on development of methodologies to enable brain studies offers opportunities for application to a very wide range of problems. Because of this, there is potential for high societal relevance in fields including education, healthcare, information management and games.

**Quality**

The theme combines a number of excellent research groups with very high academic reputations in different complementary fields, and there seem to be excellent facilities for non-invasive recordings. Some specific areas deserve special note, such as the unusual combination of innovation and neuroscience focus in MRI physics and some exceptional work in bioinformations/image analysis. The research is coherent and, in some cases, very original, but in all cases, current. The research of this theme is competitive internationally and amongst the best internationally in some specific areas such as those highlighted. The research portfolio as a whole is very creditable and is addressing topical themes.

Invasive methods and animal models can be more strongly developed. The presentation during the site visit and the material in report was felt to understate the coherence - current and potential - of the group. Overall, the major risk is that it conducts fragmented, supporting methodology research to many groups, rather than building on the special opportunities of being together to make a “step change” in neuroscience. Some good funding and commercialisation through BrainGain is an outstanding example of what can happen.
Productivity
There is a very good publication track record, with a number of internationally leading publications. The overall grant track record is also quite good, although some of the research groups could probably make an effort to further attract outside funding. The integration within sub-groups of the theme was well demonstrated, along with the opportunities for development of younger investigators that this provides. However, a stronger within theme cooperation between the computational neuroscience / machine learning groups and the experimental/ methodological groups could enhance productivity even further. Even greater emphasis on collaborations across other themes within the Donders could leverage to special range of skills within the Institute.

Societal relevance
This theme has a special opportunity to deliver high impact research. The BrainGain project is an important initiative within this theme to enhance translational research that illustrates the principle well. It is thematically centred around Brain-Computer Interfaces and the self-evaluation report already lists a number of application areas and successful collaborations with companies, which is very laudable. However, applications so far seem to be restricted in scope, which limits their societal impact. Linking research within BCI more strongly to the core topic of the theme “dynamic network interactions” could be beneficial. The link to clinical (neurological & psychiatric) research is well taken, and there is very high potential for successful translational research, given the competences of the theme’s groups. However, collaboration with medical schools could be strengthened, specifically with focus on the “dynamical diseases”. An initiative similar in scope to the BrainGain project could strongly enhance valorisation and societal impact. Opportunities for public-private engagement or “spin out” of research should be sought, particularly with “low hanging fruit”, such as “Big Data” bioinformatics and the need for rational computer delivered cognitive or psychological interventions.

Vitality and feasibility
This theme has great potential and big opportunities. There are ample opportunities to exploit the very special chemistry between the people and solid methodological foundations. On the other hand, the Committee did not appreciate a clear, shared overall strategy. The strong methodology in the theme is a key to the opportunities, but is a kind of research that is hard to fund in isolation. One way of further developing the theme could be to explicitly take on a limited number of ‘grand challenges” of either fundamental importance to neuroscience or that will have significant clinical or commercial impact.
Conclusions and recommendations for the theme

The combination of experimental work with advanced data analysis and computational studies is very promising and unusual within a single academic unit. The PI groups involved in this theme overall strike a good balance between experimental, methodological and computational expertise. To enhance potential for success, a resolute focus on their objectives of driving greater “vertical integration” is needed with the interactive combination of experimental work with advanced data analysis and computational studies. This already is quite well reflected in the composition of the PI group, which includes an unusual mix of excellence across both experimental and theoretical disciplines. The need to further develop optogenetics, ideally by recruiting an external leader, was highlighted.

For further improvement of the theme the committee would recommend to:

- develop invasive methods and animal models more strongly;
- strengthen the within-theme cooperation between the computational neuroscience/machine learning groups and the experimental/methodological groups. It would also be desirable to have more of the computational studies directly connecting with the system level and the behavioural and non-invasive neuronal data from the human studies;
- there is a potential need to strengthen the theme further with an additional senior appointment(s) given recent staff turnover. A greater development on optogenetics and local circuit modelling would enhance the capabilities in a useful way.
4. Response of the institute

On behalf of all members of the Donders Institute (DI), we would like to express our appreciation and gratitude to the committee members who conducted the External Evaluation. We highly value the committee’s statement that the Institute is a very stimulating environment for top researchers as well as for young talents. Below, you find our immediate response regarding the major recommendations provided by the committee to improve the quality of the research and training of master and graduate students at the Institute.

- **Balance between breadth and focus**
  The committee recommends finding a balance between breadth and focus to guide the Institute’s recruitment efforts. In response to this suggestion, it is part of our strategy that new (aspiring) PIs should indeed strengthen the focus of the currently defined research themes. Speakers of the themes play a central role in formulating job descriptions and selection of new (aspiring) PIs to sharpen research profiles of the themes. Specifically, important areas within cognitive neuroscience are addressed such that new possibilities in terms of theoretical ideas and methodological approaches can be exploited at the maximum within the research themes of the DI.

- **Clinical versus basis science**
  The committee suggests stimulating further the interactions between clinicians and more fundamental scientists, to incorporate clinical insights better in the graduate school program, and to foster this interaction by creating positions that cover all levels of translational research.
  We agree and will further stimulate collaborations between clinical and fundamental researchers by developing and implementing a comprehensive and focussed strategy in 2013/14. Potential opportunities for this strategy include new hires for the heads of departments at Psychiatry and Neurology, mixed clinical - non-clinical scientific theme meetings, internal PhD calls focussed on interdisciplinary projects, developing a translational neuroscience unit, and dedicated workshops assessing unmet clinical needs and potential solutions offered by fundamental research executed at the Donders Institute. Moreover, measures will be taken to improve the Cognitive NeuroScience master program so that interactions at the interface between clinical and fundamental research are encouraged, *i.e.*, an obligatory lab-rotation between clinical and basic science PI groups.
Proposals for new hires will made that fill critical gaps at the clinical - non-clinical intersection, like language or speech pathology.

- **Increase potential of societal relevance**
  Besides stimulating the interactions between clinicians and fundamental scientists, the DI aims to extend its outreach at different other fields in society. One new initiative is the establishment of a dedicated platform within the DI to foster our societal outreach. In connection, within the Dutch program “Topsectors” the DI is active within the areas AgriFood and Creative Industry. Related to the latter, software and Apps are currently developed that exploit neurocognitive insights about the user. Additionally, various projects are running within the field of Education, with the aim to use neurocognitive insights to improve teaching methods, such as word learning in first and second languages and mathematics at primary schools.

- **Improve gender balance**
  We are aware of this issue and fully agree with the committee. We feel confident that the increased awareness of this unwanted imbalance, our current diversity friendly recruitment policy, and the existing mentor programs will increase the number of female (aspiring) PIs in the Institute in the near future.

- **Improve speed of completion of PhD students**
  With the establishment of the graduate school, new measures were developed and implemented to ensure that a greater proportion of students finish on time. Some of these rules are, no contract extensions are offered and candidates who have not finished their thesis are not eligible for post-doc position or any other form of appointment at the DI. Furthermore, candidates are encouraged to stay at the DI to complete the thesis when the contract has finished. And If the candidate leaves the DI for other employment, a plan is drawn up with the candidate to ensure realization of the thesis. Positive effects of the various rules are expected with the more recent cohorts of PhD students. Two other envisioned improvements are the hiring of a Coördinator of the graduate school and the involvement of DI directors in annual meetings with PI’s concerning progress of PhD projects, at the moment typically performed by faculty deans.

- **Data-processing**
  The recommendations on taking measures to guarantee the availability of state-of-the-art data processing capability in the future in terms of investment in hardware, software, and sufficient technical support are well-taken.
A task force is outlining the challenges the DI has to face in terms of storage, protocols and support and will soon present concrete plans. We are also in close contact with the Radboud University Board to make fast progress on this important issue. A new Research Data Management (RDM) structure is currently developed and the DI is the pilot participant within the overall RU-RDM project.

- **Central managerial support**
  The committee advises to establish sufficient administrative and coordinative support in order to maintain the high standard of the PhD training at the Donders Institute. We hope to appoint a Coordinator of the graduate school soon, and will discuss further steps to streamline administrative support.

  In conclusion, the Donders Institute was very favourable assessed. We feel encouraged by the assessment to take the next steps to further enhance our position as an international top institute for brain, cognition and behaviour.

  We reiterate our gratitude to the Chair and members of the Evaluation Committee for their efforts and thoughtful assessment.

  On behalf of the directors of the Donders board, the speakers, its researchers and staff,
  Prof. Harold Bekkering
Appendix 1

Curricula vitae of the Evaluation Committee members

Michael Gazzaniga is the Director of the Sage Centre for the study of Mind at the University of California, Santa Barbara. He received a PhD from the California Institute of Technology, where he worked with Roger Sperry, and had primary responsibility for initiating human split-brain research. He has established Centres for Cognitive Neuroscience at Cornell Medical School, the University of California-Davis and at Dartmouth. He is the founding editor of the Cognitive Neuroscience Institute and the Journal of Cognitive Neuroscience. He was a member of the President's Council on Bioethics from 2001-2009. He is a member of the American Academy of Arts and Science, the Institute of Medicine and the National Academy of Sciences. His new book is based on his Gifford Lectures -- *Who's in Charge? Free Will and the science of the brain.*

Gary Dell is Professor of Psychology, Linguistics, and the Beckman Institute at the University of Illinois at Urbana-Champaign. He obtained his PhD in Psychology at the University of Toronto in 1980, and subsequently held academic positions at Dartmouth College and the University of Rochester, before coming to Illinois in 1989. He is currently the head of the Cognitive Science Group of the Beckman Institute, a Senior Editor of Brain and Language, and sits on the editorial boards of nine journals. Previously, he has been Acting Editor and Associate Editor of the Journal of Memory and Language and Associate Editor of Cognitive Science. Dell’s research deals with how people produce, comprehend, and learn language, and how these processes can be modelled using neural networks.

Ype Elgersma received his PhD ‘Cum Laude’ in 1995 at the University of Amsterdam on the study of peroxisome biogenesis and protein trafficking in Scerevisae. He then worked as a Post-doc in several laboratories in the United States (UC San Diego, Cold Spring Harbor Laboratory and UC Los Angeles). During this time he switched his interest towards Neuroscience, and received training in the laboratory of Alcino Silva. In 2002, Ype Elgersma started his own laboratory at the department of Neuroscience, Erasmus MC University Medical Centre in Rotterdam. The Netherlands. His laboratory seeks to get insight in the molecular and cellular basis of intellectual disability, and to use this knowledge to develop treatments. The laboratory is particularly interested in developmental disorders that are associated with intellectual disabilities, with a specific focus in disorders in the RAS-ERK and TSC-MTOR pathways and in Angelman Syndrome.
Matthew Lambon Ralph came to Manchester in 2001 as Professor of Cognitive Neuroscience within the School of Psychological Sciences. He is now also Associate Vice-President (Research) and Director of the Manchester Doctoral College at the University. He is an Action Editor for Neuropsychological Rehabilitation and on the editorial board for Cognitive Neuropsychology, Memory, International Journal of Language & Communication Disorders, Psychologia, and Neurocase. He was the President of The British Neuropsychological Society (2010-12) and the Vice-Chair for the British Aphasiology Society (2000-2005). He was made a Fellow (hons) of the Royal College of Speech and Language Therapists in 2003 and Fellow of the British Psychological Society in 2012. He was awarded the Distinguished Achievement Award (Researcher of the Year) by the University in 2008. He is also a Senior Investigator for the NIHR, a member of the MRC Non-Clinical Training and Career Development Panel, of the Royal Society Dorothy Hodgkin Fellowship panel, and of HEFCE REF Panel 4 (Psychology, Psychiatry & Neuroscience). In his research he makes use of four key methodologies: neuropsychology, computational models (models that can mimic neural organisation in their construction but also produce target behaviours), transcranial magnetic stimulation (TMS), structural and functional neuroimaging. The various research projects can be summarised under three themes: (1) Semantic memory (2) Language (3) Recovery, rehabilitation and neuroplasticity.

Paul M. Matthews, OBE, DPhil, FRCP is Professor of Clinical Neurosciences and Head of the new Division of Brain Sciences (incorporating mental health, neuropsychopharmacology, neurology and neurosciences) at Imperial College London. He also is Vice President, Integrative Medicines Development for Neurosciences and Medicine Development Lead in GlaxoSmithKline. His research interests are in novel therapeutics development and medicines stratification for multiple sclerosis. He is a Fellow by Special Election of St. Edmund Hall, Oxford and has honorary academic appointments at McGill University, the Institute of Neurology in University College, London and in the University of Oxford, as well as honorary neurology consultancies in the Oxford Radcliffe and in the Imperial College NHS Trust. Most recently, he was the founding Head of the GSK Clinical Imaging Centre at the Hammersmith Hospital, London and jointly led GSK’s programme to externalise the facility as the novel public-private partnership, Imanova, Ltd. Earlier appointments were as MRC Clinical Research Professor and Head of the Department of Clinical Neurology in Oxford, where he founded the Oxford FMRIB Centre and as MRC (Canada) Clinical Scientist and Assistant Professor of Neurology, Neurosurgery and Human Genetics at McGill University. He trained at the University of Oxford and Stanford University School of Medicine and was a resident in Neurology at McGill University.
**Alice Nieuwboer**, PhD, is working as a full professor at the Faculty of Movement and Rehabilitation Sciences of the Katholieke Universiteit Leuven (Belgium), teaching both undergraduate and postgraduate physiotherapy students in specialised topics in neurological rehabilitation and evidence-based physiotherapy. She was principal investigator of the EU-funded RESCUE-project (2002-2005 5th Framework) on cueing in Parkinson’s disease (PD) and has published widely on several topics in the field of neurological rehabilitation. Her main research efforts are dedicated to the mechanisms of freezing of gait, cueing and rehabilitation in movement disorders. Since 2007, she is running several research programs involving gait analysis, a prospective study of freezing and brain imaging of upper limb freezing, motor learning of writing problem, motor imagery and dual tasking in Parkinson’s disease. She is currently principal investigator in 2 7th framework EU-funded projects on developing and testing clinical efficacy of virtual reality learning modes, i.e. V-time and CUPID.

**Professor Kia Nobre** is a cognitive neuroscientist interested in understanding the principles of the neural systems that support cognitive functions in the human brain. Her current research investigates how neural activity linked to perception and cognition is dynamically modulated according to memories, task goals, and expectations. She is also interested in understanding how these fine and large-scale regulatory mechanisms develop, and how they are disturbed in disorders of mental health. Her work integrates behavioural methods with a powerful combination of non-invasive techniques to image and stimulate the human brain.

Kia grew up in Rio de Janeiro, Brazil, and then completed her University education in the United States, where she obtained her PhD from Yale University. She moved to Oxford in 1994 to take up a Lectureship in Cognitive Neuroscience and a Junior Research Fellowship at New College. She is currently Professor of Cognitive Neuroscience at the University of Oxford and Tutorial Fellow of Psychology at New College. She is also Adjunct Professor at Northwestern University, in Chicago. Kia directs the Oxford Centre for Human Brain Activity, a state-of-the-art facility for scientists investigating the neural dynamics that underpin human cognition and the neural deficits in psychiatric and neurological disorders, and heads the Brain & Cognition Lab, in the Department of Experimental Psychology.

**Lars Nyberg** has been active in the field of functional neuroimaging during the last two decades. He joined Endel Tulving’s group at the Rotman Research Institute in 1994, and began working on PET imaging of episodic memory (e.g., Nyberg et al., 1996, *Nature*). After returning to Sweden, Nyberg has served as professor at Umeå University (in Psychology until 2005, and in Neuroscience since 2006).
During this time he established *Umeå Center for Functional Brain Imaging* (UFBI; www.umeabrainimaging.com), and has served as the Director for UFBI since its formal start in 2001.

Nyberg is one of three principal investigators of the Betula project, which is a longitudinal study on aging, memory, and health (*e.g.*, Nilsson et al., 2004, *ANC*). Nyberg’s responsibility in Betula is brain imaging, and integration of imaging data with other kinds of data in the project (*e.g.* cognitive and genetic data from > 4000 subjects).

Nyberg and colleagues have been examining neural correlates of various training interventions. One project focused on “frontal-lobe” training by implementing a 5-week training program on working-memory updating. Selective transfer was observed to a working-memory task that also involved updating and taxed the striatum (Dahlin *et al*., 2008, *Science*). PET imaging showed that release of dopamine is elevated after updating training (Bäckman, Nyberg, *et al*., 2011 *Science*). Nyberg is since 2008 a member of the Royal Swedish Academy of Sciences.

**Klaus Helmut Obermayer** (Dr. rer. nat.) is currently professor for Computer Science (C4) at the Department of Electrical Engineering and Computer Science (Fakultät IV), Technische Universität Berlin, Germany. Klaus got his degree in physics (grade 1.0, “with honors”) at the University of Stuttgart, Germany in 1987. From 1989-1992 he had a student research position at the University of Illinois at Urbana/Champaign and the National Center for Supercomputing Applications, Urbana, IL, USA. In 1992 he received his doctorate (“with honors”) at the Department of Physics, Technical University of Munich, Germany. In 1992-1993 he followed a Postdoctoral training at the Rockefeller University, New York and in 1993-1994 at the Salk Institute for Biological Studies in La Jolla, CA, USA.

In 1994-1995 he was appointed as Hochschulassistent (C1), Technische Fakultät, University of Bielefeld, Germany and from 1995 to 2001 Associate Professor (C3) at the Department for Computer Science, TU Berlin, Germany. From 1997-1999 he was Vice-Chairman and from 1999-2001 Chairman of the Department of Computer Science, TU Berlin, Germany. Since 2001 he is appointed as full professor for Computer Science (C4), TU Berlin, Germany and since 2004 he is involved in the Bernstein Center for Computational Neuroscience as coordinator TU Berlin & ExCom member.
His research fields are Computational neuroscience (visual system, neural coding, adaptation, plasticity), Machine learning and artificial neural networks, Analysis of neural data, Pattern recognition applications.

**Pieter R. Roelfsema** received his MD degree at the University of Groningen in the Netherlands in 1991. For his PhD work he went to the group of Wolf Singer at the Max-Planck-Institute for Brain Research in Frankfurt (Germany) to work on the visual system of the cat and the role of neuronal synchronisation. He received his PhD degree at the University of Amsterdam in 1995. He then worked as postdoc in the department Visual Systems Analysis at the University of Amsterdam headed by Henk Spekreijse where he worked together with Victor Lamme. In 2002 he became workgroup leader at the Netherlands Ophthalmic Research Institute, which became part of the Netherlands Institute for Neuroscience in 2005. In 2007 he was appointed as general director of the Netherlands Institute for Neuroscience, an institute of the Royal Academy of Arts and Sciences of the Netherlands. In 2005 he became strategic Professor at the Free University of Amsterdam and in 2012 also Professor at the AMC in Amsterdam. Pieter Roelfsema was member of the Dutch Young Academy from 2005 to 2010, and he is now ambassador for the Dutch Young Academy. He studies visual perception, plasticity and memory in the visual system using multi-electrode recording techniques in experimental animals, behavioural paradigms in humans, and computational neuroscience approaches. Pieter Roelfsema investigates how neurons in different brain areas work together during visual cognition, i.e. during tasks that require thinking with the visual brain. Even the simplest visual task activates thousands neurons across a large number of cortical and subcortical brain areas. Roelfsema studies how these networks of neurons work together to solve the task and how networks configure themselves during learning.
Appendix 2

Programme Site Visit Donders Institute 29-31 May 2013

Location: "Heyendael Mansion", Geert Grooteplein 9, 6542 EZ Nijmegen.

**Wednesday 29 May 2013**

15.00-16.00 Kick-off meeting Chair, Secretary and University staff member (program, logistics, procedures, report, etcetera). Room: Titus Brandsma.
16.00-18.00 Closed session plenary committee (Discussion on individual impressions, program, procedures, and content of interviews). Room: Titus Brandsma.
18.00-19.00 Welcome reception and introduction (repr. Univ. Board and Donders Board). Room: Hall first floor.
19.00-21.00 Dinner (Committee members only). Room: Van Agt.
21.00-22.30 (Continued) Closed session plenary committee (further preparation of interviews). Room: Titus Brandsma.

**Thursday 30 May 2013**; Room: Marijnen.
08.45-09.00 Welcome by Prof. Sebastian Kortmann, Rector Magnificus, Radboud University Nijmegen
09.00-09.15 Presentation on Donders Institute by Donders Chair, Prof. Harold Bekkering
09.20-10.05 Presentation (5-10 min.) + interview (35 min.) Theme 1 - Prof. James McQueen
10.05-10.50 Presentation (5-10 min.) + interview (35 min.) Theme 2 – Prof. Ivan Toni
10.50-11.10 Writing and internal discussion committee
11.10-11.55 Presentation (5-10 min.) + interview (35 min.) Theme 3 – Prof. Barbara Franke
11.55-12.40 Presentation (5-10 min.) + interview (35 min.) Theme 4 – Dr. Ole Jensen
12.40-13.00 Writing and Internal discussion committee members
13.00-13.30 Lunch together with speakers of four Themes and of Graduate School. Room: Marijnen Hall.
13.30-13.40 Walk to Donders Laboratories
13.40-15.00 Tour along Donders labs (parallel groups, each guided by talented young researcher)
15.10-15.30 Coffee break
15.30-16.30 Presentation (5-10 min.) + interview (50 min.) Graduate School – Dr. Christian Döller and Prof. Ruud Meulenbroek
16.30-17.15 Interview Deans (Profs Dekkers (Social Sci), Gielen (Science), Brunner (Medicine)
17.15-18.15 Plenary discussion committee members, and writing on report
18.30 Dinner together with members of Donders Board, Dean(s), man. director. Room: Van Agt

Friday 31 May 2013

09.00-12.00 Four parallel sessions for interviews PI's (Themes 1-4). Rooms: Marijnen, Cals, Regout and Hermesdorf. Each Theme will be represented by nine PI's (20 min. per PI) PI selection is done by the speakers, committee may ask to see others when preferred

12.00-12.45 Writing report addressing individual PI-groups. Room: Marijnen.

12.45-14.00 Lunch and meeting PhDs and Postdocs (Experiences Donders Graduate School) including some poster presentations. Room: Beel + Central Hall.

14.00-15.00 Interview Donders Board. Room: Marijnen.

15.00-17.00 Plenary committee meeting to discuss results and further procedures assessment report. Room: Marijnen.

17.00-17.05 Walk to Lecture Hall (Radboud Auditorium; Geert Grootplein 15).

17.05-17.30 Presentation of preliminary conclusions by Chair Committee

17.30-18.00 Informal meeting and drinks

18.00 End of Site Visit