

Erasmus MC

Universitair Medisch Centrum Rotterdam



Research Assessment

Theme Brain &
Senses

2013-2018



Report on the research review according to the Standard Evaluation Protocol 2015-2021

dr. Floor Meijer
onderzoek, tekst & advies



Contents

Preface	5	V. Department of Oral and Maxillofacial Surgery	23
I. Introduction	7	<i>Mission and strategy</i>	<i>23</i>
<i>Assignment to the committee</i>	<i>7</i>	<i>Research quality</i>	<i>24</i>
<i>Assessment criteria.....</i>	<i>7</i>	<i>Relevance to society.....</i>	<i>24</i>
<i>Committee composition</i>	<i>8</i>	<i>Viability.....</i>	<i>25</i>
<i>Documentation</i>	<i>8</i>	<i>Recommendations.....</i>	<i>26</i>
<i>Working method.....</i>	<i>8</i>	VI. Psychiatry.....	27
<i>Structure of the report.....</i>	<i>9</i>	<i>Strategy and targets.....</i>	<i>27</i>
II. General findings Theme Brain & Senses.....	11	<i>Research quality</i>	<i>28</i>
<i>Organizational structure</i>	<i>11</i>	<i>Relevance to society.....</i>	<i>28</i>
<i>Strategy23</i>	<i>11</i>	<i>Viability.....</i>	<i>28</i>
<i>Funding.....</i>	<i>11</i>	<i>Recommendations.....</i>	<i>29</i>
<i>Infrastructure</i>	<i>12</i>	VII. Ophthalmology.....	30
<i>Data management</i>	<i>12</i>	<i>Strategy and targets.....</i>	<i>30</i>
<i>Talent management.....</i>	<i>13</i>	<i>Research quality</i>	<i>30</i>
<i>Patient participation.....</i>	<i>13</i>	<i>Relevance to society.....</i>	<i>31</i>
<i>Diversity.....</i>	<i>13</i>	<i>Viability.....</i>	<i>31</i>
<i>Research integrity.....</i>	<i>14</i>	<i>Recommendations.....</i>	<i>32</i>
<i>PhD training and supervision.....</i>	<i>14</i>	VIII. Otorhinolaryngology and Head & Neck Surgery	33
III. Department of Neurology	17	<i>Strategy and targets.....</i>	<i>33</i>
<i>Mission and strategy</i>	<i>17</i>	<i>Research quality.....</i>	<i>33</i>
<i>Research quality</i>	<i>18</i>	<i>Relevance to society</i>	<i>34</i>
<i>Relevance to society</i>	<i>18</i>	<i>Viability</i>	<i>34</i>
<i>Viability.....</i>	<i>19</i>	<i>Recommendations.....</i>	<i>35</i>
<i>Recommendations.....</i>	<i>19</i>	Appendices	37
IV. Department of Neurosurgery.....	20	<i>Appendix 1: CVs of committee members.....</i>	<i>39</i>
<i>Mission and strategy</i>	<i>20</i>	<i>Appendix 2. Quantitative data on the departmental composition and financing</i>	<i>41</i>
<i>Research quality</i>	<i>21</i>	<i>Appendix 3: Schedule of the site visit</i>	<i>43</i>
<i>Relevance to society</i>	<i>21</i>	<i>Appendix 4: SEP Assessment Scale</i>	<i>45</i>
<i>Viability.....</i>	<i>22</i>		
<i>Recommendations.....</i>	<i>22</i>		

Preface

It is with great pleasure that we present you the report on the research review 2013-2020 according to the Standard Evaluation Protocol 2015-2021 of the theme Brain & Senses of Erasmus MC. With this report the committee aims to provide Erasmus MC with commendations on the research of the Theme Brain & Senses and with recommendations to maintain and further develop its success in the future.

During the process of the evaluation, we have encountered an open attitude among both the leadership and the mid- and junior-level professionals, which has made the interactions between the committee members and those representing the theme both valuable and pleasurable. And this even though we were forced to have all encounters via videoconferencing instead of in person due to the measures around the corona-pandemic.

We trust that the report will help Erasmus MC to continue to play an important role in improving the lives of patients with diseases of the brain and senses.

Prof. dr. CJM (Karin) Klijn
Committee chair, Theme Brain & Senses
Nijmegen, March 2021

I. Introduction

Assignment to the committee

The Executive Board of Erasmus University Medical Centre Rotterdam (Erasmus MC) initiated an assessment of the scientific research done at the institute during the period 2013-2018. This quality assessment was part of the regular six-year evaluation cycle of the research of Dutch universities and University Medical Centres (UMCs).

The primary units of research at Erasmus MC are its 48 departments, which are (financially) responsible for carrying out the institute-wide research strategy. Each department is led by a Department Head appointed by the Executive Board of Erasmus MC. The Department Head is fully responsible for the core functions (research, education, and if applicable patient care) as well as for the atmosphere and working environment (diversity & research integrity) of the department. Historically, departments are distributed over nine overarching themes, including research, clinic and education:

1. Biomedical Sciences (6 departments)
2. Brain & Senses (6 departments)
3. Daniel den Hoed (3 departments)
4. Diagnostic & Advice (7 departments)
5. Dijkzigt (8 departments)
6. Health Sciences (4 departments)
7. Sophia (7 departments)
8. SPIN (3 departments)
9. Thorax (3 departments)

For the purposes of this assessment, the Executive Board of Erasmus MC appointed a separate committee of international experts for each of its nine themes, consisting of international experts in the fields of the departments involved. Each committee conducted its own assessment, amounting to a total of nine assessments. The respective digital site visits to Erasmus MC took place in the period September 2020 to April 2021.

Originally, the members of each committee were intended to meet with one another and with Institute and Department representatives during onsite meetings. These were scheduled to take place in the spring of 2020. However, due to the global Covid-19 pandemic, the site visits to Rotterdam were first postponed and later replaced by remote meetings via a digital platform. In order to partially compensate for the loss of interpersonal interaction during physical meetings,

it was decided to schedule additional online meetings between committee members and use interactive working methods.

This report describes the findings, conclusions and recommendations of the committee that assessed the six departments that are part of Theme Brain & Senses. Each department is assessed in the context of research programmes and institutes worldwide in similar disciplines and on similar topics and without a formal quantitative comparison.

The committee did not attempt to draw a direct comparison between departments within the theme and Erasmus MC. Nonetheless, it has taken note of the results and strategies of the departments in Theme Brain & Senses and discussed them in relation to each other. The committee emphasizes that the assessments made by the nine committees are not comparable; each committee assessed the theme in question on its own merits.

Assessment criteria

The assessment of Theme Brain & Senses was guided by the Standard Evaluation Protocol 2015-2021 of the Royal Netherlands Academy of Arts and Sciences (KNAW), the Netherlands Organisation for Scientific Research (NWO) and the Dutch Association of Universities (VSNU). The three assessment criteria specified in the Standard Evaluation Protocol – (1) research quality, (2) relevance to society and (3) viability – formed the starting point for the assessment. In its report, the committee both qualitatively and quantitatively assesses these criteria, scoring them on a four-point scale, ranging from world leading/excellent (1) to unsatisfactory (4). The meaning of the scores is explained in appendix 4. In accordance with the Standard Evaluation Protocol, the assessment also includes a qualitative appraisal of Erasmus MC's PhD programme, and its research integrity and diversity policies and practices.

In addition to the Standard Evaluation Protocol criteria, the committee took three specific research-related targets into consideration. These are part of Erasmus MC's current strategy ([Strategy23](#)), which designates 'Technology & Dedication' as its guiding principles. In the Terms of Reference for the research assessment the Executive Board of Erasmus MC describes the three research-related targets as follows:

1. Positioning ourselves as a partner;
2. Using technology to lead the way in innovation;

3. Focusing on our staff and internal organization.

Committee composition

Members of the committee that assessed the departments of Theme Brain & Senses are:

- Prof. C.J.M. (Karin) Klijn, chair, Radboudumc, the Netherlands;
- Prof. F.M. (Floortje) Scheepers, vice-chair, UMC Utrecht;
- Prof. Constantinus Politis, KU Leuven, Belgium;
- Prof. Hendrik Scholl, University of Basel, Switzerland;
- Prof. Benedikt Schoser, University of Munich, Germany;
- Prof. Conrad Timon, Trinity College Dublin, Ireland;
- Prof. Robert Takes Radboudumc, the Netherlands;
- Prof. Steven De Vleeschouwer, KU Leuven, Belgium.

Dr Meg van Bogaert and Dr Floor Meijer were appointed as independent secretaries to the committee. A short curriculum vitae of each of the committee members is included in appendix 1. All members of the committee signed a statement of impartiality and confidentiality to ensure a transparent and independent assessment process. Any existing professional relationships between committee members and departments under assessment were reported. The committee concluded that there was no risk in terms of bias or undue influence.

Documentation

Prior to the site visit, the committee received the self-evaluation report of the theme and the departments involved, including the information and appendices required by the Standard Evaluation Protocol. The following additional documents were provided:

- Standard Evaluation Protocol 2015-2021;
- Terms of reference for conducting the site visit;
- A Beginner's Guide to Dutch Academia (The Young Academy, 2018);
- Strategy23 (*Koers23*);

Working method

Prior to the site visit, the committee members were asked to read the documentation and formulate preliminary assessments and questions for the interviews. In an online kick-off meeting, approximately six weeks prior to the site visit, the

committee was introduced to the Standard Evaluation Protocol and agreed upon procedural matters. In a second online meeting, approximately three weeks prior to the site visit, the committee discussed preliminary assessments and formulated questions on relevant topics. These questions were afterwards sent to the heads of department in order to facilitate their preparations for the site visit. On the day before the start of the digital site visit, the committee held a closed online meeting to prepare for the interviews.

Each member of the committee was primarily responsible for the assessment of one specific department. As 'first assessor', he or she took the lead in preparing for the assessment of this department. Furthermore, this committee member took the lead in the online interviews with department staff and eventually drafted an assessment based on the Standard Evaluation Protocol criteria. For reasons of continuity, a 'second assessor' was appointed to each department. Contrary to the first assessor, the second assessor was not necessarily an expert in the field of the department.

The online site visit of Theme Brain & Senses took place on 14 and 15 January 2021. During the site visit, the committee met with the Executive Board of Erasmus MC, as represented by the dean, as well as with representatives of the departments. Each department was given a time slot, which it filled with presentations and interviews. Committee members also spoke with PhD candidates of the departments during two consecutive speed dates and a plenary PhD session. During its final meeting, the committee jointly scored all of the departments. To conclude the visit, the committee presented the main preliminary conclusions to the dean of Erasmus MC and the heads of departments of Theme Brain & Senses. The schedule for the site visit is included in appendix 2.

After the site visit, the chair and the secretaries drafted a first version of the committee report, based on the assessments drawn up by the first assessors. This draft report was circulated to the committee for all members to comment on. Subsequently, the draft report was presented to Erasmus MC for factual corrections and comments. In close consultation with the chair and other committee members, the secretaries used these comments to finalize the report. The final report was presented to the Executive Board of Erasmus MC.

Structure of the report

This report contains the committee's findings and conclusions on the six departments of Theme Brain & Senses. In accordance with the Standard Evaluation Protocol, the committee details its assessments on strategy and targets, research quality, societal relevance and viability in separate chapters for all six departments. These chapters also discuss particularities with respect to PhD

training. Overarching and institutional dimensions of such aspects (e.g. policies that are developed at Erasmus MC rather than at the departmental level, general practices at Theme Brain & Senses with respect to PhD training, diversity and research integrity) are assessed in a general chapter that precedes the chapters on the departments. Details on the composition of the committee, the assessment scale and the setup of the digital site visit can be found in the appendices.

II. General findings Theme Brain & Senses

Organizational structure

Erasmus MC has traditionally been organized in a decentralized manner. Its 48 departments form the primary units for governance, HR and funding. Also, the head has to ensure a good atmosphere and working environment (diversity and research integrity) within the department. He or she reports directly to the Executive Board of Erasmus MC.

For organisational/administrative purposes, departments have been grouped together in themes. The committee learned that the current nine themes were created in 2012, when departments were clustered based on existing clinical collaborations. The themes are organizational units only. As such they are not responsible for developing research strategies or distributing funds. Within a theme, the combined heads of departments, together with the theme director, form the Theme Board. One of the heads acts as chair.

In its conversations with staff members of Theme Brain & Senses, the committee explored the added value of the theme-level. It found that the theme is currently mainly relevant in an administrative sense. Theme Brain & Senses has its own Theme Office, which supports and facilitates the associated departments in their operational management. Otherwise, the individual departments that make up the theme appear only loosely connected. While there are certainly collaborations between individual departments that share certain research interests, collaborations appear not necessarily incentivized from the theme level. Moreover, collaborations between departments seem to cross theme boundaries just as easily as they stay within them. All in all, there appears to be no specific effort of departments to jointly advance the mutual interests of research in the theme. This seems to be a missed opportunity.

The organizational structure of Erasmus MC, with its departments and themes, seems functional, albeit rather traditional. The committee understood that Erasmus MC is currently discussing potential alternative arrangements. The committee could imagine that the Executive Board aims for the organizing principle that best serves its strategy. A more interdisciplinary approach seems to have been taken in recently established institutes (Cardiovascular, Cancer, and others).

The committee also learned that over the review period, Erasmus MC has stimulated cross-departmental cooperation in research, patient care and education by offering staff the opportunity to establish academic centres of excellence (ACEs). These ACEs were presented to the committee as bottom-up, virtual units, which do not receive structural funding for their activities. There are now around eighty of these ACEs, which are led by one or multiple principal coordinator(s). It is not mandatory for staff to be part of ACEs and in practice the level of participation seems to vary.

Strategy23

As part of the new institutional strategy for the 2018-2023 period ('Strategy23') Erasmus MC aims to become the first technical academic medical centre in the Netherlands by convergence with Delft University of Technology (TU Delft) and Erasmus University Rotterdam. Technology and dedication are the dual focus points of this new strategy.

The committee sees a lot of potential from a research perspective in Strategy 23. From the interviews it was clear that there are already interesting and promising collaborations with TU Delft which are focused on technological innovation – although in some departments more so than in others. Providing a central stimulus for such initiatives would be helpful, with clear examples in Neurosurgery, Oral and Maxillofacial Surgery and OHNS (see in the respective chapters). The committee encourages Erasmus MC to develop the full research potential of the liaison with TU Delft over the full range of departments in the theme.

Funding

Funding for research is administered and spent at the level of the department. Most departments have income from all three funding streams (i.e. government funding allocated to the departments by the Executive Board, grants and contracts). However, there are substantial differences in the ratio of these different sources of income (cf. appendix 3 on quantitative data).

The extent to which departments share in the first stream funding awarded to Erasmus MC by the government appears to be a source of discontentment, especially now that first stream research budgets are under increasing pressure across the Netherlands. Department representatives informed the committee that larger departments with a longstanding research

tradition receive a relatively larger share of direct funding than smaller departments which entered into research more recently. In the allocation model, historical factors outweigh the actual research performance of departments or Erasmus MC's strategic choices for the future. While the Executive Board informed the committee that it is willing to change the allocation model – and indeed different scenarios for change are currently being explored – it also acknowledged that this will be no mean feat, mainly because at department level the first stream budget is tied up in the salaries of staff with permanent contracts.

The committee believes that solving this difficult puzzle will ultimately be in the best interest of Erasmus MC and it therefore encourages the Executive Board to continue its efforts to set out a new road map for the distribution of direct government funding. The committee believes that a new allocation model should optimally fit the strategic choices that were made as part of Strategy23.

Infrastructure

In terms of the facilities available to researchers, Erasmus MC was described to the committee as a 'research paradise', which is clearly a strong commendation. Staff agreed that there is good access to literature and other resources needed for research. The committee learned that facilities are offered at different levels, ranging from the central to the department level. This approach seems to fit the multi-layered organizational model.

At the central level, Erasmus MC offers its departments a number of core facilities, like the 3D lab and research suite. These are centrally operated facilities that staff can use for their research purposes, or where they can have specific services performed.

At the theme level, there is a shared theme office, which provides financial, HR and managerial support to the six departments of Theme Brain & Senses. This theme office was labelled as well-equipped for its responsibilities. Particularly, departments appear to appreciate the theme office's experience with administering externally acquired funding. It was stressed that within the theme there is no discrimination based on the size of departments. Larger and smaller departments benefit equally from the services provided by the theme office. The costs for this facility are divided based upon the financial capacity of the departments. Relations between departments were described to the committee as cordial and

respectful. Nonetheless, the committee sees opportunities for optimizing synergy at the theme level with respect to research support and other critical success factors.

From the interviews it was clear that quite some (crucial) research infrastructure is organised at the department level. Inequality between departments seems to be an issue here. Larger departments have the means to organize excellent support facilities (e.g. Research Office Neurology at Department of Neurology), smaller departments could benefit from experiences and the support office of the larger departments. The committee was pleased to learn that some exchange of services and sharing of facilities takes place, for instance: the Department of Neurosurgery can make use of the ICT facilities of the Department of Neurology. According to the committee, efficiency and professionalism on a theme level could be improved upon by making knowledge available to all departments in the theme. It is very likely more cost-effective if departments within the theme benefit more often from each other's research infrastructure and know-how.

Staff mentioned that researchers and research groups often encounter similar issues that they each try to solve on their own, without being aware of, or making use of, pre-existing knowledge and solutions. Research meetings and staff retreats that transcend the boundaries of individual research groups or departments may facilitate and strengthen both formal knowledge-exchange and informal contacts between researchers.

Data management

Erasmus MC aims to generate, store and publicize research data in accordance with legal, academic and ethical requirements and according to the FAIR principles (Findable, Accessible, Interoperable and Reusable) according to the Handbook for Adequate Natural Data Stewardship developed by the Federation of Dutch UMCs. In 2018, Erasmus MC started an initiative to develop an institute-wide research IT-infrastructure ('Research Suite'). This project deals (amongst others) with:

- Providing the physical infrastructure for data storage and computing power (cloud service);
- Offering data stewardship and governance for the (re)use of different types of data;
- Creation of digital workspaces for researchers where they can safely collaborate with partners inside and outside the Erasmus MC.

- Implementation of data capture tool, electronic lab journal, study/project management (PaNaMa)
- Support with development of study specific data management plans

In the review period, central data storage facilities provided by Erasmus MC were not necessarily suited to the needs of all departments. An Erasmus MC-wide data management plan and associated storage facilities with an audit trail and log ('Research Suite') are currently in the final stages of development. A research management software application ('PaNaMa') is simultaneously being finalised.

Talent management

The staff members that the committee spoke with appeared to be in agreement that Erasmus MC is a good place to work. There is a collaborative atmosphere with many opportunities and a good amount of personal freedom for individual staff. The committee was particularly pleased to find that researchers both at the senior and junior level radiate a high intrinsic motivation and a strong common dedication to Erasmus MC's mission of improving patient care. Quite a number of them started as (PhD) students at Erasmus MC and consciously chose to continue their career there.

While staff satisfaction is clearly high in many respects, staff members also flagged a number of concerns, particularly with respect to talent management. A main objection that is shared by the committee is that Erasmus MC has not adopted a tenure track programme, signifying that departments lack a formal tool for making informed HR decisions. Also, it means that early- and mid-career staff members have only limited insight in their career possibilities. This may result in valuable and talented researchers pursuing opportunities elsewhere, while the succession of senior researchers who are due to retire is not secured. In the committee's opinion, this is a situation that requires urgent attention, in order to safeguard the viability of departments at Theme Brain & Senses.

Another conclusion is that many staff members would benefit from establishing formal mentoring and coaching programmes. The committee feels that having an outside mentor is not only helpful to early-career researchers but could also benefit more established clinician-scientists. Also, in addition to the existing talent classes, Erasmus MC could consider providing seeding grants to young

talent, as this would help them in gaining independence.

Patient participation

For each department the committee assessed the relevance to society of the research. One aspect concerning this topic is relevant to all departments in the theme. The committee recommends to consider mechanisms to increase patient participation and inclusion in all parts of the research agenda. Patient participation/co-creation in asking the right research questions, designing methods and focusing on the right outcomes. In some departments this topic is already being discussed and on the agenda, while other departments are still at the start of this development.

Diversity

Erasmus MC is working on its diversity policy. The committee fully encourages Erasmus MC to keep pursuing diversity at all organizational levels. It noticed that, when reporting on diversity, the departments mostly seemed to refer to gender and not to (e.g.) socio-economical and ethnical diversity. More attention – and preferably: targeted interventions – may be beneficial to promote diversity in the full sense of the word. In addition, the committee suggests the leadership in the theme to capitalise on diversity.

In order to achieve an equal gender balance, Erasmus MC specifically developed a number of policy initiatives to support female researchers. These include the Female Talent Class, consisting of various workshops and interventions intended for talented early career researchers (maximum of two years after PhD completion), and the Female Career Development Programme, developed for female scientists (clinical and non-clinical scientists between 4 and 8 years after promotion) who have the potential and ambition to reach the position of associate professor (UHD). The committee met with several talented female researchers who made use of these initiatives and said to have benefitted from them.

Despite these policy initiatives, the gender balance amongst senior researchers and in management is still skewed in favour of men. There is clearly no shortage of female talent amongst early- and mid-career researchers, but few women make it to the top. In the interviews, PhD candidates – both male and female – specifically stressed that female role models at the professor and managerial level are in short supply. It is also recognized amongst staff that more diversity at managerial and professor

level would bring different styles of leadership, new perspectives and novel approaches – and thus ultimately a richer research culture. The committee therefore encourages Erasmus MC to give its departments the necessary tools to fast-track ambitious female talent.

Research integrity

Erasmus MC endorses the Code of Conduct for research of the Association of Universities in the Netherlands (VSNU) and the revised European Code of Conduct for Research Integrity. As of early 2018, Erasmus MC has its own guidelines in case of scientific misconduct. Furthermore, Erasmus MC policies on academic/scientific integrity are outlined in the Erasmus MC Research Code that covers the following aspects:

- Research with patient data and biomaterial;
- Data management;
- Guidelines for publishing and authorships;
- Guidelines inducements by companies;
- Intellectual property.

As the committee understood it, the decentral implementation of the centralized integrity policy is work-in-progress. In anticipation of this policy, departments are responsible for their own research culture. All PhD candidates follow a mandatory one-day course on research integrity. For researchers who are involved in patient or human studies, a training requirement for clinical practice is the Basic Regulatory Course and Organization for Clinical Researchers. The committee has not received any signs that integrity is at risk.

PhD training and supervision

PhD training and supervision

Erasmus MC offers three- to four-year (fulltime equivalent) PhD positions, which are most often funded through grants and industry. Projects are either individual or (partially) shared with other PhD candidates. From speaking to a delegation of PhD candidates, the committee concludes that Erasmus MC offers its PhDs a safe learning and working environment, in which there is room to communicate both successes and failures. Also, there appears to be a good balance between individual autonomy for PhDs to develop their own ideas and guidance by supervisors.

Until recently, training and supervision practices were shaped at the decentral level and significantly varied from department to department and from supervisor to supervisor. In recent years, initiatives have been taken to streamline procedures and

practices across Erasmus MC. The most prominent (and imminent) change is the introduction of a Graduate School, which will be operational in early 2021. This new Graduate School will replace the (five) local research schools (i.e. NIHES, Molmed, COEUR, MGC, ONWAR), that are currently responsible for the training of Erasmus MC PhD candidates. The courses offered by these schools will be integrated in three tracks, Clinical Sciences, Health Sciences, Biomedical Sciences, and will become available to all +/- 1500 Erasmus MC PhD candidates.

A second initiative aimed at streamlining the PhD programme, is the introduction of the central database system Hora Finita (operational as of late 2019) in which the status of all PhD projects is registered. The committee notes that, before the introduction of Hora Finita, Erasmus MC did not centrally keep track of completion times, success rates and next destinations of PhDs. Therefore, it was not possible to assess quantitative aspects of the PhD programme for the 2013-2018 period

PhD candidates are expected to obtain a total of 30 EC over the course of their project. These credits can be earned by taking courses, attending lectures and conferences and teaching undergraduate students. A one-day course on research integrity is mandatory for all Erasmus MC PhD candidates. Candidates who conduct animal experiments are required to follow a course on laboratory animal science, while candidates who are involved in patient-related research take part in a course on good clinical practice. PhD candidates that the committee spoke with assessed the course quality as good-excellent. There is a broad range of courses and they are sufficiently in-depth.

PhDs are also generally positive on their career options and on labour market preparation throughout the PhD project. Many (but not all) supervisors encourage PhDs to think about future careers and inform them on potential options. The Graduate School could in the future offer labour market orientation training to prepare PhD candidates for the job market.

All of the PhDs that participated in the review have a personal training and supervision plan (TSP), usually drawn up by the PhD candidate him/herself, sometimes with help from the supervisor(s). In some cases, this was done retrospectively, after the introduction of Hora Finita, as this system demands having a TSP. It is not (yet) common that the TSP is updated annually

or taken as the starting point for yearly progress meetings, but it is believed that this will become the norm for future cohorts. The PhD candidates with whom the committee spoke, were generally very satisfied with the quality of supervision, praising the high level of involvement and interest of supervisors, their accessibility and helpful attitude. Having two supervisors seems to be the norm, although some of the PhDs have three or even four. When more than one department is involved in the supervision, communication is not always optimal, according to PhD candidates.

The provision of information to PhD candidates seems to be a general point of attention. The committee noted that PhDs commonly rely on informal sources of information rather than on 'official' communication channels. This means that not all PhDs have the necessary information available to them at all times. A striking example of this is the communication on thesis requirements. While Erasmus MC has official requirements for graduation (four published articles, of which two first authorships and at least two in the first quartile of the scientific field concerned), not all PhDs seem aware of these requirements – at least not at the start of their projects and neither are a number of supervisors. PhD candidates also mentioned that, in practice, expectations in terms of the number of submitted/published articles tend to vary across departments – and perhaps even across supervisors. In some cases, these differences make sense because of different research practices in different disciplines. In other cases, perceived variations seem more random. The committee recommends more clarity on what is expected/required and why, from an early stage on. The Graduate School can most likely play a positive role in this respect. An on boarding programme may be considered.

The time that PhD candidates spend on their PhD varies from 30-40 hours a week to more than 50 hours. While many PhDs are (very) satisfied with their work-life balance, this is not the case for everyone. Maintaining a healthy work-life balance seems to be an issue that a portion of the PhD population struggles with. Combining a PhD with a residency programme was mentioned as particularly challenging, because of the high workload involved. The committee was also told that the start of the project is the most difficult phase in terms of work-life balance. For new PhDs,

living up to the high expectations of supervisors can seem quite jaunting. Furthermore, PhDs note that there is quite a bit of peer pressure within the PhD community to deal with, for example the number of required publications is often lower than what PhD students feel they should have.

To improve the work-life balance of PhDs, the committee recommends adding more structure to the first part of the PhD trajectory. In its opinion, an 'onboarding' procedure could help to facilitate the transition from student to PhD candidate by familiarizing PhDs with their new environment and by clarifying expectations. Furthermore, it is important to provide PhDs with a personal support system. The committee recommends to consider a buddy system, in which more advanced PhDs provide advice and information to their junior colleagues. Finally, the committee feels that it will be helpful to make external coaching and mentoring available to PhD candidates.

An issue related to job satisfaction that was pointed out by PhDs, is that the pressure to complete a PhD is strong in medicine, and perhaps particularly so at Erasmus MC. Obtaining a PhD is (almost) a prerequisite for entering residency. By consequence, at least part of the PhD population is not driven by an intrinsic interest in research and may not find the process all that enjoyable. This approach should perhaps be reconsidered in this light.

A final topic that the committee touched upon with PhD candidates, is their access to general facilities. While many PhDs are satisfied with the facilities on offer, they also had a number of suggestions for further improvement. For many PhDs, flexible office space ('de kantoortuin') is a major source of discontentment, because sharing offices with many others makes it difficult to concentrate. With respect to data management, it was mentioned that it would be helpful to have a clear point of contact who can explain procedures. Similarly, some PhD candidates miss hands-on lab instruction, preferably by an experienced technician or a postdoc who is firmly involved in lab work. In general, it was mentioned that cohesion between departments could be better. It can be quite difficult for PhDs to find their way to the expertise that they need and that is available elsewhere within Erasmus MC.

III. Department of Neurology

Research quality	Excellent (1)
Relevance to society	Excellent (1)
Viability	Very Good (2)

Mission and strategy

The department of Neurology is one of the largest departments in Theme Brain & Senses. Its mission and strategy are directly derived from the overall mission and strategy (*Koers18, Koers23*) of Erasmus MC, thereby ensuring a close alignment between departmental goals and ambitions and those of the wider institute. The department's mission is defined as 'to improve diagnosis, treatment and outcome in patients with neurological disorders by performing translational, clinical and population-based research'. This is done in close collaboration with partners from other disciplines within Erasmus MC and with national and international partners and patient advocacy groups.

The department appropriately narrows down its rather broad mission by placing particular emphasis on a backwards translational approach (from 'bed to bench', instead of from molecules to humans), with the goal to improve diagnosis, prediction of treatment response and monitoring and to find new targets for treatment. The department makes it clear that it does not study the normal functioning of the nervous system, nor does it primarily focus on disease models in experimental animals. The committee finds this a suitable, sensible, and modern approach. The phrasing of the mission and strategy could, however, be reconsidered. The committee feels that, in order to be properly understood by the general public and by patients, the department could make more clear what particular problems it aims to solve.

The department's main research areas are neurovascular, neurocognitive, neuro-inflammation with neuromuscular, and neuro-oncology. Research is formally organised into three 'sectors', two of which are further subdivided:

1. Neurovascular and Neurodegenerative disorders (subdivided into Neurovascular disorders and Neurocognitive disorders).
2. Inflammation of the peripheral and central nervous system (subdivided into Inflammation of the peripheral nervous system and Inflammation of the central nervous system).

3. Neuro-oncology.

Each sector is led by a sector head, while each (sub)sector consists of several research lines, directed by PIs. In monthly meetings, the sector heads and the head of department discuss practical matters and strategic choices. Also, they prepare the agenda for the department's Scientific Committee, which safeguards e.g. research integrity. The committee noted a collegial atmosphere. PIs have clearly gotten to know and appreciate each other and have grown in their role together, as a team. This collaborative spirit resonates through to the other organizational levels. Where necessary, staff members take over tasks from colleagues, thereby effectively helping each other navigate the workload. Staff members also indicated that they feel free to raise issues with the management and experience that these are treated with integrity. Overall, the committee is under the impression that staff members, from management to PhD candidates, feel comfortable at the department.

In line with the institute wide Strategy²³, the department sees many opportunities for technological innovations in the field of neurology by cooperating with TU Delft in areas such as imaging, robotics, microfluidics, big and personalized data analysis, and mass spectrometry. The department has appointed two ambassadors to explore the various possibilities. This has already led to a number of interesting interdisciplinary projects on AI in clinical imaging in inflammatory neuropathies and deep machine learning in stroke research and autoimmune encephalitis. All three sectors have specific collaborations with other Erasmus MC departments. There is a particularly strong link to the Department of Neurosurgery and to the Sophia Children's Hospital. The sectors are at multiple levels in long-term international cooperation throughout the world.

Clinical trial support was mentioned as an area for improvement, especially as staff experience an increasing administrative burden. The committee was informed that the department has taken the first steps towards more structural support, by increasing the number of support staff and by establishing the Research Office Neurology (RON), whose main task is to support researchers in registration and implementation of clinical studies. Nonetheless, RON is widely recognized as an initiative that has yet to reach its full potential. Staff members would prefer it if RON provides more support on grant writing, data management, trial set-up, trial monitoring, and communication

with the general public, as these specific aspects make research increasingly demanding. Furthermore, the department will shortly join Research Suite, which should help with secure storage of the extensive amounts of data coming in from large cohort studies that all sections are using for their specific research projects. Erasmus MC core facilities that the department uses on a regular basis include, EDC, iPS, HuGe-F, proteomics, GenR, EMI.

Research quality

Overall, the quality of the research is excellent. Across all major areas of research, the department has succeeded in translating its strategy of performing backwards translational research into research outcomes of world-leading quality. Specifically, the department has been able to use (inter)national trials and specific prospective disease cohorts to build large databases and biobanks. Also, there are close links to basic research, e.g. for brain tumour research, neuroinflammation, and neurometabolic disorders, e.g. gene therapy.

The department's productivity is very high across the board and has grown further over the review period. The same holds true for its impact, as demonstrated by a very solid and increasing mean normalized citation score. Throughout the review period, there have been multiple high-impact publications in high-ranking papers (e.g. N Engl J Med., Cell, The Lancet, Lancet Neurol, Lancet Oncol, Ann Neurol, Brain, Neurology). These have added to the department's international visibility and academic reputation.

Section heads and their key co-workers are typically international leaders in their specific fields. Over the review period, the department saw a number of new arrivals, who have since proven their value for the department's research efforts. Moreover, staff members have been highly successful in establishing (inter)national collaborations and in bringing in (inter)national research funding, e.g. IGOST consortium. External research funding is at an excellent level, while direct ('first stream') funding has remained stable throughout the review period.

From the evidence examined by the committee, it is clear that the department has spent the previous decades building its research sectors and (large number of) underlying research lines to a level of international excellence. In working with highly specialized patient cohorts, the research lines have put forward and nurtured several new ideas, with

results to match. The overall nature of the research, however, is somewhat on the safe side. It is conceivable that at this specific moment in its existence, when the department is clearly going from strength to strength, something could be gained by moving into more experimental, high-stakes, high-gain research (cf. 'viability').

Relevance to society

The Department of Neurology's research addresses acute and chronic devastating diseases of the nervous system. Its scientific excellence in major neurologic (especially neurovascular) diseases guarantees that the work is highly relevant for the general public and for patients in particular, who benefit from early detection of central and peripheral nervous system diseases.

An important starting point for the department is that in order to perform excellent clinical and translational research, patient care also has to be outstanding. So, while the department is very research oriented, the patient's best interest is key. All three research sectors have adopted the principles of Value-Based Health Care. The department is also involved in guideline development. For example: the PI of the autoimmune encephalitis group chairs the European guideline for autoimmune encephalitis.

The department has strong connections with disease specific civil organizations and patient advocacy groups (e.g. Dutch Heart Foundation, Brain Foundation Netherlands, Spierziekten Nederland, MS Nederland). Patients are regularly consulted on grant applications and involved in the research itself. The Stroke center, for example, has an active lay panel consisting of patients who were treated in Erasmus MC for various neurovascular diseases (ischemic and hemorrhagic stroke, subarachnoid hemorrhage). The Alzheimer Center is co-funded by Alzheimer Nederland and actively consults families with genetic FTD on its research plans, while Spierziekten Nederland and PBS actively participate in the development of new therapies for Pompe disease.

The research lines use social media, newsletters and patient days to communicate with patients and the public at large. As explicitly stated in the self-evaluation report, the department can further develop its efforts in this respect: in coming years, the department plans to more comprehensibly communicate to patients and laymen and expand its social media use. Academic Centers of Excellence are believed to be the ideal vehicle for such efforts. Also, it was mentioned that an

improved Erasmus MC and departmental website could increase the overall visibility of the research. In the opinion of the committee, translating the department's mission into goals that can be clearly understood by the public could be considered as a first step to more effective communication. Moreover, for a society giveback, socio-economic studies on cost effectiveness of standard of care versus future therapies could be performed on the department's large cohorts, reflecting societal relevance in more detail. Especially as the Department of Neurology has scientific epidemiological expertise, and knowledge.

Viability

The viability of the department's research is very high. Because of its strong clinical cohort resources, the department is highly attractive to (inter)national studies and clinical trials. The committee expects that the department's highly favourable international standing will continue to provide it with a sustainable financial base and the possibility of long-term staff commitment, thereby heightening its attractiveness to talented researchers. While the strengths of the department are obvious and many, the committee also observed some vulnerabilities. These mainly relate to a relative shortage of diversity in a broad sense, both in terms of the composition of staff and in the nature of research.

A first concern is that PIs are a rather homogeneous group in terms of age, sex and cultural/ethnic background. Current leadership styles seem to be quite uniform. Female leadership and female role models at professorial level are almost entirely absent. The five to seven-year window for remedying this situation that was laid out by the programme management seems too long to the committee. It believes that urgent and proactive interventions are necessary to promote staff diversity. A tenure track programme at Erasmus MC level, a well-considered departmental hiring strategy, protected research time arrangements and mentoring/coaching for the next generation will prove crucial tools in this respect.

A second observation is that the department could open itself up to new avenues of research. The

research lines have built an outstanding international reputation with research of a steady high quality, but choices tend to be on the safe side and the department's outlook on where it sees itself in 2040 is not exactly visionary. The committee feels that the time is now right for the department to consolidate its leading position by moving into new and potentially riskier territories, for example by adding a new pillar of research that crosslinks the work on different cohorts and capitalizes on possibilities for cooperation with TU Delft (e.g. 'life-span neurology/neuro-technology', 'humanized technology').

Finally, the committee wants to encourage the department to share and disseminate its successes. As a sizeable, well-funded department with a strong research infrastructure, the Department of Neurology could proactively contribute to the development of other departments within Theme Brain & Senses and the Academic Centres of Excellence that it is involved in.

Recommendations

The committee offers the following recommendations:

- Rephrase the strategy in the direction of patients. The current strategy is generic and in order to be properly understood by the general public and patients, the department could clarify which particular problems it wants to work on and wants to solve in the coming years (and which it doesn't).
- Continue to implement clinical trial expertise in RON in order to effectively support research staff.
- Make diversity an opportunity. The committee believes that viability and long-term sustainability could be increased by a more heterogeneous staff profile and by aiming for new high-risk research projects.
- Disseminate the department's excellence in research management and infrastructure to smaller departments within Theme Brain & Senses, thereby strengthening cross-departmental connections.

IV. Department of Neurosurgery

Research quality	Very Good (2)
Relevance to society	Very Good (2)
Viability	Very Good (2)

Mission and strategy

The Department of Neurosurgery is one of the smaller departments within Theme Brain & Senses. However, with a staff of fifteen neurosurgeons it is comparable in size to, if not larger than, similar departments in the Netherlands. The department's mission is to improve outcome in patients with neurosurgical disease. It aims to achieve this by continuously improving its surgical skills and techniques, by seeking and developing new treatments through translational research and innovation, and by performing clinical studies.

The committee appreciates the department's integrative approach, which explicitly links basic and clinical science ('from molecule to bedside'). The current phrasing of the mission is rather generic, however. The committee encourages the department to further detail its mission and associated strategies and targets, making them more tangible and distinctive from those of similar departments. One way to do this, would be to refer to the objective of bringing technological novelties to daily clinical care and/or put more emphasis on the promotion of personalized medicine-approaches in (oncological) neurosurgery. The existing strong connection to the neurosurgical wet lab for testing new (repurposed) drug substances in a large variety of models is clearly an asset for this.

Over the past ten years, the research component of the department was steadily developed. The arrival of the current head of department in 2008 seems to have been a defining factor in the department transitioning from a mostly clinical unit to a department with substantial research collaborations and infrastructure. At present, the department has one fully developed research line, which is in neuro-oncology. Within this line, three main themes, are distinguished, each led by one or more PIs:

1. Translational research into new therapies (wet-lab focused on GBM treatments);
2. Clinical research into novel tools and techniques for optimal surgery;
3. Clinical research into cognition and language.

Also, the department is involved in clinical studies and trials in several other neurosurgical fields (neuro-vascular, neuro-trauma, paediatric neurosurgery, spinal disease).

The committee notes that the efforts of the department to build its research from scratch have resulted in a solid research line in neuro-oncology. This is a good accomplishment for which the department deserves full credit. For the moment, there seems to be some hesitancy towards further diversifying research effort and topics, which is understandable given the department's starting position. If persisting, it might also become a missed opportunity. The committee strongly feels that branching out into other subfields of neurosurgery is the way forward. One or more of the abovementioned fields that the department is already involved in could be developed into (a) full-fledged research line(s), which would further enhance the research profile of the department.

As part of building its research programme, the department engages in collaborations within Erasmus MC and with external clinical partners. Prominent examples of cross-departmental collaboration are the Brain Tumor Center (an ACE that is jointly led by the departments of Neurosurgery and Neurology, with a variety of additional participants) and the Stroke Center (an ACE in which the departments of Neurosurgery, Neurology and Radiology collaborate with additional partners). These collaborations are highly valuable and fulfil the aim of learning from partners with extensive research experience and increasing chances for grant acquisition. At the same time, it is important for the department to avoid being pushed in the role of 'junior partner' while more research-oriented departments take the lead: a fair mutual benefit from existing collaborations should be aimed for. Considering the department's research focus on neuro-oncology, the committee advises to further explore and exploit links with the oncology departments of Erasmus MC (unified in Theme Daniel den Hoed). The committee was pleased to learn that joint projects with TU Delft have already been established (on the use of functional ultrasound in the OR and development/use of tools to overcome the blood-brain barrier for substance delivery). It fully supports further expansion of such projects, which are very much in line with the institute wide Strategy²³.

The department is governed by the department head and the PIs who lead the individual research groups. The atmosphere within the department

seems open and respectful. Through the interviews, the committee got to know the staff as a group of hard-working colleagues who are driven by an authentic aspiration to build a portfolio of research that truly benefits patients. At the same time, they are modest in advertising their successes and seem to have little time for reflection because of a high clinical burden. In charting its future course – particularly if further diversification of research topics is to be implemented – the department could capitalize on the broader input from staff and benefit from shared responsibility of research management and coaching. This could also lighten the burden of the department head, who will have to integrate possible new lines in the existing structure.

In the review period, the department has made considerable progress in building its research infrastructure by setting up its own wet lab connected to clinical research and biobank for brain tumours and tissue. Because of budgetary limitations, the department cannot afford its own research office. Support from the Research Office Neurology (RON) and possibly the Research Suite would be a welcome boost for the future. The relation with the Erasmus MC wide Technology Transfer Office (TTO) is already strong. Also, the department has good access to 3D facilities at the Department of (neuro) Radiology.

Research quality

The quality of the research is very high, especially given the modest first stream financial resources available to the department and the absence of a long research tradition. Recent efforts in developing a highly focused research line in neuro-oncology, a field with high scientific and societal relevance, have clearly paid off. The department has been able to establish a top-notch wet lab and collected phenotyped cohorts that promise a continuing contribution to its translational mission.

Staff members have published several articles in top journals in the review period and the department head and PIs are international leaders in their research topic. Several were awarded prestigious national and international grants.

The committee particularly appreciates that the department does not shy away from riskier research paths that do not always produce immediately publishable results. Within the neuro-oncology research line, the department has found a good balance between low-risk (e.g. drug repurposing) and high-risk (oncolytic virus/exosomes research) projects. It may not be

easy to publish the latter type of research in high-impact journals, but when done properly this innovative research will help to build the group's international reputation and visibility and has the potential to have a profound impact on the field. In the committee's opinion, the department could consider putting these innovative elements of the research program center stage.

As said, the strong focus on neuro-oncology could at some point become a vulnerability; other groups within Erasmus MC (i.e. the oncological departments within Theme Daniel den Hoed) might ultimately be broader connected to excel in this field: teaming up with other 'cancer-oriented' innovative research groups will increase viability in the longer run. The department is therefore advised to diversify its research efforts. Amongst the department's research interests are several strong candidate research lines that could be valid choices, especially if the department could team up with the Department of Neurology, other Erasmus MC departments and/or TU Delft.

Over the review period, the department has been increasingly successful in acquiring grants and research contracts. However, as a result of the Erasmus MC wide allocation model, basic funding for research is very low. This means that it is difficult for the department to ensure continuity. The department of neurosurgery would get vastly more funding opportunities if Erasmus MC could come up with some grants specifically allocated to groups that strongly invest in broad collaborations with partners beyond its own borders.

Relevance to society

The Department of Neurosurgery's research is highly relevant to society, as it addresses acute and chronic consequences of devastating brain diseases, which are very much in the spotlight due to the ageing of the general population. Both in the field of neurovascular disease, neurotrauma and in the field of brain tumours there is a significant unmet medical need. The department aims to address this with a truly patient-centred research approach, using the principles of value-based healthcare. In the committee's opinion, the translational nature of the department's research provides a strategy to warrant that results are highly relevant to patients. Opening up a second avenue of research could potentially multiply the department's societal relevance. Furthermore, the committee highlights the possibility of performing socioeconomical studies for the department's cohorts of brain tumour patients.

The department aims to involve patients in its research – although this seems currently mainly limited to brain tumour patients. The neuro-oncological research line is in close contact with the patient advocacy group *Stichting Stop Hersentumoren*, which financed a large proportion of its research. This foundation is led by brain tumour patients or their relatives and has access to a large online patient community which gives asked and spontaneous advice on research activities and helps to disseminate findings.

Finally, the committee was pleased to learn that the department's network extends to external commercial partners. It notes that the department launched a promising alliance with tech companies and spin-offs to help tackle its highly relevant research questions, both in terms of cellular therapy and device development (test and optimize devices for future use), especially in the field of neuro-oncology.

Viability

The viability of the department's research is very good. Its strong clinical cohort resources and innovative research topics (e.g. organoids, EXOVectory) make the department an attractive partner for national and international studies and collaborations, thereby aiding future success in attracting external funding. Nonetheless, there are also significant challenges ahead for this young research department, mainly relating to continuity of funding, maintaining a healthy balance between top-level clinical care and innovative research, and managing research talent.

Although the department has had increasing success in attracting external funding, the allocated internal research budget is low. Reconsidering the Erasmus MC allocation model for first stream funding and providing seed money to talented young researchers will be crucial for this (and other) upcoming research department(s) that are building their research portfolio. The department has not been able to structurally provide staff members with protected research time. For many, research is something that is done in their spare time, or for which external funding is an indispensable condition. This situation adds to the already considerable workload of staff members.

The committee got the impression that planning a research career has its challenges for the department's promising young staff. Interviews highlighted that a lot depends on getting grants early on, while success rates for the bigger grants

are typically low. Early-career researchers would therefore like to have more opportunities to acquire small starting grants, which could help them prepare for more substantial grant acquisition. A tenure track programme appears currently absent at Erasmus MC and while there are some possibilities for mentoring and coaching, these do not seem to be structurally used. In the committee's opinion, better tools for talent management would help the department in attracting, retaining and promoting promising researchers. Female representation amongst neurosurgeons is low (currently 2 out of 15 are women) and will need attention in the coming period.

The committee concludes that there is still underused potential in the department. A particular aspect that Erasmus MC could be capitalizing on are the strong possibilities for collaboration with TU Delft that exist within the department. When given the right incentives, neurosurgery has the potential to become one of the flagship departments in terms of tech valorisation.

Recommendations

The committee offers the following recommendations:

- Diversify the research effort. There seems to be room and enough opportunity to introduce one or more additional research line(s). Amongst the department's research interests (neuro-vascular, neuro-trauma, paediatric neurosurgery) there are several candidate research lines which could be valid choices, especially if the department – depending on its choice of topic – teams up with the Department of Neurology, other Erasmus MC departments and/or TU Delft.
- Unleash the potential of becoming one of the flagship departments in terms of Tech Valorisation especially in the setting of an intensified alliance with TU Delft.
- Reflect on ways to facilitate staff members who want to obtain a PhD. Having a larger proportion of staff with a PhD might help the department to diversify and assign new lines of research to other/new staff members.
- Seriously consider cashing in on the department's leading position in promoting personalized medicine approaches, which will become very complementary to the Evidence Based Medicine driven research of larger departments in the them.

V. Department of Oral and Maxillofacial Surgery

Research quality	Very Good (2)
Relevance to society	Good (3)
Viability	Good (3)

Mission and strategy

The mission of the Department of Oral and Maxillofacial Surgery (OMFS) is to optimize the diagnosis, treatment and outcomes of patients with oral and maxillofacial disorders, specifically focusing on congenital anomalies, trauma and head/neck cancer. This is done by performing basic, translational and clinical research in population-based cohorts and patients, in close collaboration with (inter)national partners and patient advocacy groups.

Over the past ten years, this relatively small department (6,37 research fte in 2018) has been able to build its research programme, almost from scratch. Under the current department head, who took office in 2011, three research lines were established by actively looking for connections and possibilities within Erasmus MC. A fourth research line was added as recent as 2018. The committee notes that this swift transition from an almost purely clinical department to a department with active research lines and collaborations is a major achievement, for which the department should be applauded.

Important next steps could be to develop a long-term strategy and underlying targets for the department, and to narrow down the research focus by prioritizing specific subjects over others. Currently, the mission seems a bit broad and generic. When looking at the actual content of research, the committee found that congenital anomalies seem better represented than trauma and head/neck cancer, i.e. the other two areas of research mentioned in the mission. The department may wish to adjust its mission accordingly.

The department has four research lines, which are led by PIs and cover both dentistry and maxillofacial surgery:

1. Oral and Craniofacial Health (studies based on GenerationR clinical cohort, one of Erasmus MC's core facilities);
2. Bone Tissue Engineering (in collaboration with the Departments of Orthopaedics and ENT);

3. Cleft and Craniofacial Anomalies (in collaboration with the Departments of Plastic and Reconstructive and Hand Surgery and ENT);
4. Computer-assisted CMF Diagnosis and Therapy (started in 2018 as a collaboration with engineers in the Biomedical Imaging Group Rotterdam (BIGR, Department of Radiology & Nuclear Medicine).

As it stands, the four lines seem to function rather autonomously, with research line 2 even operating from labs outside of the department. Each research line has its own particular research strategy, focus (epidemiology, regenerative medicine, preventive medicine) and approach (dental, clinical, (clinical) engineering), without defining crosslinks between the four research lines. Also, a common goal seems to be missing. Because of the interdepartmental collaborations, staff work at different locations. In the committee's opinion, more spatial proximity between research lines and their staff could be helpful for finding common ground. Specifically, the department could aim for more connectivity between lab and clinic. In the interviews, the engineers stressed the importance of close collaboration between research and clinic, as this helps them identify clinical problems that require technical solutions.

The committee was informed that each research line meets on a regular basis (biweekly or monthly) to discuss the progress of research and future possibilities. Plenary sessions for all researchers are less numerous (twice a year) and research staff indicated that they would like to increase the frequency in order to create more synergy across the department. Every three years, the coordinators of the four research lines meet to discuss their mid-term (three-year) and long-term (ten-year) strategy for the four research topics.

The atmosphere in the department seems pleasant and respectful, with staff enjoying a high level of freedom and trust. The department head has an inclusive management style: he leads by involving staff in the decision-making, which is clearly appreciated. Something for the department to consider is whether there is perhaps a little too much freedom for individual staff, who might benefit from more clearly defined research pathways and guidance.

The department's research is strongly linked to existing research lines of other Erasmus MC departments. There are active collaborations within Theme Brain & Senses (with ENT, Ophthalmology and Neurosurgery) and with

departments outside of it. Some interdepartmental collaborations take place within ACEs, e.g. renowned cleft centres around the world. There are also collaborations with external partners, although the positioning towards other (inter)national dental research groups was identified as a weakness in the department's SWOT analysis.

The committee was pleased to find that the department values, and is involved in, convergence with TU Delft as part of Strategy23. The recently established research line on Computer-assisted CMF Diagnosis and Therapy has a particular focus on technical improvements and collaborates with engineers/researchers from TU Delft and the Biomedical Imaging Group Rotterdam. In 2019, a joint smart surgery lab was initiated, which is a promising initiative. In order to make future collaboration on technical solutions for clinical problems even more effective, the committee recommends optimizing communication processes between engineers and clinicians. In the interviews, staff expressed their satisfaction with existing facilities, but first stream funding is nearly absent. The department was said to receive high-quality administrative, HRM-support from the theme office of Brain & Senses. The 'Research Tower' seems a particular asset, because it offers a collaborative atmosphere and easy access to hardware, software and full-text-articles. It contains a skills lab for dry-model navigation CMF surgery, including all necessary instruments and equipment to perform in vitro studies.

Research quality

The quality of the department's research is very good. Over the review period, this small and previously clinically oriented department has generated a substantial research output of 40-50 publications per year and 3-4 annual PhD defences (often co-supervised with other departments) in four dedicated research lines – all of which did not exist before 2012. Both the MNCS and the percentage of publications that belong to the top 10% of most frequently cited articles in their research field have increased over the review period. To the committee, this signifies clear progress. All four lines have the potential to grow further in terms of size and quality during the coming years. The committee would, however, prefer to see more convergence of the now rather separate lines (cf. 'Viability').

Amongst the staff members, there are some very promising researchers who could rise to international prominence. One of the main PIs of

research line 3 is already at this level. His work on Cleft and Craniofacial Anomalies is internationally leading and has raised the profile of the department. This is reflected in several marks of recognition received from the international peer group, including invited lectures and memberships of scientific committees.

Both the research lines on Cleft and Craniofacial Anomalies and Bone Tissue Engineering have established significant and important international collaborations. The new research line on Computer-assisted CMF Diagnosis and Therapy, which is a vehicle for cooperation with TU Delft, also looks promising, with nice work already being done by the engineers. Nonetheless, Erasmus MC's late entry into this field does mean that it is lagging behind departments at e.g. Radboudumc or Amsterdam UMC.

The research budget is very small. Throughout the review period (2013-2018), the department has mostly relied on first stream funding, which amounted to 83% of the total research budget in 2018. Additionally, the department has acquired third stream funding. Only the research lines on Cleft and Craniofacial Anomalies and Bone Tissue Engineering have been awarded important project funding. After the research period (2020), there have been promising developments in the sense that the research line on Oral and Craniofacial Health as well as the two already mentioned research lines obtained additional grants. This funding is however consortium funding and does not guarantee funding on the longer term.

Relevance to society

The department's research is potentially highly relevant to society. The department is involved in preventive dentistry, regenerative and personalised medicine, all of which are research fields with clear societal gains. Because of the department's relatively short research history, not all research lines have yet produced results that benefit patients and society at large. This will take some time. The committee, however, feels that the department is on the right track for attaining high societal relevance.

The research line on oral and craniofacial health aims to improve the oral health of Rotterdam children, thus preventing problems at a later age. So far, its findings on oral health inequalities among different ethnic and socioeconomic groups have generated media attention and interest from the general public. A next step is to actively reach out to policy makers and consultation centres. The

department is already in communication with *Stichting de Verre Bergen* to initiate education in oral health for primary schools. The research line on bone tissue engineering sets out to discover new and innovative ways to treat large bone defects. Bone is the second most transplanted tissue worldwide, so this research potentially has major implications for patients who have suffered major trauma, cancer or congenital deformities. As a basic research line, this line is furthest removed from direct application in society, daily life and practice. There is therefore no interaction with patient advocacy groups or other societal groups.

The research line on cleft and craniofacial anomalies has contributed to improved knowledge about a variety of rare craniofacial anomalies, which has major implications for patients and their families, and has led to several international guidelines. The research line is in communication with patient advocacy groups to take a role in PROMS development in cleft care. Also, to promote knowledge transfer on ectodermal dysplasia, the research line reaches out to groups like the *Vereniging voor Ectodermale Dysplasie*.

The new research line on Computer-assisted CMF Diagnosis and Therapy has – understandably – not yet delivered societally relevant results. Its research does hold promises for patients, in terms of more precise diagnosis, improved patients' safety during procedures and better surgical outcomes. It should also be mentioned that patient experience plays a substantial role in a virtual reality project in orthognathic surgery that the group is working on. All in all, the committee feels that this group would benefit from a clearer strategy (including a 'clinical landing point') on where it wants to make the difference for patients and society at large. A specific focus on validation of patient outcome-criteria as a research target would increase visibility.

Viability

The committee is impressed with the strong development of this small department over the review period. The department has managed to start and sustain four research lines, each with a growing output and increasing scientific/societal relevance. This is an achievement that highlights the viability of the department's research. In the committee's opinion, the department has now sufficiently matured to make strategic choices and prioritize subjects. Long-term viability will benefit from laying out a firm vision and strategy for the future.

Relevant to OMFS's viability is the fact that the department sees a need for a dental school at Erasmus MC. This would bring in much-needed resources in terms of funding, staff and students and could therefore boost the research line on oral and craniofacial health. The Executive Board of Erasmus MC is supportive to starting a dental school but the decision-making process in the relevant ministries has proven to be slow. In the committee's opinion, the governmental decision on the dental school is highly consequential for the department's vision and strategy. The committee is aware that external factors – in particular: a benevolent attitude on the part of the Executive Board – will play a role in the department's chances of success. However, this should not stop the department from arguing its case as strongly as possible. The department management will have to be very clear about why maxillofacial research is needed at Erasmus MC.

The committee foresees particular challenges in terms of funding and staffing the department. From the self-evaluation report and interviews, it was clear that the current allocation model for first stream funding disadvantages smaller departments without a longstanding research tradition. Having direct government funding tied up in salaries of tenured staff in larger departments, makes it very difficult to kick-start the research of up-and-coming departments, whose staff lack dedicated research time and internal seeding grants for starting new projects. In the committee's opinion, the Executive Board should reconsider the system of allocating first stream funding, adapt it to align with their strategic choices, and if deemed necessary based on these choices, correct undesirable historical differences in tenure-funding.

The committee further points out that the department is understaffed, particularly for maxillofacial research, which makes it very difficult to sustain research efforts across four research lines. To be viable, the number of research-involved staff will need to be increased and the department will need to be given appropriate tools for attracting, promoting and retaining research talent. Especially, the committee feels that a career track for the engineers involved in the department is highly needed and that the department should work on a better gender balance within the research staff (1:7 ratio of female to males).

Recommendations

The committee has the following recommendations:

- Towards the future: the fragmentation of research lines needs convergence towards a more common strategic view.
- The Executive Board of Erasmus MC should reconsider its policy of fixed contracts and direct ('first stream') funding. The lack of direct funding and the difficulty of obtaining fixed contacts on external funding is a direct threat to the viability of the Department of OFMS.
- In a very competitive environment, critical mass needs to be guaranteed both clinically and research-wise in order to function well.
- Measures to retain talented collaborators, both from the department and the university, should be made explicit as to be visible to all involved.
- The cooperation with TU Delft could be structurally integrated both in clinic and in research line 4.

VI. Psychiatry

Research quality	Excellent (1)
Relevance to society	Very Good (2)
Viability	Very Good (2)

Strategy and targets

The mission of the Department of Psychiatry is to innovate and optimise the diagnosis, treatment and prevention of severe mental health disorders in a medical context. This is done by performing applied, clinical and translational studies within three primary research lines:

Neurobiology of Mood & Psychotic Disorders
Applied Social and Forensic Psychiatry
Medical Psychology

The three research lines seem appropriate in relation to current scientific discourse in Psychiatry. During the virtual site visit, the Department Head in more detail explained the way the three research lines are connected and what is the common denominator. The department chose a bio-psycho-social approach, that includes the more fundamental biological approach, clinical research and epidemiological research. Although this provides a basis for further integration of the research lines, the committee is of the opinion that the department covers a large amount of research topics with relatively few researchers. Partially causing the variety of research topics is the bottom-up approach towards research.

Researchers are given a lot of freedom to determine the direction of their own research based on their interests. Although this leads to qualitatively very good research, it also has the consequence that the department as a whole lacks a pronounced and clear focus and that coherence is not that strong. This wicked tension will be an ongoing challenge for the department. On the one hand, more focus and a certain level of cohesion is needed to prevent everyone from working on 'their own island'. On the other hand, the freedom and bottom-up approach are important reasons for high-quality researchers to work at Erasmus MC. In the period of the evaluation the Psychiatry Department merged with the Medical Psychology department. The process of synergy and Integration was started and is expected to further continue in the upcoming period. The department management expressed to be working on stronger integration of the research lines. The committee stimulates the department to continue with this

effort as a more coherent department will strengthen the fundament for future research.

Each research line holds regular research meetings to discuss ongoing projects and consider new opportunities. In addition, a weekly departmental research lunch meeting is organized during which all staff members and PhDs present and discuss their research. This is a strong basis for further collaborations.

Worldwide the perspective on psychiatry is transforming from a brain perspective towards a more integrated, complex human behaviours perspective that includes humanities and social sciences. Not only are technology and artificial intelligence (on clinical data) increasingly playing a role in psychiatry (and healthcare as a whole), also patient participation and the role of the environment on psychiatric diseases are becoming more important. Increasing importance is given to influences on behaviour other than the brain; interactions and adaptation are increasingly seen as important aspects in the treatment of psychiatric disorders. These aspects of a changing perspective on psychiatry could be highlighted in the future plans of the department. It is important to describe in strategy and policy plans that time and investment are needed (sometimes at the expense of output) to deal with field transformation and to be able to build a strong fundament for the future.

The committee had extensive discussions with the management on diversity. Up to and including the level of associate professor, there is an excellent gender balance. However, as yet, there is not a single female full professor. The head of department convincingly indicated that he is actively working on achieving a better balance at the highest level. In addition to the participation of talented female researchers in career development programmes, the department also provides personal coaching. Furthermore, discussions take place with external parties about the financing of chairs in order to create space for talented researchers. In the interview with the committee, researchers from the department indicated that they do feel supported in their careers. The committee is optimistic about the path that has been taken and hopes that during the next visitation - in six years' time - the gender balance will no longer need to be a point of attention.

Research quality

The research of the Psychiatry Department is cutting edge. The committee sees a large number of excellent studies and outstanding publications. Number and impact of publications have steadily increased in the past years and show that the quality is of the highest level. The neurobiology research line in particular has international stature, the research is outstanding with respect to technique and methodology. The effects on psychiatry practice of the fundamental line of research are more difficult to establish. The work of the other two research lines is also impressive. The two presentations shown during the virtual site visit - Mother-child and iBerry reflect the broad portfolio and variety of the research in the department and both showed interesting and impressive research with a strong link to practice and patient participation integrated in the methods. The department points out that citations and metrics are not an end in themselves, but an important step in realising social and clinical impact.

The committee is impressed by the way the department builds networks and collaborations. Within Erasmus MC, these are not so much departments within the Theme Brain & Senses, but the department consciously chooses with which other departments to cooperate. There is also a large national and international network that enhances the quality of research. This will create a sustainable fundamend and funding opportunities for the future. The department employs two part-time PIs who also hold appointments at universities in the United States. This has both advantages and disadvantages, as the Department recognises. It is difficult to really involve these PIs as part of the department. At the same time, these PIs offer an excellent opportunity to build an external network. Cooperation with international partners and NIH grants are nice examples of the network that these researchers facilitate.

The interviews during the virtual site visit revealed a positive image of the culture and atmosphere within the department. Researchers indicated that they experienced a lot of support from the management, both in their research and with regard to their career planning. Researchers receive autonomy and trust from the management to set up their own lines of research. This open and positive culture is remarkably strong in the department.

Relevance to society

The department's focus on societal and clinical impact of research over metrics is a conscious choice that the committee supports. The department feels supported in this approach by the current dean; the importance of social impact is explicitly endorsed by the Executive Board. However, the department still has some doubts about this approach since, from an international perspective, citations and publications still largely determine the quality and funding of research. There is also some concern that support from the Executive Board for the chosen approach may change in the future. The committee encourages the department to explicitly include the choices made in its strategy and thus make them future-proof.

The interviews revealed that mental health care organisations are willing to cooperate with the department. Municipalities also see the added value of research by the department. The relevance to society is evident from the fact that both are willing to contribute to these research projects.

Patient participation is increasingly given a place in the design of research projects. There are some strong examples of patient-participation and co-creation with focus groups in the early phase of studies and implementation of new interventions directly in practice leading to new research questions. The committee underscores the integration with and development of Medical Psychology research line during the evaluation period. Researchers indicate that the added value of involving patients and their families in (the design of) research is becoming increasingly clear. Although the patient is more distant in - for example - disease modelling, it appears that interaction with patients and organisations can lead to the targeting of other symptoms. The committee is of the opinion that there is a good, strong basis to further build on in the coming period. The committee furthermore noticed some good examples of clinical pilots that lead to research projects and the improvement of care. This could be seen as good examples of patient participation for the other departments in the theme Brain & Senses and could increase the societal relevance of the research.

Viability

As was mentioned before by the committee, the worldwide perspective on psychiatry and psychiatric disorders is changing with a less

dominant focus on the biological aspects and with a stronger focus on the clinical and environmental aspects. The committee is of the opinion that on several levels the department is including these changes in its approach and advises to integrate this global change more explicitly into its future plans. This will help the department to determine whether changes have to be made and if investments are needed. For example, collaboration with other disciplines than medical can lead to other (or even lesser) funding possibilities. This requires an adaptive strategy. Already a connection is made with the faculty of Philosophy to jointly appoint a chair.

The committee also indicated that the department covers a wide range of research topics with a relatively limited number of researchers. The department has been working on its portfolio and coherence of the research. In order to maintain the high quality of research in the future, the committee believes it is necessary to continue focussing on the research portfolio, even if the size of the department remains unchanged.

There is clearly an open and positive culture in the department, with good communication between colleagues. This creates a positive working atmosphere, which enhances the quality of research and gives the committee confidence in the future of the department.

Recommendations

The committee has the following recommendations:

1. Integrate the worldwide transformation of perspective on psychiatry into future plans. This would make clear that in the coming years investments are necessary to develop in the right direction.
2. There already is focus on coherence in content of research and on stronger integration of topics and themes. This could be further developed
3. There are some strong examples of patient participation/co-creation as well as examples of clinical pilots that lead to research projects and improvement of care. This could be strengthened, further developed, and used as good example in the rest of Erasmus MC.

VII. Ophthalmology

Research quality	Excellent (1)
Relevance to society	Excellent (1)
Viability	Excellent (1)

Strategy and targets

The mission statement of the Ophthalmology Department is to fight eye disease through outstanding research, care and education.

The research of the department is organised in three research lines:

- Epidemiology and Population screening
- Clinical course and treatment
- Fundamental research and genetics

The main research disciplines are Medical Retina (Age-related macular degeneration (AMD), Myopia, Retinal Dystrophies), Glaucoma, Uveitis, and Oncology (Uveal Melanoma).

The committee appreciates the organisational structure of this department and the open atmosphere it encountered during the interviews. The department consists of a coherent group of researchers, and is relatively small but with concrete research topics. Particularly impressed was the committee by the considerable added value and crucial role of the Research Coordinator with a pivotal role in the department.

Over the period of the evaluation, the department has shown significant growth. From the interview during the site visit it became clear that the growth is mainly in the Epidemiology research group. This group has been very successful in research output and grant applications. The committee notes that the department has thought about a strategy to manage this growth. To keep the increased size of the department sustainable, new grants need to be secured. This is being worked on, but there is also a buffer to absorb fluctuations in income. For a small department such as this one, growth management is particularly important, because the departure of one person, or the obtaining or not of a large grant, has a major impact. To manage the size of the department in the future, it is important to develop business cases for long-term positions and infrastructure. The development of clinical trials may be an area for easy expansion that might also attract other business and lead to opening of opportunities for combined fundraising for clinical trials and reading centre activities.

Organisational issues the department is struggling with, include dedicated research time and combination of research and clinical work. Another topic, that involves support from the Erasmus MC Executive Board, is a capable IT-infrastructure. The committee was pleased to learn about the plans Erasmus MC has in this regard.

The relation of the department with the Rotterdam Eye Hospital was discussed in-depth during the site visit. The expected and planned relocation of this hospital to the Erasmus MC site in 2026 presents both opportunities and challenges. Cooperation is expected to intensify. For example, more glaucoma cases will be referred for investigation. As a non-academic hospital, ophthalmologists in the Rotterdam Eye Hospital have little time for conducting research and for including patients in studies. The committee understands that this is a major challenge, but encourages the department to be timely and proactive in ensuring that the advantages outweigh the disadvantages.

Research quality

According to the committee the quality of the research by the department is outstanding. Epidemiologic and genetic research on myopia and AMD are world class. This is reflected e.g. in a publication of the high-level research by the Consortium for Refractive Error and Myopia (CREAM), where variants in 161 genes were identified to carry risk for myopia, and pathways analysis showed that light-induced signalling is a driver of refractive error. Other examples are the risk score base on environmental and ocular factors that can identify children at high risk of myopia and the EYE-RISK/E3 database: Prevalence of AMD and the role of diet for risk modification.

The Erasmus MC Ophthalmology Department is the world-wide leading research group on myopia. The Myopia Clinic in Rotterdam was the first in Europe and actually started and developed complex genetics of myopia in Rotterdam, making them frontrunners in their field. For example, the 20-20-2 rule is being used worldwide.

The academic reputation of the department is partly the result of its role in the Rotterdam Study and Generation R. This research on population-based data is done in an excellent way with impressive results. The reputation of the department as a whole is outstanding, although the committee observes some variability in the reputation of individual staff members: from world-class, to uprising to average and phasing out. The number of publications has strongly

increased in the period of evaluation with the maintaining of a high MNCS score of 2.0. The committee identifies many publications in top journals in the field, but also impressive publications in journals beyond the field (such as Nature Genetics and JAMA). In conclusion, the output is excellent.

The quality of the research is further underlined by its contribution to the body of scientific knowledge and its effects on patient care. Two large cohort studies, the Rotterdam Study and Generation R, led to the generation of axial length growth curves that were implemented in the (commercially available) Myopia Meter. There was also an immediate contribution to state-of-the-art treatment, namely establishing high-dose atropine as a successful treatment for childhood myopia. Also, the revision of the Dutch Guideline for Vision Screening is based on the department's research, the OVAS Study. The oncological research group is part of the Erasmus MC wide Cancer Institute. This results in the Ophthalmology Department being the go-to partner in the hospital in case of cancer-associated eye problems such as metastatic eye conditions and also primary ophthalmic cancer. Furthermore, many of the clinical oncological trials are partly conducted in and by the Ophthalmology Department.

Collaborations were developed with the Rotterdam Eye Hospital (on AMD, high myopia, keratoconus, uvea melanoma and glaucoma), mostly to increase numbers of patients, and with the Department of Ophthalmology at Radboud UMC (on AMD). Development of new and further collaboration may be sought, for example on uveal melanoma.

Relevance to society

The relevance to society of the research in this department is impressive. Not only is the research recognised through awards and International funding (such as the Ammodo Science Award by the Dutch Royal Academy or the Horizon 2020 Consolidator Grant), the committee also observes outstanding relevance towards large target groups through product establishment in clinical care (such as atropine treatment for myopia, growth curves of axial length) as well as recommendations on lifestyle modifications to reduce the risk of age-related macular degeneration, the leading cause of blindness in European countries.

Another aspect of societal relevance is the extensive media coverage of research results (mostly on myopia) on television and in

international newspapers. A prominent example is the broadcasted lecture at the University of the Netherlands on April 23th, 2020: *Word je blind van je beeldscherm?* (Can you become blind from your computer screen?).

From the patients' perspective the myopia network in the Netherlands (Myopie.nl) is very informative. The committee appreciates the way in which the department manages to combine research with society and prevention. Along this line of dissemination of knowledge through websites, www.eyened.nl and www.maculadegeneratie.nl remain an important source of information for patients as well as researchers.

Viability

In addition to an impressive performance in the review period, the committee is also confident about a bright future for the department. It has a clear view on the future, including clearly identified research topics and targets; exploration of genetic pathways, the identification of targets for intervention, and prognostic modelling, and building up towards translation (intervention & prevention). The committee appreciates the plans of the department to go more into translational research, which is an important expansion of the department's research scope.

The department is well connected within the Erasmus MC, it participates in ten ACEs including Sensory Disorders, DNA Repair, Molecular Biomarkers in Medicine, Lysosomal and Metabolic Disease and Brain Motion. Not only is the department well connected in the Netherlands, for example in the RD5000 Consortium, it is also extremely well connected internationally. The department is both participating and actually leading consortia, like the Consortium for Refractive Error and Myopia (CREAM), EYE-RISK consortium, European Ocular Oncology Group (OOG) and EUSCREEN Study.

The opportunities in the Convergence with TU Delft might be limited given the research methods (epidemiology and genetics) in relation to engineering. However, Artificial Intelligence may be an interesting link that would allow engineering solutions for ophthalmic applications (e.g. reading centre, myopia research). This does not mean that the existing collaboration with Amsterdam and Nijmegen should be abandoned but rather a new partner that could be included.

One of the challenges already mentioned in this report is growth management and to continue the success of the past period. In addition to the development of business-cases for long-term positions and infrastructure, the smaller groups could seek additional support through collaborations and local/national fundraising. The committee is of the opinion that the department somewhat underestimates the funding opportunities in the field.

Recommendations

The committee has the following recommendations:

- The department, through its coverage of complex expert disciplines has a relatively low number of patients. Higher throughput may not only allow economic growth, but also recruitment of patients into specialized new treatments, clinical trials and research projects. The department has developed collaborations with the Rotterdam Eye

Hospital and department of Ophthalmology, Radboud UMC. Further collaborations may be sought.

- Clinical trials may be an area for easy expansion that may also attract other business. It may open an opportunity for combined fundraising for clinical trials AND reading centre activities (within the same clinical trial).
- Capable IT infrastructure and up-to-date skills in Bioinformatics and Biostatistics will be necessary for handling Big Data.
- Growth management of the department overall may require the development of business-cases for long-term positions and infrastructure.
- Given the research lines (i.e. very little engineering) the Convergence with TU Delft may have only few connecting factors. AI may be such a link and would allow engineering solutions for ophthalmic applications (e.g. reading centre, myopia research).

VIII. Otorhinolaryngology and Head & Neck Surgery

Research quality	Very Good (2)
Relevance to society	Excellent (1)
Viability	Very Good (2)

Strategy and targets

The mission of the Otorhinolaryngology and head and neck surgery (OHNS) Department is to improve healthcare in communication disorders, head and neck cancer and disorders of the senses, through clinical studies, population-based research and participation in basic and translational research. This is done in collaboration with other Erasmus MC research groups, (inter)national partners and patient advocacy groups.

The research in the OHNS Department is organised in three research lines:

- Oncology
- Hearing & Speech
- Upper airway reconstruction

During the site visit, the Department Head clearly stated its ambitions for the department. The committee is positive about this clear vision, focus and strategy for the future. Part of the strategy is taking opportunities that come along, e.g. the collaboration (Convergence) with TU Delft and participation in the Generation R study. The structured plans include the people and there is attention for content, such as optimizing both oncologic as well as quality of life outcomes for patients with head and neck cancer and prevention of hearing loss.

The size of the research staff increased considerably during the evaluation period. This is mainly the result of success in applying for (inter)national grants. Although the growth is nice and a sign of success, it also leads to increasing vulnerability. It takes time and energy to successfully attract the second and third streams of funding each year and success is certainly not always guaranteed. For many fields/topics of research in OHNS the possibilities of obtaining research grants are limited. Moreover, the clinical research staff has limited available research time as the proportion of time needed for the clinical tasks seems to be considerable.

An important part of the research staff is PhD students. The committee understands that it is

customary in the Netherlands for specialists to do a PhD before starting their residency. It seems that many doctors who want to become specialists do a PhD to increase their chances of getting this residency. Although the committee believes that specialists should have some knowledge and understanding of research and are connected to research, it wonders whether all these (future) specialists should have a PhD degree except those aspiring an academic career.

The department's organisation is structured and various checks and balances are in place. With this, the department aims to create an open culture and introduce a structure that leads to the reduction of errors and the prevention of improper behaviour. Examples are that no one works alone, a flat organisational structure and for PhD students there are always two (co)promoters, one of whom is from a different department. The department has its own supporting science committee that, among other things, monitors the PhD students. The committee is also positive about the supporting staff in the department, consisting of a research coordinator, data manager and clinical data scientists. The research coordinator provides grant application support, monitors projects and coordinates the various ACEs in which the department participates. The committee also appreciates the attention for and stimulation of scientific training (epidemiological education). Over 50% of the research staff have a master's degree in epidemiology.

The committee notes that the interaction with the Brain & Senses Theme is limited even though there are close collaborations with other departments in this theme, e.g. Oral & Maxillofacial Surgery. The committee believes that by working more closely together, the departments can support and encourage each other. For example, not every department has a scientific committee or research coordinator. By joining forces, some aspects can be realised more efficiently. The limited collaboration within the Brain & Senses Theme may be explained by the (head and neck) oncologic research which would fit better in the oncological research theme ("Daniel den Hoed") and is now conducted in the context of 'ACEs' which are more organized based on content but are not separately funded and seem to offer limited (financial) support.

Research quality

The scientific work by the department over the past years is solid. At the moment of the site visit, the output was still relatively limited, but the committee is impressed by the potential of this

department. As examples, the Committee mentions the E-health tools and dashboards such as OncologIQ and Healthcare monitor enabling tailored decision making and provision of care; this is very unique and successful. Publications by the department are good, but do often not seem to go beyond the immediate speciality.

Regarding the content of the research and scientific leadership, the committee noticed that there are differences between the three research lines in the way they presented their results and seem to have a clear picture on the future research. The Generation-R study shows exiting possibilities for research into speech. With regard to hearing this appears to be an excellent cohort in Rotterdam for research into (age-related) hearing loss. Regarding Head and Neck surgery, internationally the discipline in general is poorly served with prospective studies of patients with cancer. Treatment has great impact on the quality of life concerning speech and swallowing, though results are difficult to measure. The emphasis on prospective data acquisition on QoL and oncological outcomes of this department is very valuable in this context.

The convergence with TU Delft is seen as an opportunity by the department. A full professor from the OHNS department has been appointed as full professor at the TU Delft as well, several Medical Delta projects have already been funded and there are a number of convergence projects in which the department is involved. The committee thinks this can lead to good research with good and useful results.

During the site visit, the committee discussed the heterogeneity of the research topics. The department is aware of its relatively dispersed research portfolio. At the same time, the department reflecting the specialty of OHNS covers a wide area with little overlap between different topics. Therefore bundled focus is not possible and the three research lines will continue to exist. The committee is positive about the approach of the department towards this challenge and agrees with the three research lines chosen. It is important that researchers from each of the three lines of research enter into strategic collaboration with other departments and partners. For example, the Oncology research line has strong connections with the Cancer Institute of Erasmus MC.

Relevance to society

The committee is very impressed with the societal relevance and impact of this department's research, which is one of its most powerful aspects. All three research lines have great societal relevance, the research has a direct impact on the quality of life and is recognised in the field and in the media. In head and neck cancer, not only survival is important but both the cancer as well as its treatment significantly impact quality of life. This aspect is reflected in the type of research done in the department, with a focus on "data driven" health care and long-term research that is not done overnight.

The development of devices (Raman, spin-off company SurGuide) and tools (such as OncologIQ and Healthcare Monitor) are available for dissemination. The department wants it to have relevance for the patient as an individual. Examples in addition to the tools and devices mentioned are research on improving surgical outcomes and reducing the amount of adjuvant treatment. Research on noise damage and prevention also has high societal relevance, both in young and old people.

Viability

The viability is very good, the department is currently in the phase of investing in its future results and impact. Over the past years, the period of this evaluation, a solid basis was created for further development of the three research lines. In the Netherlands the OHNS in Rotterdam is one of the largest clinical OHNS departments and the visibility of the research is increasing. The committee observed a lot of potential, with young staff, and a well-organized and ambitious department. In the committee's opinion, all this lays a strong foundation and holds out a clear promise for the future. The next step is to strengthen international visibility and the (international) network.

The committee agrees with the choice of three research lines. These research lines have been developed and invested in over the past few years. The committee emphasises that although the choice for these lines is logical at the moment, this could change in the future. The department will have to consider in the coming years, especially when opportunities come along, whether the choice for the current three lines of research remains the best one. The committee sees the convergence with TU Delft as an opportunity for the future. For example, upper airway reconstruction is interesting for engineers. The

committee is positive about the approach, but also notes that there is still a long way to go before a translational project will produce results.

For a bright future an increase of the output, e.g. in International outstanding / high impact journals is required. All necessary elements for this are in place and the committee expects that the results will follow. In order to be truly sustainable in the future, it is of great importance that researchers are given dedicated research time or that clinical researchers have matching (basic) researchers to work together. At the time of the site visit, this was not arranged and it may put a brake on the development of the department.

Recommendations

The committee has the following recommendations

1. Lack of dedicated research time (for medical staff) hampers the sustainability and reaching the goals which are set. Linking clinical researchers with researchers of other disciplines such as biomedical or technical researchers (within the department) may offer a synergy overcoming this.
2. International visibility and network can be improved.
3. Impact of the research, which has high societal relevance, can be expanded.

Appendices

Appendix 1: CVs of committee members

Prof. Karin Klijn (chair) trained in Neurology at the University Medical Center Utrecht. In 2013, after finishing her training, she worked as stroke fellow at the stroke unit of Royal Perth Hospital, Perth, Western Australia (prof Graeme J Hankey, MD, FRCP, FRCP (Edin), FRACP). From 2004 to 2015, she worked as neurologist at the UMC Utrecht. In June 2015, she was appointed as chair and professor of Neurology at the Radboud University Medical Center. Her research interest is in neurovascular diseases. In addition to her studies of haemodynamic stroke in patients with carotid artery occlusion (leading to her cum laude PhD in 2001) and moyamoya, she now aims to improve life after intracerebral hemorrhage by means of etiological, diagnostic, prognostic and intervention studies. Over the years, Klijn has received multiple grants, including the prestigious clinical fellowship and Aspasia grant of ZonMw and a clinical established investigator grant of the Dutch Heart Foundation.

Prof. Constantinus Politis is an Oral and Maxillo-Facial Surgeon and current Full Professor and Chairperson of the Department of Oral and Maxillofacial Surgery at Leuven University, KULeuven, Belgium. Politis is also Invited Lecturer at the EHSAL in Brussels. He holds a PhD on complications of orthognathic surgery. He is Member of the Belgian Royal Academy of Medicine.

Prof. Floortje Scheepers is trained in psychiatry and child and adolescent psychiatry. She did her doctoral research (on the effects of atypical antipsychotics in the brain of people with schizophrenia). From 2005-2011, Scheepers worked as treatment manager, psychiatrist, and researcher at the academic cluster of Karakter (child and adolescent psychiatry) and InZicht (orthopsychiatry). In 2012 she became head of the department of Psychiatry at the University Medical Centre Utrecht and since 2017 Scheepers is appointed full professor on Innovation in Mental Health Care. Her main focus of research is applied data science in clinical care, Digital network care and the use of new data sources like wearables and text. Her additional functions are with the Health Council, Supervisory Board Parnassia, Supervisory Board Fritz Redlschool cluster IV, Scientific director of Phrenos, and Quality Council of ZiN.

Prof. Hendrik Scholl is chairman of the Department of Ophthalmology, University of Basel, Head of the Eye Clinic, University Hospital Basel; and Founding and Scientific Co-Director of the Institute of Molecular and Clinical Ophthalmology Basel (IOB), Switzerland. Scholl specializes in medical and surgical management of retinal diseases, especially inherited retinal degenerative diseases. Scholl received his medical degree from the University of Tübingen in Germany before completing a residency in Ophthalmology at the University Eye Hospital in Tübingen and a clinical research fellowship in Medical Retinal Disease at Moorfields Eye Hospital and the University College London Institute of Ophthalmology in London, United Kingdom. From 2010 until 2016, he was Professor of Ophthalmology at the Johns Hopkins Wilmer Eye Institute in Baltimore, Maryland, where he headed the Retinal Degeneration Clinic and the Visual Neurophysiology Service of the Johns Hopkins Hospital. Scholl has received numerous awards including the European Vision Award in 2008, the Wynn-Gund Translational Research Award by the Foundation Fighting Blindness and the Macular Degeneration Research Award by the American Health Assistance Foundation in 2010, the Visionary Award from the Foundation Fighting Blindness and the ARVO Foundation/Pfizer Ophthalmics Carl Camras Translational Research Award in 2014, and the President's Award from the American Society of Retina Specialists in 2015, the Research Award Retina 2017 of the German Ophthalmic Surgeons, the Alfred Vogt Award in 2019 and the Paul Henkind Award & Lecture of the Macula Society in 2020.

Prof. Benedikt Schoser is senior consultant and co-chair at the Friedrich-Baur Institute, Dept. of Neurology at the Ludwig-Maximilians-University of Munich, Germany. He is coordinator of the diagnostic working group within the German MD-NET and member of the German reference group for neuromuscular disorders. Schoser trained as a neurologist and intensive care neurologist at the universities of Mainz, Frankfurt and Hamburg in Germany. He completed his MD thesis on muscle denervation in Hans Hilmar Goebels Dept. of Neuropathology in Mainz. Later, he worked as a postdoctoral research fellow in the channelopathy laboratory of Thomas Jentsch at the Center of Molecular Neuroscience in Hamburg. In 2001, he joined the Friedrich-Baur Institute at the LMU Munich and completed his habilitation on the caveolinopathy rippling muscle disease as professor of neurology in 2004. Schoser has a long-

standing interest in the molecular pathogenesis and histopathology of muscular dystrophies, myotonic dystrophies and metabolic myopathies. Within the neuromuscular research group at Friedrich-Baur Institute he is engaged in all types of morphological and biochemical analyses including animal models. He has a special interest in translational therapy including gene therapy of multisystemic disorders.

Prof. Conrad Timon is Consultant Otolaryngologist, Head and Neck Surgeon in St James's Hospital with attachments also to the Eye & Ear Hospital, St Luke's Hospital and Crumlin Hospital. He also holds an academic position as a Professor in Trinity College Dublin. Timon is a graduate of University College Dublin Hospital and completed his initial training in Dublin followed by Head and Fellowship over a two-year period in Toronto General Hospital. He did his MD research in Salivary Gland Cancer and subsequently returned to Dublin and was appointed as Consultant and Professor in Otolaryngology Neck Surgery in January 1993. Timon is actively involved in both bench clinical research in the etiology and management aspect of Head and Neck Cancer for the last number of years.

Prof. Robert Takes leads the multidisciplinary head and neck oncology expertise center of the Radboud University Medical Center since 2009 and he is board member of the Radboud Center of Oncology. After being chairman of the research steering group for 10 years, he is president of the Dutch Head and Neck Society (NWHHT). He is co-founder of the head and neck oncology quality registry, the Dutch Head and Neck Audit (DHNA), member of the board of directors of the Head and Neck Cancer Inter Group (HNCIG) and co-founder and secretary of the International Head and Neck Scientific Group (IHNSG). His research interests are quality of care and quality of life, lymph node diagnostics and optical and image-guided surgery in head and neck cancer. He has published several book chapters and over 230 peer-reviewed scientific papers.

Prof. Steven De Vleeschouwer

Trained as a neurosurgeon in Leuven, Belgium (residency) and Duesseldorf, Germany where he did a senior fellowship in oncological neurosurgery and microvascular techniques, he started his career as staff neurosurgeon in the academic department at the University Hospitals, Leuven, Belgium in 2005. He was holder of an *ACSB* award (American Cancer Society UICC International Fellowships for Beginning Investigator) from the International Union Against Cancer (UICC) in 2004/2005 and obtained his PhD in February 2005. In the University Hospital Leuven, he has been responsible for the clinical care program of patients with intracranial tumors. Since 2014 he is professor at KU Leuven, at the Neurosciences department at KU Leuven, as Head of the Laboratory of Experimental Neurosurgery and Neuroanatomy. He is the past Chair of the Belgian Association of Neuro-oncology (BANO), an extended board member of the Belgian Society for Neurosurgery (BSN) and active member of the European Association of Neurosurgical Societies (EANS), the European Association of Neuro-oncology (EANO) and the Society of Neuro-oncology (SNO). He is supervisor of several finalized and ongoing PhD projects, peer reviewer for more than 25 scientific journals, serving in the editorial board of 4 biomedical journals and project reviewer for 8 international competitive funding agencies. His primary clinical interest comprises brain tumor surgery, skull base and neurovascular surgery. From a research perspective, he's mainly active in the field of both clinical and experimental neuro-oncology, including functional and morphological demarcation tools in brain tumor surgery, basic and applied brain tumor immunology/immunotherapy and strategies to modify the brain tumor micro-environment. He is member of the scientific advisory board of Ovensa Inc., Canada.

Appendix 2. Quantitative data on the departmental composition and financing

Neurology Department

Composition of the department

	2013		2014		2015		2016		2017		2018	
	#	FTE	#	FTE	#	FTE	#	FTE	#	FTE	#	FTE
Scientific staff	62	27.2	51	27.3	62	30.7	67	33.0	63	30.7	61	32.8
Support staff	24	7.3	30	8.3	37	10.7	40	15.3	40	14.	48	14.8
Total staff	86	34.5	81	35.6	99	41.4	107	48.2	103	45.6	109	47.6

Financing of the department

	2013		2014		2015		2016		2017		2018	
	FTE	%	FTE	%	FTE	%	FTE	%	FTE	%	FTE	%
Direct funding	9.68	28%	9.39	26%	10.02	24%	13.01	27%	12.92	28%	11.12	23%
Research grants	14.52	42%	19.28	54%	19.42	47%	18.79	39%	18.37	40%	18.67	39%
Contract research	10.28	30%	6.95	20%	12.00	29%	16.43	34%	14.30	31%	17.81	37%
Total funding	34.48		35.62		41.44		48.23		45.59		47.59	

Neurosurgery Department

Composition of the department

	2013		2014		2015		2016		2017		2018	
	#	FTE	#	FTE	#	FTE	#	FTE	#	FTE	#	FTE
Scientific staff	6	3.7	6	2.9	5	3.2	7	2.8	7	2.9	12	7.1
Support staff	7	1.1	4	1.3	8	2.6	8	3.3	7	3.1	9	2.5
Total staff	13	4.8	10	4.2	13	5.8	15	6.1	14	6.0	21	9.5

Financing of the department

	2013		2014		2015		2016		2017		2018	
	FTE	%	FTE	%	FTE	%	FTE	%	FTE	%	FTE	%
Direct funding	3.96	83%	3.55	85%	1.78	31%	2.61	43%	2.94	49%	4.49	47%
Research grants	-	0%	-	0%	-	0%	0.33	5%	0.44	7%	0.96	10%
Contract research	0.83	17%	0.65	15%	3.97	69%	3.17	52%	2.57	43%	4.09	43%
Total funding	4.90		4.20		5.75		6.10		5.96		9.54	

Ophthalmology Department

Composition of the department

	2013		2014		2015		2016		2017		2018	
	#	FTE	#	FTE	#	FTE	#	FTE	#	FTE	#	FTE
Scientific staff	11	6.7	21	10.5	29	12.8	40	17.9	42	20.2	38	20.5
Support staff	12	4.2	13	6.0	19	7.0	28	11.0	30	9.8	26	9.9
Total staff	23	10.9	34	16.4	48	19.8	68	28.9	72	30.0	64	30.4

Financing of the department

	2013		2014		2015		2016		2017		2018	
	FTE	%	FTE	%	FTE	%	FTE	%	FTE	%	FTE	%
Direct funding	6.6	61%	9.82	60%	9.20	46%	9.97	35%	10.08	34%	8.58	29%
Research grants	-	0%	-	0%	-	0%	2.74	9%	0.71	2%	2.20	7%
Contract research	2.70	25%	3.43	21%	7.25	37%	13.62	47%	15.88	53%	17.77	57%
Other	1.55	14%	3.17	19%	3.33	17%	2.53	9%	3.34	11%	1.87	6%
Total funding	10.87		16.42		19.78		28.87		30.00		30.42	

Oral & Maxillofacial Surgery Department

Composition of the department

	2013		2014		2015		2016		2017		2018	
	#	FTE	#	FTE	#	FTE	#	FTE	#	FTE	#	FTE
Scientific staff	9	5.79	8	6.13	8	5.38	7	4.68	12	6.58	15	6.37
Support staff	2	0.92	3	0.93	4	0.89	4	2.40	4	2.07	1	0.56
Total staff	11	6.71	11	7.06	12	6.27	11	7.08	16	8.65	16	6.93

Financing of the department

	2013		2014		2015		2016		2017		2018	
	FTE	%	FTE	%	FTE	%	FTE	%	FTE	%	FTE	%
Direct funding	4.71	70%	5.15	73%	5.23	83%	5.66	80%	6.20	72%	5.73	83%
Research grants	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%
Contract research	2.00	30%	1.92	27%	1.05	17%	1.41	20%	2.45	28%	1.20	17%
Total funding	6.71		7.06		6.27		7.08		8.65		6.93	

Otorhinolaryngology and head and neck surgery Department

Composition of the department

	2013		2014		2015		2016		2017		2018	
	#	FTE	#	FTE	#	FTE	#	FTE	#	FTE	#	FTE
Scientific staff	4	3.5	6	4.4	9	5.6	12	8.2	13	8.0	18	10.5
Support staff	4	2.5	2	0.9	3	0.9	4	1.7	7	2.2	8	2.4
Total staff	8	6.0	8	5.4	12	6.5	16	8.9	20	10.1	26	12.9

Financing of the department

	2013		2014		2015		2016		2017		2018	
	FTE	%	FTE	%	FTE	%	FTE	%	FTE	%	FTE	%
Direct funding	5.11	85%	4.48	84%	5.70	87%	6.66	68%	6.80	67%	7.21	56%
Research grants	-	0%	-	0%	-	0%	-	0%	-	0%	0.92	7%
Contract research	0.92	15%	0.88	16%	0.84	13%	3.19	32%	3.33	33%	4.72	37%
Total funding	6.02		5.35		6.54		9.85		10.14		12.85	

Psychiatry Department

Composition of the department

	2013		2014		2015		2016		2017		2018	
	#	FTE	#	FTE	#	FTE	#	FTE	#	FTE	#	FTE
Scientific staff	58	39.0	63	35.4	71	37.4	69	33.8	67	37.1	66	34.5
Support staff	30	7.5	26	7.8	21	9.1	34	12.1	45	14.1	45	15.0
Total staff	88	46.5	89	43.2	92	46.4	103	45.9	112	51.1	111	49.5

Financing of the department

	2013		2014		2015		2016		2017		2018	
	FTE	%	FTE	%	FTE	%	FTE	%	FTE	%	FTE	%
Direct funding	32.81	71%	30.05	70%	30.41	66%	29.91	65%	33.06	65%	32.59	66%
Research grants	5.97	13%	5.68	13%	5.40	12%	5.78	13%	7.76	15%	5.87	12%
Contract research	7.68	17%	7.50	17%	10.61	23%	10.01	22%	10.30	20%	11.04	22%
Other	-	0%	-	0%	-	0%	0.17	0%	-	0%	-	0%
Total funding	46.46		43.23		46.42		45.86		51.12		49.49	

Appendix 3: Schedule of the site visit

Wednesday 13th January 2021

Time	Preparation meeting: Complete committee
17.00-19.00	Informal meeting of complete committee. Purpose: The complete committee is introduced to each other. Preparation site-visit, everyone clear on the agenda etc. Last minute questions are addressed.

Thursday 14th January 2021

Time	Topic parallel committee 1	Topic parallel committee 2
9.00-9.30	Welcome & general introduction by the Dean Attendees: Heads of Department, Dean, Committee members, Secretaries	
9.30-9.45	Introduction and preparation Dept. Neurology	Introduction and preparation Dept. Psychiatry
9.45-10.45	Department of Neurology session 1 Management/Leading staff	Department of Psychiatry session 1 Management/Leading staff
10.45-10.55	Committee members: break	Committee members: break
10.55-11.10	Debriefing first session Neurology committee members	Debriefing first session Psychiatry committee members
11.10-12.10	Department of Neurology session 2 Academic staff Programme: Short introduction film or presentations (10 min.)	Department of Psychiatry session 2 Academic staff Programme: film Neurobiological Lab (5 min) and film iBerry study (5 min)
12.10-13.10	Committee members: break	Committee members: break
13.10-13.25	Debriefing second session Neurology	Debriefing second session Psychiatry
13.25-13.55	Feedback with committee members and discuss concept report department	Feedback with committee members and discuss concept report department
13.55-14.15	Committee members: break	Committee members: break
14.15-14.30	Introduction and preparation Dept. Neurosurgery	Introduction and preparation Dept. Otorhinolaryngology and head and neck surgery
14.30-15.30	Department of Neurosurgery session 1 Management/Leading staff Programme: Presentation (15 min.)	Department of Otorhinolaryngology and head and neck surgery session 1 Management/Leading staff Programme: Presentation (max. 10 min.)
15.30-15.45	Committee members: break	Committee members: break
15.45-16.00	Debriefing first session Neurosurgery committee members	Debriefing first session Otorhinolaryngology and head and neck surgery committee members
16.00-17.00	Department of Neurosurgery session 2 Academic staff Programme: Short film shown	Department Otorhinolaryngology and head and neck surgery session 2 Academic staff Programme: Three short films/pitches of each attendee (2-3 min. each)
17.00-17.10	Committee members: break	Committee members: break
17.10-17.25	Debriefing second session Neurosurgery	Debriefing second session Otorhinolaryngology and head and neck surgery
17.25-17.55	Feedback with committee members and discuss concept report department	Feedback with committee members and discuss concept report department
17.55-18.15	Questions by committee to dean about initial findings	
18.15-18.45	Debriefing day 1	

Friday 15th January 2021

Time	Topic parallel committee 1	Topic parallel committee 2
8.45-9.00	Introduction and preparation Dept. Oral and Maxillofacial Surgery	Introduction and preparation Dept. Ophthalmology
9.00-10.00	Department of Oral and Maxillofacial Surgery session 1 Management/Leading staff Programme: Presentation (10 min.)	Department of Ophthalmology session 1 Management/Leading staff Programme: 10 min. presentations
10.00-10.10	Committee members: break	Committee members: break
10.10-10.25	Debriefing first session Oral and Maxillofacial Surgery committee members	Debriefing first session Ophthalmology committee members
10.25-11.25	Department of Oral and Maxillofacial Surgery session 2 Academic staff	Department of Ophthalmology session 2 Academic staff Programme: 10 min. presentations
11.25-11.35	Committee members: break	Committee members: break
11.35-11.50	Debriefing second session Oral and Maxillofacial Surgery	Debriefing second session Ophthalmology
11.50-12.20	Feedback with committee members and discuss concept report department	Feedback with committee members and discuss concept report department
12.20-13.20	Committee members: break	Committee members: break
13.30-13.35	General introduction of online speed date session by secretary	
13.35-14.00	Speed date round 1	
14.00-14.25	Speed date round 2	
14.25-14.50	General session PhD-students and committee members	
14.50-15.05	Debriefing session PhD-students by committee members	
15.05-15.15	Committee members: break	
15.15-16.15	Preparation for giving general feedback	
16.15-16.30	Committee members: break	
16.30-17.30	Feedback session Heads of Department and committee	
17.30-17.45	Time for questions by Heads of Department	
17.45-18.15	Final appointments/conclusion of site-visits	

Appendix 4: SEP Assessment Scale

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