



# **Report on the evaluation of the Luxembourg Institute of Health (LIH)**

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**I Authors**

Nicolas Grosjean  
Andreas Balthasar  
Stefan Essig

INTERFACE Policy studies Research Consulting

Seidenhofstrasse 12  
CH-6003 Lucerne  
Tel +41 (0)41 226 04 26

Rue de Bourg 27  
CH-1003 Lausanne  
Tel +41 (0)21 310 17 90

[www.interface-pol.ch](http://www.interface-pol.ch)

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# 1. Introduction

The Ministry of Higher Education and Research (MESR) in Luxembourg mandated Interface Policy studies Research Consulting, Switzerland to organise and lead an evaluation of the performance of the Centres de Recherche Publics (CRPs) in Luxembourg in the period from 2018 to 2021. In this report, the overall results of the evaluation of the CRP Luxembourg Institute of Health (LIH) are summarised. The report is based on departmental peer reviews of LIH's departments, a bibliometric analysis, interviews with representatives of LIH's governance bodies and a benchmark analysis with an international research institution. In this chapter, we present the framework of the evaluation, including its overarching objective and methodological approach, and give a brief description of the institute.

## 1.1 Framework of evaluation

The Grand Duchy of Luxembourg operates three non-university public research and technology institutions defined as Centres de Recherche Publics (CRPs). They are the Luxembourg Institute of Science and Technology (LIST), the Luxembourg Institute of Health (LIH) and the Luxembourg Institute of Socio-Economic Research (LISER).

The overarching tasks of the CRPs are defined in the law of 3<sup>rd</sup> December 2014 (CRP law).<sup>1</sup> As stipulated in the law, the CRPs' mission is to carry out targeted fundamental and applied research activities as a necessary support for research, development and innovation activities and to transfer knowledge and technology to the public and private sectors. The detailed activities of the CRPs are defined in four-year performance agreements between the Ministry of Higher Education and Research (MESR) of Luxembourg and the individual CRPs.

### 1.1.1 Objective

The overarching objective of the evaluation is to assess the three CRPs and their research and transfer performance. This can be broken down into three sub-areas, namely input, output and outcome/impact:

- The *input* includes the preconditions for the research conducted, such as strategies, financial and human resources, infrastructure, organisation and external collaboration.
- The *output* includes the research performance, exemplified through research and innovation results and their dissemination.
- The *outcome/impact* refers to the medium- and long-term effects as well as the relevance of the output on areas such as science, society, economy and public administration/politics.

The three sub-areas of the evaluation are examined at the level of the departments of the three CRPs. Each department evaluation is summarised in a *department report*. Subsequently, an aggregation of the departmental evaluations is carried out, resulting in individual *institute reports*. Based on the department and institute reports, the entire sector of CRP research in Luxembourg is assessed in a *synthesis report*. Through the identification of the CRPs' strengths and weaknesses as well as the opportunities and challenges, the

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<sup>1</sup> Loi du 3 décembre 2014 ayant pour objet l'organisation des centres de recherche publics: <https://legilux.public.lu/eli/etat/leg/loi/2014/12/03/n2/jo>, last accessed: 27.10.2022.

aim is to contribute to improving the input of the CRPs in order to optimise their research and transfer performance.

### 1.1.2 Methodological approach

The evaluation is based on a combination of methodological approaches:

- *Departmental peer reviews:* For each department within the three CRPs, a peer review was conducted. The departmental peer reviews consisted of a self-assessment report written by the CRPs and the departments and a hearing at the departments in August/September 2022. The hearings were organised and moderated by Interface and carried out by group of experts working in the departments' research fields. Each hearing comprised a presentation by the department, a group discussion of the self-assessment report and several individual and group interviews. These included interviews with representatives from the management team and members of the research staff as well as clients. The experts of the peer reviews and the evaluation reports are listed in Appendix A 1.
- *Bibliometric analysis:* A bibliometric analysis was carried out in order to determine the positioning of the three CRPs in comparison to their international academic peer community. The analysis was carried out at the level of the 11 departments and was based on academic publications in 2018–2021 as well as on a collection of publications that served as benchmarks. The main performance indicators used were:
  - Field-Weighted Citation Impact (FWCI), indicating how the number of citations received by the institution's publications compares with the average number of citations received by all other similar publications in Scopus.
  - Outputs in Top (10%) Citation Percentiles, indicating the extent to which an institution's publications are present in the top 10% most-cited percentiles (by SciVal's CiteScore).
  - Publications in Top (10%) Journal Percentiles, indicating the extent to which an institution's publications are published in journals present in the top 10% most-cited percentiles (by SciVal's CiteScore).
- *Governance interviews:* In order to gather information on the internal and external governance of the three CRPs, interviews were carried out with representatives from the CRPs' government commissioners, boards of directors and executive management. The interview partners are listed in Appendix A 2.
- *Benchmark analysis:* Finally, a benchmark analysis was carried out to assess selected aspects of the CRPs compared to international research and technology organisations. The benchmark analysis aimed to compare governance structures. Furthermore, information about the institute's strategy and performance was collected. Based on the results of the benchmark analysis, the evaluation team draws conclusions on the institute's governance. Where possible additional conclusions as regards strategic positioning and performance of the institute were drawn. The benchmark analysis was based on document analyses and interviews with representatives of the benchmark institute. The benchmark institute was selected based on a pragmatic approach: the evaluation team selected institutes of comparable size and similar thematic orientation. Moreover, a benchmark institute with whom the evaluation team had previous contacts and access was chosen. Nevertheless, the comparison focused on selected aspects, especially governance, and does not provide a detailed analysis of all core aspects of the institute. For LIH, the Netherlands Institute for Health Services Research (Nivel) was chosen as benchmark institute.

### 1.1.3 Report structure

This institute report summarises the overall results of the evaluation of LIH. The report is divided into four parts. Chapter 2 presents a synthesis of the results at the departmental level. Chapter 3 presents the results as regards the external and internal governance at institute level. Chapter 4 describes the results of the benchmark analysis. Finally, the report concludes with the overall assessment and recommendations for the institute (see chapter 5).

## 1.2 Description of the institute

### I Vision and mission

Founded in 2015, LIH has its origins in two institutions, the Centre de Recherche Publique de la Santé (CRP-Santé) and the Integrated BioBank of Luxembourg (IBBL). The director of LIH has been in office since 2017. LIH's mission is to impact patients by performing and translating excellent biomedical research. The strategic focus positions LIH at the translational juncture between clinics and the biomedical research capacities of various biomedical research actors.

### I External governance structures

The government funding (block grant) and activities of LIH are defined in the four-year performance agreements between the MESR and LIH. The agreement also defines elements such as reporting and evaluations. The objectives are defined as performance indicators, e.g. for external funding and scientific publications. The size of the block grant depends on the overall government budget allocated to the funding of public research and the CRPs, the quality of the CRP's strategic plan, its expected social return and alignment with national priorities and the performance of the institute over the previous four-year period. In addition to the block grant, the performance agreement defines a financial institutional bonus linked to the institute's performance and success in the EU Framework Programmes for Research and Innovation. The bonus should go directly to the departments and the research groups taking part in the research activities.

### I Internal governance structures

According to the CRP law and Labour Code, each CRP is to have the following bodies: a Board of Directors consisting of representatives of civil society and the research community who are nominated by the government commissioner of LIH for a (once renewable) mandate of five years, a Chief Executive Officer (CEO) appointed by a recruitment committee following a recruitment procedure, a Staff Delegation elected on a five-year basis, and a Consultation Council consisting of representatives of researchers, staff of the research support and valorisation specialists, and Staff Delegation elected on a five-year basis. The CRP law further stipulates that the activities of the institutes are to be structured into departments representing related disciplines defined by the Board of Directors. The departments may be supplemented by technological platforms to pool the institute's resources. In addition, the CRPs may set up support services for research, development and innovation, and administrative and technical support services.

The management of LIH is organised into an Executive Committee (ExeCom), consisting of the CEO, the CFAO, and the heads of the Department of Infection and Immunity (DII), the Department of Cancer Research (DoCR), the Department of Precision Health (DoPH), and the Translational Medicine Operations Hub Department (TMOH). TMOH together with the Transversal Translational Medicine Department (TTM) are supportive structures to accelerate and facilitate the research performed by the other three departments. The structure of LIH is presented in graphic D 1.1.

LIH also disposes of the Staff Delegation and Consultation Council (named Collaborative Council, COCO) bodies. There are technological platforms associated with different departments, mainly with TMOH, where the biobank is located. Additionally, LIH has created the Scientific Steering Committee (SSC) and the Translational Steering Committee (TSC). The SSC is a consultative body composed of the CEO, the directors of the Departments, the Chief of Scientific Operations and group leaders appointed by the ExeCom for a (renewable) term of 1 year. Its main tasks are to advise on the departments' strategic and scientific orientations and provide a scientific evaluation of the research groups and projects. The TSC is an overarching governance structure for inter-institutional biomedical programmes, which reviews and approves all translational research projects and programmes which are patient-centric and/or precision medicine-driven and involve collaborations between LIH and other Luxembourg-based bio-medical institutions. It is composed of representatives of LIH, all hospitals, the University of Luxembourg, and the Laboratoire National de Santé.

#### D 1.1: Structure of LIH



Source: LIH self-assessment report.

#### I Financial and human resources

LIH is funded from two sources: direct government funding through the MESR (block grant) and externally raised funding (international and national competitive grants and contract research). In 2021, LIH received a block grant of approximately 36.3 million euros. The same year, LIH raised around 17.2 million euros in external funding. This means that the block grant accounted for about 68 per cent of the institute's total funding. In 2021, LIH employed 431 staff members (full-time equivalent [FTE] 390). Seventy-two per cent of the staff members were scientific personnel.

## 2. Input, output and outcome/impact at department level

In this chapter, we present a synthesis of the results from four peer reviews of the three research departments and the two supportive departments of LIH.<sup>2</sup> The peer review results are supplemented with the bibliometric analysis results, governance interviews and information from the departmental self-assessment reports.

### 2.1 Input

#### 2.1.1 Strategy

In all four peer reviews, the experts conclude that the departments have a strategy closely aligned with LIH's strategy of performing and translating excellent biomedical research. The experts conclude that DII and DoCR have strong strategies in their respective fields of activities and need better access to supportive structures within LIH for setting up and running translational tracks of the research activities. Regarding the newly structured DoPH, the experts are convinced that the strategy is on the right track but not yet fully developed. The experts find that TMOH/TTM have an excellent strategy to offer structured support to clinical researchers and to facilitate collaborations.

The COVID-19 pandemic had an enormous influence on the execution of the strategy in all departments. DII, DoPH and TMOH/TTM were heavily involved in the public response to the pandemic and initiated research projects related to the pandemic. On the one hand, the pandemic slowed down the activities of their ongoing projects. On the other hand, it sped up the process of bringing translational research to Luxembourg.

#### 2.1.2 Human and financial resources, infrastructure and equipment

The experts of all four peer reviews found that the departments have many highly motivated and talented employees in multidisciplinary teams. The directors have succeeded in creating a supportive atmosphere. The departments have provided good training and support for PhD students. The recruitment strategy has been quite successful, and the departments have been attractive when hiring new staff. They have recruited important staff members, e.g. project managers and bioinformatics specialists. However, the experts saw a need for LIH to develop its human resources strategy in highly competitive markets as more specialists will be required to work for the intended research projects and evidence-based services. The most needed and competitive profiles are public health researchers, experts in bioinformatics and biostatistics, experts in AI, hybrid profiles of scientists with knowledge in epidemiology and data science, medical doctors, and IT support workers. They should work for the departments in close collaboration with LIH's core facilities.

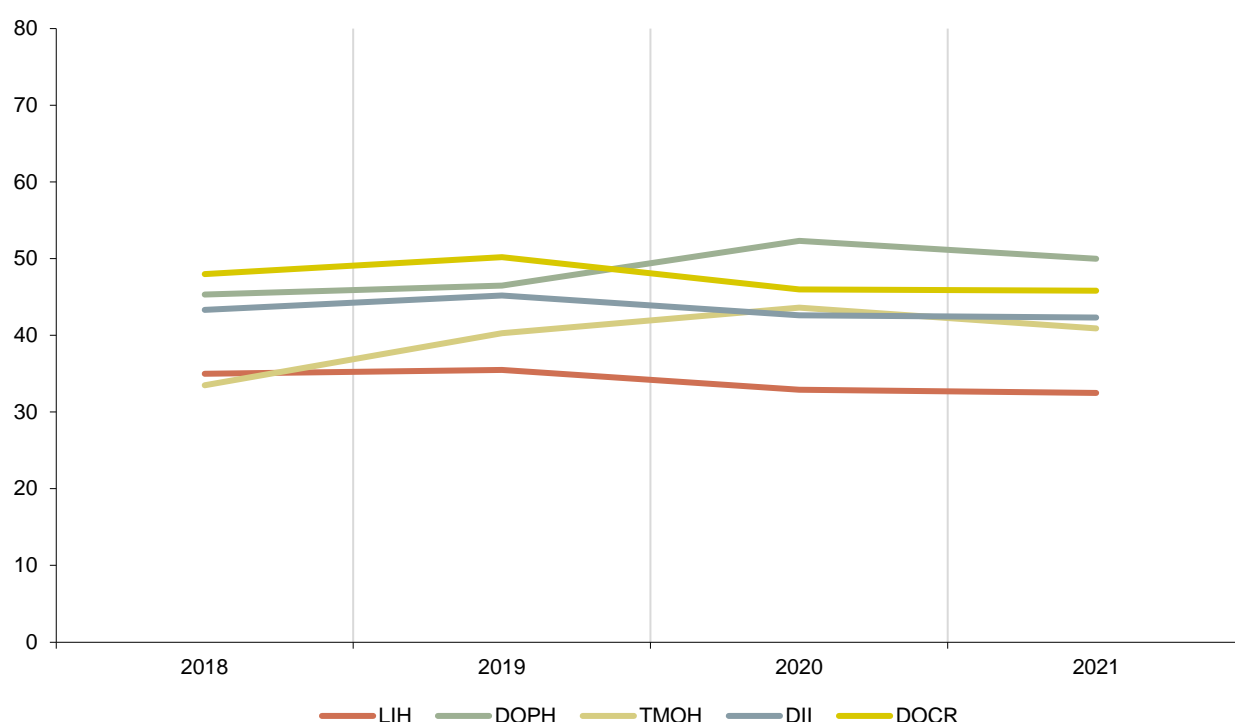
Regarding financial resources, the experts were impressed by the block grant and quite satisfied with acquiring third-party funding. As shown in graph D 2.1, the share of third-party funding of the institute's total expenditure is approximately stable at between 32 and 35 per cent. Compared with other CRPs, the institute's share of third-party financing is relatively low and should be increased (see synthesis report).

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<sup>2</sup> The two supportive structures (TMOH and TTM) were combined in one peer review.

The graph indicates that the share of third-party funding in the individual departments of LIH varies, with the highest percentage being in DoPH and DoCR in all four years of the reporting period. Third-party funding as a share of total expenditure indicates the departments' success in obtaining competitive grants and contract research. It should, however, be noted that the graph may show a somewhat skewed picture, as some projects generate third-party funding at the departmental level. At the same time, expenditure occurs at the platform level (e.g. for collecting samples in the biobank). Major reorganisations of the departments in 2019/2020 also affected the numbers. Furthermore, LIH overheads and central services might have decreased the share at the institute level. Finally, the chart does not consider that the departments contribute to research projects that other departments have obtained.

**D 2.1: Total third-party finances (% of total expenditure) of LIH**



Source: Self-assessment reports of LIH and the departments of LIH.

DoPH and DoCR have not only acquired a significant amount of funding from competitive sources but have also increased their submissions and success in grant proposals at the European level.<sup>3</sup> Nevertheless, the experts see a need to secure more diverse funding in cooperation with external collaborators and acknowledge that principal investigators invest too much time in writing up administrative, non-scientific aspects of complex grant proposals. The experts encourage all research departments to apply for grants at the EU level, and, to do so, to get administrative support for competitive funding applications. Furthermore, TMOH should attract more industrial studies to support financing LIH activities with fees and increase the share of larger supported projects to improve efficiency.

<sup>3</sup> TTM presumably also acquired a significant amount of third-party funding. However, TTM did not provide a financial report. The evaluation was therefore unable to assess TTM's financial resources.

Finally, applications for systematic funding schemes that allow, for example, funding several PhD students at once would be recommended.

The experts consider the research infrastructure and equipment to be state of the art for most of LIH. For example, IBBL, the biobank, as part of the TMOH, has shown that it has up-to-date equipment and facilities. However, and of great importance to the respective experts, DoCR lacks functioning workspace it urgently needs, including onsite lab installations, an expansion of the animal facility and additional space for labs and offices. Furthermore, at IBBL, too many activities still need to be performed manually when dealing with the reception and retrieval of samples, and therefore, investment in automating biobank processes is required. For the experts of all peer reviews, the overall long-term plan must consolidate the entire LIH infrastructure, bringing together all the activities of the institute. Ultimately LIH, the entire life science/biomedical research and possibly the hospital should be in proximity on one campus. The departments (except IBBL and research nurses at the hospitals) could benefit from being under the same roof. This might enhance collaboration between groups and increase flexibility in adaptation to new tasks.

### **2.1.3 Organisation**

According to the peer reviews, the departments of LIH are very well organised. TMOH, in particular, is highly structured and well-organised for the needs of clinical researchers. Committees supervising and guiding the researchers and their projects, such as the SSC and the ExeCom, are well accepted. Structures are also in place to educate and guide PhD students, especially regarding possibilities for attending courses and creating PhD committees. The experts further assessed that the research groups had interacted more than in the previous evaluation period. The creation of the CARES research group, a joint activity between DoPH at LIH and LISER, has the potential to be especially innovative, as it will combine complementary expertise in public health.

Regarding internal communication, the experts found that the culture in the departments is open and supportive. However, apart from that, there was room for improvement. The experts are of the opinion that the decision-making process on budget-relevant decisions is not yet transparent across all levels of the departments and LIH. The experts suggest that TTM and LIH present the highly successful Parkinson's disease research as a model for other translational projects.

Regarding external communication, DII's, DoPH's and LIH's strong media communication have successfully created public awareness and visibility during the COVID-19 pandemic. However, LIH should simplify when communicating the activities of the departments publicly. TMOH is for example a "clinical research platform", a denomination that may be easier to understand in the community. Lastly, TMOH/TTM should show more clearly that they are open to supporting all kinds of clinical research, whether translational or not. This step could be significant in making clinical research support more visible to clinicians at the hospitals and in the community.

### **2.1.4 External collaboration and service provision**

The experts found that the departments are generally well-connected to stakeholders in Europe. All departments have ongoing national and international collaborations with research and industry. Nevertheless, the departments assessed their visibility as not yet developed enough. LIH should therefore increase the visibility of its departments and activities through international collaborations and joint applications for research projects. Industry collaboration has often been based on the proximity of industry and TMOH, and should therefore be improved. Lastly, the connection to the University of Luxembourg has

been described as underdeveloped, as LIH does not seem to use teaching and career development at universities as opportunities. Such opportunities could be encouraged by facilitating tenure track possibilities and dual employment with the University of Luxembourg and LIH. Transparent processes following pre-established criteria should be developed and implemented. The experts stress that the potentially improved synergies could become extremely important in developing the biomedical landscape of Luxembourg.

The experts found that clinical activities and research are often disconnected. TMOH and TTM, the departments of LIH responsible for building and supporting this connection, are not yet used to their full potential. Within LIH, the main underlying reason is the time it takes to implement the translational agenda within the research departments. The main reason outside LIH is that hospitals do not have a strong history of clinical research and therefore collaborate only occasionally. Currently, patient data and samples are rarely used for research. The experts suggest that a connection is made between clinics and research. Specifically, they see the potential in intensifying the interactions of LIH, especially TTM, with physicians by being more inclusive from the beginning when project ideas are born. The collaborations with hospitals should be further intensified and a structured MD/PhD track should be offered.<sup>4</sup> More joint projects that document the need for patient data and samples as well as research capacity might improve the quality of the collaborations.<sup>5</sup>

## 2.2 Output

### 2.2.1 Quality of output

In all four peer reviews, the experts conclude that LIH's departments demonstrate research output of very good quality, with publications in high-ranking international journals. According to the experts, DII in particular has performed impressively over the past four years. The quality and quantity of scientific publications have been very good for most research groups. DoPH's scientific output has been relatively high in quantity and its quality has been recognised and highly cited. The service output quality of TMOH, with all its units, has been excellent. Their users seem satisfied with the services.

The bibliometric analysis confirms the conclusions in the peer reviews. All departments produce publications with above-average field-weighted citation impact and focus on publications in high-quality journals (see table D 2.2). The departments' shares of the top 10 per cent cited and top 10 per cent journal publications are between 16 and 24 per cent, and between 44 and 50 per cent, respectively. DoPH and TMOH/TTM demonstrate scientific output of especially high quality, with substantially higher field-weighted citation impacts than DoCR and DII. While the departments display very strong performance across the evaluation results, the high average results are driven by particularly successful years. It should be noted that the table may show a somewhat skewed picture, as it does not differentiate between first, last, and co-authorships. Members of TMOH are mainly co-authors when publishing as service providers in international collaborations, compared to members of the research departments who have a higher share of first and last authorships.

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<sup>4</sup> LIH runs doctoral training units that include MD/PhDs, but the institute lacks a more generic MD/PhD programme for attracting and co-educating graduates and residents.

<sup>5</sup> LIH has submitted clinician scientist applications; one has been granted at the time of report writing.

**D 2.2: Cross-departmental comparison of quality performance indicators, 2018–2021**

	<i>DoCR</i>	<i>DII</i>	<i>DoPH</i>	<i>TMOH/TTM*</i>
Field-weighted citation impact**	2.28	1.85	6.45	9.00
Outputs in top (10%) citation percentiles	18.0%	16.4%	25.9%	24.2%
Publications in top (10%) journal percentiles	49.3%	44.8%	50.1%	45.3%

Source: Bibliometric analysis. \* TTM informed the experts after the hearing that the department published over 50 additional articles during the evaluation period that were not considered in the bibliometric analysis. \*\* Number of citations received by publications, divided by average within the same Scopus Subject field. Values >1 indicate above average within field citations, values <1 indicate below average.

### 2.2.2 Quantity of output

The experts conclude that all three departments demonstrate research output of very good quantity. In all four peer reviews, the experts conclude that the output quantity is impressive compared to the departments' size. A comparison of the departments shows that DoPH produces the highest quantity (n=433 publications that could be included in the bibliometric analysis), followed by DII (n=299), DoCR (n=228), and TMOH/TTM (n=165) (see table D 2.3).<sup>6</sup> DoPH was especially strong in terms of quantity after 2019. DII was especially strong in 2021. DoCR's amount has slightly increased since 2018. For TMOH/TTM, the number of publications was quite stable.

**D 2.3: Cross-departmental comparison of quantity performance indicators, 2018–2021**

	<i>DoCR</i>	<i>DII</i>	<i>DoPH</i>	<i>TMOH/TTM*</i>
Number of publications	228	299	433	165
Annual average number of peer-reviewed journal publications	52	80	126	53
Annual average number of refereed journal publications per FTE research personnel	0.78	2.54	3.03	n/a

Source: Bibliometric analysis, self-assessment reports of departments. \* TTM informed the experts after the hearing that the department published over 50 additional articles during the evaluation period that were not considered in the bibliometric analysis.

### 2.3 Outcome and impact

In all peer reviews, the experts conclude that LIH's departments have a significant scientific impact. The experts are also starting to see an increase in societal impact thanks to the translational strategy of LIH. Yet LIH still lacks visibility and connection to the community and should better connect to patients to include their perspectives in research

<sup>6</sup> TTM informed the experts after the hearing that the department published over 50 additional articles during the evaluation period that were not considered in the bibliometric analysis. Most of these articles stem from TTM's research activities in Parkinson's disease.

projects.<sup>7</sup> The experts also suggest that TMOH/TTM advertise their activities more, supporting the development of a culture of openness for clinical research in Luxembourg. Furthermore, the interaction between DoPH and important actors in public health and policymakers is not yet strong enough. The experts also recommend that DoPH regularly interacts with other important actors, such as primary care providers and the new National Health Observatory.

Some LIH researchers have shown especially strong translational activities with applications of their inventions in hospitals, the submission of patents and the initiation of start-ups. However, the experts lacked training in technology transfer, intellectual property (IP), and start-up creation to create the potential for more impact. The detection and transfer of innovation are not systematically carried out at LIH and the experts recommend that the departments, in collaboration with the technology transfer office of LIH, incubators and the university improve training in technology transfer, IP, and start-up creation. They should improve the detection and transfer of innovation by scouting for potential inventions and patents, and participating in targeted calls for transfer funding.

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<sup>7</sup> At the time of writing, LIH launched a call to patients to become members of a patient advisory committee of the newly created National Centre for Translational Cancer Research in Luxembourg (NCTCR). Until now, patients were involved in a participant advisory committee of TTM's research projects on Parkinson's disease.

## 3. External and internal governance at institute level

In this chapter, we present the findings as regards LIH's external and internal governance. The results are based on the interviews with representatives of the Government Commissioner, the Board of Directors and the Executive Management of LIH and are supplemented with information from the self-assessment report of LIH and the peer reviews of the departments.

### 3.1 External governance

The law on the organization of public research centres<sup>8</sup> constitutes the objectives, general mission, and organization of CRP LIH. It furthermore regulates the staff, the intellectual property and the relations with the government including multi-annual planning, financing and cooperation. Based on the CRP law, the MESR and LIH negotiate a four-year performance agreement, which stipulates the CRPs strategy, budget and key performance indicators. The evaluation of the national legal framework, the performance agreement and its main elements are elaborated in the following paragraphs.

#### 3.1.1 National legal framework

The experts recognise in all four peer reviews that the departments lack a larger framework that promotes biomedical research in Luxembourg. The discussions during the site visits with the researchers showed that the current framework, in which research data is not easily linkable and reusable, severely impedes the further development of activities at LIH. Researchers depend on data exchange and interoperability to perform national and transnational research. The experts stress that a modern framework for research consent and electronic medical records is crucial for population-based and longitudinal research. The experts see the importance of these suggestions for IBBL in particular, as it has the potential to become a national biobank.

In contrast, the Executive Management of LIH does not believe that the legal framework is fundamentally different in comparison to the neighbours in Europe and stresses the willingness of the government in Luxembourg to open data for secondary use soon.<sup>9</sup> Moreover, the Executive Management sees an opportunity to improve relative to competitors abroad, as Luxembourg is small, so it is possible to talk to all actors to strengthen the legal framework.

#### 3.1.2 Performance agreement

The four-year performance agreement between CRP LIH and the MESR is the main instrument of external governance. The performance contract proposal is prepared by ExeCom and is negotiated between the MESR and the Executive Management of LIH. It includes the following main elements:

- the strategy
- the financing through the government-provided block grant
- the Key Performance Indicators (KPI) for the CRP

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<sup>8</sup> Loi du 3 décembre 2014, Organisation des centres de recherche publics.

<sup>9</sup> Discussions are ongoing at the time of report writing.

The basis for the performance agreement is the Multi-Annual Planning and the Multi-Annual Financial Planning written by LIH's ExeCom. The MAP is a strategy implementation program and an action plan that is continuously revised throughout the evaluation period. The Board of Directors (BoD) must approve the MAP. According to the partners involved, the negotiation of the performance agreement is based on a continuous negotiation and exchange process with the MESR.

The performance agreement is considered a suitable instrument by all partners involved. According to the Board of Directors, the negotiation provides a platform for discussion between the MESR and LIH, to express expectations and to find common ground to work together. The Board of Directors of LIH has mandated the Executive Management to negotiate the performance agreement with the MESR. The Executive Management experiences the process as very positive and sees the agreement as a central reference to the law in offering planning capacity and financial clarity for many years. The agreement supports the change process within LIH and helps everyone understand the institute's general direction. For the MESR, the agreement enables the Ministry to specify the expectations regarding the performance of LIH. Furthermore, it serves as the basis for accountability to the population.

#### I Performance indicators

Most partners see the KPIs in the agreement as an effective means of defining the expected performance in research, collaboration, funding and impact. It is important to all partners that the indicators are revised every four years to keep them up to date. Initially, the performance agreement only included indicators for academic output. Now, the indicators also include societal impact. The Executive Management would like to see more indicators in a future version of the contract to capture the translational strategy of LIH. However, the management recognises the complex task of creating clear indicators that measure what it wants them to measure. The MESR sees generic indicators as unfortunate but also necessary for comparing the CRPs. The MESR mentions that the mutual discussion and phrasing of the indicators are already constructive. Finally, the indicators help the MESR clearly communicate the block grant's output to the parliament. A minority of the interviewees involved criticised the indicators as being too narrow.

#### I Budget

In the performance agreement from 2018 to 2021, the total block grant was around 149.9 million euros.<sup>10</sup> The block grant accounts for about 68 per cent of LIH's total funding, with the remaining 32 per cent originating from third-party funding.

The Executive Management considers the available budget for the institute's activities adequate. It is essential for the management that the MESR understands the need to finance many scientific service platforms and all the researchers that use them. However, the management sees little room to influence the budget, as its amount is decided using a top-down approach. A minority of the interviewees suggested discussing how the budget is negotiated, i.e. to fix the objectives and projects first before negotiating the amount.

The parliament decides on the budget for the CRPs and makes its decision based on the preceding budgets. Consequently, the MESR is not involved in the decision on the budget for the CRPs and the distribution of the block grant for the CRPs is not executed in a performance-based approach.

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<sup>10</sup> The block grant was later increased due to COVID-19 related activities at LIH.

The financial bonus linked to the institute's performance and success in the EU Framework Programmes for Research and Innovation is seen as critical by LIH. The Executive Management understands the rationale behind the EU bonus. Still, it stresses that a third of LIH's FTEs produce data as a service for other researchers, which does not correspond to the criteria for the bonus.

### I Strategy

LIH has a vision for translational impact through excellent research and by giving back to the community in Luxembourg. The evaluation team assessed the implementation of the strategy based on interviews and the results of the peer reviews: LIH's strategy of performing and translating biomedical research is well thought through. However, LIH should improve access to supportive structures for its research groups to set up and run translational tracks. Furthermore, LIH is missing a modern legal framework for research consent, and electronic medical records that are interoperable and accessible for research (see section 3.1.1). Translating LIH's strategy into reality depends on those elements.

In the opinion of the Board of Directors and the Executive Management, LIH has successfully initiated this vision and will follow the strategy. LIH has developed integrative activities and services. For example, the institute provides services to the health directorate, with registries and public health surveys. It is well accepted that the strategy is part of the performance agreement.

For the MESR, the LIH's strategy is going in the right direction. The MESR sees that LIH is striving for excellent research and to build strong international collaborations. The ministry also supports LIH's endeavours to collaborate more with hospitals and the university. It is important to the ministry that LIH promotes its vision with a focus on translational activities complementary to university-based research.

The response to COVID-19 was essential to show patient-centeredness and respond to public health needs. Before, the topics and departments were unrelated, now they are connected. For the Board of Directors, many things came together; different steps of basic research and clinical trials, public health aspects, and different departments working together on this pathway. All of this suggests how Luxembourg could become a hub for this type of research.

### 3.1.3 Board of Directors

The Board of Directors determines LIH's general policy, strategic decisions and activities. The Executive Management see their role as synergistic with the board. The Board is seen by all partners involved as a well-functioning body, with a good composition, challenging and supervising the management, with a clear role and no micromanagement from above.

The MESR appoints a Government Commissioner who attends the meetings of the Board of Directors of the CRP in an advisory capacity. According to the MESR, the main task of the Commissioner is to ensure that all the regulations in the CRP law and the performance agreement are fulfilled. To this end, the Commissioner has a right of veto on the Board of Directors. According to the interviewed partners, this right is very rarely used. According to the partners involved, the representation of the MESR in the Board of Directors functions very well. Due to the Commissioner's limited role as an observer and the fact that LIH does not negotiate the performance agreement directly with the Commissioner, neither the MESR nor LIH see any potential conflict of interest or priorities. Rather, the Commission's participation in the board meetings is seen as ensuring the flow of

information between the Ministry and the institute, thereby reducing the risk of asymmetric information.

### 3.2 Internal governance

The internal governance of LIH also functions well. The ExeCom, research departments and supportive structures are well organised.

#### I Organisation

LIH has been fundamentally reorganised during the evaluation period, mainly by reorienting the Department of Population Health as DoPH and creating TMOH and TTM as supportive structures. Furthermore, IBBL, the biobank, was integrated into TMOH. These changes have been a success for the Executive Management as they created coherent blocks of activities and transparency on costs and block grant attribution including research platforms and services. Some members of the Board of Directors mention the high speed of these changes to the structure, adapting them to the strategy. The changes seem to increase the complexity of the organisation. Therefore, it is important that the Executive Management further adjusts the administration at LIH to follow the research reorganisations to prevent too many overhead costs.

The difficulty in understanding names and acronyms of departments and platforms is shared by the Board of Directors, the MESR and the experts in the peer reviews (see chapter 2.1.3). Everyone agrees that a simplification would be helpful. Otherwise, increasing complexity in the structure and naming is considered a risk to external communication.

#### I Support structures

The experts recognise SSC and TSC as important internal structures for supporting research projects and guiding researchers. The experts also assessed that a structure for external support in shaping the research strategy is missing at the level of DoPH and LIH. The experts recommend that an external scientific advisory board is created at the level of the department, with the members being experts close to the department's topics, meeting regularly to support the shaping of the research strategy. Another board might be created at the level of LIH, serving a more overarching function and advising on the overall research strategy of LIH.<sup>11</sup>

#### I Allocation of financial resources

The Executive Management decides about the distribution of the block grant at LIH. The directors of the department have little decision-making power as regards the budget. Following the recommendations of the 2019 evaluation, group-based budgets were introduced and worked quite well. The dissemination to the groups happens ex-ante, giving them clarity and visibility at the beginning of the year. The PIs of the groups have autonomy on how to spend their money and can roll it over to the next year if they can save money.

Executive Management sees it as essential that the process of allocating financial resources is centralised so that it can be managed with a common objective. LIH has invested considerable amounts of internal funds into strategic investments of the departments. The departments could flexibly use the group-based budgets as a carry-forward in the new year. Nevertheless, in all peer reviews, the experts found that the directors of the research

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<sup>11</sup> TSC and a potential external scientific advisory board play a similar role in reviewing research activities, but TSC lacks the possibility of accompanying the strategy from a more independent, outside perspective.

departments lack a consistent and agile budget for their own strategic investments. The experts determined that the needs of PIs have not always been evaluated quickly enough, for example, for investments in equipment, which has sometimes resulted in frustration.

## 4. Benchmark analysis

In this chapter, we present the results of the benchmark analysis. The analysis is based on document analyses and interviews with representatives of the benchmark institute, interviews with representatives of the Government Commissioner, the Board of Directors and the Executive Management of LIH as well as information from LIH's self-assessment report.

Nivel was chosen as a benchmark institution for LIH. The selection of Nivel was based on the comparable size and thematic orientation of the institute with LIH and previous contacts of the evaluation team with Nivel. The benchmark analysis focused on the governance of the institutes. Furthermore, we took additional aspects regarding organisation and performance into account. Differences between the institute were elaborated on and discussed by the evaluation team. However, the pragmatic approach in comparing the institute does not allow for a detailed, in-depth analysis of the institutions. Nevertheless, it draws attention to some important aspects that should be considered in the institute's development.

### 4.1 Comparison of strategy and areas of activity

#### I Development

Nivel was founded in 1965, making it a relatively old organisation compared to LIH. Similar to LIH's origins in CRP-Santé, a research platform for clinicians, Nivel's origins are in medical practice as it was founded as the scientific institute of the Dutch College of General Practitioners. Nivel and LIH gradually expanded their domains. In contrast to LIH, Nivel kept its primary focus on practice and did not develop an academic or basic research-based focus. Today, both Nivel and LIH are key players in the knowledge infrastructure of their respective countries' healthcare systems. The two institutions are non-university research institutes with different legal statuses; LIH is a public research institution anchored in the CRP law, while Nivel is an independent foundation.

#### I Strategic orientation

The benchmark analysis shows that LIH and Nivel have a translational strategy that positions the institutes at the crossroads of science and healthcare. *Research for better care* is Nivel's mission. Between 2016 and 2021, Nivel defined three strategic priorities: to carry out high-quality research, have a demonstrable impact on society, and be a sustainable organisation. In more specific aims within these priorities, Nivel wants to be an active and respected partner in the academic community at a national and international level, and to invest in its research infrastructure and the innovation of methods. Furthermore, Nivel wants to respond to the issues that matter in healthcare, and to be a key player in the network of stakeholders in healthcare by contributing with research that is properly aligned with the challenges that these stakeholders face. It also wants to improve its communications strategy to be more visible with regard to the institute's relevance to society.<sup>12</sup> Thus, many similarities and differences in the strategic orientation of Nivel and LIH can be identified. Whereas Nivel expresses a broader interest in societal stakeholders, LIH focuses on its function as a link by providing patient-based clinical and research data to stakeholders and producing translational deliverables.

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<sup>12</sup> A complete overview of Nivel's strategy and aims can be found here: <https://www.nivel.nl/en/mission-and-values>.

From the beginning of 2020, the COVID-19 pandemic brought similar uncertainty, disruptions, and opportunities to both Nivel and LIH, modifying the execution of the strategy fundamentally. On the one hand, activities like presentations at conferences declined, but on the other hand, projects related to the pandemic were implemented and had a significant impact.

### I Research and service areas

There are substantial differences in the research and services areas of the two institutions. Nivel conducts healthcare services research and is organised into thirteen specific research programmes covering various fields of expertise in healthcare research. LIH, on the other hand, is active in more diverse fields of research, conducting basic biomedical research in wet labs but also in public health and precision health research. At LIH, the areas are connected by their shared use of data and platforms.

Key service areas for Nivel are the institute's expertise in staff, national healthcare registries, panels of healthcare users and providers and professional registries. Nivel also runs a Communication Centre and provides inputs for data-sharing governance in healthcare. LIH is active in similar fields. Regarding registries and panels, LIH builds structures similar to Nivel but at a much earlier stage of development.

### I Target groups and partnerships

There are substantial differences in the target groups of the two institutions. Nivel and LIH have a rather broadly defined target audience, addressing the national and international scientific community, public stakeholders and the general public. However, for Nivel, the perspectives of patients, as clients or citizens, and primary care practitioners are particularly crucial. Furthermore, managers of healthcare services, insurers and governmental agencies are essential.

Similarly to LIH, Nivel is an organisation outside of universities and therefore needs many collaborations and partnerships. Like LIH in Luxembourg, Nivel has strong ties to Dutch universities, with 13 professors who are chairs at seven Dutch universities. As a result, Nivel is closely connected to science and can play a significant role in science, policy and practice. To a smaller extent, Nivel also collaborates with universities of applied sciences, especially with nursing and paramedic departments.

An important example of an international partner for Nivel is the Fundación Avedis Donabedian in Spain, a health services research organisation. Other partners come from various fields, including patient organisations, healthcare professionals, insurers, and government at national and international levels.<sup>13</sup> The motivation for collaboration is typically mutual: both Nivel and its partners are interested in strong research, and both raise research questions. LIH is building similar partnership networks but is in a more difficult position; Luxembourg, in contrast to the Netherlands, has only recently started a basic medical curriculum and does not have a strong culture and organisation of biomedical research.

## 4.2 Comparison of financial and human resources

At 7.1 million euros in 2021, the budget of Nivel is about 20 per cent of LIH's annual budget (2021: 36.3 million euros). Both Nivel and LIH are mainly financed through government funding. However, the governmental contribution percentage of all financial resources is only 45% for Nivel compared to 68% for LIH. Nivel argues that its total

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<sup>13</sup> For an overview of current partners and funders as well as Nivel projects, see: <https://www.Nivel.nl/en/partners-and-funders-our-international-research>.

financial resources are just big enough to ensure the necessary range of knowledge and competencies. Nivel appreciates the government funding but warns against too high a proportion of public financing and the risk of becoming dependent.

Nivel and LIH aim to spread their funding among diverse financiers at national and international levels. For Nivel, the most critical national funder besides the Ministry of Health is ZonMw, a funding organisation in health research and care innovation. Internationally, the European Commission is the most important funder. Unlike at Nivel, competitive grants are essential to LIH's funding. For Nivel, on the other hand, contract research is more critical than for LIH.

Nivel is also significantly smaller than LIH in terms of human resources. In 2021, Nivel had 185 employees (FTE 156), while LIH had 431 employees (FTE 390). The proportion of scientific to total personnel is slightly lower for Nivel. While the number of staff at LIH increased during the evaluation period, a significant challenge in terms of financial resources had a profound influence on Nivel's personnel; a drastic cut in its block grant led to a negative financial result in 2015 and a decrease in personnel, especially among young researchers with non-permanent positions. In the aftermath, targeted policies resulted in a return to a healthy financial situation for Nivel, followed by an increase in the number of employees, returning to the pre-cut headcount by 2021.

Another big issue for both institutes is the challenge for HR to find experienced researchers and supporting IT specialists. The underlying reasons are the scarcity of qualified applicants and non-competitive salaries.

**D 4.1: Financial and human resources (as of 31.12.2021)**

	<i>LIH</i>	<i>Nivel</i>
Financial resources (euros)		
Government contribution	36.3 million (68% of the total) from Ministry of Higher Education and Research	7.1 million (45%) from Ministry of Health
Competitive grants	9.4 million	1.6 million
Contract research	3.0 million	5.3 million
International	<sup>1</sup>	1.5 million
Paid services	1.8 million	<sup>2</sup>
Other	2.9 million	0.2 million
<i>Total financial resources</i>	<i>53.5 million</i>	<i>15.8 million</i>
Human resources		
Staff (FTE)	431 (390)	185 (156)
Share of scientific personnel	72%	65%

Sources: Self-assessment reports of LIH and Nivel 2022. <sup>1</sup> The international grants of LIH are included in competitive grants. <sup>2</sup> The paid services of Nivel are included in contract research.

### 4.3 Comparison of governance

#### 4.3.1 External governance

The structure of the two institutes' external governance is quite different. There are clear indications that the involvement of the government funder is more pronounced in LIH than in Nivel:

- *Government funder:* For Nivel, the government funder is the Ministry of Health, whereas, for LIH, it is the Ministry of Higher Education and Research.
- *Performance agreement:* Nivel is governed by a six-year framework contract without performance indicators. The contract includes the expected research areas in a broad sense as boundaries of work and Nivel's bid book with a justification of the costs. Nivel argues that the framework contract is ideal for both itself and the ministry. The ministry does not want to direct Nivel too much to prevent dependency and a conflict with competition law. In contrast, the MESR and LIH have four-year performance agreements with performance indicators in the contract.
- *Representation of government funder in governing body:* The CRP law in Luxembourg stipulates that the government funder can appoint an observer to attend the institutions' governing body meetings. Therefore, the MESR is represented on LIH's Board of Directors. In contrast, no government member is part of Nivel's Board of Directors.
- *Reporting and evaluation:* Nivel and LH report annually on their activities. In addition, both institutions are regularly assessed by external evaluations. Nivel's strategy process is framed by six-year periods, after which Nivel writes a self-assessment report and receives a visit from international experts. Nivel then defines the strategy based on their feedback. The ministry uses Nivel's self-assessment report and the feedback of the international experts to create the contract. The ministry itself does not evaluate

Nivel. In contrast, the evaluation of LIH is mandated by the MESR, and the evaluation period is four years.

- *External scientific board:* Neither Nivel nor LIH have an external scientific advisory board. For LIH, the evaluation shows that such a board would be advisable to accompany the translational strategy (see chapter 3.2). Nivel says that the constant contact with stakeholders in research and impact work makes such a board redundant for them.

#### D 4.2: External Governance: Overview of bodies and instruments

	<i>LIH</i>	<i>Nivel</i>
Government funder	Ministry of Higher Education and Research	Ministry of Health
Contract type	4-year performance agreement	6-year framework contract
Performance indicators in contract	Yes	No
Reporting and evaluation	Annual report External evaluation every 4 years	Annual report External evaluation every 6 years
Representation of funder in strategic board	Yes, defined in CRP law (advisory capacity)	No
External scientific advisory board	No	No

Sources: Self-assessment reports and websites of LIH and Nivel 2022.

#### 4.3.2 Internal governance

The internal governance of Nivel and LIH shares general aspects but differs in distinct components and instruments. Nivel's Supervisory Board is similar to LIH's Board of Directors. It supervises how Nivel's Management Board runs the institute. The current governors are from ZonMw, DIVOSA (an association for municipal executives in the social domain), two Dutch universities and an Academic Medical Centre. Nivel's Management Board is similar to LIH's Executive Management and consists of the executive director, two deputy directors and the heads of the three research departments. Both Nivel and LIH have internal scientific advisory boards. In addition to these bodies, LIH has several committees, such as the Staff Delegation and COCO, thus displaying a more complex internal governance structure than Nivel. Lastly, both institutions have developed a multiannual strategy defining their missions, objectives and activities.

**D 4.3: Internal Governance: Overview of bodies and instruments**

	<i>LIH</i>	<i>Nivel</i>
Strategic leadership	Board of Directors	Supervisory Board
Executive leadership	Executive Management, Executive Committee (ExeCom)	Management Board
Further bodies	Scientific Steering Committee (SSC) Translational Steering Committee (TSC) Collaborative Council (COCO) Staff delegation	Internal scientific and quality boards
Instruments	Multi-annual strategy	Multi-annual strategy

Sources: Self-assessment reports and websites of LIH and Nivel 2022.

**4.4 Comparison of output and impact****I Output**

There are substantial differences in output between the two institutions. Nivel is satisfied with its output but the quantity of the output in total and per FTE dropped over the last few years because many of its junior researchers are newly hired and will need a few years to start publishing. Additionally, the COVID-19 pandemic hit the institute and reduced the number of presentations. Nevertheless, 40 dissertations based on Nivel research were completed in the last six years, with 27 researchers working on their theses at the end of 2021. In contrast, LIH has increased its output in total, with its output per FTE remaining stable. No impact of COVID-19 on the output of LIH is visible.

Nivel publishes its scientific articles in international journals. 85% of these articles were in Q1 and Q2 journals of their respective category in the impact factor assessment. The quality of scientific publications is routinely assessed by the Centre for Science and Technology Studies (CWTS). The CWTS report says that Nivel scores at around or slightly above world average, and that citations take a bit longer than in other fields. In contrast, LIH's scientific articles are published in higher-ranking journals and are more frequently cited (see chapter 2.2).

It should be noted that a comparison of the output between Nivel and LIH is difficult as the institutes work in research areas associated with different publication and citation frequencies.

**D 4.4: Comparison of output**

<i>Output</i>	<i>LIH</i>				<i>Nivel</i>			
	2018	2019	2020	2021	2018	2019	2020	2021
Number of publications	342	332	402	459	188	176	170	132
Number of publications per FTE (total all HR)	1.0	0.9	1.0	1.2	1.6	1.5	1.2	0.8

Sources: Self-assessment reports of LIH and Nivel 2022.

## I Impact

There are substantial differences in the areas of impact of the two institutions. Both institutions have an impact through their research activities and services. Still, the comparison makes it clear that LIH's impact lies primarily in its service platforms. In contrast, Nivel has a clear societal impact through its extensive contract research on behalf of the public sector. Nivel has a strong focus on societal impact. Products geared towards social issues and their knowledge dissemination are important. Per year, Nivel publishes more than a dozen articles and book chapters, 50 reports and over 100 web publications. Interactions with the community concerning social issues, such as guest lectures, committees and board positions, are common. Examples of activities are the development of a methodology to collect meaningful care data in nursing homes or a planning tool to determine the necessary medical training influx. Furthermore, Nivel monitors the changes in the social participation of people with disabilities in a national panel and contributes to raising awareness of the importance of considering people with limited health literacy.

### 4.5 Concluding remarks

The benchmark analysis has revealed some similarities and important differences between Nivel and LIH. The two organisations are non-university research institutes, suggesting their structures have proven suitable. The external governance of Nivel is smaller in comparison to LIH, with no government-appointed member of the strategic board and a smaller block grant. There are also no performance indicators in the multi-year contract with the government.

The research activities of Nivel and LIH are pretty different but their strategic focus on impact is similar. Nivel has a long history of working with clinicians and the population, resulting in increased societal outcomes and a more substantial impact. Nivel's impact on society is valued by the Ministry of Health and stakeholders from healthcare, professional and patient organisations. Nivel researchers are increasingly part of the knowledge ecosystems that support decision-making and professionalism in healthcare. Nivel aims to respond to the need for information within these ecosystems in a timely and accessible manner. LIH's focus on impact might lead in a similar direction.

## 5. Overall assessment and recommendations

This chapter presents the overall assessment and the resulting recommendations for LIH. The results are shown in more detail in the previous chapters.

### 5.1 Overall assessment

#### I Input

The evaluation recognises LIH as a very active CRP. LIH's strategy of performing and translating biomedical research is well thought through. The recommendations raised in the 2019 evaluation have generally been well implemented. However, LIH should improve access to support structures for its research groups to set up and run translational tracks.

The directors have succeeded in creating a supportive atmosphere. The departments have many highly motivated and talented employees in multidisciplinary teams and they provide suitable training and support for PhD students. Nevertheless, the evaluation found that a strategy for human resources in competitive markets is needed.

The evaluation also finds that most of LIH's infrastructure and equipment are state of the art. For example, the biobank has up-to-date equipment and facilities. Nevertheless, several investments are needed, for instance, in the automation of processes.

In terms of financial resources, some of the departments were highly successful in acquiring third-party funding and the submission of grant proposals at the European level increased. Overall, however, the amount of funding from competitive sources is relatively low at LIH compared to the other CRPs.

The departments of LIH are very well organised. Committees supervising and guiding the researchers and their projects, such as the SSC and the ExeCom, are well accepted. The evaluation finds examples of excellent internal and external communication but there is also room for improvement.

#### I Output

LIH published research of high quantity and quality in the evaluation period. All departments have produced research with above-average field-weighted citation impact. The departments' shares of the top 10 % cited and top 10 % journal publications are between 16 and 24 per cent, and between 44 and 50 per cent, respectively.

#### I Outcome/impact

The evaluation also shows that LIH's departments have a significant scientific impact and are starting to see an increase in their societal impact. Some of LIH's researchers have shown especially strong translational activities with applications of their inventions in hospitals, the submission of patents and the initiation of start-ups. Yet, LIH still lacks visibility and connection and should therefore better connect to international research consortia, industry, universities, patients, actors in public health, and policymakers.

### I Governance

The external governance structures of LIH function well. However, LIH lacks a modern legal framework for research consents, and electronic medical records that are interoperable and accessible for research. Translating LIH's strategy into reality depends on those elements. The governance, implemented through the performance agreement with the MESR and the appointed Board of Directors, is seen as appropriate by the partners involved. The performance agreement, including the defined strategy, financing plan and performance indicators, ensures a clear framework for activities and financial predictability and gives the institute sufficient freedom of research. The strategic responsibility of the Board of Directors guarantees the independence of the strategic orientation of the institute. Furthermore, the MESR representative on the Board ensures the flow of information between the Ministry and the institute.

The internal governance of LIH also functions well. The ExeCom, research departments and supportive structures are well organised, but the rapid rate of change in the organisation increases the complexity. Following the results of the 2019 evaluation, group-based budgets were introduced and work pretty well. Still, the directors of the research departments lack a consistent and agile budget for their own strategic investments.

### I Benchmark

The benchmark analysis shows that although LIH and the Netherlands Institute for Health Services Research (Nivel) both have a translational strategy positioning as institutes at the crossroads of science and healthcare, there are substantial differences in their missions and thus also in their target groups, research areas, output and areas of impact.

At the same time, the two institutions are both non-university research institutes, suggesting that their structures have proven to be suitable. There are clear indications that the involvement of the government funder is more pronounced in LIH than in Nivel. Overall, the analysis shows that Nivel has a more patient- and citizen-oriented perspective and a long history of research collaborations with, for example, physicians, resulting in more societal outcomes and a more substantial impact.

## 5.2 Recommendations for the institute

Based on the overall assessment and the observations stated in the following chapters, Interface formulates the following recommendations for LIH.

### I Recommendation 1: Advocate for a national framework for performing and translating biomedical research

The evaluation identifies a need for a modern legal framework in Luxembourg on research consents, and electronic medical records that are interoperable and accessible for research. Interface recommends that:

- LIH makes its unused potential known to the Luxembourgish research society and advocates for a change in the legal framework so that the great potential of population-based, longitudinal research can become a reality,
- IBBL biobank facility develops a vision of becoming a national biobank belonging to the people of Luxembourg, collecting samples from the community and performing modern genetic and epidemiological research.

**Recommendation 2: Support translational activities of research departments**

The evaluation finds that access to support structures within LIH for setting up and running translational tracks of the research activities is limited, and clinical activities and research are often disconnected. Interface recommends that:

- the LIH researchers get easy access to support structures, e.g. translational managers, to enable more researchers to become active in bedside-to-bench-to-bedside activities while protecting valuable time for work at the bench,
- LIH and its partners build a bridge between clinics and research by intensifying interaction with physicians and collaborations with hospitals, offering a formal MD/PhD programme, and promoting more joint submissions of research proposals,
- external scientific advisory boards for advising on the translational strategy are created as support at the department and LIH levels.

**Recommendation 3: Invest in infrastructure and equipment**

The evaluation assesses that several investments are needed to enhance collaboration between research groups and increase flexibility in adaptation to new tasks. Interface recommends that:

- DoCR receives, as a matter of priority, a functioning workspace, including onsite lab installations. Also, in the medium term, an expansion of the animal facility and additional space for labs and offices,
- IBBL automates processes in the biobank,
- ultimately, LIH, the entire life science/biomedical research and possibly the University hospital are located in proximity on one campus. LIH needs a building strategy to have the departments (except IBBL and research nurses at the hospitals) under the same roof.

**Recommendation 4: Develop a strategy for human resources in competitive markets**

The evaluation finds that more specialists will be required to work on the intended research projects and evidence-based services. Interface recommends that LIH develop a human resources strategy for highly competitive markets. The most needed and competitive profiles are public health researchers, experts in bioinformatics and biostatistics, experts in AI, hybrid profiles of scientists with knowledge in epidemiology and data science, medical doctors, and IT support workers.

**Recommendation 5: Allocate strategic budget to the departments**

The evaluation assesses that the directors of the research departments lack a consistent and agile budget for their own strategic investments. The experts recommend that LIH allocates a budget to the directors of the departments for investments to respond to the needs of the PIs quickly and support the vision of the directors.

**Recommendation 6: Diversify funding and increase third-party funding**

The evaluation found that the amount of funding from competitive sources and submission of grant proposals at the European level increased. Nevertheless, Interface recommends that:

- the research departments apply for grants at the EU level, and, to do so, get administrative support for competitive funding applications,
- the research departments apply for systematic funding schemes that allow, for example, funding of several PhD students at once,

- TMOH/TTM attracts more industrial studies to support financing LIH activities with fees and to increase the share of large supported projects to improve efficiency.
- LIH overall increases the proportion of third-party funding.

#### **I Recommendation 7: Communicate better**

The evaluation found examples of excellent internal and external communication but there was also room for improvement. Interface recommends that:

- the decision-making process for budget-relevant decisions should be made transparent across all levels of the departments and LIH,
- LIH and TTM present the highly successful Parkinson’s disease research as a model for other translational projects,
- LIH and TMOH/TTM make it more apparent that they are open to supporting all kinds of clinical research, whether translational or not,
- LIH simplifies when communicating the activities of the departments publicly. TMOH is, for example, a “clinical research platform”, a denomination that may be easier to understand in the community.

#### **I Recommendation 8: Connect to important stakeholders**

The evaluation found that the departments are generally well-connected to stakeholders in Europe. However, the connections are not yet used to their full potential. Interface recommends that:

- LIH better connects to universities by facilitating tenure track possibilities and dual employment with the University of Luxembourg and LIH,
- LIH better connects to patients to include their perspectives in research projects,
- the departments seek more international collaborations and joint applications for research projects,
- the departments better connect to the technology transfer office of LIH, incubators and the university to detect and transfer innovation.
- TMOH increases industry collaborations,
- DoPH better connects to essential actors in public health and policymakers.

# Appendices

## A 1 Departmental peer reviews

### I Evaluation teams

Department	Experts
Department of Cancer Research (DoCR)	<ul style="list-style-type: none"> <li>– Dr. Rolf Apweiler, Director of EMBL's European Bioinformatics Institute (EMBL-EBI), United Kingdom</li> <li>– Prof. Dr. Eric Solary, Professor at Paris-Saclay University and Physician Scientist at Gustave Roussy Cancer Center, France</li> <li>– Dr. Franck Perez, Research Director Cell Biology and Cancer Unit CNRS, Institut Curie, France</li> </ul>
Department of Infection and Immunity (DII)	<ul style="list-style-type: none"> <li>– Prof. Dr. Rudi Beyaert, Professor and Associate Science Director of the Center for Inflammation Research, Ghent University - VIB, Belgium</li> <li>– Dr. Silvia Monticelli, Group Leader Molecular Immunology, Institute for Research in Biomedicine, Università della Svizzera italiana, Switzerland</li> <li>– Prof. Dr. Thea Kølsen Fischer, Professor in Public Health, Virus Infections and Epidemics, University of Copenhagen, Denmark</li> </ul>
Department of Precision Health (DoPH)	<ul style="list-style-type: none"> <li>– Prof. Dr. Jean-Philippe Empana, Research Director and Team Leader Integrative Epidemiology of Cardiovascular Disease, French Institute of Health and Medical Research (INSERM), France</li> <li>– Prof. Dr. Francis Guillemin, Director of Research Unit APEMAC and Professor of Public Health, School of Public Health, Université de Lorraine, France</li> <li>– Dr. Thomas Ziese, Head Department of Epidemiology and Health Monitoring, Robert Koch Institute, Germany</li> </ul>
Translational Medicine Operation Hub (TMOH) and Transversal Translational Medicine (TTM) Departments	<ul style="list-style-type: none"> <li>– Prof. Dr. Andres Metspalu, Head of Estonian Biobank, Professor of Genomics and Biobanking, University of Tartu, Faculty of Science and Technology, Institute of Genomics and Professor of Biotechnology, Institute of Molecular and Cell Biology, Estonia</li> <li>– Prof. Dr. Jérôme Pugin, Deputy Dean in charge of Clinical Medicine, University of Geneva, President of Clinical Research Centre, Hôpitaux Universitaires Genève, Switzerland</li> <li>– Prof. Dr. Elsebeth Lynge, Professor of Epidemiology, University of Copenhagen, Nykøbing Falster Hospital, Denmark</li> </ul>

### I Departmental evaluation reports

- Balthasar, Andreas; Essig, Stefan (2023): Report on the evaluation of the Department of Cancer Research (DoCR) at the Luxembourg Institute of Health (LIH), Interface Policy studies Research Consulting, Lucerne.
- Balthasar, Andreas; Essig, Stefan (2023): Report on the evaluation of the Department of Infection and Immunity (DII) at the Luxembourg Institute of Health (LIH), Interface Policy studies Research Consulting, Lucerne.
- Grosjean, Nicolas; Essig, Stefan (2023): Report on the evaluation of the Department of Precision Health (DoPH) at the Luxembourg Institute of Health (LIH), Interface Policy studies Research Consulting, Lucerne.
- Grosjean, Nicolas; Essig, Stefan (2023): Report on the evaluation of the Translational Medicine Operation Hub (TMOH) and Transversal Translational Medicine (TTM) Departments at the Luxembourg Institute of Health (LIH), Interface Policy studies Research Consulting, Lucerne.

## A 2 Governance interviews

<i>Level</i>	<i>Interview partners</i>
MESR	<ul style="list-style-type: none"> <li>– Robert Kerger, Government Commissioner</li> <li>– Pierre Misteri, Government Commissioner</li> </ul>
Board of Directors, LIH	<ul style="list-style-type: none"> <li>– Gregor Baertz, President of the Board</li> <li>– Lysiane Back, Board Member</li> <li>– Francoise Berthet, Board Member</li> <li>– Viviane Bremer, Board Member</li> <li>– Carole Brueckler, Board Member</li> </ul>
Executive Management, LIH	<ul style="list-style-type: none"> <li>– Ulf Nehrbass, CEO</li> <li>– Marc Grabowski, CFAO</li> <li>– Frank Glod, CSO</li> </ul>