



Report on the evaluation of the Department of Precision Health (DoPH) at the Luxembourg Institute of Health (LIH)

**Based on a peer review as commissioned by the Ministry of
Higher Education and Research of Luxembourg**

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1. Introduction	4
2. Detailed results of the evaluation	6
2.1 Description of the research department	6
2.2 Input	6
2.2.1 Strategy	6
2.2.2 Human and financial resources, infrastructure and equipment	7
2.2.3 Organisation	8
2.2.4 External collaboration and service provision	8
2.3 Research performance	8
2.3.1 Quality of output	8
2.3.2 Quantity of output	9
2.4 Outcome and Impact	9
3. Overall assessment and recommendations	11
3.1 Overall assessment of the department	11
3.2 Recommendations	11
Appendix: Agenda of hearing	13

1. Introduction

The Ministry of Higher Education and Research (MESR) of Luxembourg mandated *Interface Policy studies Research Consulting*, Switzerland, to organise and lead a research evaluation of the Centres de Recherche Publics (CRP).

The Grand Duchy of Luxembourg operates three non-university public research and technology institutions. 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 three CRPs include research departments linked to different scientific disciplines. The evaluation focused on the research performance of the CRP's research departments.

The research evaluation was conducted in 2022 and followed two earlier evaluations carried out in 2012 and 2018.¹ This report presents the evaluation of the Department of Precision Health (DoPH) of LIH.

The observations and recommendations presented in this report are based on a peer review by the following three experts working in the departments' research fields:

- Prof. Dr. Jean-Philippe Empana, Research Director and Team Leader Integrative Epidemiology of Cardiovascular Disease, French Institute of Health and Medical Research (INSERM), France
- Prof. Dr. Francis Guillemin, Director of Research Unit APEMAC and Professor of Public Health, School of Public Health, Université de Lorraine, France
- Dr. Thomas Ziese, Head of Department of Epidemiology and Health Monitoring, Robert Koch Institute, Germany

The peer review consisted of a self-assessment report written by the DoPH and a hearing at the department that took place in September 2022. The assessment period runs from 2018 to 2021. The hearing, which was organised and moderated by Interface, comprised a presentation by the department, a group discussion of the self-assessment report and several individual and group interviews. These included interviews with the Head of department, research team leaders, members of the wider research staff and PhD students as well as clients and business partners. The report was finalised by Nicolas Grosjean and Stefan Essig of Interface.

¹ Between 2010 and 2012, evaluations of selected departments of the former CRPs were carried out. The first full evaluation of the CRPs, which included all departments, was carried out in 2018.

The overall results of all departmental evaluations are summarised in an institute report for each CRP² and a synthesis report³. The institute report includes an assessment of the CRPs as a whole. It also summarises the findings from additional governance interviews with representatives of the management teams at the CRPs as well as a comparison between the CRPs and a foreign benchmark institute.

The report is structured into two parts: the first part discusses in detail the observations gathered by the expert team during the evaluation process. This part will focus on the input, output and outcome/impact of the research department:

- *Input* includes the preconditions for the research conducted, such as strategies, financial and human resources, infrastructure, organisation and external research, industry and other collaborations.
- *Output* includes the performance of the research department, exemplified through research and innovation results and their dissemination.
- *Outcome and impact* refer to the medium- and long-term effects as well as the relevance of the output on science, society, economy, and public administration/politics.

The second part presents the expert team's overall assessment and recommendations for further developing existing strengths and overcoming observed weaknesses.

² Grosjean, Nicolas; Balthasar, Andreas; Essig, Stefan (2023): Report on the evaluation of the Luxembourg Institute of Health (LIH), Interface Policy studies Research Consulting, Lucerne and Lausanne.

³ Rieder, Stefan; Balthasar, Andreas; Haefeli, Ueli; Grosjean, Nicolas; Büchler, Chiara; Essig, Stefan; Thorshaug, Kristin (2023): Synthesis report on the evaluation of the Centres de Recherche Publics (CRP) in Luxembourg, Interface Policy studies Research Consulting, Lucerne and Lausanne.

2. Detailed results of the evaluation

2.1 Description of the research department

The Department of Precision Health (DoPH), which was named Department of Population Health until recently, was created in 2015. The rebrand became necessary to better reflect the strategy of DoPH and its alignment to the other departments at LIH. After several changes of leadership and structure, DoPH's current director was appointed in early 2021. The number of employees decreased to around 70 at the end of 2021, due to two units moving to central structures at LIH. DoPH is structured as follows: "Public Health Expertise", including epidemiologists, data collection specialists and epidemiology data managers providing services for public authorities, and "Public Health Research", including seven research groups and two "custom groups"⁴. DoPH's researchers have original expertise in various fields, such as vocal biomarkers, mRNA biomarkers, and hair analyses. The department's activities are spread across translational, transversal, and interventional research.

2.2 Input

2.2.1 Strategy

The experts are convinced that DoPH's research strategy is on the right track but that it is not yet fully developed. Only recently, the department changed its name from Population Health to Precision Health to highlight its new strategic orientation at the intersection of technologies, monitoring and research, trying to be more "precise" in the consecutive integration of different data. DoPH wants to apply these methods without focusing on specific diseases or risk factors. New possibilities, e.g. in AI, should be combined with its historical expertise in public health. The experts appreciate that DoPH wants to achieve this goal by breaking down disciplinary silos. The director of DoPH has vision and ambition as well as management and leadership capacity, all of which have inspired the members of the department.

The experts identified the following challenges:

- DoPH's position on new tools like AI, in comparison with more traditional public health approaches, is not yet clear.
- The innovative, new tools are not yet strategically linked to the needs and preferences of stakeholders in the community.
- The role of surveillance and monitoring, including the registries, for research is not clear.
- The strategy of the department is not focussed enough on the core issues of public health such as prevention, health promotion, and vulnerable groups of the population.
- The strategy is not fixed for DoPH's ambition to build large datasets such as a nationwide cohort. DoPH is lacking high-quality epidemiological datasets for research, especially interoperable data in collaboration with national and trans-national partners.⁵

⁴ At DoPH, custom group is a transition format for researchers preparing a concept for leading their own research group after being member of another PI's group.

⁵ The linkage of databases is difficult because Luxembourg lacks a law on «Public Health» as the necessary legal basis.

- The strategy of working in the area of intervention research is not clearly defined despite fragmented activities in intervention research and the classical epidemiology of interventional studies.

The COVID-19 pandemic was an external shock that had a big impact on DoPH's ability to execute its strategy during the evaluation period. The former director of DoPH became heavily involved in managing the crisis at the Ministry of Health, leaving DoPH in effect with no leader during seven months. Furthermore, the majority of DoPH's activity was then dedicated to research on COVID-19 and to supporting the Ministry in managing the crisis. Overall, the researchers assessed the outcome of the pandemic as rather positive, with new strengths born as a result of the crisis.

2.2.2 Human and financial resources, infrastructure and equipment

Overall, the experts assessed that human resources developed positively, thanks to DoPH's recruitment strategy which has been excellent. For example, an expert in artificial intelligence (AI) was recruited. The department generally has highly motivated employees in multidisciplinary teams and has been attractive when hiring new staff. An increasing number of PhD students are in place. The experts support DoPH's ambitions of applying for systematic funding schemes that allow, for example, the funding of several PhD students at once. The communication culture within the department is open and supportive. The students of the department have felt well supported and they are well connected with other students and researchers within the department. In addition, the experts consider DoPH to be a financially strong department. DoPH's activities were funded by the state block grant and third-party sources (competitive calls and contract research). In 2021, third-party financing totalled around 2.0 million euros, 28% of which came from the Luxembourg Fonds National de la Recherche and 41% from the public sector of Luxembourg. The experts are aware that public health research does not have a long scientific history in Luxembourg, making it hard to get national funding. The experts also recognise that other external funding, especially EU funding, contributes 20% of third-party financing. This success has impressed the experts, and the department now has a pipeline for further EU applications.

The experts also assessed the infrastructure of the department and considered it to be very good. The digital resources, IT equipment and wet lab infrastructure are of high quality.

The experts identified the following challenges:

- The department has established collaborations with medical doctors but still lacks medical doctors who could co-develop research ideas and collaborate in research projects.
- The AI domain is understaffed, accepting that hybrid profiles of scientists with knowledge in epidemiology and data science are rare.⁶
- The director of DoPH is lacking a budget for strategic investments. Consequently, for example, the decision process for purchasing equipment for the wet labs took too long.
- DoPH's principal investigators (PIs) lack administrative support for competitive funding applications. They invest too much time into writing up complex grant proposals and lack support regarding non-scientific aspects.

⁶ Recruitment of AI specialists is not only a challenge for DoPH but LIH as a whole. The institute report covers this topic.

2.2.3 Organisation

The experts recognise that DoPH's organisation supports collaboration within the department. Some of the research groups are rather small but continuous efforts are made to make the organisational structures more efficient. The committees supervising and guiding the researchers and their projects, such as the scientific steering committee and the executive committee, are well accepted by most members of the department. Support structures for PhD students are in place, e.g. regular meetings, discussions and coaching.

In comparison to the previous evaluation period and following the points raised at that time, DoPH's research groups have interacted more. DoPH has improved connections between the department's research groups; there no longer seem to be any isolated groups. DoPH also improved the connections to other departments at LIH. For example, all departments initiated a large epidemiological study in the context of the COVID-19 pandemic. The experts recognise these observations as a promising sign for a new culture of collaboration. Also, in line with the previous suggestions, the CARES research group was created as a joint activity between DoPH at LIH and LISER, which has the potential to be especially innovative, as it will bring together complementary expertise in public health and will further develop research on the theme of socio-economic inequalities and vulnerable populations.

The experts identified the following challenges:

- DoPH lacks an external scientific advisory board. DoPH particularly lacks support from experts connected to the department's topics who would be willing to shape DoPH's strategy together with its leaders.

2.2.4 External collaboration and service provision

It is still too early for the experts to make a detailed assessment of the collaborations under the new strategy and structure. However, DoPH's efforts to initiate collaborations were already in evidence. DoPH wants to intensify its efforts on strategic national partnerships and increase its exchange of know-how with European consortia. The department tries to systematically connect to the medical realm. DoPH also feels ready to offer unique expertise for business partnerships. The collaborators that were interviewed by the experts value the strategic vision of DoPH, its future oriented methods and its range of skills and expertise which is very broad.

2.3 Research performance

2.3.1 Quality of output

DoPH's output quality in terms of scientific publications has been very good for most research groups, both in absolute and relative terms. The experts appreciated the standards of the publications; they fulfil the state of the art of the discipline. The topics of the publications are also well in line with the strategy of the department. The bibliometric analysis says that, while the departments research topics only shifted gradually during the evaluation period, a main restructuring of research areas in 2020 can be observed. Responding to the global pandemic, several COVID-19 related research areas appeared, while the earlier research focus on "running related injuries" and "nutrition in metabolic disease" stagnated in absolute and decreased in relative terms.

DoPH produced research with an above average field-weighted citation index (FWCI) of 6.45, which is a very strong performance. According to the bibliometric analysis, DoPH maintained a constantly high FWCI, indicating stable high impact research production. In 2018, the FWCI is particularly high, compared to other years but also globally. This indicates the publication of substantial work that received massive global attention. Out

of all publications, 25.9% were among the 10% most-cited publications of the scientific field, and 50.1% were published in the 10% top journals. In 2018, also share of top-10% and top-1% cited journal publications was very high, indicating that high citation impact was not only driven by one “star” publication but rather manifests in several high impact publications.

Amongst the other innovative output that the experts valued were scientific events as well as DoPH’s knowledge and technology transfer activities. Furthermore, DoPH’s members have received awards and public recognition for their work. DoPH’s top output, which can be used as a model for the future, came from large-scale epidemiological studies and studies that received EU funding.

2.3.2 Quantity of output

DoPH’s output quantity has been very good, totalling 433 publications with an increasing trend of production over the period from 2.26 to 4.02 publications per year per full time equivalent researcher. Considering the size of the department, these numbers impressed the experts. DoPH’s researchers contributed to scientific publications mostly as co-authors and in about one quarter of the papers as first, last, or corresponding authors. Two patents were filed by the cardio-vascular unit, applicable in the context of a potential spin-off for diagnostic tools. The department also produced a substantial number of commissioned reports and to some extent books/book chapters.

The productivity of DoPH was affected by the COVID-19 pandemic. However, the impact of the pandemic was described as rather small due to the many activities of the department that can be performed from home offices. Its productivity might even have increased thanks to the focus on desk work.

2.4 Outcome and Impact

Of utmost importance to the experts, DoPH has had some societal impact. The department engaged in the Luxemburgish response to the COVID-19 pandemic, in the work of the national Crisis Cell, sanitary inspections for contact tracing, and testing of elderly people in nursing homes. The part of DoPH with the greatest impact, the Public Health Expertise Group, also provided other relevant national public health information. In general, DoPH’s interests are close to those of the population as it does not do basic but applied research.

In terms of scientific impact, DoPH has initiated and supported successful scientific careers as well as publishing many important peer-reviewed publications. The experts recognise that DoPH has a positive impact on the research community and that the researchers of the department engage increasingly in international research networks.

A potential economic impact can be seen when assessing other activities, such as a research collaboration with L’Oréal. Other researchers, especially in the cardio-vascular unit, are engaged in the commercialisation of their research output.

Overall, the experts agree that DoPH’s new strategy will need more time to reach its full potential in terms of impact. There are new developments which have a potentially positive bearing on DoPH’s impact, such as the foundation of the National Health Observatory and the National Data Exchange Platform. More achievements are expected in the next evaluation period.

The experts identified the following challenge:

- DoPH’s exchanges with important actors in public health, stakeholders, policy makers, and customers are not yet strong enough.

3. Overall assessment and recommendations

3.1 Overall assessment of the department

According to the experts, DoPH at LIH, which was named Department of Population Health until recently, has performed very well over the past four years. The director of DoPH has vision and ambition as well as management and leadership capacity that have inspired the members of the department. DoPH has developed original expertise in various fields, such as in vocal biomarkers, mRNA biomarkers, and hair analyses. Furthermore, DoPH's recruitment strategy has been excellent, as the department has generally highly motivated employees in multidisciplinary teams and has been attractive when hiring new staff. Whilst the experts assessed that the successful recruitment of PhD students is challenging, DoPH's ambition for increased funding that goes beyond individual grant applications for PhD students is therefore excellent. Additionally, the communication culture within the department is open and supportive. DoPH's PhD students, in particular, have felt well supported. The experts also recognise that the department has been successful in its applications for European research grants, which is impressive for a relatively small unit. DoPH's scientific output has been quite high in terms of quantity, and its quality has been recognised and highly cited. The experts also assessed that DoPH's research groups have interacted more than in the previous evaluation period. The creation of the CARES research group, bringing together epidemiology and health economics to research socio-economic inequalities in a joint venture between DoPH at LIH and LISER, has the potential to be especially innovative, as it will unite complementary expertise in public health.

Nevertheless, the evaluation detected some challenges. The experts are sure that DoPH's research strategy is on the right track but it is not yet fully developed. Also, external support to shape the research strategy is missing for both DoPH and LIH. According to the experts, DoPH also lacks high-quality data for research, a strategic budget for investments, and the presence of medical doctors and experts in artificial intelligence (AI) in its team. Furthermore, DoPH PIs invest too much time in writing up complex grant proposals due to a lack of support in non-scientific aspects. Finally, links between DoPH and important actors in public health, stakeholders, policy makers, and customers are not yet strong enough.

3.2 Recommendations

Based on the observations stated above and in the previous chapters, the expert team formulates the following recommendations (any aspects which concern LIH as well as DoPH are also reported in the institute report for LIH):

I Recommendation 1: Develop research strategy

The experts recommend that some elements of the strategy are further developed, especially that:

- DoPH discusses how to position itself on new tools like AI, in comparison with more traditional public health approaches.
- DoPH develops a clear vision of its role in surveillance and monitoring, including the registries, in order to get the best research result from these activities.
- DoPH links its development of innovative tools with stakeholders in the community.

- DoPH includes more public health activities, considering vulnerable groups in particular.
- DoPH considers initiating a large representative nationwide cohort, with the potential for it to become a central, innovative pillar of the department.
- DoPH defines a clear strategy for intervention research or discontinues this activity.

I Recommendation 2: Create an external scientific advisory board

The experts recommend that an external scientific advisory board is created at the level of DoPH to support in shaping the research strategy, with the members being experts with close connections to DoPH's topics including one specialist in public health. Another board might be created at the level of LIH, serving a more overarching purpose and advising on the overall research strategy of LIH.

I Recommendation 3: Advocate for data exchange and interoperability

The experts recommend that DoPH advocates for data exchange and interoperability in order to ensure national and trans-national research.

I Recommendation 4: Set a budget for strategic investments

The experts recommend that DoPH sets a budget for strategic investments to support the agility of the department. This would allow for faster decisions in closer exchanges with the PIs.

I Recommendation 5: Be more inclusive for physicians

The experts recommend that DoPH becomes more inclusive for physicians, from the start, when project ideas are born, and that it intensifies collaboration with medical doctors, in tandem with ongoing initiatives like the LCTR. DoPH could host medical doctors during their training or hire MD-PhD students.

I Recommendation 6: Increase recruitment efforts as regards AI

The experts recommend that LIH and especially DoPH increase their recruitment efforts as regards AI. DoPH should also collaborate more closely with AI specialists at LIH's centralised platforms as well as promotes hybrid profiles of scientists with knowledge in epidemiology and data science.

I Recommendation 7: Increase support for funding applications

The experts recommend that DoPH increases administrative support for competitive funding applications.

I Recommendation 8: Apply for PRIDE

The experts encourage DoPH to submit larger grant applications permitting it to recruit a block of PhD students, e.g. an application for PRIDE, an award by FNR.

I Recommendation 9: Connect with important actors in public health

The experts recommend that DoPH is in regular contact with other important actors in public health, such as primary care providers and the new National Health Observatory. DoPH should also monitor the needs of stakeholders, policy makers, and customers.

Appendix: Agenda of hearing

Monday, 12 September 2022			
1 15:45 – 16:45 Welcome address by the Ministry of Higher Education and Research (MESR)		MESR	
16:45 – 17:00 <i>Break</i>		DoPH Evaluation team	
2 17:00 – 18:00 Presentation by the Department of Precision Health (DoPH)		DoPH Evaluation team	
Time	#	Function/institution of participants	
17:00 – 18:00	1	Head of Department	
	2	Head of Cardiovascular Research Unit	
	3	Head of Human Biomonitoring Research Unit	
	4	Head of Public Health Expertise	
	5	Cancer Epidemiologist	
	6	CEO LIH	
18:00 – 20:00	Discussion of self-assessment report and preparation of interviews		Evaluation team
Tuesday, 13 September 2022			
3 8:00 – 9:30 Questions and discussion on the self-assessment report		DoPH Evaluation team	
Time	#	Function/institution of participants	
8:00 – 9:30	1	Head of Department	
	2	Head of Cardiovascular Research Unit	
	3	Head of Public Health Expertise	
	4	Strategic Department Coordinator	
9:30 – 10:00 <i>Break</i>			
4 10:00 – 12:15, 13:30 – 15:10 Individual interviews		DoPH Evaluation team	
Time	#	Function/institution of participants	
10:00 – 10:30	1	Head of the Department	
10:35– 11:05	2	Research unit leader	
11:10 – 11:40	3	Senior Researcher	
11:45 – 12:15	4	Junior Researcher	

12:10 – 13:30 <i>Lunch Break</i>		
13:30 – 14:00	5 Senior Researcher	
14:05 – 14:35	6 Postdoctoral fellow	
14:40 – 15:10	7 Cancer epidemiologist	
15:10 – 15:30 <i>Break</i>		
5 15:30 – 17:15 Group discussions with clients/business partners (group 1) and researchers (group 2)		DoPH Evaluation team
Time	#	Function/institution of participants
15:30 – 16:15	1	Ministry of Health, Luxembourg
	2	L'OREAL
	3	Western University
16:15 – 16:30 <i>Break</i>		
16:30 – 17:15	1	PhD Student
	2	PhD Student
	3	Research associate
From 17:15	Discussion of results and report writing	
		Evaluation team
6 17:30 – 18:15 Visit to laboratories and other infrastructure		Evaluation team DoPH
Wednesday, 14. September 2022		
7 8:30 – 12:00 Discussion of results and report writing		Evaluation team
8 12:00 – 12:30 Presentation of results		MESR DoPH Evaluation team