



**Report on the evaluation of the
Translational Medicine Operation
Hub (TMOH) and Transversal
Translational Medicine (TTM)
Departments 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

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 departments linked to different scientific disciplines. The evaluation focused on the research performance of the CRPs' 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 Translational Medicine Operation Hub (TMOH) and Transversal Translational Medicine (TTM) Departments 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. 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
- Prof. Dr. Jérôme Pugin, Deputy Dean in charge of Clinical Medicine, University of Geneva, President of Clinical Research Centre, Hôpitaux Universitaires Genève, Switzerland
- Prof. Dr. Elsebeth Lynge, Professor of Epidemiology, University of Copenhagen, Nykøbing Falster Hospital, Denmark

The peer review consisted of a self-assessment report written by the TMOH/TTM and a hearing at the departments 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 departments, 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 departments:

- *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 departments, 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 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 departments

TMOH and TTM were created in 2021 and 2019, respectively, as part of a programme of sweeping changes which had been ongoing since the last evaluation. The directors appointed at the time of creation of the departments are still in office. The number of employees increased to around 120 for TMOH and 45 for TTM⁴ at the end of 2021. TMOH combines operational units and collaborative platforms, including the Clinical Project Management Office, Clinical and Epidemiological Investigation Centre, Luxembourg Clinical and Translational Research Centre, Competence Centre for Methodology and Statistics, Integrated Biobank of Luxembourg (IBBL), Disease Modelling & Screening Platform, Luxgen Genome Centre, and Research Pathology Platform. TTM is structured into Strategy and Research Support, Experimental Team, and Clinical Research Team. TMOH and TTM are essential pillars of LIH's transversal translational medicine strategy and work synergistically. TMOH provides the infrastructure to intra-institutional research, as well as supporting transversal translational projects in Luxembourg and abroad. TTM, on the other hand, conceptualises and advises on strategy.

2.2 Input

2.2.1 Strategy

The experts understand that the strategic mission of TMOH is providing necessary and structured support to clinical researchers and they support this. TMOH provides a single point of contact on research services for internal and external stakeholders by supporting them in terms of design, operations, and regulatory aspects of research. TMOH wants to facilitate a seamless workflow and high-quality project execution. Clear processes and interfaces as well as transparent communication are also aspects of the strategy.

The strategic mission of TTM has become clearer to the experts during the evaluation; bringing translational research to Luxembourg. TTM facilitates and accelerates inter-institutional collaborations between biomedical research institutions and hospitals by fostering a translational research pipeline. Alongside those services, TTM is doing research, with a strong focus on clinical and experimental research into Parkinson's disease subsequently translated into other disease areas like COVID-19.

The experts identified a challenge in that the strategic mission is not inclusive enough. More specifically, the experts are of the impression that:

- the mission of TMOH to foster translational medicine is phrased too narrowly,

⁴ TTM's employees had different affiliations. 17 of 45 had LIH contracts, the others were employed by the Centre Hospitalier de Luxembourg and Luxembourg Centre for Systems Biomedicine. The experts were unable to comprehensively assess the significance of TTM's staff for LIH as the documentation and presentation of the department did not include organisational charts. Additionally, technical difficulties during the site visit made it hard to gather missing information during the interviews via video calls.

- the current strength of TTM in research into Parkinson’s disease is not visible enough in the strategy, communication, or organisation.⁵

The experts are also of the opinion that the larger legal framework, in which research data is not easily linkable and reusable, severely impedes the further development of activities at TMOH and TTM. The experts mentioned the following examples:

- TMOH may be underutilised because data from the biobank, population register, healthcare system and insurance are unconnected, and because case report forms have to be filled in manually, and hospitals lack digitalised data.
- IBBL, the biobank, may be underutilised because access to samples, longitudinal collections, and linkage to data sources on disease occurrence are difficult.
- Moreover, it seemed that the main function of IBBL is to keep samples from different projects and programs (either international or domestic) in absolutely perfect condition. However, the level of reuse of the samples is low (below 10%) due to this “project-based approach”.⁶ This approach does not support collaboration between institutions, because it is not easy to find out what has been collected; phenotypes can be obtained from the projects’ PI. It seems that this immensely valuable collection of samples (over 3 million!) could be used more effectively in the future. In order to change, it does not so much need funding, as the infrastructure is perfect already and people are experts in biobanking, but legal agreements between the project PIs and IBBL.⁷

The COVID-19 pandemic was an external shock that had a large impact on the execution of TTM’s strategy. The pandemic was seen as an opportunity and mainly had a positive impact, speeding up the process of bringing translational research to Luxemburg. The pandemic also brought new research projects into the department, thanks to TTM’s knowledge in setting up cohort studies and collecting representative patient data. Since the TMOH department was formally only created in July 2021, there was minimal impact on that department.

2.2.2 Human and financial resources, infrastructure and equipment

The experts determined that human resources are a strong asset for TMOH and TTM. Employees of TMOH and TTM were enthusiastic about their work and seemed satisfied. The panel was impressed by the collaborative spirit of the team members and observed a good atmosphere, with employees benefiting from the new organisation. TTM, in particular, seems to develop new talents. The director of TTM serves as a role model for junior physicians looking to embrace an academic career.

In terms of financial resources, the experts consider TMOH to be a financially healthy department. TMOH’s activities were funded by the state block grant and third-party sources coming from successful grant applications of intra- and extra-institutional PIs. In 2021, third-party financing was around 2.3 million euros, 69% of which came from the

⁵ The lack of visibility might partly be addressed by sustaining the National Centre for Excellence in Research on Parkinson’s Disease (NCER-PD).

⁶ Projects with higher-than-average reuse levels are NCER-PD and the “COvid-19 National survey for assessing Vlral spread by Non-affected CarriErs” (CON-VINCE).

⁷ IBBL wants to improve access to data and biomaterial. Access to samples that are linked to projects without Data and Sample Access Committee (DAC) can be granted upon request from the department’s translational steering committee (TSC: see chapter 2.2.3) in its role as DAC. Furthermore, the department is in contact with the Comité National d’Ethique de Recherche (CNER) to ease the conditions for secondary use of data.

Luxembourg Fonds National de la Recherche. Other external funding, especially EU funding, was rather limited.⁸

In terms of infrastructure and equipment, IBBL, as part of TMOH, has shown that it has up-to-date equipment and facilities, and is well organised.

The experts identified the following challenges:

- At IBBL, too many activities are still being performed manually when dealing with the reception and retrieval of samples, and IT support has been limited.
- TMOH, including the biobank, has not yet exploited its full potential for third-party funding.
- The units of TMOH (except IBBL and research nurses) lack one common building.

2.2.3 Organisation

The experts assessed that TMOH has been able to offer integrated research support to the research departments of LIH and partners. The support services, like project management, methodological support, statistics, data management, work of clinical research associates and nurses are now more streamlined, and work closely together. Nevertheless, the experts had difficulties understanding the complex structures within and between TMOH and TTM. There were also uncertainties related to the hierarchical positions and work relations of the two supportive structures.⁹

The experts also found that TMOH is highly structured and well organised for the needs of clinical researchers. The department offers them a single point of contact at the Clinical Project Management Office for a multitude of services and applications for support. Internal processes now follow clear guidelines.

Finally, the experts noticed with interest that LIH implemented the scientific steering committee (SSC) and the translational steering committee (TSC) to regulate clinical research and the work accepted by TMOH. The SSC advises on the strategic and scientific orientations of the departments and provides a scientific evaluation of the units and research projects. The TSC reviews and evaluates all inter-institutional translational research projects.

2.2.4 External collaboration and service provision

The experts assessed that TMOH and TTM have many clients and are well connected to the research community. Their cooperation network is well developed and the departments have successfully entered the market. TMOH is service provider and TTM coordinates successful research applications in large research communities, especially in projects connected to the COVID-19 pandemic.

Interviews by the experts of selected partners gave some specific insights, showing a generally favourable picture. The partners confirmed that TMOH's team members are highly dynamic and pay close attention to detail. Their coordination of the collaboration is described as efficient. IBBL is considered an impressive biobank model. The University

⁸ TTM did not provide a financial report. The experts were therefore unable to assess TTM's financial resources.

⁹ The uncertainties concerning the two departments remained as the experts missed organisational charts and were unable to acquire pertinent information during the site visit (see chapter 2.1).

of Luxembourg has built a strong relationship with TMOH and TTM, valuing their accessibility and knowledge in crucial methodologies. The local hospital assesses that the work of the departments is still in the early stages but that the connections and projects that have already been initiated are promising.

2.3 Research and innovation performance

2.3.1 Quality of output

The experts assessed that TMOH, and all of its units, excels in the services provided. Their users seem satisfied with the services. As important services, TMOH offers monitoring and audits of clinical trials. Of further interest is that TMOH has medical expertise in-house, which is important for the quality of protocols and the safety of participants in clinical trials.

The experts also appreciated that TMOH is ISO 9001 certified.

TMOH's and TTM's outcome quality can be measured in terms of peer-reviewed, scientific publications. However, due to being a support infrastructure, the numbers must be interpreted carefully. The bibliometric analysis shows that TMOH and TTM are young departments with positive tendencies. This holds particularly in publication quality and impact indicators. Topic and research areas are up to now dynamic and volatile. The publications from 2021 created major impact, with a field-weighted citation index of >20 (publications receive > 2000% more citations than field). These results are preliminary as FWCI needs one to two years to stabilize, but already citations numbers of 2021 publications indicate a lot of attention. Out of all publications, 24.2% of their publications were among the 10% most-cited publications in the scientific field, and 45.3% were published in the top 10% of journals. The departments also produce a substantial number of commissioned reports and to some extent books/book chapters.

2.3.2 Quantity of output

The interviewees stressed that TMOH and TTM enabled and supported many research projects coming from within LIH but also from external collaborators in Luxembourg and abroad. Thanks to being supportive departments and to strong PIs using their services, TMOH and TTM co-authored many publications. The bibliometric analysis totals 165 peer-reviewed articles.¹⁰ However, the rules on how to be a co-author on peer-reviewed publications seems to differ between projects. It was therefore not possible for the experts to thoroughly assess the quantity of the department's output.

2.4 Outcome and Impact

The experts appreciated that TMOH and TTM have established diverse collaborations, reaching out to hospitals, university partners, commercial companies and start-ups. The two departments are unique in Luxembourg and are considered as a bridge between clinics, research institutions, regulators and health authorities, ethics committees, ministries, pharmaceutical companies, and contract research organizations.

The operational units of TMOH, in particular, have demonstrated their expertise in being a reliable collaborator for setting-up and implementing operations for clinical research projects. The impact can be measured by the 3.1 million biospecimens that are now stored at IBBL, and the 3,600 patients that were supported by research nurses.

¹⁰ 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 report. Most of these articles stem from TTM's research activities in Parkinson's disease.

Their impact is also visible in the scientific realm, with many successfully enabled and supported research projects and peer-reviewed articles. The departments have also initiated and supported scientific careers.

The departments are carefully building campaigns which connect LIH and partners. However, the experts are of the opinion that the departments lack visibility and communication with the community. The experts identified the following challenges:

- TTM has had an impact on building translational research capacity in Luxembourg, but TTM has not yet fully exploited its potential.
- The evaluation panel had difficulties understanding the names and abbreviations of the departments and units, for example TMOH and TTM as well as LCTR, CRC and TRC.

3. Overall assessment and recommendations

3.1 Overall assessment of the departments

The experts assessed TMOH and TTM at LIH. Due to the newness of the departments, the panel was unable to comprehensively assess their performance but even with its limited scope, some positive aspects have become apparent. The experts understand that the mission of TMOH is to provide necessary and structured support to clinical researchers. The mission of TTM has become clearer during the evaluation; bringing translational research to Luxemburg. Covid-19 has had a positive impact on the speed of this process. In terms of organisation, the experts appreciate that TMOH has been able to offer integrated research support to the research departments of LIH and partners. TMOH is highly structured and well organised for the needs of clinical researchers. Furthermore, the experts determined that human resources are a strong asset of TMOH and TTM. In terms of infrastructure, IBBL, the biobank, as part of the TMOH, has shown that it has up-to-date equipment and facilities, and is well organised. In terms of output quality, TMOH, and all its units, offer excellent services with which its users seem satisfied.

Nevertheless, the evaluation detected some challenges. The experts assessed that the strategic mission is not inclusive enough. In terms of human resources and infrastructure, at IBBL, too many activities are still being performed manually when dealing with the reception and retrieval of samples, and IT support has been limited. The units within TMOH (except IBBL and research nurses) lack one common building. In terms of financial resources, TMOH, including the biobank, has not yet exploited its full potential for third-party funding. The experts also assessed that TMOH seems to lack visibility and communication with the community. Lastly, the large legal framework, in which research data is not easily linkable and reusable, severely impedes the further development of activities at TMOH and TTM.

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 TMOH/TTM are also reported in the institute report for LIH):

I Recommendation 1: Revise strategic mission

The experts recommend that TMOH should open to all kinds of clinical research; whether translational or not. This would be an important step in making clinical research support more visible to clinicians at hospitals as well as to the community.

The experts also invite TTM and LIH to present their Parkinson's disease research as a model for other translational projects.

I Recommendation 2: Invest in infrastructure and human resources

TMOH should invest in its infrastructure and human resources. The experts recommend that:

- the automation of processes and investment in IT support should be priorities for the biobank.

- the units within TMOH (except IBBL and research nurses) could benefit from being under the same roof. This could enhance collaboration between units and increase flexibility in adapting to new tasks.

I Recommendation 3: Communicate better

TMOH/TTM should improve their communication. The experts recommend that:

- TMOH/TTM advertise their activities more, supporting the development of a culture of openness for clinical research in Luxembourg.
- TTM should approach clinicians more intensively and should offer adequate incentives for clinicians to perform and participate in clinical studies.
- TMOH and TTM should look to simplify, especially when communicating the activities of the departments more publicly. TMOH, for example, is a “clinical research centre”, a description that may be easier to understand in the community.

I Recommendation 4: Improve funding structure

The experts recommend that TMOH should focus on attracting more industrial studies in order to support the financing of LIH activities with fees. It is also important that TMOH increases the share of larger supported projects in order to improve efficiency.

I Recommendation 5: Change larger framework

To resolve these issues, the experts recommend that Luxembourg develops a modern legal framework on research consents, and electronic medical records that are interoperable and accessible for research. TMOH and TTM should make this untapped potential known to Luxembourgish research society, and advocate for changes so that the great potential for population-based, longitudinal research can become reality.

Given the very high quality of the IBBL facility, the experts recommend that this biobank works towards a vision of becoming a national biobank belonging to the people of Luxembourg, to start collecting samples from the community and perform modern genetic and epidemiological research. Moreover, a national biobank should form the basis of the characterisation of the genetic heterogeneity of the people of Luxembourg allowing for the introduction of personalised medicine including the secondary prevention of disease and adverse drug reactions over the coming years.

Appendix: Agenda of hearing

Wednesday, 14 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>		TMOH & TTM Evaluation team
2 17:00 – 18:00 Presentation by TMOH & TTM		TMOH & TTM Evaluation team
Time	#	Function/institution of participants
17:00 – 18:00	1	Director TMOH
	2	Head CPMO, Head CIEC
	3	Head CCMS
	4	Head BS&DG
	5	Director TTM
	6	CEO LIH
18:00 – 20:00	Discussion of self-assessment report and preparation of interviews	
Evaluation team		
Thursday, 15 September 2022		
3 8:30 – 10:00 Questions and discussion on the self-assessment report		TMOH & TTM Evaluation team
Time	#	Function/institution of participants
8:00 – 9:30	1	Director TMOH
	2	Head CPMO, Head CIEC
	3	Head CCMS
	4	Head BS&DG / Head QSMO
	5	Director TTM
	6	Research and Strategy specialist TTM
	7	Programme Manager TTM
9:30 – 10:00	<i>Break</i>	
4 10:00 – 12:15, 13:30 – 15:10 Individual interviews		TMOH & TTM Evaluation team
Time	#	Function/institution of participants
10:00 – 10:30	1	Research and Strategy Specialist, TTM
10:35– 11:05	2	Clinician Scientist, TTM
11:10 – 11:40	3	PhD student, TTM

11:45 – 12:15		Pearl fellow and group leader Digital Medicine	
12:15 – 13:30		<i>Lunch Break</i>	
13:30 – 14:00	5	Clinical research mangager, TMOH	
14:05 – 14:35	6	Head BioRepository	
14:40 – 15:10	7	Clinical Research Project Manager Coordinator	
15:10 – 15:30		<i>Break</i>	
5 15:30 – 17:15 Group discussions with clients/business partners			TMOH & TTM
Time	#	Function/institution of participants	Evaluation team
15:30 – 16:15	1	Uni Luxembourg & Luxembourg Centre for Systems Biomedicine	
	2	Centre Hospitalier de Luxembourg (CHL)	
	3	Laboratoire national de santé (LNS)	
16:15 – 16:30		<i>Break</i>	
6 16:30 – 17:15 Visit to laboratories and other infrastructure			Evaluation team TMOH & TTM
Friday, 16 September 2022			
7 8:30 – 13:00 Discussion of results and report writing			Evaluation team
8 13:00 – 13:30 Presentation of results			MESR TMOH & TTM Evaluation team