

19 February 2019

Evaluation of the Luxembourg Research Centres (CRP) – Synthesis Report on the System Level

Report by the Technopolis Group

Evaluation of the Luxembourg Research Centres (CRP) – Synthesis Report on the System Level

Report by the Technopolis Group

technopolis |group| February 2019

Geert van der Veen, Katharina Warta, Erik Arnold, Anke Nooijen, Fritz Ohler (Technopolis Group)

With contributions from Rudi Beyaert, Robin Hickman, Louis Schlapbach (Chairs of the institutional expert panels).

Executive summary

This report is part of the evaluation of the Luxembourg Public Research Centres (CRP) 2014-2017. It addresses the system level of the R&D system in Luxembourg and focuses on governance and organisational issues.

The CRP have not reached international top-level (yet). To do so will require a more optimal positioning of the CRP in relation to fundamental knowledge and needs of society, as well as better access to evidence, data and testing possibilities. Although cooperation on the knowledge side (including in education) is reasonably well developed in Luxembourg, it is failing to reach its full potential. The CRP should also develop a more international agenda with strategic partnerships and increased presence in European Framework programmes.

Cooperation with public and private partners should be less ad hoc and more structured, based on a strategic agenda. This will require structural and continuous attention from the CRP side.

In general, more explicit and more focused thematic strategies are needed in all CRP, in order to produce truly excellent research with large societal impact. To help develop and implement these strategies, it is advised that all CRP should put in place Advisory Boards.

Specifically, for LIH, the ambition to achieve success in translational and clinical research requires a national approach (with strong international links).

Public investment in the CRP is high and assures good infrastructure and high-level personnel, but also tolerates inefficiencies to the detriment of scientific progress. As a percentage of the total income, the block grant for the CRP is much more generous than the funding of RTO's in other European countries. The requirements for the CRP to attract additional funding are correspondingly low.

The CRP do not attract the targeted minimum of 40% income from external sources. A significant part of external income is acquired from FNR. Income from the European Framework Programme (FP) is very limited, as is income from contract or cooperative research and services for/with (paying) clients (12-25%). Incentives to increase external income appear to be missing. So-called collaborative research has strongly increased, especially at LIST. Although this has led to increased interaction with (esp. private) parties, this type of research requires large investments of block grant. Growth of the CRP (esp. LIST) is also restricted by the present way the CRP adhere to state aid rules. A shift in dealing with state aid rules is recommended.

The block grant is at present not distributed transparently nor used strategically. The block grant should be used to implement the new strategies. It should be seen as source of growth and renewal and be distributed in a transparent way, with a focus on strategic programmes or initiatives.

At all CRP, overhead costs are high. Overhead costs should be reduced, and administration should be organised more efficiently.

The first years after the start of the present CRP were difficult years from the perspective of governance and organisation. Despite this, the CRP achieved most of the KPIs as agreed in the performance agreements. However, the CRP are at present not at the ambition level to be among leading research institutes in Europe. The KPI targets are too low and not particularly stimulating.

This suggests that there is also a governance issue: The balance in responsibilities in the MESR-BoD-CEO triangle should therefore be reconsidered.

Finally, the organisational position of IBBL and (the rest of) LIH as two 'separate' entities with two separate CEO's under one BoD, is benefitting neither the operational power nor the visibility of both organisations. This requires separate attention, and discussions should start immediately.

Table of Contents

1	Introduction and evaluation background	1
1.1	This report addresses the system level of the R&D system in Luxembourg.	1
1.2	It is part of the evaluation of the Luxembourg CRP 2014-2017.....	1
2	Positioning.....	2
2.1	Top level research institutes should have intimate acquaintance with fundamental knowledge and with needs of society and should have access to evidence, data, and testing possibilities. The CRP have not found their optimal position yet.	2
2.2	Cooperation on the knowledge side (including in education) is fairly well developed in Luxembourg, but is failing to reach its full potential.....	2
2.3	The CRP should develop a more international agenda, with strategic partnerships and better presence in European Framework programmes.	3
2.4	Cooperation with public and private partners should be less ad hoc and more structured, based on a strategic agenda. This requires structural and continuous attention from the CRP side.	3
2.5	The ambition to realise impact in translational and clinical research requires a national approach (with strong international links).	4
3	Focus and critical mass, thematic strategies.....	5
3.1	More explicit and more focused thematic strategies are needed in all CRP, in order to be in a position to perform excellent research that has large societal impact.....	5
3.2	To help develop and implement these strategies, Advisory Boards are suggested for all CRP.	5
4	Funding.....	6
4.1	Public investment in CRP is high and assures good infrastructure and high-level personnel, but also tolerates inefficiencies to the detriment of scientific progress.	6
4.2	As a percentage of the total income, the block grant of the CRP is much more generous than the funding received by RTO's in other European countries. As a consequence, the requirements to attract additional funding are low.....	6
4.3	The CRP do not attract the agreed minimum of 40% income from external sources. A significant part of external income is acquired from FNR. Income from European FP is very limited.	7
4.4	Income from contract or cooperative research and services for/with (paying) clients is also limited (12-25%). Incentives to increase external income seem to be missing.	8
4.5	So-called collaborative research has strongly increased, especially at LIST. Although this has led to increased interaction with (esp. private) parties, it requires large investments of block grant.	8
4.6	Growth of the CRP (esp. LIST) is also restricted by the present way the CRP adhere to state aid rules. A shift in dealing with state aid rules is recommended.	9
5	Use of the block grant, overhead costs.....	10
5.1	The block grant is at present not distributed transparently.	10
5.2	The block grant is at present not used strategically.....	10
5.3	At all CRP overhead costs are high. Overhead costs should be reduced, and administration should be organised properly.	10
5.4	The block grant should be used to implement the new strategies. It should be seen as source of growth and renewal and be distributed in a transparent way, with a focus on strategic programmes or initiatives.	10
6	Governance and organisation	11

6.1	The first years after the start of the present CRP were difficult years from the perspective of governance and organisation.	11
6.2	Despite this, the CRP fulfilled most of the KPIs as agreed in the performance agreements.	11
6.3	The CRP are, however, not at the ambition level to be among leading research institutes in Europe. The KPI targets are too low and not particularly stimulating.	11
6.4	This suggests that there is also a governance issue: The balance in responsibilities in the MESR-BoD-CEO triangle should therefore be reconsidered.	11
6.5	The organisational position of IBBL and (the rest of) LIH as two ‘separate’ entities with two separate CEO’s under one BoD, is benefitting neither the operational power nor the visibility of both organisations. This requires separate attention, and discussions should start immediately.	12
7	Conclusions and recommendations.....	14
7.1	Positioning	14
7.2	Focus, critical mass, thematic strategies	14
7.3	Funding.....	14
7.4	Use of the block grant, overhead costs	14
7.5	Governance and organisation	14

Figures

Figure 1 RTOs' three-stage innovation dynamic and funding model.....	7
--	---

1 Introduction and evaluation background

1.1 This report addresses the system level of the R&D system in Luxembourg.

This report is one of the final reports of the evaluation of the three Luxembourg Public Research Centres (CRP: LIH, LISER and LIST) under the responsibility of the Ministry of Higher Education, Science and Research (MESR), covering the period 2014-2017. The current report covers the Luxembourg R&D system at the *system* level and addresses issues that are common to all institutes and issues that may be caused or can only be solved at the national level of the research and innovation system.

In separate evaluation reports, at institute and department level, the impacts of the CRP on science, innovation and society are described. These impacts are significant, but it is concluded that in all CRP there is a potential for higher impact. In the following chapters the challenges and barriers related to improving the potential impact of the CRP are addressed.

1.2 It is part of the evaluation of the Luxembourg CRP 2014-2017.

The evaluation of the CRP considers scientific and technological performance, relevance for society including client and partner interaction, and the governance and organisation. The evaluation has been assigned to Technopolis Group (www.technopolis-group.com). The evaluation set-up has been designed based on the terms of reference from MESR. It aligns with good practices used in many evaluations.

The system level report is based on the evaluations of the individual CRP, which were based on peer reviews. For LIH and LIST, the institute evaluation consisted of peer reviews at department level (4 at LIH, 3 at LIST) with a focus on scientific quality and innovation impact, and at institute level (one at LIH, one at LIST) with a focus on management, organisation and governance. The peer reviews at department level at LIH and LIST were all performed by teams of independent, external experts with a scientific or management background in the area of expertise of the respective department. In most teams, at least one independent expert with knowledge of the science and innovation system in Luxembourg was present. The peer review teams at institute level for LIH and LIST were composed of the chairs of the department level peer review teams. These teams visited the institutes for a second time for the institute level review.

LISER was, because of its smaller size, reviewed in one (longer) peer review session (by one, larger, peer review team of, again, independent experts) that addressed both department and institute level. All peer reviews were supported by experienced evaluators from Technopolis Group.

Issues at system level which were identified in the institute level evaluation reports, were discussed in a long Skype session with the three institute level peer review chairs. This report is the result of this discussion. The report is structured along key findings, namely the positioning of the CRP in a broader (national and European) context (section 2), thematic focussing and strategies (section 3), funding issues (section 4), the use of the block grant (section 5), and governance and organisation (section 6). The final section provides conclusions and recommendations addressing the system level.

The results of the evaluation are intended for MESR to (re)define its relation to the institutes; and for the institutes to both help them re-define their missions, benchmark and further improve their performance further and for other (mainly public)-stakeholders to use as they find suitable.

2 Positioning

2.1 Top level research institutes should have intimate acquaintance with fundamental knowledge and with needs of society and should have access to evidence, data, and testing possibilities. The CRP have not found their optimal position yet.

The overall objectives and missions of the CRP are described in the law of 3 December 2014:

- Article 3.1 states that “the CRP have the objective to undertake activities of research, development and innovation **in order to** promote the transfer of knowledge and technologies and the national and international scientific and technological cooperation.”
- Article 4.1 indicates the CRP have two general missions: “to develop and undertake activities in basic oriented research and applied research, as a necessary support for research, development and innovation activities” and “to transfer knowledge and technologies to the public and private sector.”

These objectives and missions are rather broad. Given that the process from (fundamental) research towards impact on society is non-linear, and the budgets for research at the CRP are not unlimited, impact maximisation requires a careful positioning of the CRP between the need for renewal of (fundamental) knowledge on the one hand, and the demand for societal relevance and impact on the other hand. All three institutes are struggling with this positioning, as can be read in the conclusions of the institutional evaluations:

- At LIH there is an ongoing debate about the balance between basic research and translational research. Here the CEO has proposed a shift towards more translational research, which is strongly supported by the peer review as part of this evaluation, but the articulation of basic research with translation to both public health and personalized medicine not yet well developed.
- At LIST the focus after the merger between former CRP Gabriel Lippmann and Henri Tudor has been on Technology Readiness Level (TRL) 3-7. This focus has had a positive impact on LIST, as it increased awareness of the required steps to get from research to implementation. However, the observed focus on TRL 3-7 at LIST tends to result in a limitation of activities to TRL 3-7 activities only. This is inappropriate for a Science and Research Institute, as it neglects scientific excellence and sets insufficient incentives to develop demand-side driven activities.
- At LISER the efforts to improve the scientific performance, building on the heritage of its predecessor institute, which had a strong focus on meeting short-term customer needs, has overshadowed LISER’s societal role to the extent that LISER’s core mission, to generate societal impact, is neglected in places.

In this situation however, there is no ‘one size fits’ all model. ‘Bridging the gap between fundamental knowledge and application is an issue central to all RTO’s, inside and outside Luxembourg. To really excel as an RTO/research institute it is required to translate knowledge into practice, to be intimately acquainted with fundamental knowledge (often obtained by either doing own research and/or cooperating with relevant research institutions, in particular universities) and be sensitive to the needs of society (or ‘the market’, best realised by listening to, cooperating with and working for public and private partner/client organisations) as well as to have access to evidence, data, and testing possibilities.

2.2 Cooperation on the knowledge side (including in education) is fairly well developed in Luxembourg, but is failing to reach its full potential.

The relation between the CRP and the University of Luxembourg (UL) is a key issue. The UL is the only university in Luxembourg and is therefore considered the natural partner for the CRP, for joint education and training of young researchers and for research. In the Common Strategy Paper 2016-2025, the three CRP and UL describe the efforts foreseen for strategic concertation of their activities in four domains: Materials Science, Sustainability, Information technology and high-performance computing, and Biomedicine.

The implementation of a doctoral training track and the more systematic training of young researchers and related career tracks including attempts to encourage entrepreneurship, can be seen as one of the most successful endeavours of the recent past throughout the three CRP in cooperation with UL. CRP

researchers contribute to trainings and doctoral schools and supervise PhD students: The number of staff at the CRP with the authority to supervise PhD students has increased significantly over the last couple of years and appears to be at a good level; PhD students can be located in the CRP; PhDs at the CRP participate in university courses (the UL is even offering courses to those PhD students at LIST supervised by professors from other universities than UL), etc. This is well received by (young) researchers and their supervisors.

In terms of research the relation between the CRP and UL is more complex. The UL has set-up three research centres in areas adjacent to CRP research, with a coherent overarching profile, i.e. the Interdisciplinary Centre for Security, Reliability and Trust (SnT), the Luxembourg Centre for Systems Biomedicine (LCSB), and the Luxembourg Centre for Contemporary and Digital History (C2DH). These centres all have a clear and unique mission, focusing on top-level research with application of research results in mind, and they all have their roots in strong Luxembourg sectors or traditions: the Luxembourg financial industry (SnT), in the health sector of Luxembourg and the Greater Region (LCSB) and in the (rich) history of the Grand Duchy of Luxembourg and its archives (C2DH). They are well perceived and appreciated at European level.

Since all three UL research centres have, research topic wise, common ground with one or the other CRP, managing the interface between UL and CRP is necessary to maximise benefits for Luxembourg at a national level. Cooperation should be realised where this is of added value for Luxembourg. A good example is the successful cooperation between LIST and UL in the field of materials research.

2.3 The CRP should develop a more international agenda, with strategic partnerships and better presence in European Framework programmes.

Although the CRP have many international staff, and many senior researchers and principal investigators have cooperation partners outside Luxembourg, international cooperation in the CRP appears primarily opportunity-driven. As a consequence, cooperation is often limited to individual projects, depending on individual contacts and attention. In order to (contribute to) achieving critical mass and building international reputation, strategic partnerships are more suitable than incidental project cooperation. The CRP should engage in more strategic relations, building on existing good examples, like the cooperation with the university of Trondheim in the Norlux Group at LIH-DONC. E.g., LISER is already a participant in various social surveys, often as the Luxembourgish government representative. There may be opportunities to exploit these data better through more international studies; this could have the incidental effect of mitigating the risk that potential readers ignore publications because they feel Luxembourg is small and unimportant.

Since strategic partnerships often start with cooperation in projects, the poor presence in European / Horizon 2020 projects and consortia, observed in all three CRP, can be seen as a missed opportunity in this respect.

2.4 Cooperation with public and private partners should be less ad hoc and more structured, based on a strategic agenda. This requires structural and continuous attention from the CRP side.

In terms of cooperation with non-research institutions and stakeholders in Luxembourg or the Greater Region, there is a culture of traditional practices and attitudes: Projects over programmes; project-based cooperation rather than long-term strategic alliances; poor anchoring of research in Luxembourgish problems, challenges, societal needs and missions. It is the exception rather than the rule that the CRP have long-term institutional arrangements that allow ‘access to the real world’ (cf. the access to data from STATEC in case of LISER, to patients and cohorts in case of LIH / IBBL, or to environmental data in case of LIST). A closer look shows that the CRP themselves are primarily responsible for these poor linkages: lack of clearly defined strategies, fluctuations at top management level, re-organisations / mergers. Good examples at each CRP show that opportunities for success are there.

2.5 The ambition to realise impact in translational and clinical research requires a national approach (with strong international links).

In the field of health, LIH has realised successes in basic biomedical research, but so far has achieved only relatively modest outputs in translational and clinical research and in implementing new clinical trials and personalized medicine in the country / Greater Region. LIH in its current structure does not have the resources and leverage to fully deliver in this respect. Major changes will need to be realised in the medical and healthcare systems, providing bridges for translating the expertise of LIH scientists into clinical trials and progress in the development of personalized medicine. Cooperation and shared strategies and goals with the Ministry of Health, other Luxembourgish institutes (UL, LNS) and hospitals are necessary to achieve effective translation of research results. A close and productive interaction with IBBL is absolutely essential. The translational capacity in Luxembourg cannot be fuelled by national projects only, but needs to attract outside collaborations and access to sufficient patients. Additional platforms and capacities have to be built up. International collaboration will also be needed to have access to sufficient patients. It is suggested to develop a master plan for building a suitably located ‘health campus’ gathering LIH, academic stakeholders and a value creation/innovation ecosystem of spin-offs and start-ups in the biomedical field, to catalyse these developments. LISER could also play a role (experience in managing relevant microdata).

3 Focus and critical mass, thematic strategies

3.1 More explicit and more focused thematic strategies are needed in all CRP, in order to be in a position to perform excellent research that has large societal impact.

The peer reviews at institute level indicate that a stronger focus is necessary in order to realise the potential for growth, both in terms of scientific quality and in terms of technology, innovation and impact. The present activities lack the critical mass to be, and remain, at the forefront of truly excellent research and stay there. More focus requires the sharpening of strategic, thematic and market priorities and therefore demands clear choices and a more explicit strategy in all institutes.

These explicit strategies do not necessarily have to focus on achieving international research excellence alone. E.g. LIST-ERIN is the main and single actor of environmental research in Luxembourg. Holding this position comes with a responsibility to serve the Luxembourg government and the Luxembourg society with knowledge in this area. Similarly, LIH plays an important role in the maintenance of several national registries and population cohorts such as the ORISCAV LUX cohort. This requires good quality of expertise over a broad area, which the institute has proven to possess. However, there is a tension between the broad knowledge needs from society, and the need for focus and critical mass to achieve international excellence in research. ERIN has proven to be able to combine both roles in the field of water, where the daily measurements for the Luxembourg government and other public partners have been used as input for valuable research at international level.

3.2 To help develop and implement these strategies, Advisory Boards are suggested for all CRP.

Such strategies should be developed in a structured process, with attention to both the needs and developments in the outside world, and the research strengths which are present in the CRP.

In this process of strategy formulation, external advice from (international) experts would be of added value. For this reason, an Advisory Board that also, periodically, oversees implementation of the strategy, is suggested for all CRP. According to the mission of the CRP such bodies should represent, and link, two complementary worlds: solutions, thus the production of research-based knowledge on the one hand and problems / challenges / missions the other hand. While the role and handling of *scientific* advice is well known, advice on *missions* is less well established and has to be learned. The key challenge is here to find knowledgeable representatives of health systems, manufacturing, financial industry etc., being able to provide advice regarding future ‘challenges’ and how to translate social, societal, economic and political challenges into research agendas. EU-wide R&I missions, in the sense of ambitious, bold goals to tackle issues that affect our daily lives, are one of the new elements of the agenda of Horizon Europe, the next European Framework Programme¹.

¹ EU funding for Research and Innovation 2021-2027, European Union, 2018.

4 Funding

4.1 Public investment in CRP is high and assures good infrastructure and high-level personnel, but also tolerates inefficiencies to the detriment of scientific progress.

In absolute terms, the 2016 block grant was M€40 for LIST, M€28 for LIH and M€10.5 for LISER. The evaluators welcome this readiness for institutional funding, laying the ground for considerable investment, internationally competitive infrastructure and the employment of highly skilled researchers. However, the comfortable basic funding has also led to high administrative costs, partly lacking efficiency, as well as subcritical research activities with low impact, be it societal or scientific, in some areas. Although it is hard to compare these figures with other RTO's, since RTO's have differences in mission, research area, focus, maturity and other circumstances, a look at the same figures for RTO's abroad provides some orientation. The Fraunhofer institutes in Germany receive a core funding of about M€500 per year for 72 institutes, or about M€7 per year per institute.² TNO in the Netherlands received M€171 in core funding in 2015 ('Rijksbijdrage'), shared between 5 transition areas (so on average M€34 per area). Wageningen University and Research Centre received M€85 for its 9 research institutes, M€9.4 per institute on average.³ In Flanders *imec* received M€48⁴, and VIB M€45.⁵ In Switzerland Empa received a 'Trägerfinanzierung' of M€113⁶.

The absolute level of the block grant per institute in Luxembourg is therefore within the broad range of funding for RTO's in other European countries, and should be large enough for the CRP to be able to become top-level RTO's.

4.2 As a percentage of the total income, the block grant of the CRP is much more generous than the funding received by RTO's in other European countries. As a consequence, the requirements to attract additional funding are low.

RTOs have a three-stage innovation funding model (Figure 1).

1. They use core or institutional funding to develop knowledge and capabilities that are 'one step beyond' what industry can do
2. They further develop that knowledge in doing advanced projects for – or, often, with – companies that have high absorptive capacity
3. As the knowledge becomes routinised, they use it to provide services to both high- and low-capacity firms⁷

In principle, the proportion of RTOs' income that is provided by the state as institutional funding largely determines the extent to which they can afford to do research at low TRL levels numbers as part of their competence building. The Scandinavian RTO systems tend to get 15% or less in institutional funding while the 'continental' model used at VTT, TNO and Fraunhofer provides about one third (TNO in The Netherlands receives 40%, but has limited freedom to use the block grant; Wageningen Research receives 27%; Fraunhofer Institutes (Germany) also receive 27%; IMEC (Flanders) receives 12% (figures 2015). Empa (Switzerland), a more research-oriented institute receives approx. 68%; VIB (Flanders) receives 45%).

To some extent, RTOs can compensate for the limits that are put on their more fundamental research (because of limited institutional funding), by cooperating with universities – in effect outsourcing parts

² Fraunhofer annual report 2016.

³ TO2 evaluation report, Commissie Schaaf, 2017.

⁴ *imec* annual report 2015.

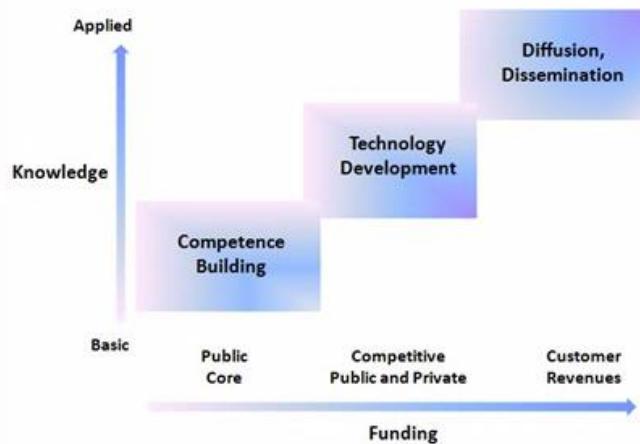
⁵ VIB annual report 2016

⁶ EMPA, annual report, 2015. More recently Empa received around M€95 basic funding from ETH Board including budget for buildings and attracted approximately M€50 external funding.

⁷ Sörlin, S., Arnold, E., Andersen, B., Honoré, J., Jørna, P., Leppävuori, E., & Storvik, K. (2009). A Step Beyond: International Evaluation of the GTS Institute System in Denmark. Copenhagen: Forsknings- og innovasjonsstyrelsen.

of this activity. RISE (Sweden) exploits this possibility by having a large number of people on its staff that are adjunct professors.

Figure 1 RTOS' three-stage innovation dynamic and funding model



Source: European Association of RTOs (EARTO) <http://www.earto.eu/about-rtos.html>

With industrial development, companies' average level of absorptive capacity rises, and the RTOs have to become increasingly research-based in order to stay one step ahead of what industry can do. Together with the wider trend for technology to become increasingly science-based, this means the RTOs have to increase their first-stage research effort over time, involving more science and causing upward pressure on institutional funding. They have become more interdisciplinary (or 'polytechnic') and need to be able to import and apply technologies – notably, but not only ICT – from other domains. The extent to which RTOs' work is research-based has also tended to increase because the general level of education and ability to do research has increased right across society (Gibbons, et al., 1994), making companies more demanding, and, second, because over time technology has become increasingly science-based. This has been recognised by the state R&D funders who provide both institutional and external funding to RTOs and is therefore reflected in RTOs' performance indicators and to an extent in requirements for partnership with academia imposed on RTOs when they apply for state project funding.

During this evaluation period, the CRP had the target to supplement their block grant with additional funding in such a way that their total funding consisted of 60% block grant and 40% other funding. There were no obligations tied to the use of the block grant. This 60% base funding is a high percentage in international perspective, meaning that the turnover realised with one Euro of block grant of the CRP is (far) lower than the turnover per euro block grant in comparable RTO's in Europe. Going back to Figure 1, Luxembourg CRP tend to be positioned on the right side, independently of their mission and ambition to diversify towards technology development and diffusion, impeding on stronger focussing and broader outreach of their activities.

4.3 The CRP do not attract the agreed minimum of 40% income from external sources. A significant part of external income is acquired from FNR. Income from European FP is very limited.

Because the CRP largely fail to attract the target 40% of their budget from external sources, i.e. from contracts or grants, the de facto block grants share is higher than 60% (with the exceptions of the predecessors of LIST which in 2014 achieved more than 40% external income; and LISER which achieved this target in 2015).

External income primarily comes from competitive grants, from direct contract research or services, and, at LIST, also from collaborative projects.

FNR is the main source of non-block grant income for all three CRP. Over the period 2014-2017 FNR grants constituted 8.6% of the total income for LIH, 10.0% for LISER and 17.6% for LIST. Although FNR funding is awarded in competition, this competition is limited because of the small size of Luxembourg and the good availability of funds at the FNR.

Participation in FP/H2020, which is far more competitive, is very limited (0.5% of income for LIH; 0.8% for LISER and 2.0% for LIST). This poor presence and performance in European projects is not a sign of poor research performance per se, but rather the result of the comfortable financial environment of the CRP (generously sized block grant as well as a well-endowed national research council (FNR)). There are definitely opportunities for growth here: LIST shows an increasing participation in FP/H2020 over the years and, at department/group/level there are ‘positive deviants’ in each CRP showing that it is feasible to be present and perform at international level.

Increased participation in FP is not only important for additional income, but also provides better access to (synergistic) knowledge and strong partners, and therefore opens the doors to opportunities to take part in prominent research projects.

4.4 Income from contract or cooperative research and services for/with (paying) clients is also limited (12-25%). Incentives to increase external income seem to be missing.

The income from contract or cooperative research and services for/with (paying) clients ranges from 12.2% (LIH and LIST) to 25.1% (LISER) (totals 2014-2017). The main external clients at LISER and LIH are public authorities in Luxembourg (96% of contract income at LISER; 64% at LIH). LIH also has a sizeable income from private clients abroad (mainly foreign clients of IBBL).

LIST gets 2.7% of its total income from collaborative research with the public sector (including ESA funding and public utility missions); 3.3% from public services and public contracts; 1.7% from collaborative contracts with the private sector and 4.5% from services and contracts from the private sector.

The ‘comfortable situation’ of the CRP seems to have weakened entrepreneurship and entrepreneurial attitude. Throughout, the CRP have not yet sustainably turned the privilege of large block grant and not extremely competitive FNR funding into an opportunity. Incentives to increase external income seem to be missing. These could be better integrated in the Performance Contracts.

4.5 So-called collaborative research has strongly increased, especially at LIST. Although this has led to increased interaction with (esp. private) parties, it requires large investments of block grant.

At LIST, over the evaluation period, the income from collaborative contracts has strongly increased (from 1.7% to 7.5%) and income from direct contracts and services has strongly decreased (from 10.8% to 4.6%). Deliberately, a broad category of collaborative projects and PPPs has been opened and put in the focus of activities, and this has increased cooperation with and income from (esp.) private partners. All these cooperation models however require the use of the block grant, and therefore have their limits. A closer look at various of these projects indicates that cost-sharing between CRP and partners/clients varies, with some tendency of possible cost carriage in projects that might, in economically tougher contexts, be negotiated as research service contracts fully paid by the clients/partners. This is grey zone, in particular in terms of an imbalance between (public) funding and (private) appropriation of results.⁸

This issue is of specific importance at LIST, but also in the other CRP, when it comes to research based services. They should make a clear distinction between standard services that can also be obtained on the market (that should be offered at full cost price including a ‘normal’ profit margin, or not be offered at all); research as a service (where LIST has an unique knowledge position with an economic demand, paid by clients, at least at cost-price, but where possible at a higher price) and projects that have a

⁸ The more fundamental legal issue, whether or not these collaborative projects are not of economic use (as is required by art. 2.2.2 of the State Aid Framework) has not been addressed in this evaluation as it was not part of the evaluation questions. It furthermore requires more detailed insight in the contracts of the cooperation projects, and specific legal expertise.

strategic value and have the possibility to generate follow-up projects for the same and other clients. Block grant should only be used in this last type of (external) projects. A clear understanding of the different roles of “partners” and “clients” will follow naturally.

4.6 Growth of the CRP (esp. LIST) is also restricted by the present way the CRP adhere to state aid rules. A shift in dealing with state aid rules is recommended.

In order to prevent any distortion of competition within the European common market, state aid remains a highly controlled and regulated field (cf. Art 107 (1) of the Treaty on the Functioning of the European Union), the basic rule being that state aid is strictly forbidden. In order to avoid dire consequences, it is worth sticking to a strict compliance to the regulations. In case of LIST (and also for the other CRP, but since these operate in primarily public domains this is for them less relevant), it is chosen to prevent (allegations of) state aid by actively avoiding positioning LIST as an enterprise. In order not to be considered an enterprise, economic activities like contract research and services such as routine analyses carried out in the labs, tailor-made trainings and workshops, should not comprise more than 20% of the activities of LIST.

This is a rather low percentage for an RTO with the mission to carry out research activities oriented by the needs and interests of private socio-economic actors and translate these results into innovations that are useful and sustainable for the economy and society. In order to maximise knowledge transfer to companies (and public partners) intensive cooperation and knowledge exchange is a must, and the business model of contract research is very suitable for this.

As is indicated in paragraph 4.2 above, other RTOs (in Europe) have far larger percentages of income from contract research and providing services to commercial companies than LIST has. These RTOs are therefore all seen as enterprises, but prevent (accusations of) illegal state aid by asking prices for their services, at least covering full costs (some even use value based pricing for research as a service); giving no discriminatory access to their (with government funding obtained) IPR by asking (market) prices for this; and by partnering with commercial parties on a programmatic basis (with specific contracts about shared access to IPR). All these RTOs also have extensive activities to participate in EC funding programmes. In this way there are no immediate limits to growth determined by their base funding: their limit to growth is determined by their ability to sell their unique knowledge; their ability to develop new unique knowledge and their access to good researchers.

We recommend the CRP (and in particular LIST) to develop comparable strategies to deal with state aid rules.

5 Use of the block grant, overhead costs

5.1 The block grant is at present not distributed transparently.

Throughout the entire evaluation, all three CRP have been unable to provide a full overview of the use of the block grant to their review teams. After the reviews it was indicated that this information could be made available, but in the eyes of the review teams, transparency was low. During the reviews it furthermore appeared that the distribution of the block grant was not very transparent for the managers at the institutes, let alone for the researchers.

5.2 The block grant is at present not used strategically.

There are indications⁹ that the block grants are largely used in an unproductive way: only a minor share (ranging from a tenth to a third of the block grant) is used for internal research projects. Major shares of the block grant are most probably used to cover the costs for administration and management. The remaining part is mainly given to (externally) funded (operational) research (projects). As a consequence, the block grant cross-subsidizes both grants and contracts.

5.3 At all CRP overhead costs are high. Overhead costs should be reduced, and administration should be organised properly.

In all CRP high overhead costs are reported by the institute peer review teams, often combined with a perceived low added value of overhead services. This is clearly a legacy from before the creation of the current CRP, which has not been addressed properly. The high overhead costs limit the amount of CRP institutional funding available for research. The lack of transparency is detrimental to good project management and limits the opportunities to improve the use of funds (first and foremost the block grant).

Overall, overhead costs should be reduced, and financial administration should be improved.

5.4 The block grant should be used to implement the new strategies. It should be seen as source of growth and renewal and be distributed in a transparent way, with a focus on strategic programmes or initiatives.

CRP need a radical reset with respect to the use of the block grant. The block grant should be considered the core of strategic thinking and acting and should be used for (internally) defined (strategic) research (programmes), aiming both at research results (for publication, thus for sharing the results) as well as at paving the ways for subsequent applications for grants and attraction of contracts. As has been concluded above, such strategies are missing.

To achieve the reset, a change in the mind-set and culture in the institutes is necessary: a re-definition of values, roles, and attitudes and to a much lesser extent a re-design of (formal) organisational structures and processes. It will be necessary to upgrade the symbolic value of internal funds from a comfortable coverage of central administration and management costs, to a means of strategic development and change. The focus for the use of the block grant should be on financing strategic programmes or initiatives that provide in turn a basis for generating external revenue and impact. Appropriate incentive systems should be designed to link external performance with internal funding and vice versa.

Concerning roles and attitudes, it is the CEO who should be the ‘owner’ of the block grant and organise a transparent process, possibly involving the new Advisory Board. The rules for the distribution of the block grant should be clear to all, once these rules are used transparently this will lead to acceptance amongst the key staff of the CRP. As this transformation will take time – three to five years –, it will be necessary to have a long breath and broad commitment.

⁹ We notably refer to the chapters on ‘The use of the block grant’ in the self-assessment reports.

6 Governance and organisation

6.1 The first years after the start of the present CRP were difficult years from the perspective of governance and organisation.

The evaluation period 2014-2017 has been dynamic in terms of governance and organisation. All three CRP have had difficulties in finding the right CEO and have been under interim management for parts of this period. This ‘uncertainty at the top’ has not helped in creating renewed and more decisive organisations.

6.2 Despite this, the CRP fulfilled most of the KPIs as agreed in the performance agreements.

The CRP have been set up as Public Research Centres by the Luxembourg Government, and the basic funding of all CRP is arranged by way of performance contracts for each individual CRP. KPIs are part of these performance contracts. Although the CRP have not achieved the targeted income from grants (a proxy for quality) and contracts (a proxy for relevance / impact) at the amount of at least 40% of their budgets, most KPI targets have been reached by the CRP.

6.3 The CRP are, however, not at the ambition level to be among leading research institutes in Europe. The KPI targets are too low and not particularly stimulating.

The presented evaluations show that the implicit ambition of the Luxembourg government, and the institutes, to be among the leading research institutes in Europe has not been met. The causes of this failure are quite pervasive, and, as has been sketched above, show a lot of commonality across the CRP. They include: lack of leadership (6.1), lack of strategy (2.1-2.4, 3.1) and operational issues (5.1-5.4) are all having their effects. Finally, the KPI targets are too low and not particularly stimulating.

6.4 This suggests that there is also a governance issue: The balance in responsibilities in the MESR-BoD-CEO triangle should therefore be reconsidered.

MESR selects all members of the Board of Directors (BoD), which is then approved by the Council of Ministers, thus in a strict sense by the Government. MESR negotiates a performance contract with the BoD, and delegates the supervision of the implementation of this performance contract to the BoD. MESR is represented in the BoD by the Government Commissioner, a civil servant that is non-voting member, mainly in charge of supervising and ensuring legal obligations. Overall, during the implementation of the performance contract, MESR acts in a hands-off way.

MESR has delegated many important and powerful roles to the BoD: the negotiation of the performance contract and the supervision of its implementation; a key role in hiring top-management, setting strategies and financial plans, and approval of annual reports. As we understand from the discussions during the peer reviews, the BoD meetings include a lot of operational management issues as well.

The CEO is responsible for the actual management of the CRP. The effective power of the CEO is larger than the formal power: The CEO with his or her team negotiate the performance contract directly with MESR, the BoD only approves it. For the review of the implementation of the performance contract there are annual meetings between MESR and the CEO directly.

The institute evaluations only lightly touched upon governance. However, every institute peer review included a discussion with a delegation of Board Members, and the interaction between MESR, Board and CRP management was discussed in other sessions as well. Based on this, the following observations have been made:

- With respect to the role of MESR:
 - In all CRP, the peers identified a lack of explicit strategy. Although MESR should not try to have a big influence on the strategies (only at high abstraction level, e.g. more attention for the problem of climate change; stronger focus on translational research; focus on financial sector),

it should require the presence of explicit strategies, either during or before the performance contract negotiations. It is suggested that research agendas/research strategies should be developed by the institutes about a year before the performance contracts end, should be part of an external evaluation of the performance of the institutes in the period prior to the performance contract, and should in their final form be part of the performance contract.

- The KPI targets for science and innovation seem misaligned with the broader ambition of becoming a top research institute with societal impact. Moreover, there are no consequences of underachievement or overachievement with respect to the KPI targets. Such rewards and penalties could have a huge motivating impact. It is suggested that KPIs are defined so that excellence of research as well as valorisation of knowledge and their national, respectively international relevance have appropriate weight. This includes a KPI for external (client) income. Targets need to be realistic but also ambitious. Overachievement should be rewarded, underachievement should have consequences as well.
- The dual role of MESR as both ‘principal’ and observer in the BoD has its advantages (good information flows, close relations) but is in other countries sometimes seen as undesirable (possible conflict of interest for government commissioners between their role as civil servant and their role as Director).
- With respect to the role of the BoD:
 - The formal role of the BoD is very large, however in practice, a lot of this power is delegated to the CEO. This is useful: there is only a limited amount of time that part-time BoD members can spend on their CRP (even though the ones we spoke are very committed to their CRP) and this is certainly less than the time that a full time CEO and his/her team can spend on the CRP. It is recommended to make the BoD more explicitly supervisory (in charge of checks and balances) and less operational, in practical, and (this probably needs a change in the law) also in formal terms.
 - The BoD should furthermore have the capability to open doors to ‘problem owners’ at political (public) or Board (private) level.
 - The profile of the members of the BoD and their nomination procedure need to be in line with this new role.
- With respect to the role of the CEO:
 - The formal role of the CEO is at present limited, and the relation between the CEO and the Board seems not always crystal clear. It is suggested to strengthen the operational and strategic role of the CEO. However strong CEOs also require strong controlling BoDs, with clear procedures, complete, transparent communication, and critical assessment of plans and performance as part of a relation build on trust.

6.5 The organisational position of IBBL and (the rest of) LIH as two ‘separate’ entities with two separate CEO’s under one BoD, is benefitting neither the operational power nor the visibility of both organisations. This requires separate attention, and discussions should start immediately.

IBBL is a strong player in the international biobanking field (both at the processing and storage level) and among the best in the world with regard to its engagement in biospecimen quality and method standardisation. There is a strong identity perceived internally and internationally around IBBL branding. Unfortunately, the use of IBBL within Luxembourg is rather low, because the IBBL has targeted mainly international collaborations, although it should be noted that MESR in the performance contract 2014-2017 specifically asked IBBL to develop this external visibility by getting Horizon 2020 funding and signing contracts with third parties. Also, the lack of clinicians, and clinical research plays a role in the low use of IBBL in Luxembourg research. LU and LIH researchers could benefit a lot more from working together with the IBBL to improve biospecimen quality and to make use of the IBBL’s international visibility and should be encouraged to do so. In the light of the new translational approach of LIH, IBBL should serve not only as biomaterials centre but as datacentre for LIH that collects and manages all kind of data related to patient samples, e.g. clinical, pre-analytic and analytic data and makes these data available for projects.

At present, IBBL is a department of LIH, with the attitude of a separate legal entity.

The current situation, with LIH and IBBL being one formal organisation, with one budget and one administrative support system, but two independent CEOs who report to the same BoD seems a bit odd and is benefiting neither the operational power nor the visibility of both organisations.

At present, IBBL is a department of LIH, with the attitude of a separate legal entity.

The current situation, with LIH and IBBL being one formal organisation, with one budget and one administrative support system, but two independent CEOs who report to the same BoD seems a bit odd and is benefiting neither the operational power nor the visibility of both organisations.

The organisational position of IBBL in relation to (the rest of) LIH requires separate attention. There are various options. In support of integrating IBBL as the fourth department within LIH is the fact that IBBL can play a pivotal role in the implementation of the new LIH strategy, as it would offer LIH an in-house infrastructure to run large population or clinical cohorts. In favour of setting up IBBL as a separate legal entity is the consideration that IBBL is a serious budget and strategic liability for LIH because it is the nature of biobanks such as that one to consume more budget and resources. From this point of view, it may be better to move it out of LIH and establish it as “the biobank of/for Luxemburg”, jointly supported by a broader range of stakeholders than LIH.

The BoD should make a decision on the relation between IBBL and (the rest of) LIH, based on the vision on the Luxembourg health research landscape, the desired position of LIH/IBBL therein and the re-defined strategies of LIH and IBBL. With the CEO of IBBL retiring in two years, discussions and plans related to a new organisation structure should start now.

7 Conclusions and recommendations

7.1 Positioning

Top level research institutes should have intimate acquaintance with both fundamental knowledge and with needs of society, and have access to evidence, data and testing possibilities. The CRP in Luxembourg have not found their optimal positioning yet.

Cooperation on the knowledge side (including in education) is fairly well developed in Luxembourg, but doesn't reach its full potential. The CRP should develop a more international agenda, with strategic partnerships and improved presence in European Framework programmes.

Cooperation with public and private partners should be less ad hoc and more structured, based on a strategic agenda. This requires structural and continuous attention from CRP leadership.

The ambition to reach excellence in translational and clinical research requires a national approach with strong international links.

7.2 Focus, critical mass, thematic strategies

More explicit and more focused thematic strategies are needed in all CRP, in order to be at the forefront of truly excellent research with large societal impact. To help develop and implement these strategies, Advisory Boards are suggested for all CRP.

7.3 Funding

Public investment in CRP is high and assures good infrastructure and high-level personnel, but also tolerates inefficiencies to the detriment of scientific progress.

As a percentage of the total income, the block grant of the CRP is much more generous than the funding of other RTO's in Europe. The necessity to attract additional funding is correspondingly low.

The CRP do not attract the agreed minimum of 40% income from external sources. A significant part of external income is acquired from FNR. Income from European FP is very limited. Income from contract or cooperative research and services for/with (paying) clients is also limited (12-25%). Incentives to increase external income seem to be missing. So-called collaborative research has strongly increased, especially at LIST. Although this has led to increased interaction with (esp. private) parties, this requires large investments of block grant.

Growth of the CRP (esp. LIST) is also restricted by the present way the CRP adhere to state aid rules. A shift in dealing with state aid rules is recommended.

7.4 Use of the block grant, overhead costs

The block grant is at present not distributed transparently nor used strategically.

At all CRP, overhead costs are high. Overhead costs should be reduced, and administration should be organised more efficiently.

The block grant should be used to implement the new strategies. It should be seen as source of growth and renewal and be distributed in a transparent way, with a focus on strategic programmes or initiatives.

7.5 Governance and organisation

The first years after the start of the present CRP have been difficult years from the perspective of governance and organisation. Despite this, the CRP have mostly reached the targets set by the KPIs as in the performance agreements. However the CRP are not yet among leading research institutes in Europe, falling back behind their ambition. The KPI targets are too low and not sufficiently stimulating.

This indicates a governance issue: The balance in responsibilities in the MESR-BoD-CEO triangle should therefore be reconsidered.

The organisational position of IBBL and (the rest of) LIH as two ‘separate’ entities with separate CEO’s under one BoD, is benefitting neither the operational power nor the visibility of both organisations. This requires separate attention, and discussions should start immediately.

technopolis |group| The Netherlands
Spuistraat 283
1012 VR Amsterdam
The Netherlands
T +31 20 535 2244
F +31 20 428 9656
E info.nl@technopolis-group.com
www.technopolis-group.com