

Implementation of the quality framework for doctoral training

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Table of content

1) Introduction

2) Getting ready for the institutional QFDT

3) Doctoral research environment and management

3.1) Infrastructure

3.2) Access to documentation

3.3) Scientific and social exchange

3.4) Quality control of doctoral training

Thesis Supervisory Committee

Thesis Assessment Committee

Internal quality monitoring

4) Recruitment and admission into doctoral training

4.1) Recruitment strategy

4.2) Recruitment procedure

4.3) Project and candidate evaluation

4.4) Employment contract

4.5) Institute induction

5) Supervision

5.1) Supervision guidelines

5.2) Supervisor criteria

5.3) Supervisory team

5.4) Supervision agreement

5.5) Conflict mediation

5.6) Absence of supervisor

5.7) Supervisor evaluation

5.8) Supervision training

6) Skills training and professional development

6.1) Training courses

6.2) Professional development and career orientation

6.3) Teaching activities of PhD candidates

6.4) Participation in outreach activities

7) Dissemination

7.1) Rules of authorship in publications

7.2) Dissemination to a non-scientific public

7.3) Intellectual property rules and support for valorisation

7.4) Public availability of PhD theses

8) Good practice in research

8.1) Compliance to ethical and data protection standards

8.2) Research integrity

8.3) Training in ethics and responsible research conduct

8.4) Responsibility of supervisors

9) Thesis assessment committee and procedures

10) Additional approaches for the QFDT

10.1) Appointment of a representative for doctoral and postdoctoral researchers

10.2) Integration of PhD candidates into the staff appraisal system

1) Introduction

Since its creation in 1988, Luxembourg Institute of Health (LIH, previously named CRP-Santé) is engaged in training undergraduate/graduate students and doctoral candidates affiliated to different universities in the Greater Region and beyond. Doctoral education is a mission defined by Luxembourgish law and is a key performance indicator in the institute's performance contract with the Government. LIH committed to train 8 PhD candidates per year over a 4-year period, from 2014 to 2017. On average, during the past 5 years, 7 PhD candidates graduated per year and 8 PhD candidates started their doctoral studies per year.

With the release of the Salzburg principles¹ in 2005 and subsequent recommendations² in 2010, doctoral education provided by PhD-awarding and non-PhD-awarding institutions has significantly changed in Europe. Doctoral training has to be performed according to the seven EU Principles of Innovative Doctoral Training³: research excellence, attractive institutional environment, interdisciplinary research options, exposure to non-academic sectors, international networking, transferable skills training and quality assurance. Thus, doctoral training has become more structured in recent years and reflects not solely on scientific production, but also on skills development and employability of the future PhD holders. Doctoral education remains however unequally developed, as measures and procedures are not harmonised at European level and often even not at national level⁴.

LIH, as a non-PhD-awarding institution, employs 30 PhD candidates registered at 8 different European universities (status of August 2015). All universities have in place doctoral schools or programs for the coordination of doctoral training and offer coursework tailored to the needs of young researchers. Nevertheless, there are differences in the functioning of the doctoral schools/programs and in the course offers. Consequently, there are slight disparities in doctoral training quality at LIH.

The objective of the National Research Fund Luxembourg (FNR) to foster the set-up and implementation of a quality framework for doctoral training (QFDT) at an institutional level as part of the PRIDE programme is strongly welcomed by LIH. To ensure the same training and development opportunities for all its PhD candidates, the institution aims to apply this consistent doctoral education and the related quality assurance mechanisms not only to future PRIDE-funded

¹ Salzburg principles

http://www.eua.be/eua/jsp/en/upload/Salzburg_Conclusions.1108990538850.pdf

² Salzburg II recommendations

http://www.eua.be/Libraries/publications-homepage-list/Salzburg_II_Recommendations

³ Principles for Innovative Doctoral Training

http://ec.europa.eu/euraxess/pdf/research_policies/Principles_for_Innovative_Doctoral_Training.pdf

⁴ Report of the EC conference 'Future of the Doctorate', Riga, 28-29 May 2015

https://future-doctorate.teamwork.fr/doc/conference_report_future_of_the_doctorate_eac.pdf

PhD candidates, but to all its PhD candidates, independently of the funding source (AFR, CORE, Télévie,...). The institutional QFDT that the institute is setting up will ensure that all PhD candidates leave LIH at the end of the PhD trajectory, not only with a doctor title and a specific scientific expertise, but also with a wealth of skills that make them competitive for the labour market of both the public research and the industrial sector.

It can be foreseen that a number of universities/doctoral schools/doctoral programmes to which LIH PhD candidates will be affiliated and of those that will be involved in future doctoral training units (DTUs) do not entirely comply with the requirements of the FNR's QFDT. Therefore, the institutional QFDT commits to complement the framework offered by the academic partners and to fill all the identified gaps in order to be fully in line with the FNR's QFDT. Of note, the procedures and measures defined by universities/doctoral schools/doctoral programmes will be applied primarily. If a procedure/guideline is missing or incomplete (e.g. the establishment of a supervision agreement, the requirement of a thesis assessment committee), the corresponding procedure/guideline established at institutional level will be applied.

2) Getting ready for the institutional QFDT

In September 2014, a PhD training coordinator (50% part-time) was hired at LIH. She forms a unit specifically in charge of doctoral training (DOCT unit) that is under the direction of the General Management. The coordinator was tasked firstly to assess the working, training and supervision conditions of LIH's PhD candidates by face-to-face surveys (October - November 2014, participation: 35 out of 37 PhD candidates). Secondly, she collected input on the different aspects of the future QFDT from the PhD supervisors employed at LIH, again by a face-to-face survey (January - February 2015, participation: 22 out of 23 PhD supervisors). Both surveys, as well as meetings with the Executive Committee composed of the CEO, the CFAO and the directors of department, allowed comparing the situation at the time point 'end 2014/early 2015' with the QFDT to be established, to identify deficits and collect suggestions for improvement.

Importantly, the survey with the PhD candidates revealed that they are generally very satisfied with their research environment, work conditions and work-life balance. Nevertheless, it also identified a number of requests: the monitoring of supervision quality, the extension of the internal course offer for young researchers, the harmonisation of the recruitment practices for PhD candidates, the establishment of common institutional guidelines for all aspects of doctoral training and the enhancement of interactions between doctoral candidates.

In a third step, the PhD training coordinator is in charge of writing formal procedures/guidelines and of proposing an implementation plan for the QFDT, taking into account the good practices requested by the FNR as well as the input from the PhD candidates, their supervisors and the Executive Committee. In 2016, at the latest at the onset of the PRIDE programme (fourth quarter of

2016), all aspects of the QFDT shall be enforced by the Executive Committee and put into practice under the oversight of the PhD training coordinator.

In the following sections the key elements of LIH's QFDT are described. Identical titles to the sections of the FNR's QFDT document⁵ are used, allowing an easy comparison of the FNR's requests and LIH's conformity. **Supplementary information** on the institutional QFDT can be found on the **LIH website** on a webpage dedicated to doctoral training⁶. A number of institutional documents related to doctoral education are downloadable on this webpage. An implementation plan⁷ in the form of a table is also available, giving a comprehensive overview of the actions that have been taken and those that are still to be taken for full compliance with the FNR's QFDT. The persons in charge of the actions and the expected time frame for implementation are listed in the table.

3) Doctoral research environment and management

3.1) Infrastructure

LIH offers a highly stimulating research environment for early-stage researchers who want to specialise in laboratory-based biomedical research as well as in clinical, epidemiological or public health research. It is composed of three research departments whose names reflect the three research focuses: the Department of Population Health, the Department of Infection & Immunity and the Department of Oncology. The departments are headed by scientific/operational directors and subdivided in research units and teams. Since January 2015, LIH comprises the Integrated BioBank of Luxembourg (IBBL), which keeps its management autonomy.

The LIH research facilities are located at three different campuses: Strassen-Luxembourg (Edison building, BAM, Former Maternity, IBBL), Eich-Luxembourg (Centre Médical de la Fondation Norbert Metz) and Esch-sur-Alzette (House of BioHealth). All facilities are well equipped, comply with security norms and offer sufficient laboratory and office space for the researchers.

The House of BioHealth, closely situated to the Belval campus in Esch-sur-Alzette, is a new site for LIH's research activities. Early 2015, approximately 1/3 of the staff moved to this brand-new facility. This relocation significantly enhanced the available space, allowed the acquirement of further equipment and eventually regrouped a whole department, the Department of Infection & Immunity, under one roof. The House of BioHealth, which is still to be extended, also hosts a number of biotech companies. This cohabitation is very beneficial to create contacts with industry and develop public-private partnerships.

LIH has state-of-the-art technology platforms, namely for flow and mass cytometry, confocal microscopy, magnetic resonance imaging, analytical chemistry as well as genomics and

⁵ <http://storage.fnr.lu/index.php/s/SbluoBMOt5te8cZ/download>

⁶ <https://www.lih.lu/page/departments/gm-doct-doctoral-training-1392>

⁷ LIH QFDT implementation plan

proteomics analysis. A strong expertise in the application of all these techniques is present. The institute also has an animal facility for experimentation with rodents and zebra fish. The IBBL offers know-how in storage and handling of biological samples.

3.2) Access to documentation

LIH staff has access to research documentation via a personal account for the Findit portal⁸ of the Luxembourg National Library (BNL). The portal provides access to the full text of 53,000 electronic journal titles (e.g. from Elsevier, Nature, Wiley, Thomson, Oxford, Springer), 93,500 science eBooks and several hundred specialised databases and reference platforms in English, French and German (status 2015). Access to journals and books is in continuous evolution.

'How-to' guides for the portal are available internally. Newcomers can also get individual support from LIH's documentary manager to optimally use the functionalities of the portal for their bibliographical search. In addition, they can get a tutorial from the documentary manager on how to use the Endnote software for managing bibliography and creating citations.

PhD candidates have the possibility to consult the PhD theses of former doctoral candidates. All PhD theses of the last 5 years are available electronically on the common server of LIH, except those for which the content is currently confidential.

3.3) Scientific and social exchange

Although LIH staff is dispatched over several sites, a good communication is ensured by a common IT system including an Intranet for announcements of news, events and important messages from the management. A wealth of scientific events, internal courses and workshops as well as two major social events organised every year, allow gathering LIH staff from all the different sites. Of note, all scientific meetings and seminars at LIH are held in English, the language typically used by the science community and indispensable in a multinational environment.

In the frame of the FNR-supported lecture series in 'Infection & Immunity' (Department of Infection & Immunity) and in 'Cancer Research' (Department of Oncology) and seminars organised by the Department of Population Health, LIH researchers as well as externals can assist to presentations given by internationally recognised scientists. The lecture series include workshops that are specifically meant for young researchers. The workshops are reserved to a restricted number of registered participants, thus stimulating an informal exchange with the invited speaker about his/her research and career.

Regular department and research unit meetings (frequency can differ from one department/research unit to another), during which research projects and results are presented and discussed, ensure the scientific exchange between LIH scientists from the same research field.

⁸ www.findit.lu

PhD candidates are able to attend national and international scientific conferences. They are encouraged to actively participate either by presenting a poster or by giving a short oral presentation. The survey conducted with the PhD candidates revealed that they attend two national or international conferences per year on average. They consider conferences as an excellent opportunity for getting scientific advice from experts and for networking. All PhD candidates of LIH reported that they attend and actively participate at least once during the course of their PhD in the annual 'Life Sciences PhD Days' organised by doctoral candidates of the University of Luxembourg and LIH affiliated with the local Doctoral School in Systems and Molecular Biomedicine. Many of them attend or plan to attend it each year.

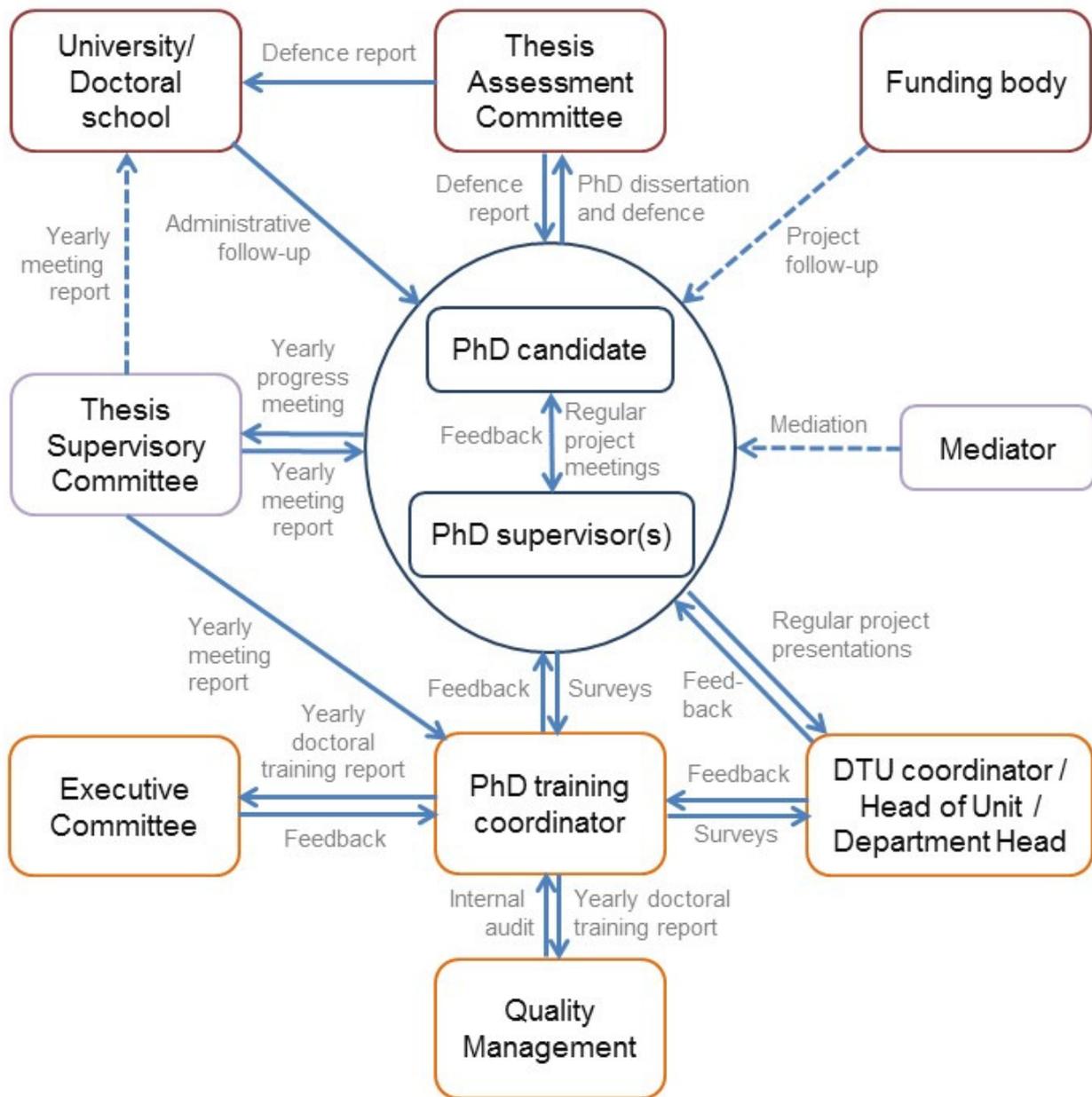
As social events, the LIH organises a yearly Cohesion Day with team building activities and a Christmas Party. From 2016 on, the PhD training coordinator initiated in addition two social events per year exclusively for PhD candidates such as ice-skating, bowling, movie evenings or touristic and cultural visits.

Via an internal PhD mailing-list, the PhD training coordinator also informs the doctoral candidates about the national PhD association LuxDoc and encourages active membership and participation in networking events.

3.4) Quality control of doctoral training

Doctoral training involves a number of internal and external stakeholders, the PhD-awarding institution being the most important external stakeholder. The interplay and efficient communication flow between all stakeholders guarantees the quality control of doctoral training at all levels of doctoral management: at the level of the PhD candidate and the supervisory team, at the level of a DTU (or other consortia), at the level of the institution and at the level of the doctoral school/university. Doctoral training quality will be monitored throughout the doctoral life cycle, from the first year to graduation.

The communication flow between all stakeholders ensuring quality control is illustrated in the scheme on the next page.



Stakeholders:

- Internal (LIH)
- External (university)
- Internal or external

Communication flow:

- In all cases
- - - Case-dependent

Thesis Supervisory Committee

At the PhD-awarding institution, quality control is mainly ensured by the Thesis Supervisory Committee (TSC). The TSC evaluates the progress of the research project of a PhD candidate and his/her performance as an early-stage researcher. It guides the doctoral candidate throughout the PhD trajectory and can give advice on career orientation.

The formation of a TSC will be mandatory for all LIH PhD candidates. If the university to which a PhD candidate is affiliated sets the obligation to have a TSC and has formal rules regarding its composition, meeting frequency and proceedings, then those rules will be applied. In the absence of a TSC obligation and formal rules by the university, the TSC procedure⁹ of LIH will be applied. The PhD training coordinator ensures that the TSC procedure is adopted by all involved parties and applied consistently.

Briefly, the procedure stipulates that the TSC is formed of the supervisory team and at least one member external to LIH. The TSC shall meet yearly, meaning at the end of the 1st, 2nd year and 3rd year of the PhD project. The decision for approval of submission of the PhD dissertation shall be made during the last TSC meeting. Following each meeting, the TSC shall write an evaluation report using a predefined template. The report shall give information on the project progress and requested changes in the project work plan. In addition, it should contain the evaluation of the performance (strengths and weaknesses, research potential) of the candidate as well as constructive feedback that can lead to improvements. The report, signed by all members of the TSC and the PhD candidate, will be handed to the university (if required), the PhD candidate and the PhD training coordinator.

The external member of the TSC can be an expert or a non-expert of the research field in which the PhD project is carried out. He/she can be employed at the university to which the PhD candidate is affiliated or at another university/research institution or be from a relevant industrial sector.

Thesis Assessment Committee

At the end of the PhD cycle, it is the Thesis Assessment Committee (TAC, defence committee or thesis jury) that evaluates the quality of the whole PhD work presented in a dissertation and during the defence (see section 9: TAC and procedures). The TAC will decide on whether the PhD title can be conferred (or not) to the doctoral candidate. The PhD training coordinator will compile all information on progress and successful completion of theses of all LIH PhD candidates.

⁹ Thesis Supervisory Committee procedure

Internal quality monitoring

To additionally monitor the institutional quality of doctoral training, the PhD training coordinator will conduct yearly surveys with the PhD candidates, their supervisors (employed at LIH) and the DTU coordinators (for the PhD candidates who are not funded through PRIDE: the heads of the research unit or department). The surveys will be in the form of an electronic questionnaire. Precise and concise questions on the different aspects of doctoral training will allow assessing the quality of supervision, training courses, work environment and doctoral management in the research units, departments and DTUs.

The PhD training coordinator will be in charge of creating, collecting and analysing the questionnaires. The surveys should give an institution-wide overview on the application of the procedures of the QFDT and identify the points that need to be improved. For individual PhD candidate - supervisor pairs, possible deficiencies in supervision, lack of commitment to the doctoral project and emerging conflicts should be identified. In the case of large discrepancies in the answers for the same type of questions of a PhD candidate and the respective supervisor, the PhD training coordinator will ask for individual face-to-face meetings to further investigate the situation, identify the problem and propose measures for improvement. In the case of a true conflict between both parties, the PhD training coordinator will advise the intervention of a mediator (see section 5.5: conflict mediation).

The PhD training coordinator will synthesise the results of all the questionnaires and submit a yearly report to the Executive Committee and to the Quality Management. Both entities will advise on a possible review of the quality control structure. Consequently, questionnaires may be readapted or other quality monitoring tools may be developed. If the Executive Committee and/or Quality Management identify points to be improved at a certain level on doctoral management, these will have to be addressed by the PhD training coordinator, the head of research units and departments and/or the DTU coordinators.

With help of the survey results, the PhD coordinator will also identify and develop indicators that allow to precisely 'quantify' the quality of doctoral education (e.g. number of successful PhD theses, ratio PhD candidate/PhD supervisor, subsequent employment rate).

Since 2013, LIH's General Management, its Administrative Department as well as a number of research units hold the ISO 9001:2008 certification. As the DOCT unit is part of LIH's General Management, its functioning and the quality control of doctoral training comply with the management system and enter into the certification scope. An external evaluation took place in the last quarter of 2015 and conferred the ISO 9001:2008 certification to the unit. All procedures and guidelines of the QFDT generated by the DOCT unit are integrated into LIH's documentation management system. They will all be fully implemented at the latest at the onset of the PRIDE programme and will be reviewed and updated if necessary.

4) Recruitment and admission into doctoral training

4.1) Recruitment strategy

To recruit the best candidates for a PhD position, job descriptions are advertised nationally and internationally. For PhD position openings in the context of PRIDE, a pool of positions is advertised in a single announcement. Emphasis is put on the research scope of the DTU, the inter-institutional and public-private collaborations, the QFDT and the attractiveness of Luxembourg as a research location. Individual PhD position advertisements contain a description of the research scope and of the research project. In any case, the minimal requirements for the candidate have to be listed (e.g. Master's degree, knowledge of English) as well as information on the type and duration of the employment contract.

The job offer is created using a graphic template and a defined style. It is sent to the Luxembourgish employment agency ADEM and published on general job and science job portals (e.g. Nature Jobs, Euraxess, jobvector.de, ABG Intelli'agence, doktorarbeit.de). In addition, it is published on the professional and social network accounts of LIH (LinkedIn, Facebook, Twitter, ResearchGate). LIH staff is informed about the open position through an Intranet message. It is free to spread the job offer to its professional network (universities, research centres). Internal applications can be considered and are treated in the same way as external ones.

4.2) Recruitment procedure

Since 2010, LIH holds the label 'Human Resources Excellence in Research' from the European Commission. This means that the institute conforms to the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers¹⁰. Early 2015, LIH was honoured by an award in the form of a certificate for having fulfilled all the required steps to accordingly improve its human resources policies. LIH is the first Luxembourgish research institution having fulfilled all the criteria to durably maintain the label.

LIH has a general recruitment procedure¹¹ guaranteeing a transparent and fair-minded recruitment process. For the recruitment of 'students' (PhD candidates fall into this category), the application of the recruitment procedure is not mandatory until now. At the latest at the start of the PRIDE programme, the procedure will also be consistently applied for the recruitment of PhD candidates.

Recruitment of PhD candidates will be done by a selection committee. Apart from the scientific experts, the committee must contain at least one member of LIH's human resources (HR) staff. The PhD training coordinator may also be invited to be part of the selection committee. It is recommended that there is a gender balance in the selection committee. Prior to the start of the

¹⁰ European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers
<http://ec.europa.eu/euraxess/index.cfm/rights/europeanCharter>

¹¹ LIH general recruitment procedure

recruitment process, the HR staff communicates the general procedure to the selection committee and informs the candidate about the different steps of the recruitment process.

Within the committee, the HR representative has a consultative role. He/she must ensure that there is no employment discrimination with regards to origin, religion, gender or physical/sensory disability and that the candidates will not be asked any inappropriate questions (e.g. family plans, political view). As of August 2015, LIH employed 18 female and 12 male PhD candidates. In general, LIH has significantly more women carrying out a PhD in life sciences. The selection committee will therefore have to consider gender balance in its recruitment strategy.

In complement to the general recruitment procedure, LIH will develop a handbook¹² on how the recruitment could be performed generally and in the specific case of PhD candidates: composition of selection committee, sequence of interviews, interview content, possible interview questions and criteria to evaluate the candidates. A laboratory visit and/or an encounter with the future co-workers may be organised after the interview to give the possibility to the candidates to get an impression on the research and work environment.

The recruitment of PhD candidates in the frame of the PRIDE programme will be carried out in cohorts (not individually). LIH leaves it to the DTU coordinators to define the exact recruitment process that must, however, be in line with the general recruitment procedure of the institute. In the context of PRIDE, selection committees may also contain members from other institutions being part of the DTU.

4.3) Project and candidate evaluation

Independently of the funding source, any project that is conducted at LIH (with or without external collaborations), is analysed with the help of LIH's Research and Knowledge Transfer Office (RKTO) for its potential for scientific, economic and/or societal value creation. Such evaluation takes into account the relevance, innovation, feasibility and patentability potential of the research project. When pertinent, the project is also reviewed by LIH's Competence Centre for Methodology and Statistics for feedback on the best suitable experimental design to answer the research questions.

For PhD projects that are not funded through the PRIDE programme, the evaluation of quality, feasibility, thematic fit, adequacy of supervisor and academic ability of the PhD candidate is further ensured by the responsible funding body and/or the university which will admit the PhD candidate into doctoral studies. For PhD projects that are proposed in the frame of the PRIDE programme, the project description and evaluation is done at the DTU-level as well as by RKTO and the PhD-

¹² LIH handbook for recruitment (in development)

awarding institution, as mentioned above. LIH will develop guidelines for PhD project evaluation¹³ that can serve as a support.

Once a PhD project is started, a TSC must be formed with the first 6 months of the PhD project. It monitors the progress of the project and evaluates the performance of the PhD candidate during yearly progress meetings (see section 3.4: Quality control of doctoral training).

4.4) Employment contract

Since 2009, all PhD candidates hired for doctoral training at LIH sign an employment contract. The contract mentions the funding source and the name of the PhD project. There is no gender pay gap (male-female income difference). Regardless of the funding source, the gross salary per month is adjusted to the level of the funding attributed by FNR PhD funding schemes.

PhD candidates initially receive a 3-year employment contract including a 6-month probation period. The decision to continue the work contract after the probation period is taken by the hierarchical superior of the PhD candidate, in most cases the PhD supervisor. At the end of the employment period it is possible to continue the employment with a second work contract whose duration must not exceed 1 year. The maximum employment time to conduct a PhD will be strictly limited to 4 years with the onset of the PRIDE programme. Optimally, doctoral candidates should have defend their PhD thesis before the end of their work contract.

4.5) Institute induction

As all newcomers, starting PhD candidates get an institution introduction in order to get an overview of LIH's mission, organisational structure, internal rules, research axes and administrative and research-support services. The institute induction for PhD candidates consists of three parts: the 'New Hires Day' and the 'Support Services Checklist' organised by the HR unit three times a year, and an individual introduction to the doctoral training environment held by the PhD training coordinator.

The 'New Hires Day', spread over a working day, includes a welcoming by the CEO who presents the LIH's strategic goals, vision and history. Next, LIH departments and IBBL are presented with a slide presentation and a site visit. The 'Support Services Checklist' consists in a subsequent introduction to the mission of all administrative and research-support services including the DOCT unit.

For a more detailed introduction to doctoral education at LIH, the PhD candidates meet the PhD training coordinator individually or in small groups. With a slide presentation, the mission of the DOCT unit is explained. The PhD training coordinator will inform about all courses, events and procedures related to the QFDT. From the start of their work contract, the DOCT unit will be a contact point for the PhD candidates for any questions related to their education.

¹³ LIH guidelines for PhD project evaluation (in development)

5) Supervision

5.1) Supervision guidelines

LIH has established a document¹⁴ with general principles on the responsibilities of the PhD candidate, the PhD supervisor (main supervisor, co-supervisor) and the PhD training coordinator. It includes the obligations of the PhD candidate throughout the course of the PhD and gives guidelines for supervision to the supervisory team. The principles will be communicated to all parties at the onset of the PhD project.

5.2) Supervisor criteria

Since June 2015, the institute has specific criteria¹⁵ to define the person entitled to be a PhD supervisor. The criteria include scientific production, success in obtaining competitive/contractual funding and prior experience in supervision. The criteria differentiate between senior and junior PhD supervisors. Of note, senior PhD supervisors need an authorisation from a university (e.g. HDR, ADR, professorship) in order to be considered as official supervisors.

5.3) Supervisory team

Supervision can be done by a single qualified person or by a supervisory team. Within the supervisory team, one person is identified as the main supervisor. The distribution of the supervision tasks is clearly arranged with the university to which the PhD candidate is affiliated and shall be recorded in a supervision agreement (see section 5.4: supervision agreement).

The LIH criteria for PhD supervisors, mentioned beforehand, define who is considered as being a junior supervisor. A junior supervisor, typically having limited experience in doctoral education, should do co-supervision with a senior PhD supervisor of LIH or another research institution. In general, co-supervision models are encouraged because they ensure a strong individual support for the PhD candidate on the one hand and mentoring for the junior supervisor on the other hand.

5.4) Supervision agreement

At the start of the PRIDE programme, the establishment of a supervision agreement between the PhD candidate and the supervisory team will be compulsory. It must be established and signed by both parties upon admission of the candidate into doctoral training. The main purpose of the supervision agreement is to clarify the mutual expectations of both parties right at the beginning of the PhD trajectory. Importantly, it also fixes the schedule and frequency of meetings to discuss results and progress of the PhD project.

¹⁴ Responsibilities of PhD candidate, PhD (co-) supervisor and PhD training coordinator

¹⁵ LIH criteria for PhD supervisors

LIH will use the template of the supervision agreement of the University of Luxembourg¹⁶ for all its newly arriving PhD candidates. The document will contain all the stipulations requested by FNR's QFDT document (objectives of PhD project, monitoring of progress, training plan,...) and will also be in line with the LIH document on the responsibilities of PhD candidate and PhD supervisor. The supervision agreement is an evolving rather than a static document. Upon request of the PhD candidate or a member of the supervisory team, it can be reviewed during the course of the PhD.

5.5) Conflict mediation

In case of a conflict of any type between a PhD candidate and a supervisor that cannot be solved between the two parties, a mediator shall be contacted to analyse the conflict in an objective manner, do mediation and find an agreement that is acceptable for both parties.

At LIH, two contact points exist for mediation, depending on the type of conflict. For a conflict related to workplace issues, (e.g. absenteeism, prolongation of work contract, parental leave, bullying), the PhD candidate or the supervisor can address the request for mediation to LIH's HR manager. In case of a conflict related to the supervision agreement (e.g. deficiencies in supervision, unjustified delay in results delivery, excessive teaching activities for PhD candidate) or a scientific disagreement (e.g. authorship issue), mediators with a scientific background can be contacted. The scientific mediators commit to assist to a specific training in mediation techniques and is nominated by the CEO (first scientific mediator appointed in September 2015).

LIH will not established a strict procedure on conflict mediation, but a document with guidelines¹⁷, as the mediation process will be handled case-by-case. Both mediators will consistently apply the techniques they learnt and commit to stay fair-minded and objective in any conflict situation. The mediators shall meet both parties separately in a first phase, then together in a second phase. A solution to the conflict should be worked out jointly with the mediator. The agreement taken at the closing of the mediation process shall be documented in a report.

Some universities/doctoral schools have conflict mediation procedures in place. In this case, either the director of a doctoral school or a designated ombudsman is the contact person for mediation. PhD candidates are free to choose the mediation offer of the university as an alternative to that of LIH.

5.6) Absence of supervisor

If a main supervisor is not able to continue supervision of a PhD candidate for justified reasons (e.g. severe illness, leaving of workplace), this task must be taken over by another member of the supervisory team. The TSC shall discuss the designation of an alternative supervisor. The ultimate decision on a successor is reserved to the university to which the doctoral candidate is affiliated.

¹⁶ LIH supervision agreement template (in development)

¹⁷ LIH conflict mediation guidelines (in development)

5.7) Supervisor evaluation

Supervisors and the supervision environment (e.g. DTU) will be evaluated yearly as part of the doctoral training monitoring process (see section 3.4: Quality control of doctoral training). PhD candidates directly evaluate their supervisor(s) and the research unit/department/DTU they belong to by filling in a survey questionnaire. The latter is analysed by the PhD training coordinator to detect any neglect in supervision, mismanage or non-compliance to the QFDT. Better conformity or a corrective action will be advised to the party concerned if such a case arises.

5.8) Supervision training

As of 2016, a training course on PhD supervision will be proposed to supervisors and potential supervisors. The LIH will engage a private training provider or alternatively seize a possible course opportunity at the University of Luxembourg. The participation will be strongly encouraged for junior supervisors. PhD supervisors also have the possibility to assist to team management courses proposed by the HR unit and held by a private training provider.

6) Skills training and professional development

6.1) Training courses

Every newly starting PhD candidate will be affiliated to a doctoral school or a doctoral programme of a university. Doctoral schools offer a palette of mandatory and optional courses of three types: scientific courses, transferable skills courses and career development courses. European universities apply the European Credit Transfer and Accumulation System (ECTS). One ECTS credit corresponds to 25-30 hours of coursework including preparation, follow-up and/or examination. Doctoral schools and programs to which the current PhD candidates are enrolled (status of August 2015) expect the acquirement of 20 to 60 ECTS credits during the PhD.

In principal, the PhD candidate will take most of his/her training courses at his/her university. As not all universities have the same course offer, LIH will complement the offer and foster the career development of its early-stage researchers. The institute will define the minimum obligations regarding attendance of courses of the three types and active participation in conferences and events for its PhD candidates¹⁸.

Since 2013, the institute organises a series of transferable skills courses. This series, named 'Training & Workshops', is held by dedicated LIH staff members and is free of charge. LIH also offers English and French language courses provided by external trainers and facilitates the access to Luxembourgish courses. The English courses allow newly arrived PhD candidates with moderate proficiency in English to quickly acquire a decent level. The other language courses are intended to ease integration for foreign employees in Luxembourg's work environment and culture.

¹⁸ Minimal complementary training requirements for LIH PhD candidates

The survey conducted by the PhD training coordinator with PhD candidates in October - November 2014 included a feedback on satisfaction and a needs analysis with respect to these courses. Based on the results, the PhD coordinator, in cooperation with the HR manager, initiated the extension of the internal course offer from 8 to 18 courses. Since May 2015, training in the following 4 categories is proposed: scientific courses, transferable skills courses, methodology and software courses, technology transfer courses. The majority of the courses are also open to employees of the University of Luxembourg and the other Luxembourgish research institutions for free and are thus advertised externally as well¹⁹. Doctoral schools/universities decide whether ECTS credits can be granted for the participation to courses from the 'Training & Workshops' series.

With the help of short questionnaires filled in by the participants at the end of each course, the quality and outcome of the different courses is evaluated. The participants' feedback and the attendance rate will be taken into account for the organisation of the subsequent series of courses.

6.2) Professional development and career orientation

LIH aims to offer specific support for career orientation to PhD candidates yet. The survey conducted with the PhD candidates in October - November 2014 revealed that 2/3 of LIH's doctoral candidates would like to receive more detailed information about their employability, possible career paths and the current labour market.

The PhD training coordinator raises awareness on the importance of early career orientation and the valorisation of competences acquired during the PhD. For this, she regularly collects information on PhD employment reports, job fairs, career development events and job opportunities in industry and makes it available to the PhD candidates via e-mail and Intranet postings.

The workshops organised in the frame of the yearly FNR-funded lecture series in 'Cancer Research' and 'Infection & Immunity' as well as the seminar series organised by the Department of Population Health, mentioned earlier in this document, allow PhD candidates to meet renowned international researchers in an informal atmosphere to ask questions about their daily work, educational background and career path. They also provide important contacts for postdoctoral opportunities to PhD candidates.

In 2016, LIH will initiate a similar concept with representatives from the non-academic sector. Speakers who hold a PhD and successfully work in different areas including industrial R&D, science management, patent reviewing, communication, technical support or sales in Luxembourg or abroad, will be invited to give a presentation on their career path and profession. Following the

¹⁹ <https://www.lih.lu/page/training>

presentation, young researchers will be able to informally exchange with the invitees. Two such encounters will be organised per year.

A career orientation or development workshop given by an external provider will also be organised once a year at LIH. In addition, LIH gives financial support and contributes to the organisation of doctoral education and career events with the other research actors in Luxembourg as well as with Euraxess and LuxDoc.

The PhD supervisory team should also have a mentoring function, guide the PhD candidate in the career choice and let him/her benefit from its professional network. A further approach for career orientation and networking will be to keep contact details of leaving PhD candidates for up to 6 years and allow the current doctoral candidates to get in touch with the alumni.

LIH's training and events specifically organised for early-stage researchers, in combination with a sound doctoral programme provided by a doctoral school/university, will ensure individual professional development and guide future career choices.

6.3) Teaching activities of PhD candidates

Universities generally include teaching activities delivered by PhD candidates into their doctoral programmes. In principal, teaching of practical courses can only be enabled by academic institutions, not by non-academic public research institutions. LIH welcomes the involvement of PhD candidates in academic teaching and also encourages the supervision of training periods of Bachelor or Master students. Both experiences allow to develop didactic competences and organisational skills that are essential, especially if a career in academic research or higher education is envisaged. The volume of teaching activities should be defined in the supervision agreement to avoid excessive duties.

6.4) Participation in outreach activities

LIH scientific staff, including the PhD candidates, is encouraged to participate to and organise outreach activities. The Communication Unit regularly informs about science- and research-promoting activities organised in Luxembourg such as the Science Festival, Researcher's Days, 'Chercheurs à l'école' and Girls & Boys Day. The communication team facilitates active participation in outreach activities by giving advice on targeted communication, assisting in preparing graphical material and giving logistic support.

The Communication Unit yearly organises around six events on the occasion of World Days, such as the World Heart Day, the Rare Diseases Day or the World Hepatitis Day. Furthermore, the institute organises a yearly Open Day during which the institute's research activities are presented to the broad public through presentations, workshops and games. LIH researchers also take own initiatives, for example by inviting school classes for hands-on laboratory visits or organising conferences for the general public.

PhD candidates are directly involved in all these outreach activities as organisers, speakers and/or facilitators. Each doctoral candidate shall actively participate in at least one outreach activity during his/her PhD.

7) Dissemination

7.1) Rules of authorship in publications

PhD candidates communicate their research results to the scientific community by means of publications in scientific journals as well as by oral or poster communications at scientific congresses. LIH, in accordance with most universities/doctoral schools/doctoral programmes, expects PhD candidates to have at least one first-author manuscript accepted in a peer-reviewed international scientific journal with impact factor by the end of their thesis.

LIH will establish an institutional policy²⁰ regulating authorship on publications that will be applied from 2017 on. It will be predominantly based on the Vancouver recommendations released by the International Committee of Medical Journal Editors (ICMJE): Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals.

7.2) Dissemination to a non-scientific public

LIH research staff are continuously encouraged to disseminate research results and mediate science to the public at large. Researchers can get support from LIH's Communication Unit to set up workshops or conferences. Press releases, newsletters, website news and social media posts, written in an adequate and comprehensible language for the lay audience, are prepared by the communication unit in cooperation with the researchers to spread information on research projects and major achievements. PhD candidates can thus use this service to disseminate their results to the non-scientific public. LIH's annual activity report is also targeted to the general public. Exceptional performances of PhD candidates are highlighted in a special section in the activity report.

7.3) Intellectual property rules and support for valorisation

The Research and Knowledge Transfer Office (RKTO) is in charge of identifying research results that give scope for translation into socio-economic value. RKTO supports the researchers, including PhD candidates, in all steps of knowledge transfer. Rules on intellectual property protection and ownership are clearly defined in an institutional policy²¹. A further policy²² compels researchers to send all scientific manuscripts and abstracts to the RKTO in parallel to their submission to a journal or a conference to allow for protection of intellectual property with

²⁰ LIH authorship policy (in development)

²¹ LIH knowledge transfer policy

²² LIH intellectual property protection policy for scientific publications and abstracts

valorisation potential before public release. In addition, RKTO proactively traces inventions with high commercial potential within the institution.

7.4) Public availability of PhD theses

The universities at which the PhD candidates enrol ensure that the PhD theses are made publicly available as electronic file and paper version. If the PhD project is part of a collaborative agreement with third parties or if a patent application is pending for intellectual property that resulted from the PhD project, the LIH may ask the PhD-awarding institution to keep the thesis confidential. It shall however be made publicly available after an embargo period not exceeding two years.

8) Good practice in research

8.1) Compliance to ethical and data protection standards

LIH adheres to the European Charter for Researchers²³ which mentions compliance to ethical standards. An ethical charter is also part of LIH's internal regulations (ROI)²⁴. By signing a work contract with LIH, the PhD candidate accepts complying with the ethical standards of the researcher profession. For animal experimentation, a specific ethics charter²⁵ is established. The institutional Animal Welfare Structure (AWS) evaluates all experimental protocols involving animal experimentation. All guidelines are available in the document management system of LIH's quality management system.

The main PhD supervisor ensures that research activities requiring ethical approval or data protection procedures of his/her PhD candidate are authorised by the competent authorities if the project requires the collection and/or use of human samples. LIH's Clinical and Epidemiological Investigation Centre (CIEC) is in charge of guiding researchers for the submission of documents to the Comité National d'Ethique de Recherche (CNER) and the Commission Nationale pour la Protection des Données (CNPD).

8.2) Research integrity

LIH promotes the responsible conduct of research and has no tolerance for scientific misconduct. The importance of research integrity is emphasised in its internal regulations (ROI). Research findings shall be reported honestly, accurately and objectively. A procedure²⁶ on the management and investigation of suspected scientific misconduct is in place as well as guidelines²⁷ to avoid

²³ European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers <http://ec.europa.eu/euraxess/index.cfm/rights/europeanCharter>

²⁴ ROI - Règlement d'Ordre Intérieur (in development)

²⁵ Ethics charter concerning animal experimentation

²⁶ LIH procedure on management and investigation of suspected scientific misconduct

²⁷ LIH plagiarism guidelines

plagiarism. Also, to formalise the instructions on how to adequately document experimental design and research results in a laboratory notebook, a detailed procedure²⁸ will be established in 2016.

8.3) Training in ethics and responsible research conduct

In most of the universities at which LIH PhD candidates are enrolled, including the University of Luxembourg, a training in ethics and responsible research conduct is mandatory during the PhD studies. With the onset of the PRIDE programme, all PhD candidates will be asked to take training in ethics and responsible conduct. The two-day course 'Good Scientific Practice' offered four times a year at the University of Luxembourg is open to PhD candidates from other universities carrying out their PhD in Luxembourg.

8.4) Responsibility of supervisors

PhD supervisors take the prime responsibility for their PhD candidates to conduct research according to the established standards of the research field. This implies that supervisors make certain that the doctoral candidates read all institutional documents related to research integrity, ethics and data protection and follow a specific training at a university. Furthermore, it is the PhD supervisor who must ensure that the PhD project is declared to and approved by the ethics and data protection committees.

9) Thesis assessment committee and procedures

The procedures for the thesis assessment committee (TAC) are defined by the university at which the PhD candidate is registered. LIH will recommend that the committee contains at least one member external to the university and to the institute in order to guarantee objectivity and adequate quality control.

10) Additional approaches for the QFDT

PhD candidates have a particular status at LIH: they are both employees on a fixed-term contract and students by their affiliation to a university. Nevertheless, they are considered as employees with the same rights and duties as their co-workers. LIH aims to valorise the PhD candidate's employee status. Therefore it intends to include two further approaches into its QFDT:

10.1) Appointment of a representative for doctoral and postdoctoral researchers

LIH plans to organise the election of a representative (and an alternate) for doctoral and postdoctoral researchers in 2017. The election will be done by his/her peers. The representative will be invited to assist to the monthly informative research-administration meetings as well as to the coordination council. The latter is an organ that issues advisory opinions to the Board of Directors regarding LIH's research, development and innovation policy.

²⁸ LIH procedure on laboratory notebook documentation (in development)

The election of a representative of the early-stage researchers is essential to increase their interest and further involve them in discussions about managerial decisions and research strategies. Having a representative who consults and exchanges with his/her peers will in addition lead to the creation of a young researcher's community.

10.2) Integration of PhD candidates into the staff appraisal system

In January 2016, LIH implemented a staff appraisal system in all its departments. The PhD survey revealed that despite being evaluated by a TSC or a similar mechanism at university, PhD candidates affirm to have a lack of critical feedback on their personal performance as well as on their integration into their team and work environment. Therefore, LIH offers the possibility to the PhD candidates to be evaluated in the frame of the staff appraisal system.

Being included in the staff appraisal system should permit PhD candidates to better identify their competences and get constructive feedback on how to 'strengthen their strengths and weaken their weaknesses'. It helps them to define their competency profile and better valorise their personal skills when applying for their next job position.