

Response of the Faculty of Science and Leiden Institute of Chemistry (LIC) to the research assessment report 2016 – 2022

The Leiden Institute of Chemistry (LIC) and the Faculty of Science (hereafter: Faculty) are grateful to the evaluation committee for their assessment of the research at LIC. The research assessment committee recognizes the academic reputation and leadership of the LIC as excellent. It notes that LIC's two central themes Sustainability and Health indicate a forward-thinking approach and promise long-term relevance. The financial situation is considered as standing on firm ground, and the funding strategy robust, with state-of-the-art infrastructure. The societal relevance, in particular the strength to engage industrial partners and stakeholders, is emphasized. The committee concludes that the Institute is very well positioned for the future. We are pleased with these very positive conclusions.

We highly appreciate the detailed and broad analysis by the committee of the workings of the Institute, which yielded a list of valuable recommendations, addressed in detail below. As a general comment, we note that many recommendations relate to (financially) strengthening various aspects of the work or staff. The committee recommends filling several open staff positions, continuing to appoint eight Institute-funded PhD students per year, expanding the support staff, maintaining our high-level infrastructure, creating larger start-up packages, and setting aside resources for data management and social policies. We agree that such investments are desirable, however, priorities will need to be set, depending on the financial situation of the Institute, Faculty and University. Furthermore, a number of recommendations relate to or depend closely on developing Faculty and University policies and thus need to be addressed in that context.

In this response, the recommendations of the committee are addressed point by point. In addition, some thoughts on how to further improve the Institute in the coming evaluation period are offered. The report and this reaction will be used for further discussions with the co-workers of the LIC via the scientific council, Institute council and PhD/PD platform.

Recommendations

Open Science

1. Secure tailored systems and support to make the transition to FAIR principles such as data management and electronic notebooks desirable for all users.

- We recognize this recommendation. In collaboration with the faculty data steward, an ad hoc workgroup has been set up to make an inventory of the type of data collected in the different research areas in the Institute. Then, an overall policy will be formulated in line with Faculty and University policies and the FAIR principles, with practical descriptions for the different research areas. Implementation follows the timeline of that of the Faculty RDM policy project that is expected to be launched soon. The new procedures will be widely communicated, and the groups leaders are responsible for ensuring that their co-workers work accordingly.

2. Refine the university's data management courses to offer more specialized and practical content, addressing the feedback from PhD candidates regarding the current courses' lack of specificity.

- We agree with this recommendation. Once the Institute's protocols are in place, training in data management will be tailored to the needs for our type of data, either by adjusting the University courses (if possible given the university-wide nature of the course), or providing our own course at the level of the Institute or Faculty.

Diversity

3. Improve gender balance across all roles and actively promote initiatives that foster a diverse and inclusive working environment.

- We will follow the aims formulated in chapter 6 of the self-evaluation: 50%-50% hiring of research staff of female and male gender and at least 20% female full professors in 2028.
- Recent actions taken include hiring in 2023, Drs Kim Bonger (UHD) and Madeline Kavanagh (UD) and promoting in 2024 Dr Irene Groot to full professor. In 2024 or 2025 we hope to appoint a female professor by special appointment (*bijzonder hoogleraar*).
- Diversity and inclusion are very much on the agendas of the different organisational levels, and initiatives, such as the actions of a group of female PhD students, are supported and promoted.
- Two staff members of LIC are member of the board of Researchers in Science for Equality (RISE), the network for female beta scientists at the Faculty.

4. Ensure that support for changing private circumstances is tailored to individual needs (e.g. flexible access hours).

- We expect that the new Faculty policy for longer opening hours of the building will enable flexible access hours for all staff. Tailor-made solutions in relation to private circumstances are and will be sought where possible.

5. Offer an intensive Dutch language course for international staff prior to the start of their roles at LIC to facilitate smoother integration.

- In the strategy plans, we already formulated the aim to more strongly encourage the foreign staff to learn Dutch. Relating to this specific recommendation, a discussion with the present international staff will be held. Is the form suggested here something they would have appreciated? Would it have helped them to integrate in the Dutch culture faster?

6. Provide adequate supervision and integration for the influx of young staff, facilitating successful career initiation and promoting retention at LIC.

- Mentorship by senior colleagues in relation to grant applications, education and leadership was already in place informally. In the current situation, new research staff are advised to affiliate with existing research groups, where they can develop their own independent research, supported and mentored by more senior staff members, in advice on grant writing, in strategizing on their research directions, in finding their way in the institute and faculty, and in developing their teaching skills. A discussion with the scientific staff on whether to formalize it more took place in the meantime, in March 2024. The general conclusion was that the current system works well. The scientific director monitors the workings of mentorship on an individual level during the PID interviews. Maintaining the highly collaborative nature of the Institute, which is an asset for many researchers, will remain a priority. The document with where or with whom to find information (mentioned in the report) will be developed further and will remain a living document.

Social safety and inclusivity

7. Seek external consultation to evaluate current social safety systems and to provide comprehensive training to staff, establishing a supportive and secure academic environment.

- The report indicates that the committee wants the Institute to determine whether the established routes for picking up social safety issues are effective. We note that in 2023 the

procedures have been made clearer for all staff and the theme social safety has been and remains widely discussed. We check for issues via discussions with the PhD committee, the HR manager, among the MT members, and in the conversations with individual employees. Given that several issues have come to the attention of the MT at an early stage, we believe that the safeguards are working.

Still, to grow the awareness of potential social safety issues further, we will consult the staff (including support staff and temporary scientific staff) to probe whether their experience is different and what measures, including more training, we can take further. For example, the Active Bystander course will become a mandatory course, as indicated in the new HR policy of the faculty. Furthermore, the board of the LIC aims to learn from the experiences and best practises of others outside the LIC, by consulting board members of other institutes within or outside our Faculty.

8. Foster community and idea-sharing through informal activities, including retreats for PhD candidates and postdocs.

LIC supports this recommendation and will continue to organize informal activities:

- The LIC organizes a range of informal activities, such as staff retreats, lab-outings, various celebrations, pub quizzes, and the annual symposium. The newly formed PhD/Postdoc platform (called LIC73) has had a first retreat for PhDs and post-docs only, which was successful. Depending on the ideas and wishes of the platform, such retreats can be organised again in the future.
- The LED3 community (IBL, LIC, LIACS, LACDR) will organise their first PhD symposium, next to the highly successful lecture series.
- The LIC organizes the Van Marum lecture series with input from LION.

Careers

9. Define what constitutes 'quality' in research, moving beyond quantitative measures and establishing clear benchmarks for staff evaluation.

- We fully agree with this recommendation. Defining and weighing quality in research is central to development and promotion regulations and guidance, that are parts of the ongoing discussion on career policy in the Faculty and the introduction of a new protocol for Results and Development interviews in the University. A faculty-wide working group will start this year to formulate instruments with regard to recognition and rewards.
- At LIC, defining benchmarks for promotion of scientific staff has started already and is still under development, using a large set of criteria that include quality of research, education, management, impact (incl. outreach), and leadership. While academics need some merit on all these topics, the weights can vary depending on performance. For the quality of the research, the central criterium is that the researcher runs a successful research group, as evidenced by successful supervision of researchers (PhDs, post-docs), visibility in the field (invitations, editorships, collaborations, etc.), output as corresponding author, and funding. Further discussions with the staff will be held, also in relation to Faculty policy that is under development. It is noted, however, that some expectation management is required. With a large set of criteria and avoiding hard quantitative measures, any comparison with benchmarks is necessarily qualitative and thus contains some degree of subjectivity. Furthermore, promotions with a significant research component imply that the researcher is able to sustain a research group, which includes obtaining continued external funding. Promotions with a significant educational component require contributions toward

curriculum development and/or educational leadership.

10. Transition towards more transparent career progression and salary structures to clearly communicate pathways for advancement within the Institute.

- See point 9. As we do not appoint researchers on long temporary contracts, the moments for evaluations and promotions are no longer defined by end-of-contract decisions. The scientific director keeps track of the progress and researchers can always ask for a discussion about their progress. Promotion decisions are solely based on merit, not on the formation (i.e. availability of higher-level vacancies).

11. Address the workload pressure by expanding support staff and setting realistic management expectations, along with recognizing the contributions of postdocs within the Institute.

- We agree with this recommendation and plan to hire two additional technicians in 2024/2025 and extend the LIC management office in 2024.
- The committee notices that only 2% of the papers have post-docs as first author, whereas we have 10% post-docs among the non-tenured scientific staff. We will analyse this issue further. Many PhD students stay on for several months as a post-doc, but their papers may have been counted still as PhD papers. Also, the possibility to allow post-docs to gain teaching experience will be discussed.

12. Continue efforts to ensure support staff feel valued, providing clear career development pathways.

- We maintain our efforts to offer development opportunities for the non-scientific staff. The pilot of involving technicians in the bachelor's practical course was successful and is now extended to other practical courses. Ongoing initiatives include training in agile working and reduction of the research environmental footprint. We note that we are confined by the UFO profiles for the types of support staff, with salary scales that make it difficult to be competitive for certain functions.

13. Provide more competitive start-up packages for PIs.

- We are not convinced that the start-up package was the reason for candidates to reject an offer from the Institute. We normally offer funding for two PhD students and some equipment. Candidates generally indicate that they are satisfied with available large shared infrastructure. Reasons for rejection in the last round concerned the entry level (candidates asked for entry levels that were beyond our standards (see point 9) or specialized facilities that could not be offered. So, we do not consider this a priority.

PhD-candidates and postdocs

14. Implement necessary measures to shorten the duration of PhD programs, aligning with more efficient and sustainable research trajectories.

- This is a general point of attention wider at the Faculty. At LIC, the policy plan (appendix A.9 of the self-evaluation) has been implemented. It has been discussed with the scientific council and the Institute council and has broadly been accepted as a necessary step. The transition period has started as per January 1, 2024, and we notice already a mentality change among the scientific staff. We are confident that the target for 2028 can be reached.

15. Enhance the teaching skills of PhD candidates and postdocs to open up broader educational career pathways and inspire the next generation in science.

- This is an important development point. For the skills courses that are required for new PhD students, we consider offering teaching courses, which will need approval of the graduate school. In addition, teaching itself may be rewarded as a part of the required skills courses. Other possibilities, such as research-education co-tracks will need further investigation and cannot be offered by the Institute in isolation. It should be organized at least at the level of the Faculty.

16. Conduct annual evaluations to improve communication and feedback opportunities for PhD candidates, facilitating a more responsive and dynamic supervisory process.

- This recommendation will need to be discussed with the scientific staff and PhD students. We need to weigh the benefits for the PhD students against the additional workload for the staff, given that we have about 200 PhD students. We note that all co-workers, including the PhD students, already have annual evaluations (PDI / ROG).

Management, funding and infrastructure

17. Provide financial and personnel resources to maintain and operate the Institute's infrastructure efficiently.

- In chemistry, there has been a move toward large and expensive infrastructure (advanced NMR, EM, MS, lasers, light microscopy, computational facilities, physical chemistry set-ups) as well as more biological model systems (eukaryotic cell culture, zebrafish, mouse). By sharing equipment among research groups, we increase efficiency and reduce costs. We aim to maintain the high level in a challenging financial situation.

18. Maintain the current level of general LIC management and support to preserve the Institute's high standards.

- As a consequence of Faculty policy, LIC will transit to the new three-membered Institute's board as per June 2024. We continue to aim to preserve LIC's level of management. We aim to extend the LIC management support (see point 11) and maintain the current high level of project support.

19. Manage the expectations of young PIs concerning grant writing, providing guidance to align their efforts with their career trajectories.

- See point 6 on mentorship.

20. Secure the availability of the eight PhD candidate positions, particularly in light of changes in the Dutch funding landscape.

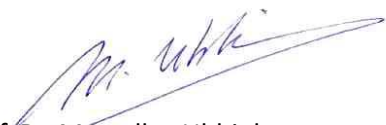
- We agree with the committee that the Institute-funded PhD positions are an asset to maintain research lines running and for doing pre-competitive research that can be used for external funding applications. Also for teaching the PhD students are essential. The other side of the coin is that less tenured or support staff can be hired, increasing the burden on the remaining staff. Furthermore, in times of financial cuts, temporary positions are more readily cut than tenured positions. So, we highly value the positions, but we cannot guarantee that we can provide eight positions every year. In fact, in 2023, five could be afforded.

Tech transfer

21. Collaborate with specialized tech-transfer entities like the Oncode valorization team or Biotech Booster to leverage LIC's research outcomes effectively.

- The committee rightly signals that the type of tech-transfer knowledge required for the LIC is sometimes specialized and is not always available at the University. We will investigate solutions for this issue and consider the suggestions of the committee.

On behalf of the Institute of Chemistry,

A handwritten signature in blue ink, appearing to read 'M. Ubbink', written over a horizontal line.

Prof. Dr. Marcellus Ubbink
Scientific Director

On behalf of the Faculty of Science,

A handwritten signature in blue ink, appearing to read 'J. Knoester', written over a horizontal line.

Prof. Dr. Jasper Knoester
Dean

To:
Executive Board Leiden University
Rapenburg 70
2311 EZ Leiden
The Netherlands

Utrecht, 8 March 2024

Dear Members of the Executive Board,

Please find enclosed, on behalf of the Evaluation Board, the report of the Research Assessment 2016-2022 of the Leiden Institute of Chemistry (LIC) of Leiden University.

The committee was honored to be invited for this evaluation and would like to thank you for your generous reception and hospitality. All discussions were open, transparent, and characterized by a joint aim to improve the Institute where needed, which made it a pleasure to visit and evaluate the LIC.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Braakman', with a long horizontal flourish extending to the right.

Prof. dr. Ineke Braakman, Chair

**Leiden Institute of Chemistry (LIC)
Faculty of Science, Leiden University**

Research Assessment 2016-2022

Executive summary

An external committee of peers (henceforth the 'Committee') evaluated the research quality of the Leiden Institute of Chemistry (LIC) of Leiden University during a site visit in November 2023. This executive summary contains a brief overview of the Committee's main findings. More detailed findings and recommendations can be found in the report.

The Committee concludes that the LIC is very well positioned for the future, with a consistently high scientific impact and societal relevance reflected across key metrics. The Institute's academic reputation and leadership are recognized as excellent. The strategic focus on two pivotal research areas indicates a forward-thinking approach, aligning with domains that promise long-term relevance. Financially, the Institute stands on firm ground, supported by a robust funding strategy and state-of-the-art infrastructure.

LIC's commitment to open-access publishing is notable, having achieved a 100% rate and establishing itself as a leader in this area within the Netherlands. The Institute's collaborative strength is evident in its ability to engage stakeholders and industry partners effectively in both the planning and execution phases of its research, underscoring the significant and multifaceted societal relevance of its work.

The staff reports a supportive and collegial atmosphere, which is underpinned by effective leadership capable of navigating the Institute through the evolving landscape of modern research.

While all these elements bode well for LIC's viability, the Committee has also identified some challenges.

The Committee encourages LIC to integrate its history of research excellence with evolving scientific standards. The adoption of FAIR data practices, advancement of social safety policies, and the Recognition & Reward system must be pursued with continued dedication. A diversified evaluation of contributions, including teaching, is recommended for career progression.

Urgent improvement in gender diversity across the Institute's roles is essential, as is the promotion of a diverse and inclusive work culture. Addressing the extended PhD completion times is also critical, requiring a recalibration of expectations towards balanced workloads and streamlined PhD processes.

Financially, the Committee highlights the need for proactive measures to preserve funding amidst shifts toward more applied research streams and underscores the importance of protecting University-funded PhD-candidate positions from funding fluctuations.

LIC's state-of-the-art infrastructure must be matched with consistent funding and reliable support staff to ensure operational effectiveness. The Institute's Director is commended for prioritizing recruitment in these areas to maintain the Institute's resource equilibrium. The Faculty's support in operational aspects like data management and building maintenance is indispensable for the LIC's functionality.

The Committee is however confident in LIC's capability to meet these challenges, rooted in the Institute's strong leadership and the collective commitment of its community, provided the current level of local management support is retained.

Table of Contents

Executive summary	2
Table of Contents	3
1. The review committee and the review procedures	4
1.1. The System of Quality Assessment of Research in The Netherlands	4
1.2. The Members of the Peer Review Committee	4
1.3. Scope of the Assessment	4
1.4. Data provided to the Committee	5
1.5. Procedures followed by the Committee	5
2. Aims, strategy, organization of LIC	6
3. Assessment of LIC	8
3.1. Research organization and culture at LIC	8
3.2. Research quality	15
3.3. Relevance to society	16
3.4. PhD Policy and Training	17
3.5. Viability	19
4. Recommendations	21
Appendices	23

1. The review committee and the review procedures

1.1. The System of Quality Assessment of Research in The Netherlands

An external committee of peers (henceforth Committee) evaluated the research quality of the Leiden Institute of Chemistry (LIC) of Leiden University.

This quality assessment (peer review) is part of the assessment system for all publicly funded Dutch research organizations, as organized by the Universities of the Netherlands (UNL), the Royal Netherlands Academy of Arts and Sciences (KNAW) and the Netherlands Organisation for Scientific Research (NWO).

In accordance with the Strategy Evaluation Protocol 2021-2027 for Research Assessment in the Netherlands (SEP), the Committee's tasks were to assess the quality of LIC on the basis of the information provided by the Institute and interviews with management, the research leaders, staff members, PhD programme management and PhD candidates, postdocs, and research support staff, and to advise on how it might be improved.

1.2. The Members of the Peer Review Committee

The Committee consisted of:

Prof. dr. Ineke Braakman (chair), Utrecht University, the Netherlands;
Prof. dr. Karoliina Honkala, University of Jyväskylä, Finland;
Prof. dr. Marc Robert, Université Paris Cité, France;
Dr. Ton Rijnders, Consultant Pharma & Life sciences, the Netherlands;
Prof. dr. Carsten Schultz, Oregon Health and Science University, USA;
Nina Roothans MSc (PhD candidate), TUDelft, the Netherlands.

Dr. Jetje De Groof (Belgium), independent higher education quality assurance project manager, was appointed as secretary to the Committee.

All members of the Committee signed a statement of impartiality to ensure that they would judge without bias, personal preference or personal interest, and that their judgment is made without undue influence from persons or parties committed to the institute or programmes under review, or from other stakeholders.

1.3. Scope of the Assessment

The current assessment covers the period 2016-2022.

The scope of the assessment was set by the Terms of Reference (TOR). In the TOR, the Committee was requested to assess the quality of the LIC, as well as to offer recommendations in order to improve the quality of its research and strategy.

The Committee was requested to carry out the assessment according to the guidelines specified in the Strategy Evaluation Protocol (SEP). The evaluation includes a backward-looking and a forward-looking component. Specifically, the Committee was asked to judge the performance of the LIC on the main assessment criteria and offer its written conclusions as well as recommendations based on considerations and arguments. The main assessment criteria are:

1. Research Quality
2. Societal Relevance
3. Viability

During the evaluation of these criteria, the Committee was asked to incorporate four specific aspects:

1. Open Science: availability of research output, reuse of data, involvement of societal stakeholders.
2. PhD Policy and Training: supervision and instruction of PhD candidates.
3. Academic Culture: openness, (social) safety and inclusivity, and research integrity.
4. Human Resources Policy: diversity and talent management.

1.4. Data provided to the Committee

The Committee members received a documentation package well in advance of the site visit. This contained the self-evaluation of LIC, with a description of the mission, objectives and results achieved in the reporting period, as well as a future vision and strategy plan with concrete policy actions. The documentation included quantitative data about staff composition, PhDs awarded, publications, and financial resources. The Committee also received the SEP and TOR for the assessment. In the period leading up to the site visit, the Committee received, upon request, further information on first authorship of PhD candidates and postdocs, funding for fundamental research, time available for research, and careers of alumni.

1.5. Procedures followed by the Committee

Committee members were asked to read the complete information package and provide their written preliminary appraisal of LIC prior to the site visit. This was used as input for a preparatory meeting on the evening prior to the site visit.

Appendix 1 shows the programme of the site visit. Between the interviews, time was available for the Committee to discuss its findings. At the end of the site visit, a closed Committee session was held so that all members could come to a consensus on the final assessment of the LIC. At the conclusion of the visit, the Committee presented its main preliminary conclusions to the LIC community orally.

After the site visit, the evaluation report was prepared, with each Committee member taking the lead in composing specific subsections. An integrated version of the report then was circulated to the Committee for comment. A final version with comments incorporated then was sent to LIC for a check for factual errors. Finally, the report was delivered to the Executive Board of Leiden University.

2. Aims, strategy, organization of LIC

Through the preparatory documents and the site visit, the Committee developed a clear view of the mission, strategy, and organization of the LIC.

The LIC, situated within the Faculty of Science at Leiden University, serves a dual mission: to educate LIC students to become excellent and responsible scientists in chemistry and to perform curiosity-driven research that strengthens the knowledge base of two central themes with high societal relevance, a sustainable society and health. In its strategic vision, the LIC describes that in order to achieve its mission, it builds and maintains a vibrant academic community. It is moreover dedicated to creating a safe, diverse, and inclusive environment in which scientific talents of all levels can thrive and excel. Also, the LIC promotes open science and strives to distribute its chemical tools and methods for free after publication.

The Institute has demonstrated notable growth in personnel, with the staff full-time equivalents (FTE) increasing from 238.9 in 2016 to 313.6 in 2023. This expansion is primarily due to augmented direct funding as well as a rise in research grants. A significant milestone in the Institute's development was its relocation to the Gorlaeus Building in 2016.

The Institute is structured around ten research groups, each aligned with one or both of the research themes that were established between 2012-2015 following the implementation of the Sectorplan Physics and Chemistry. In *Chemistry for human health* (also called Chemical Biology), the aim is to apply chemical tools to address biological questions related to health. Research in *Chemistry for a sustainable society* (also called Energy & Sustainability) is aimed at obtaining a fundamental understanding of matter in relation to the transition toward sustainable energy production. These themes serve to focus the institute's research endeavours and articulate its research interests to the international community. Although the research themes do not hold a formal organizational role, they are integral in clustering researchers with aligned interests to enhance scientific discourse, share resources, and coordinate educational responsibilities.

The governance of the LIC is overseen by a scientific director, who is endorsed by the Dean of the Faculty of Science to lead the institute. The management team, comprising the scientific director, a programme director, the Institute manager, and a representative for each scientific theme, facilitates the administrative and strategic decisions, usually arriving at conclusions through a consensus-based approach. The institute's Scientific Council, consisting of all tenured scientific staff, convenes monthly to provide advisory input to the scientific director. Scientific and support staff, including PhD candidates, are represented by the Institute Council that discusses LIC affairs and advises the scientific director. Additionally, educational committees that include student and lecturer representatives guide each study programme. The Advisory Board of the Institute, which was reconstituted in 2023, includes five external academics and industry representatives. This board provides strategic advice on research and education.

The scientific support staff at the institute, including 13 technicians, are integral to maintaining laboratory operations. Their roles encompass ensuring chemical safety, maintaining equipment, supervising laboratory users, and managing supplies. The Institute also hosts general facilities such as a buffer and media kitchen staffed by two individuals and is equipped with nuclear magnetic resonance (NMR) facilities. Beyond the resources directly managed by the LIC, researchers have access to a broad array of facilities within the Faculty of Science. This includes electron microscopy at the Netherlands Centre for Electron Nanoscopy (NeCEN) and the use of animal models such as mice and zebrafish for in vivo studies.

The strategic goals for the upcoming years at the LIC, as mentioned in the self-evaluation report, are:

1. To ensure that it stays at the forefront of scientific developments in its fields by investing in young scientific staff who bring in new ideas and technologies,
2. To maintain and enhance its highly collaborative nature by building further collaborations with other institutes within the Faculty, other faculties, and external partners in academia and industry,
3. To sustain a strong funding position by supporting its staff to apply for both individual grants and collaborative grants, with mentoring and administrative support,
4. To enhance a transparent career policy for both scientific and non-scientific staff by using defined criteria and valuing the diverse types of contributions (Recognition and Reward),
5. To enhance the quality of the working environment with ample attention to social safety and inclusion at all levels of the organisation and to promote diversity in the workforce, for example in hiring and on-boarding procedures,
6. To organize PhD candidates and postdocs, enabling interactions and sharing experiences, and to reduce the average duration of PhD trajectories to 54 months by 2028,
7. To maintain the open-access character of its publications and further develop the accessibility of data according to the FAIR principles.

3. Assessment of LIC

In this section, the Committee evaluates the performance of LIC on the three criteria of research quality, relevance to society, and viability. In line with the requirements of the SEP, the Committee also considers how the Institute organizes and performs its research with special reference to Open Science, PhD Policy and Training, Academic Culture and Human Resources Policy. The Committee makes its assessment on the basis of the documents received and the interviews during the site visit.

The following structure will be followed:

- The specific aspects of Open Science, Academic Culture and Human Resources Policy will be considered first (3.1. Research organization and culture at LIC) as they provide the necessary context for the Committee's further assessment of '3.2. Research Quality' and '3.3. 'Relevance to Society'.
- The specific aspect of 'PhD Policy and Training' will be discussed in a separate section (3.4.).
- The considerations of section 3.1. to 3.4. will form the basis to then evaluate the Institute's Viability (section 3.5.)

An overview of the Committee's recommendations is given in section 4 of this report.

3.1. Research organization and culture at the LIC

3.1.1. Research focus and organization

The Committee appreciates the concentration of the Institute's research in two principal themes: Chemical Biology (CB) and Energy & Sustainability (E&S). This focus is commendable as both areas hold significant and immediate relevance for patients, the economy, and the environment. Although practical applications, particularly in clinical settings or the energy sector, may require extended periods to develop, the strategic emphasis on these topics is a strong choice.

The proportion of faculty dedicated to CB versus E&S stands at approximately 2 to 1. The Committee recognizes this distribution as being judicious, attributed in part to the more extensive teaching load in the field of Chemical Biology. This approach aligns with the Institute's educational commitments and is supported by the Committee as an appropriate balance.

It was noted that the previous evaluation committee had raised concerns regarding the E&S theme, which was perceived as undersized given the competitive nature of the field. However, the Committee concludes that the current critical mass for E&S is satisfactory.

Moreover, the overlap of two research groups in both CB and E&S themes serves to reinforce the link between them. This structural arrangement fosters sustained connectivity and collaboration between groups from different themes.

The Institute hired numerous young investigators in the reporting period, which will help to add diversity in the research breadth covered by the Institute. The potential hiring of a more advanced chemical biologist would be exciting as this will add expertise in non-canonical amino acids and protein engineering, key areas in the field of chemical biology. The succession of the chair of Medicinal Biochemistry should be pursued with urgency. The LIC identified further needs for adding expertise in various fields after conducting an internal identification process. It includes advanced-timescale spectroscopy for atomic-scale understanding of reactive and catalytic systems, AI and machine learning (in protein design, materials and catalysis sciences), coordination chemistry, and organic electrosynthesis. The Committee supports potential expansions into these directions as they

will strengthen the LIC at frontier challenges, and will help build bridges both within LIC and with other Leiden University institutes.

The Committee also supports the pursuit of combined positions that bridge research and application, such as the use of artificial intelligence for protein design and machine learning for E&S initiatives. These interdisciplinary roles, which may include joint appointments and shared funding, are instrumental in bringing together diverse research groups and catalysing collaborative innovation.

3.1.2. Governance and leadership

In alignment with the prior assessment Committee's recommendation, the LIC has now included a representative from each research theme in its management team. This enhancement has fortified the connection between the management team and the research themes, fostering mutual understanding and ensuring that the perspectives and progress of each theme are comprehensively represented and considered in decision-making processes.

The Committee acknowledges and commends the support provided to the LIC by experts that are familiar with its operations, such as the managing director and her team. It advocates the retention of the current level of general management, recognizing the crucial role this local support plays in maintaining the Institute's standards.

The Committee recognizes the effective leadership exhibited by the succession of LIC directors. They have adeptly navigated the Institute through a landscape of change, all the while upholding the delivery of high-calibre research and education.

3.1.3. Budget

The LIC stands on a firm foundation with its current balance of direct funding versus grants and contracts, positioning it well for the future. The Institute is committed to curiosity-driven research, which has yielded a broad spectrum of applications and cultivated numerous societal partnerships. However, there is a noted concern that the shift in the Dutch funding landscape away from curiosity-driven research represents a potential risk (see also 3.5. 'Viability').

During the reporting period, direct funding, adjusted for inflation in full-time equivalent (FTE) terms, saw a 44% increase, which corresponds closely with the 40% growth in faculty size. Funding from Dutch research grants, also in FTE, rose by 15%, with further increments anticipated due to the recruitment of new, young faculty members. Meanwhile, funding from the EU has remained consistent, with the Institute securing several impressive grants.

Start-up packages for starting faculty in the Netherlands are very low by international standards. Junior PIs at the LIC are encouraged to apply for individual grants, fostering independence and allowing them to pursue their research interests. The Committee views this strategy as beneficial for the Institute's future sustainability. Nevertheless, the low success rate of individual grant applications nationally is perceived as a potential impediment. The Committee believes that it is crucial to manage the expectations of young PIs regarding grant writing, particularly in the context of their career development, to prevent frustration. The Committee also advises that time be allocated to analyse both unsuccessful and successful research proposals, as such reflection can provide valuable insights. More competitive start-up packages will attract more competitive young independent PIs and will increase success rate for starting grants.

Additionally, the provision of PhD positions through university funding reduces the LIC's reliance on external funds. The strategy of making eight centrally funded PhD positions available across the

department, awarded on a competitive basis, is highly advantageous. This approach, which the Committee strongly endorses, is especially beneficial for young PIs, helping to mitigate the limitations of low start-up packages. Awarding these PhD positions on the basis of fundable-but-not-funded external grant proposals contributes strongly to a decrease in work pressure.

3.1.4. Facilities

The Committee is impressed with the facilities that are available to LIC staff. It commends the LIC for its investment in state-of-the-art facilities, such as proteomics, electron microscopy, and advanced light microscopy, but also for equipping the laboratories well with basic, essential infrastructure. The availability of core facilities on the campus, which include cell sorting and deep sequencing, is noteworthy. The Committee has also observed that the Science Faculty's new building has been leveraged to foster closer interactions among researchers. The strong collaborative ties with neighbouring institutes ensure, for example, that biological experimentation as well as LION infrastructure is readily accessible to LIC staff. The Committee highly values, for example, the proximity of facilities for cell culture, animal housing, thin-film technology, and clean room. The accessibility of small-molecule libraries for medicinal-chemistry projects in the Leiden Academic Centre for Drug research (LACDR) is a valuable asset for the Institute.

With regards to computational research, the infrastructure is readily available to the LIC either through local resources or via national facilities, with sufficient computational time. Ambitions for more extensive collaboration with the computer-science department, potentially through joint appointments, have been recognized as a strategic aim.

Still, the Committee expresses concerns regarding the accessibility, ongoing maintenance, and support of this infrastructure. These aspects are critical for the viability of the LIC's research and the productivity of its support staff. The Committee urges the University to provide financial backing and sufficient personnel to ensure the upkeep of this valuable infrastructure (see also 3.5. 'Viability').

Regarding the strategy to bring in support staff through grants, the Committee notes that the restriction of two-year appointments could be counterproductive. It impedes the development of long-term expertise and continuity, which are essential for high-quality research support. The Committee suggests re-evaluating this policy to better support the infrastructure and human resources crucial for the LIC's continued success.

3.1.5. Open science

The Committee recognizes the commitment of the LIC Board and group leaders to the principles of Open Science. It noted that the Institute excels in several facets of Open Science, while other areas require sustained focus.

In terms of open-access publishing, LIC has made considerable strides, achieving a 100% rate, positioning it at the forefront within the Netherlands. The Institute also demonstrates strength in engaging stakeholders and collaborators from society and industry in both the planning and execution of research. This is evidenced by LIC's leadership roles in major grants and proposals, including for example Groeifonds, which underscores its dedication to collaborative efforts with non-academic partners.

From the interviews with the researchers, the Committee has concluded that other facets of Open Science deserve increasing awareness and concrete objectives. Specifically, FAIR principles and data management require further development and attention within the Institute.

The LIC staff showed ambiguity regarding the FAIR principles, accompanied by a degree of reluctance to adopt these practices. The Committee approves that nevertheless a committee within the LIC is currently developing protocols for implementing FAIR data storage, in collaboration with the university data steward. These protocols are still in the formulation phase and have yet to be disseminated. The Committee has noted that the support for LIC's data management is advancing more rapidly than the Faculty's or University's ability to provide support, an inefficient discrepancy that can lead to frustration. Practices and policies regarding adherence to FAIR principles vary significantly among groups, leading to a disparity in implementation. Addressing the incorporation of FAIR data principles across all LIC research groups will require focused attention from senior management and tailored support from both faculty and university levels.

Regarding electronic lab journals, their adoption is not yet widespread within the Institute. Some scientists embrace them as helpful, whereas others consider them an additional bureaucratic burden, perhaps because there is no 'One-size-fits-all' electronic notebook. The only way to successful implementation of full electronic-data capture is a system that supports researchers rather than burdens them. This requires a substantial effort to understand how electronic lab notebooks both can benefit the researchers and can be used as a stepping stone towards producing FAIR data only.

The university's data management courses have been reported by PhD candidates as too broad and unspecific to be of practical use. The Committee suggests that these courses be refined to provide more targeted and relevant content.

In terms of Open Education, the Committee recognizes the complexities involved, particularly with the high staff-student ratios in supervision and practicals. LIC is commended for its strategic decision to not pursue MOOCs (Massive Open Online Courses), thereby avoiding potential distractions from the needs of Leiden students and maintaining a focused educational environment.

3.1.6. Academic culture

Openness and inclusivity

An overall sentiment among staff members at the LIC is one of satisfaction with the collegial atmosphere. They report feeling supported by peers and leadership. By June 2024 the governance model will have expanded from a singular elected director to three representatives, ensuring broader representation of faculty and staff. This inclusive structure resonates with past practices, where the scientific director would traditionally seek counsel from section heads, including the head of education.

PhD candidates at LIC generally report satisfaction, yet there are also indications of underlying issues that merit attention (see below). Postdoctoral researchers, while displaying a strong drive for independent research, also expressed a need for connection and a pressure to produce results. The junior PIs express appreciation for the considerable academic independence they enjoy, a practice not yet widespread in the Dutch academic system and thus seen as forward-thinking. Interactions within research groups, so the Committee learned, are promoted and facilitated through shared workspaces, discussions, social events, and retreats. This fosters social cohesion and a collegial working environment while also providing a platform for the resolution and prevention of potential conflicts. To encourage community building and the sharing of ideas, the Committee suggests informal activities such as retreats for PhD candidates and postdocs only, in absence of PIs. The existing retreat for PIs, especially beneficial for the younger PIs, has been effective in lowering barriers to addressing potential conflicts and fostering an open dialogue.

The Committee and staff both acknowledge the Institute's successful efforts in integrating and welcoming new personnel. The onboarding program designed for PhD candidates with scholarships from the Chinese Scholarship Council stands out as a particularly commendable initiative. Although onboarding experiences have varied among staff members in the past, the Committee values the comprehensive documentation prepared for the new cohort arriving in 2024. The standardization of the onboarding system is expected to furnish new staff with necessary information and support. There is merit in extending this enhanced integration framework to all incoming international staff, including guest researchers. Young PIs also indicate the necessity for improved induction into their teaching responsibilities.

Foreign staff members are appreciative of the opportunity to learn Dutch, as part of their integration at LIC. Nonetheless, the absence of designated time for language learning within job descriptions or work contracts often intensifies the workload, particularly for junior staff. As a result, some have preferred to allocate time to more pressing tasks. Given LIC's commitment to staff diversity, a compulsory Dutch language course could unintentionally deter international talents. A possible solution is to offer an intensive Dutch language course before new PIs commence their day-to-day tasks at LIC.

Social safety

Social safety is a recognized priority at the LIC, and frequently discussed within the community. However, the Committee, drawing from preparatory documents and discussions during the site visit, has observed that the development, implementation, and assessment of comprehensive measures are still in the initial stages. There is a noted absence of mechanisms to detect, inform, educate, and take collective action within the LIC community. Nevertheless, the existing social safety courses offered by LIC have been deemed very beneficial by the staff members who have participated.

The Committee notes the pivotal role often played by support staff, who, due to their long tenure, naturally become confidants for newer or temporary staff members and act as an early warning system for misconduct. These staff members have embraced this role and, according to the Committee's findings, should be encouraged and supported in doing so, not necessarily to address issues but to function as sensor for warning signs.

To reinforce the culture of safety, the Committee recommends the regular organization and promotion of social safety courses to all staff members. For instance, the value of the voluntary active bystander course is acknowledged, and the Committee suggests frequent offerings to encourage wider participation, rather than making it mandatory. However, LIC is reminded that training alone is insufficient for the prevention of misconduct. It is imperative for both management and PIs to proactively define and implement measures to ensure social safety. Also, each research group should introspect and discuss proactive strategies to prevent bullying and foster a secure environment at all times. Social unsafety can be caused by anyone, from PI to BSc student entering the laboratory for a rotation.

While most staff are aware of the contact persons available for social safety concerns, alternative methods of dissemination, such as displaying lists or QR codes in restrooms, could improve visibility and access. The effectiveness of these contacts should be validated, perhaps through surveys. The Committee was made aware of concerns that reports made through existing channels have been overlooked. Overall, the LIC needs to make sure that the implemented channels are accessible and useful, and that the claims are handled properly.

Across all groups, there is reporting of high workloads and pressure to perform and deliver. Expectations need to be managed to become realistic, which should be part of an ongoing dialogue

between line managers and their PhD candidate, postdoc, support staff, or PI. The prevalence of high workload and pressure among LIC personnel necessitates prioritization to prevent burnout, a negative workplace atmosphere, and demotivation. Clear communication of expectations and the paths to achieve them should be integral to the institute's academic culture (see also 3.1.6. Human Resources Policy).

The Committee also notes that while most staff at LIC feel supported, they may not always feel empowered or encouraged to provide feedback to superiors. This feedback is crucial for both personal and institutional development. It would be beneficial for supervisors to regularly and explicitly seek feedback from their teams, including PhD candidates, postdocs, support staff, and PIs.

The PhD-candidate/postdoc platform is commended for facilitating both bottom-up and top-down decision-making, and for ensuring that PhD candidates/postdocs are informed about whom to contact with concerns.

The Committee's overarching advice includes seeking external consultation to analyse current systems and to train staff comprehensively, ensuring the effective and solid establishment of a supportive and safe academic environment at LIC.

Scientific integrity

Scientific integrity is addressed at an early stage at LIC, as it is included in the curriculum of the bachelor and master programmes. Beyond education of the staff, it is also important to verify that everyone adheres to the *Netherlands Code of Conduct for Research Integrity*. This requires courses available to everyone in the department, as well as discussions with examples in the research groups.

3.1.7. Human Resources Policy

Diversity

The LIC is an internationally vibrant Institute with strong cultural diversity, open to the world and committed to embracing different backgrounds and cultures. The Committee notes and supports the shared ambition at LIC to further diversify its staff, with the aim of enhancing scientific excellence and broadening the institute's academic perspective.

This commitment is evident in the diversity of support staff and temporary researchers, including PhD students and postdoctoral research associates. However, despite recent efforts and active recruitment of new, young faculty members, there is recognition that the gender balance among staff has not substantially improved. The Committee believes that additional measures could have been implemented during the last recruitment phase to better address this imbalance. The LIC might consider adopting strategies from other European and Dutch higher-education institutions that have successfully attracted more female staff in science and technology. Such strategies include the creation of female-only fellowships or positions.

To support the goal of a more diverse staff, the LIC should enhance its HR policies to offer a balance between professional and personal life. This could include childcare provisions and the opportunity for staff of all genders to take teaching breaks following the birth of a child. Other considerations, such as flexible work expectations for new parents, may prove beneficial. Included in this are more access hours to the workplace, a first requirement for flexibility young parents (and dual-career couples) need. Engaging in collective brainstorming, inclusive of junior staff, could yield customized policies that serve the entire research community. The influence of diverse role models, especially among young staff, could have a significant positive impact on female PhD students in the

Netherlands. To increase the number of female faculty, invitations for research seminars presented by women should be offered in addition to and outside recruiting efforts.

The Committee advises that LIC put more emphasis on the rationale behind its diversity ambition, highlighting the intrinsic benefits to the Institute's quality, rather than societal expectations alone. By developing and advertising tailored work-life balance strategies that reflect the suggestions from junior staff, LIC could enhance its appeal to a broader demographic. Every solution starts with the question "What do you need?". Female PhD candidates' perceptions of their female PIs, who may appear overburdened, underscore the importance of addressing workloads to allow them to serve as effective role models for academic careers in science.

Overall, there is a clear directive for the Institute to improve gender balance across all roles and to implement and publicize initiatives that foster a diverse and inclusive working environment.

Talent management

The Committee notes with approval the LIC's decision to discontinue the tenure-track system based on temporary contracts. This change has been met with widespread positive feedback and holds potential to contribute significantly to the LIC's long-term developments.

To build upon this advancement, the Committee suggests a move towards more transparent career progression and salary structures. The Committee envisions a system where bespoke career plans are developed for individuals, aiming to move away from a rigid 'box-ticking' exercise, and complemented by a clear and equitable pay scale. Such personalized approaches would allow for a greater acknowledgment of teaching efforts, underscoring LIC's dedication to valuing contributions beyond quantitative metrics, thus nurturing a more reflective and deliberate policy framework.

The recognition-and-reward systems at LIC currently do not seem to fully acknowledge teaching as a viable path to career advancement. The Committee has observed that promotions are often tied to securing substantial grants, and there is a question as to whether LIC has truly moved beyond the 'numbers game' in evaluating staff achievements.

During the evaluation period, the LIC welcomed 16 new scientific staff members, predominantly at the assistant professor level, thereby substantially enhancing their research capabilities and diversifying the scientific staff pool. It is crucial to provide adequate supervision and integration for this influx of young staff to facilitate a successful commencement of their careers at LIC and to foster their retention.

The LIC, along with the broader scientific community, is experiencing an increasing sense of workload pressure. The Committee advises that LIC focus on expanding its support staff, which is currently understaffed, and on setting realistic management expectations. Additionally, the important roles played by postdocs within the Institute, and the desire of some of them to teach, should be acknowledged and integrated. For this, the Committee recommends dedicated efforts to allow them additional tasks in teaching, administration, and science in the Institute.

Career development of support staff

The Committee has noted that while career and talent development are well-supported for scientific staff, the same level of focus has not been afforded to support staff. Support staff at LIC are integral to the Institute's operations, their skills ranging from constructing specialized instruments in collaboration with the mechanical workshop to managing the logistics of practical teaching and even contributing to scientific publications. Work ethics and meaningfulness are shared values among the

support-staff members, who play pivotal roles not only in providing technical and technological support but also in mentoring and fostering personal development among young researchers. The limited opportunities for personal development may affect motivation and could lead to unnecessary staff turnover. Therefore, ongoing development of opportunities for support staff is crucial to ensure their sustained job satisfaction and motivation.

The LIC is aware of this issue and is exploring avenues for salary adjustments. More notably, it is considering how to enhance the work environment and professional growth of support staff. There are already promising initiatives, such as a pilot project where technicians independently manage the logistics of practicals and build instruments from scratch with the mechanical workshop.

The Committee commends LIC for the emerging priority of career development of its support staff, ensuring that these colleagues feel valued. The Committee suggests the establishment of a customized HR policy with clear criteria and pathways for professional development. Despite financial constraints, there is an urgent requirement to bolster the support staff to maintain the increasing scope of activities at LIC. This initiative should involve active participation and support from the University.

3.2. Research quality

Scientific impact and relevance of LIC's research

The Committee has conducted an evaluation of the unit's research quality over the last six years, contextualized internationally, nationally, and regionally, drawing from the self-evaluation report and discussions with LIC staff. The self-evaluation report testifies to the scientific impact and relevance of LIC's research, which is consistently high across key metrics, such as peer-reviewed publications, other scientific outputs/products, professional accolades, completed dissertations, and acquired grants.

The Centre for Science and Technology Studies (CWTS) has analysed LIC's scientific publications, indicating that LIC's output significantly exceeds the world average. The number of published papers remains stable and impressively high, with an excellent average of around 5 papers per PI annually. The slight decline in average publication numbers per PI, from 5.3 in 2016 to 3.8 in 2022, is attributed to the influx of newly hired junior PIs who are beginning to establish their publication records as independent group leaders. The Committee would expect these numbers to increase over the next five years, unless the focus will move from publication quantity to quality and size. A significant portion of LIC's work is published in top-tier journals, receiving a high citation rate, exemplified by a citation analysis score of 1.39, signifying that LIC's research is recognized well above the global average. The Committee found the list of example papers provided in the self-evaluation report to be of high international standard.

The Committee applauds that many papers are the result of research collaborations with scientists from outside the LIC, showing wide acknowledgement of the valuable scientific contributions from the LIC community. The LIC has taken the lead in intensifying collaborations within the Faculty of Science, particularly the Leiden Academic Centre for Drug Research, the Institute of Biology Leiden, the Leiden Institute of Advanced Computer Science, the Leiden Institute of Physics and the Leiden Observatory. Outside the university, the LIC has intense collaborations with the Leiden University Medical Centre, several companies inside and outside the Leiden Bio Science Park and the Universities of Delft and Amsterdam.

From 2016 to 2022, LIC awarded 173 PhD degrees, with a noticeable increase in degrees from 18 to an average of 27 annually since 2018, following the introduction of University-funded PhD positions.

The Committee finds the high percentage of first-author publications by LIC PhD students, at ~40%, to be impressive and indicative of their crucial role at the institute. Some 60% of first authors are from collaborating external labs, and only 2% of first authors are LIC postdocs. This is of notable concern because ~10% of young researchers employed were postdoc.

LIC's academic reputation and leadership are further substantiated by the staff's involvement on journal editorial and advisory boards, as well as the numerous prizes and awards recognizing the quality of LIC's research. The institute's success in securing external funding is particularly commendable, with an impressive 75.9 million euros in competitive grants over the period 2016-2022, of which 32.6 M€ in personal grants (4 VIDI, 4 VICI, 5 ERC, 1 Spinoza, and 2 Oncode Institute). The LIC hosted 20 postdoctoral researchers who were funded by external grants, of which 13 were EU-grants. Collaborative grants totalled 41.6 M€, including an ERC Synergy grant and a work package from the Oncode-PACT Growth Fund project.

In conclusion, the Committee affirms that LIC not only meets but exceeds the standards set by common indicators for research quality.

Quality over quantity

During the Committee's evaluation, part of the LIC community expressed a preference for prioritizing quality over quantity in research outputs, striving for publication of comprehensive studies in more substantial, higher-impact papers. The self-evaluation report however still heavily emphasizes the number of publications, suggesting some discrepancy between stated values and measured performance indicators.

While the approach is commendable, timely, and even essential, the transition to another system of quality assessment of researchers requires care, transparency, and clear communication. The implications for the career development of PhD candidates, postdocs, and junior PIs must be considered and the promotion criteria for assistant and associate professors must diversify while remaining transparent. The drive for in-depth, consolidated research outcomes and fewer, more substantial publications aligns well with DORA, the declaration of research assessment co-signed by the Universities of the Netherlands.

The Committee suggests to clearly define what constitutes 'quality' in research now that focus broadens from quantitative measures to a more diverse set of criteria. This redefinition is essential to ensure that all staff, particularly those at early stages of their careers, understand how their work will be evaluated and what benchmarks they should aspire to meet.

3.3. Relevance to society

The societal relevance of LIC is significant and multifaceted. As an educational institute, LIC excels in producing highly qualified scientists who contribute significantly to a variety of sectors and organizations, with a notable presence in industry. To further illustrate LIC's societal impact, the Committee suggests a more proactive approach in tracking and highlighting the career trajectories and societal contributions of its alumni.

LIC's curiosity-driven research, centred around two highly relevant areas of societal interest, adds to the institute's societal relevance, as does its extensive collaboration with industrial partners. Furthermore, the patents and spin-out companies emerging from the LIC's research have the potential for significant contributions to health and the economy.

LIC's dedication to societal engagement is also evident in its outreach activities. Especially worth mentioning are the travelling DNA lab, visiting secondary schools and the Junior Science Lab for pupils from primary and secondary schools.

Regarding technology transfer, the Chemical Biology group has indicated that support in this area could be fortified. The University's tech-transfer office, while managing a broad portfolio, may lack specific expertise in drug discovery and development, posing challenges in assessing the value of LIC projects. The Committee recommends collaboration with specialized tech-transfer entities such as the Onco valorization team or Biotech Booster. While LIC's management justifiably prioritizes basic science, the Committee advises that greater emphasis could be placed on ensuring that discoveries in basic science are actively channelled into society through various forms of valorization.

Training by the LIC of undergraduate students and PhD candidates predominantly as scientists may seem logical, regarding the next career step of most of them, as shown in the self-evaluation. Yet, whether young researchers will continue in science after that first postdoc is much less likely. The choice for a postdoc may be stimulated by the rather science-focused training, with other career paths under their radar. Especially in teaching, in all types of schools, the shortage of science teachers has been high and increasing. The Committee suggests that enhancing the teaching skills of PhD candidates and postdocs could lead to broader career paths in education, spanning from academia to secondary education and beyond. Encouraging careers in teaching for these highly qualified individuals could be instrumental in inspiring the next generation of scientists and in promoting public understanding of science. Teachers with advanced degrees are crucial for stimulating student interest in scientific careers and for raising public science awareness and literacy.

3.4. PhD Policy and Training

PhD duration and expectation management

The Committee has noted that the duration of PhD programmes at the LIC is too long. While the reduction of the PhD trajectory duration was a goal set during the last evaluation period, it has not yet been realized. The Committee commends the LIC's recent policy adjustment to limit PhD extension periods to 3 months for the new cohort and 6 months for the current batch.

Nevertheless, it is apparent that a cultural shift within the LIC is necessary to feasibly achieve a reduction in PhD completion times. The prevalent levels of expectation and workload are untenable, leading to an environment that can be overwhelming for PhD candidates, especially when factoring in their significant teaching obligations and the demands for high research output. The anticipated increase in workload, with the integration of transferable-skills training in early 2024, is likely to further intensify this issue if the current requirements remain unaltered.

The tendency towards producing comprehensive, high-impact research papers contributes to the lengthened duration of PhD studies. Effective management of expectations is crucial to achieving the goal of shorter PhD durations. Given the lack of formal graduation criteria, proactive and well-timed conversations about future career aspirations with each PhD candidate are essential to align the PhD pathway with their professional and personal goals. At present, LIC's education model is predominantly oriented towards research-intensive careers, despite the fact that many PhD graduates pursue careers outside of academia. The Committee emphasizes the need to establish graduation requirements that support shorter completion times and accommodate a broader spectrum of doctoral research outcomes, reflecting the diverse career trajectories of LIC's PhD candidates.

PhD supervision, monitoring and quality assurance

PhD students at the LIC indicated in the interviews that the quality and scope of their supervision vary notably with different supervisors. There is a recognized need for improvement in this area, which could be addressed by providing supervisors with detailed guidelines on supervision and by fostering a culture of regular dialogue about supervisory methods throughout the PhD journey.

Some PhD students feel comfortable providing direct feedback to their supervisors, which is a positive indicator of open communication channels within LIC. The recently implemented system involving an external committee monitoring the progress and quality of the PhD students, offers significant advantages for PhD candidates. This external committee is accessible to PhD candidates at any point, providing a trustworthy platform for issues and concerns, as the committee members are independent of the candidates' supervisors and solely focused on the success of the candidates. The PhD Evaluation Committee meetings are currently scheduled at 9 months and again at 3 years into the PhD. The Committee suggests that these evaluations could be more effective if held annually, allowing for continuous communication and the chance for students to provide feedback more frequently.

Teaching

PhD candidates at the LIC have expressed concerns about the high teaching load, often in subjects that do not align with their expertise. This mismatch is attributed to a shortage of teaching staff and necessitates additional preparation time for the PhD candidates. The Committee suggests that, where feasible, PhD candidates should have more autonomy in selecting which courses to teach, to better align with their research focus and background.

Conversely, postdoctoral researchers, despite being highly motivated to teach, are frequently not given the opportunity. The Committee endorses the expansion of existing initiatives that integrate scientific support staff into teaching roles, extending these opportunities to postdocs as well. This inclusion would not only provide postdocs with valuable teaching experience but also alleviate some of the teaching burdens on the PhD candidates. Such an approach would benefit the postdocs in their career progression and contribute to a more balanced distribution of teaching responsibilities within the institute.

Postdocs

Postdoctoral researchers at the Leiden Institute of Chemistry report a high level of satisfaction with their positions, particularly valuing the opportunity to engage in high-risk projects while also having the security of smaller, low-risk projects. It is a concern though that the ~10% of postdocs have been first author in only ~2% of publications. This requires analysis, as it may stem from the high-risk projects but also from the absence of a deadline for publishing (a PhD thesis does represent).

The Committee has noted that the ratio of postdocs to PIs and PhD candidates is relatively low, a situation that stems largely from the structure of the Dutch funding system. Given the significant contributions postdocs make to the research environment at LIC, their presence and roles should be more prominently recognized and supported. The Committee advises LIC to consider increasing the number of postdoctoral positions. Moreover, integrating postdocs into teaching activities would not only enhance their professional development but also benefit the institute by enriching the educational experience for students.

PhD and postdoc representation

The Committee highly values the establishment of the new PhD and Postdoc Board. It has observed with appreciation the high level of enthusiasm and initiative displayed by PhD candidates and postdocs in leveraging this committee. This platform enables young researchers to effectively convey significant matters to senior staff members and the management board, and it also enhances social interaction among PhD candidates, postdocs, and guest researchers. The Committee encourages the management to provide full backing and ensure that necessary resources are available to support the activities of this committee. Additionally, the LIC may want to consider recognizing the time commitment of PhD candidates who participate in the committee's work by offering them credits, as these activities contribute to their training beyond science.

3.5. Viability

The Committee concludes that LIC is very well-positioned for the future. The scientific impact and relevance of the Institute has been consistently high across key metrics, and the Institute's academic reputation and leadership are excellent. The Committee commends the LIC for its strategic emphasis on two research areas that are projected to remain vital and relevant in the foreseeable future. Innovative solutions are needed to meet societal demands in these domains, positioning LIC to make critical contributions. The Institute's financial position appears robust, with a healthy distribution of direct funding and grants laying a solid foundation for the future. Moreover, the Institute benefits from state-of-the-art infrastructure. The Institute is also noted for its vibrant international environment and commitment to inclusivity. A supportive and congenial atmosphere has been reported by staff, and effective leadership has been observed in steering the LIC through the rapidly changing research landscape.

While all these elements bode well for LIC's viability, the Committee has also identified some challenges. Although most of these challenges have already been addressed above, the Committee further elaborates on them here, as they impact the Institute's viability.

First, the Committee advises the LIC to continue harmonizing its longstanding tradition of excellence with the changing dynamics of the modern research environment. The near-completion of the transition to Open-Access publications and the steps toward implementing FAIR principles are commendable, yet these require ongoing commitment to fully succeed. Policies on social safety and the new Recognition & Reward system are still nascent, and external expertise could be instrumental in refining these initiatives. An approach that emphasizes varied metrics over publication quantity is encouraged, with particular attention to developing tailored career plans that recognize contributions beyond research, such as teaching.

Second, the Committee is of the opinion that there is an urgent need for the Institute to improve gender balance across all roles and to implement and publicize initiatives that foster a diverse and inclusive working environment.

Third, the Committee calls for immediate action to address the prolonged duration of the PhD programme. To achieve this, LIC must adjust its cultural expectations to align with manageable workloads and more efficient PhD trajectories.

Fourth, the potential decrease in direct and curiosity-driven funding necessitates that LIC remains proactive in safeguarding its financial stability. The LIC has adeptly adjusted to the Dutch funding landscape's pivot towards more applied research, securing grants that allow for fundamental exploration within applied fields. Nonetheless, the Committee emphasizes that societal grant schemes, while beneficial, may not fully support the breadth of curiosity-driven science that could

have wider societal significance. Another financial threat is that the first money stream is under pressure and thus the eight PhD-candidate positions that are available. The Committee emphasizes that these positions should be safeguarded, especially in light of the changing Dutch funding landscape.

Fifth, while LIC's infrastructure is noted for its excellence, the Committee points out the need for sustained funding for essential non-roadmap infrastructure and the continuity of support staff. The Director's prioritization of support-staff recruitment is applauded as a step towards rebalancing the Institute's resources. Daily support and maintenance are also identified as crucial for the Institute's operational viability. Issues such as data storage, cleaning, waste management, and building access must be adequately supported by the faculty to meet the institute's needs.

In conclusion, while LIC has many strengths that predict a successful future, attention must be given to addressing the outlined challenges. The Committee is confident in LIC's ability to navigate these challenges, due to the dedication of the LIC community and the high quality of its leadership and management. The Committee therefore strongly advises to maintain this knowledgeable local management support.

4. Recommendations

The Committee has the following recommendations:

Open Science

1. Secure tailored systems and support to make the transition to FAIR principles such as data management and electronic notebooks desirable for all users.
2. Refine the university's data management courses to offer more specialized and practical content, addressing the feedback from PhD candidates regarding the current courses' lack of specificity.

Diversity

3. Improve gender balance across all roles and actively promote initiatives that foster a diverse and inclusive working environment.
4. Ensure that support for changing private circumstances is tailored to individual needs (e.g. flexible access hours).
5. Offer an intensive Dutch language course for international staff prior to the start of their roles at LIC to facilitate smoother integration.
6. Provide adequate supervision and integration for the influx of young staff, facilitating successful career initiation and promoting retention at LIC.

Social safety and inclusivity

7. Seek external consultation to evaluate current social safety systems and to provide comprehensive training to staff, establishing a supportive and secure academic environment.
8. Foster community and idea-sharing through informal activities, including retreats for PhD candidates and postdocs.

Careers

9. Define what constitutes 'quality' in research, moving beyond quantitative measures and establishing clear benchmarks for staff evaluation.
10. Transition towards more transparent career progression and salary structures to clearly communicate pathways for advancement within the Institute.
11. Address the workload pressure by expanding support staff and setting realistic management expectations, along with recognizing the contributions of postdocs within the Institute.
12. Continue efforts to ensure support staff feel valued, providing clear career development pathways.
13. Provide more competitive start-up packages for PIs.

PhD-candidates and postdocs

14. Implement necessary measures to shorten the duration of PhD programs, aligning with more efficient and sustainable research trajectories.
15. Enhance the teaching skills of PhD candidates and postdocs to open up broader educational career pathways and inspire the next generation in science.
16. Conduct annual evaluations to improve communication and feedback opportunities for PhD candidates, facilitating a more responsive and dynamic supervisory process.

Management, funding and infrastructure

17. Provide financial and personnel resources to maintain and operate the Institute's infrastructure efficiently.
18. Maintain the current level of general LIC management and support to preserve the Institute's high standards.

19. Manage the expectations of young PIs concerning grant writing, providing guidance to align their efforts with their career trajectories.
20. Secure the availability of the eight PhD candidate positions, particularly in light of changes in the Dutch funding landscape.

Tech transfer

21. Collaborate with specialized tech-transfer entities like the Oncode valorization team or Biotech Booster to leverage LIC's research outcomes effectively.

Appendices

Appendix 1: Programme site visit

Tuesday, November 28, 2023

Arrival of committee members in Leiden

17:00 Preparations of the visit (committee only)

19:30 Dinner with LIC management team

Wednesday, November 29, 2023

09:00 – 09:15 Committee arrives

09:15 – 09:20 Welcome by the Dean of the Faculty of Science

09:20 – 10:20 Introduction by the LIC management team + discussion

10:20 – 10:40 Coffee & tea

10:40 – 11:25 Meeting with staff members Chemical Biology

11:25 – 12:10 Meeting with staff members of Energy & Sustainability

12:10 – 13:10 Walking Lunch (committee only)

13:10 – 14:00 Tour of the labs and facilities

14:00 – 14:20 Tea & Coffee

14:00 – 14:45 Young tenured scientific staff (max 10 persons)

14:45 – 16:00 Committee meeting (committee only)

16:00 – 16:30 Questions to management team

16:30 – 17:30 Committee meeting (committee only)

18:30 Dinner (committee only)

Thursday, November 30, 2023

09:00 – 09:45 Meeting with PhD students

09:45 – 10:15 Meeting with postdocs

10:15 – 10:30 Tea & coffee

10:30 – 11:00 Meeting with research support staff (8 persons)

11:00 – 11:20 Tea & coffee + preparation remaining questions

11:20 – 11:50 Interview with management team for remaining questions

11:50 – 13:20 Committee meeting to formulate initial conclusions (incl. walking lunch)

13:20 – 13:35 Oral presentation of first conclusions by the committee

Appendix 2: Quantitative data on composition and funding

1. Staff

Table 2. LIC staff. The researchers for the two research themes, Chemical Biology (CB) and Energy & Sustainability (ES) are listed. FTE in bold and percentage female after the slash.

fte / % female	2016	2017	2018	2019	2020	2021	2022
Assistant professor	9.5 / 26	8.5 / 29	7.5 / 33	9.5 / 37	9.5 / 47	13.5 / 26	13.5 / 33
Associate professor	4.3 / 19	3.3 / 24	4.5 / 0	4.5 / 0	3.0 / 0	4.0 / 25	5.0 / 20
Full professor	7.1 / 0	7.1 / 0	6.1 / 0	5.1 / 0	7.6 / 0	7.6 / 0	8.5 / 0
Lecturer	1.8 / 0	1.8 / 0	2.8 / 0	2.8 / 0	2.8 / 0	1.8 / 0	1.8 / 0
Postdocs	17.7 / 38	17.8 / 45	23.2 / 43	24.2 / 37	24.9 / 31	24.0 / 33	24.9 / 39
PhD candidates	78.3 / 39	74.1 / 39	78.5 / 37	87.5 / 37	94.9 / 36	102.7 / 37	112.8 / 39
PhD scholars	12.0 / 41	13.0 / 46	15.0 / 47	9.0 / 55	10.0 / 40	11.0 / 27	14.0 / 29
PhD other	3.0 / 100	2.0 / 100	1.0 / 100	1.0 / 100	1.0 / 100	2.0 / 50	
Subtotal research staff CB	133.7	127.6	138.6	143.6	153.7	166.6	180.5
Assistant professor	9.5 / 11	9.5 / 11	8.5 / 12	6.5 / 15	6.5 / 15	7.3 / 25	6.3 / 29
Associate professor	0.5 / 0	0.5 / 0	2.5 / 40	4.5 / 22	5.0 / 20	5.0 / 20	6.0 / 17
Full professor	5.0 / 20	5.0 / 20	5.0 / 20	4.9 / 20	4.5 / 22	5.5 / 18	5.5 / 18
Lecturer		0.4 / 100	0.4 / 100				
Postdocs	15.5 / 26	17.0 / 29	19.8 / 34	23.2 / 31	22.4 / 25	10.3 / 29	12.3 / 41
PhD candidates	33.6 / 35	45.1 / 34	49.7 / 33	45.0 / 39	56.7 / 37	50.1 / 37	54.1 / 38
PhD scholars	7.0 / 43	9.0 / 33	5.0 / 20	5.0 / 20	7.0 / 29	7.0 / 43	6.0 / 50
PhD other		2.0 / 0	2.0 / 0	3.0 / 0	4.0 / 0	4.0 / 0	4.0 / 0
Subtotal research staff ES	71.1	88.5	92.9	92.1	106.1	89.2	94.2
Total research staff	204.8	216.1	231.5	235.7	259.8	255.8	274.7
Support staff (research)	21.7 / 49	19.6 / 54	21.7 / 44	21.9 / 50	22.3 / 57	22.6 / 46	24.3 / 40
Support staff (other)	12.4 / 76	11.7 / 85	11.2 / 93	11.5 / 91	14.2 / 94	14.8 / 86	14.6 / 81
Total support staff	34.1	31.3	32.9	33.4	36.5	37.2	38.9
Total staff	238.9	247.4	264.4	269.1	296.3	293.0	313.6

2. Funding and expenditure

Table 5. Funding

	2016	2017	2018	2019	2020	2021	2022
Funding (fte / %)							
Direct funding	106.6 / 48	104.8 / 47	105.8 / 48	116.4 / 49	121.4 / 48	133.5 / 51	153.6 / 56
Research grants NL	59.6 / 27	64.3 / 29	62.7 / 28	73.6 / 31	82.2 / 33	78.5 / 30	68.3 / 25
Research grants EU	40.2 / 18	39.1 / 18	41.4 / 19	39.3 / 17	37.6 / 15	39.7 / 15	40.6 / 15
Contract research*	14.9 / 7	13.2 / 6	11.8 / 5	8.9 / 4	10.0 / 4	10.2 / 4	13.3 / 5
Total Funding	221.3	221.4	221.7	238.2	251.2	261.9	275.8
Expenditure (M€ / %)							
Personnel costs	13.7 / 70	14.0 / 63	14.2 / 63	15.0 / 71	16.7 / 68	18.2 / 64	19.8 / 66
Material costs	5.6 / 29	5.8 / 26	6.4 / 29	6.1 / 29	5.0 / 20	7.0 / 25	7.2 / 24
Other costs (ZK-ICI)**	0.2 / 1	2.5 / 11	1.9 / 9	0.1 / 0	3.0 / 12	3.2 / 11	3.1 / 10
Total Expenditure	19.3	22.3	22.6	21.2	24.7	28.5	30.2

* Includes national consortia, public-private partnerships, funding from charities and contracts with industry

** LIC is responsible for distribution of funds of this consortium to other partners.

3. PhD candidates

Table 3. PhD candidates

Enrolment (number)				Success rate (graduated in x years) (number / %)					
Starting year	Male	Female	Total	within 4 years	within 5 years	within 6 years	6 years or more	Not yet finished	Discontinued
2013	19.0	14.0	33.0	0 / 0	16 / 49	22 / 67	26 / 79	0 / 0	7 / 21
2014	19.0	14.5	33.5	0 / 0	13.5 / 40	23.5 / 70	29.5 / 88	1 / 3	3 / 9
2015	30.0	16.0	46.0	0 / 0	12 / 26	29 / 63	35 / 76	4 / 9	7 / 15
2016	20.0	10.0	30.0	0 / 0	11 / 37	22 / 73	25 / 83	4 / 13	1 / 3
2017	21.0	10.0	31.0	1 / 3	13 / 42	21 / 68	-	7 / 23	3 / 10
2018	17.3	13.0	30.3	0 / 0	2 / 7	-	-	28 / 93	0 / 0
Total	126.3	77.5	203.8	1 / 0.5	67.5 / 33.1	-	-		